Himachal Pradesh Technical University, Hamirpur (H.P.)

CURRICULUM (CBCS)

BACHELOR OF TECHNOLOGY (B.TECH)

1ST & 2ND SEMESTER

(COMMON TO ALL BRANCHES)

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PREAMBLE

The curriculum of an institution of higher learning is a living entity. It evolves with time; it reflects the ever changing needs of the society and keeps pace with the growing talent of the students and the faculty. The curriculum of Himachal Pradesh Technical University, Hamirpur (HPTU) is no exception. Half a century of experience in preparing graduates in engineering and postgraduates in science for a wide variety of industries has led to creation of the new curriculum. I sincerely believe that it will meet the aspirations of all stake holders – students, faculty and the employers of the graduates and postgraduates of H.P.Technical University Hamirpur.

In the university system the curricula and syllabi represented the upper limit of the material to be covered, the teacher having no motivation for stepping outside the defined territory. The curriculum and syllabi only serve as a guideline. The teacher enjoys freedom to expand it in any direction he feels appropriate, incorporates his latest knowledge and stimulates the creative minds of the students. He experiments with new contents and new techniques. A new teaching learning paradigm is born.

Thecurriculum is the culmination of the efforts of large number of faculty members and university staff and reflects their creative contribution. In keeping with the demands of the changing times, it contains many innovative features. I sincerely hope that the faculty and students will take full advantage of the dynamic features of the curriculum and make the teaching-learning process a truly sublime experience for all.

On behalf of the Senate of HP Technical University Hamirpur, I record my appreciation of the meticulous work done by the Dr.N.N. Sharma, Dean Academic in compiling the whole curricula of different programmes in this consolidated form. I also record my personal gratitude to the members of the Senate who have lent every bit of their wisdom to make the contents truly superior.

Prof. R. L. Sharma,
Vice-Chancellor

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A. PHILOSOPHY OF CURRICULUM

1. Introduction

The Indian Higher Education Institutions (HEI‟s) are changing from the conventional course structure to Choice Based Credit System (CBCS). The choice based credit system enables vertical and horizontal mobility in learning and provides a “cafeteria‟ type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

The CBCS facilitates transfer of credits earned in different departments / centers of other recognized / accredited universities or institutions of higher education in India and abroad either by studying directly or by online method. The curriculum of every programme is designed accordingly and strikes a judicious balance between the need for formal instruction and free time to think beyond the course work.

The undergraduate curriculum of HPTU Hamirpur has strived to offer both theory courses as well as laboratory and design practice in all major areas of study. It has, however, consciously avoided combining theory and laboratory classes in the same course (e.g. L-T-P = 3-0-2). It was felt that an inflexible combination of theory and laboratory components will limit the opportunity to study a wide variety of subjects and increase failure rate. Therefore, separate courses are offered for theory and laboratory components in the form of (3-0-0) or (3-1-0) theory courses and (0-0-2) laboratory courses. In order to make the time table simple and easily implementable, the variety of courses are limited to only three types – (3-0-0) 3 credits, (3-1-0) 4 credits, (2-2-0) 3 credits and (0-0-2) 1 credit. Finely split subjects, carrying one or two credits, and super heavy courses carrying 4 credits or more, have been consciously avoided to ensure easy and convenient implementation.

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2. Credit System

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. In a credit system, One Credit refers to:

- One lecture hour/week/Semester for Theory Courses; and,
- Two hours/week/Semester for Lab/Practical Courses or Tutorials, and
- Four hours/ week/ Semester for project work.

Other student activities not demanding intellectual work or enabling proper assessment namely study tour and guest lecture, etc.do not carry any credits.

3. Course Structure and Credit Assignment

A typical course comprises of lectures, tutorials, practical or design practice. As stated above, separate courses are proposed for theory and laboratory.Three type of courses are proposed to be offered – (3-0-0) 3 credits, (3-1-0) 4 credits, (2-2-0) 3 credits and (0-0-2) 1 credit.

The credits assigned for different components of a course are given below in Table 1.

Table 1: Credit Values for Different Components of a Subject

Lectures (hrs/wk/Sem.)	Tutorials (hrs/wk/Sem.)	Practical Work (hrs/wk/Sem.)	*Credits* (L: T: P/D)	Total *Credits*
3	0	0	3:0:0	3
2	2	0	2:1:0	3
2	0	2	2:0:1	3
2	2	2	2:1:1	4
0	0	6	0:0:3	3

4. Course Load

Every student has to register for a set of courses in each semester, with the total number of their credits being limited by considering the permissible weekly contact hours (typically: 30/Week); For this, an average course load of 24 credits/semester (e.g., 6-7

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subjects) is considered acceptable. A typical course load per semester is given in Table. (2).

Table 2: Typical Course Load in a Semester

No. of Courses	**Credits/Course**	**Total Credits**	**Contact Hours/Week ***
Two Lecture Courses	3:0:0	6	6
Two Lecture Courses	2:2:0	6	6
Two Lec + Tut Courses	3:1:0	8	10
One Elective Course	3:0:0	3	3
Two Lab Course	0:0:2	2	4
One Mandatory Course	0:0:3	2	3
Total Courses: Six + one	17:3:2	24+3	+ 30

* Widely accepted figure ~ 30 hours/week, to enable the students to engage in homework assignments, self-learning outside the Class rooms/Laboratories, Extra/Co-Curricular activities and add-on courses, if any, for their overall development.

5. Categorization of Courses

The curriculum of all the programmes has been broadly be classified into following categories:

(i) **Foundation Courses (FC):** The Foundation courses, is a set of compulsory courses required to be taken by every student in the program. These courses prepare a student for further study and focuses on the academic skills required for further study. The courses comprises of introductory modules in applied mathematics, basic sciences, engineering Sciences, humanities and social sciences and skill based courses.

(ii) **Program Core (PC):** The program core builds the best possible foundation in the chosen program, helping the students to develop the ability to think analytically, read critically, and write effectively. The program courses include Inter-

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disciplinary courses and the students shall study all such courses through regular mode.

(iii) **Elective Core:** Electives provide breadth of experience in respective branch and applications areas. Elective course is a course which can be chosen from a pool of courses. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline/domain
- Nurturing student's proficiency/skill.

An elective may be discipline centric (Programme Elective) focusing on those courses which add generic proficiency to the students or may be chosen from an unrelated discipline called as Open Elective.

For example, in B.Tech programme, there are four professional elective groups; a student can choose not more than one course from each group. Overall, a student can opt for four professional elective courses which suit his/her project work in consultation with the faculty advisor/mentor. Nevertheless, two programme electives have to be selected.

Similarly, there are three open elective groups in the B.Tech programme; a student can choose not more than one course from each group. Overall, a student can to opt for three professional electives depending upon his/her interest. Nevertheless, one open elective out of the three is mandatory.

(iv) Mandatory Courses (MC): Mandatory courses are essentially ability and skill enhancement courses. The ability enhancement courses are wherein familiarity is considered mandatory and are recommended by the regulatory bodies such as AICTE, UGC, etc. Environmental Science, English/Communication, etc. are such courses and are mandatory for all programmes. The skill based or value-based courses on the other hand are aimed at providing hands-on-training and professional competencies to a student.

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(v) Audit Courses (AC): Audit courses are the courses offered to supplement the students' knowledge/ skills prescribed outside the range of credits.

Foundation courses shall mainly be taught during the first year of study. Limited amount of choice shall be available to departments and to students in choosing the subjects of first year.

The list of elective courses may include subjects from allied disciplines also. The course distribution will be subject to certain beneficial constraints. Sufficient open electives shall be from the area of Humanities and Social Sciences.

It is essential that the students acquire the necessary writing and presentation skills, become proficient in massive computational and data handling capacity of modern day computers (hardware and software) and related devices and develop interest in undergraduate research. In order to cater to this need, courses to enhance students Communication Skills and use of Computers and Modern Educational Technology Tools (which include MATLAB, simulation software etc.) be included as mandatory courses in all programmes.

Summer industrial training being a part of engineering education for a long time, summer internship either in industry or in an R&D organization, including educational institutes with excellent research culture must be introduced. A student must take a summer internship of minimum four weeks after fourth and/ or sixth semester. The student should have the option of choosing his/her own industry/area of interest, which may be related to their respective branch or any other service oriented task. The student is expected to submit a formal report at the end of the programme and shall be evaluated during the subsequent semester.

Seminar is introduced in the curriculum to allow students exposure to variety of topics through the medium of attending seminars. The students shall not only be expected to present seminars; they will attend seminars presented by others as per recommendation of the teacher. These will include seminars by faculty and research students in the

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department and by invited experts in the same or related departments. In a semester, a student shall be required to attend 6 – 8 seminars and write 2 scientific (including popular science) articles or posters. The articles and posters will be on display in departmental libraries, web sites or in any other media for public benefit.

Project work preferably be split into two parts as Project- I and Project - II wherever possible to put greater emphasis on Undergraduate Research. A student has a choice of taking a full semester Research or Industrial Project during the last semester in which he/she is required to demonstrate his/her ability to learn current areas of research and/or industrial interest. The Research or Industrial Project shall be carried out in an identified industry/firm/organization as per the stipulated guidelines of that industry/firm/ organization and the University/ Institute.

8. **Sequencing of Courses:** The courses that need to be completed successfully by a student are spread over eight semesters. The adopted plan and sequencing of courses is given in Table (3). Seventh and eighth semesters have relatively lesser number of courses to allow students to take full semester research project/internship and plan for future.

Table (3): Typical Sequencing Plan for Courses:

Semester	**Subject Area Coverage**
I & II	Foundation and Mandatory courses common for all branches.
III& IV	Foundation courses and Mandatory courses if required common for all branches to be continued; Program courses in two/three groups - area wise orientation and Open electives.
V&VII	Program courses, Program elective and Open elective courses; Branch-wise Orientation; Seminar.
VIII	Program electives, Project work and Internship.

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SEMESTER –I

S. N	Category	Paper Code	Subject	L	T	P/D	Credits	Evaluation Scheme (Marks)				
								Internal Assessment (IA)			ESE	Subject Total
								CT	IA	Total		
Theory:												
1	MC	HS-101	English Communication Skills	2	-	-	2	20	20	40	60	100
2	FC	MA-101	Engineering Math –I	3	1	-	4	20	20	40	60	100
3	FC	PH-101/ CH -101	Engineering Physics/ Engineering Chemistry	3	1	-	4	20	20	40	60	100
4	FC	ME-101/ EE -101	Engineering Mechanics/ Principles of Electrical Engg.	2	2	-	3	20	20	40	60	100
5	FC	CS -101/ EC -101	Computer Fundamentals and Programming in C ++/ Fundamentals of Electronics Engg.	2	2	-	3	20	20	40	60	100
6	MC	ME-102/ ME -103	Engineering Drawing & Graphics/ Workshop Technology	2	-	3	3	20	40	60	40	100
7	MC	HS-102/ HS- 103	Environmental Science/ Disaster Management	2	-	-	2	20	20	40	60	100
	Labs:							**FW**	**LP**	**Total**	**ESVE**	**Sub. Total**
1	MC/FC	HS -111/ EE- 111	Communication Lab/ Electrical Engg. Lab	-	-	2	1	10	20	30	20	50
2	FC	PH-111/ CH-111	Engineering Physics Lab/ Engineering Chemisty Lab	-	-	2	1	10	20	30	20	50
3	FC	CS -111/ EC- 111	Computer Programming Lab Electronics Engg. Lab	-	-	2	1	10	20	30	20	50
			Total	**16**	**6**	**09**	**24**					

Legend:

L - Lecture
T - Tutorial
P - Practical
CT - Class Test
IA - Internal Assessment
FC- Foundation Course

ESE - End Semester Examination
FW - Documentation/ File work and presentation
LP - Lab performance
ESVE - End Semester Exam./ viva-voce Exam.
MC- Mandatory Course

Note: **Group A:**
Branches: Civil Engg., Inf. Technology, Computer Science & Engg. and Electronics & Comm. Engg.
Subjects: HS-101, MA-101, PH-101, ME-101, CS-101, ME-102, HS-102, HS- 111, PH-111, CS-111

Group B:
Branches: Mech. Engg., Automobile, Textile, Electrical Engg. and Electrical and Electronics Engg.
Subjects HS-101, MA-101, CH-101, EE-101, EC-101, ME-103, HS-103, EE- 111, CH-111, EC-111

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SEMESTER – II

S. N.	Category	Paper Code	Subject	L	T	P/D	Credit	Evaluation Scheme (Marks)				
								Internal Assessment (IA)			ESE	Subject Total
								CT	IA	Total		
Theory:												
1	MC	HS -204	Business Communication	2	-	-	2	20	20	40	60	100
2	FC	MA -202	Engineering Math –II	3	1	-	4	20	20	40	60	100
3	FC	CH-101/ PH-101	Engineering Chemistry/ Engineering Physics	3	1	-	4	20	20	40	60	100
4	FC	EE -101/ ME-101	Principles of Electrical Engg. /Engineering Mechanics	2	2	-	3	20	20	40	60	100
5	FC	EC -101/ CS -101	Fundamentals of Electronics Engg./ Introduction to Computer Fundamentals and Programming in C^{++}	2	2	-	3	20	20	40	60	100
6	FC	ME-103/ ME-102	Workshop Technology/ Engineering Drawing & Graphics	2	-	3	3	20	40	60	40	100
7	MC	HS-103/ HS- 102	Disaster Management / Environmental Science	2	-	-	2	20	20	40	60	100
	Labs:							**FW**	**LP**	**Total**	**ESVE**	**Sub. Total**
1	FC/ MC	EE- 111/ HS -111/	Electrical Engg. Lab/ Communication Lab	-	-	2	1	10	20	30	20	50
2	FC	CH-111/ PH -111	Engineering Chemistry Lab/ Engineering Physics Lab	-	-	2	1	10	20	30	20	50
3	FC	EC -111/ CS- 111	Electronics Engg. Lab/ Computer Programming Lab	-	-	2	1	10	20	30	20	50
			Total	**16**	**06**	**09**	**24**					

Legend:

L - Lecture
T - Tutorial
P - Practical
CT - Class Test
IA - Internal Assessment
FC- Foundation Course

ESE - End Semester Examination
FW - Documentation/ File work and presentation
LP - Lab performance
ESVE - End Semester Exam./ viva-voce Exam.
MC- Mandatory Course

Note: **Group A:**
Branches: Civil Engg., Inf. Technology, Computer Science & Engg. and Electronics & Comm. Engg.
Subjects HS-204, MA-202, CH-101, EE-101, EC-101, ME-103, HS-103, EE- 111, CH-111, EC-111

Group B:
Branches: Mech. Engg., Automobile, Textile, Electrical Engg. and Electrical and Electronics Engg.
Subjects: HS-204, MA-202, PH-101, ME-101, CS-101, ME-102, HS-102, HS- 111, PH-111, CS-111

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SEMESTER-I

HS-101: ENGLISH COMMUNICATION SKILLS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Communication**: Need for effective communication, process of communication, The Seven Cs of Effective Communication - Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness; Barriers to communication - miscommunication, physical noise; Overcoming measures.	7
II	**Essentials of Grammar**: Sentence structure; Sentence formation, Use of appropriate diction, Tenses, articles and prepositions; English Phonetics: International phonetic alphabets - Production of sounds, Classification of consonant and vowel sounds.	7
III	**Writing Skills**: Letter writing - Formal, informal and demi-official letters; Business letters - quotations, supply orders, complaints, sales, adjustment letters, etc.; Resume writing: Difference between bio-data, CV and resume, Cover letter, Application for job.	7
IV	**Soft skills**: Classification of soft skills, soft skills for personality development & career growth; Capturing audience, Tone, Behavior and telephone etiquette - Good practice when making and receiving a call; Becoming a good leader and team-player, Personal SWOT analysis.	7

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Text Books:

1. Herta A. Murphy, et al., "***Effective Business Communication",*** Tata Mc-Graw Hill: New Delhi.
2. Krishna Mohan and Meenakshi Raman, "***Effective English Communication***", TMH.
3. B. K. Mitra, Personality and Soft Skills, Oxford press.

Reference Books:

1. R.W. Lesikar and John.D. Pettit, "***Business Communication: Theory and Application***", All India Traveller Bookseller.
2. Francis Soundaraj, "***Speaking and Writing for Effective Business Communication***", Macmillan.
3. Ronald B. Adler and George Rodman, "***Understanding Human Communication***", Oxford University Press: New York.

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MA-101: ENGINEERING MATHEMATIC-I

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Linear Algebra:** Review of Matrices; Linearly dependent / independent of vectors; Rank and Matrix Inverse; Linear Transformation & Matrix Representation; System of Linear Equations, Eigen values and Eigenvectors; properties of Eigen values, Diagonalization of Matrices; Jordan Canonical Form, Cayley Hamilton Theorem.	9
II	**Complex Numbers:** Roots of complex number, Real and imaginary parts of functions of a complex variables - Exponential, Circular, Hyperbolic, Logarithmic and Inverse hyperbolic functions; Summation of the series C+ iS; Limit and derivative of complex functions, Cauchy -Riemann equations, Analytic functions, Entire functions and its applications.	9
III	**Differential Calculus:** Leibnitz theorem, Partial derivatives, Euler's theorem for homogenous function, Total derivative, Change of variable; Taylor's and Maclaurin's series, Jacobian, Extrema of function of two variables, Method of undetermined multipliers. **Multiple Integrals:** Double and triple integrals and their applications, Change of order of integration, Change of variables. Application of multiple integral to surface area and volume, Beta and Gamma functions and their relationships.	9
IV	**Vector Differentiation:** Scalar and vector point functions, Gradient of a scaler field, Directional derivative, Divergence and Curl of a vector field,	9

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	Laplacian and second order operators. **Vector Integration**: Line, surface and volume integrals; Vector integral theorems: Greens, Stokes and Gauss divergence theorems (Without proof) and related problems.	

Text Books:

1. Kreyszig E., "***Advanced Engineering Mathematics***", Wiley ,9th edition.
2. B.S. Grewal, "***Higher Engineering Mathematics***", Khanna Publishers.

Reference Books:

1. H.K. Dass and Rama Verma, ***"Engineering Mathematics",*** S. Chand Publications.
2. N.P. Bali and Manish Goel, ***"Engineering Mathematics",*** Laxmi Publications.
3. D. Kandu, ***"Engineering Mathematics",*** Neel Kamal Prakashan.
4. B.V. Ramana, ***"Higher Engineering Mathematics",*** Tata McGraw Hill Education Pvt. Ltd., New Delhi

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PH-101: ENGINEERING PHYSICS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Theory of Relativity:-** Inertial and non- inertial frames of reference, earth as an inertial frame of reference, Michelson and Morley experiment, Postulates of special theory of relativity, Galilean and Lorentz transformations, Time dilation and length contraction, Relativistic kinematics and mass-energy equivalence. **Laser:** Introduction, Characteristics of lasers, Spontaneous and stimulated emission of radiation Einstein's coefficients, Population inversion, Ruby laser, Helium -Neon lasers, Applications of laser in industry, Scientific and medical fields.	**9**
II	**Oscillations:** Simple harmonic motion (SHM), Differential equation of SHM, Energy of SHM, Damped and Forced Oscillations, Relaxation Time, Quality Factor, Resonance, Sharpness of Resonance. **Fibre Optics**: Fundamental ideas about optical fibre, Propagation mechanism, Acceptance angle and acceptance cone, Numerical aperture, Propagation Mechanism and communication in fiber, Single and Multi-Mode Fibers, Step index and Graded index fiber, Attenuation and losses, Applications of optical fibres.	**9**
III	**Quantum Mechanics:** De Broglie waves, Phase and Group velocity concept, Uncertainty principle andits application, Wave function, Postulates of quantum mechanics, Derivation of Schrodinger equation for time independent and time dependent cases., Particle in one dimensional box, Potential well, Simple harmonic oscillator (one dimensional and three dimensional).	**8**

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	X-rays: X-rays production, hard and soft x-rays, Continuous and characteristics x-rays, Bremsstrahlung effect.	
IV	**Electromagnetic Waves**: Maxwell’s equations, Wave equation, Plane electromagnetic waves, Longitudinal and transverse waves, Superposition, Wave packets, Two and three dimensional waves, Energy - momentum, Poynting’s theorem, Electromagnetic boundary conditions. **Superconductivity:** Introduction and discovery of superconductivity, Meissner effect, Type-I and type-IIP superconductors, Isotope effect, BCS theory (qualitative), High temperature superconductors, Applications of superconductivity.	**9**

Text Books:

1. ***“Applied Solid State Physics”,*** Wiley India Pvt Ltd.
2. Ajoy Ghatak, ***“Quantum Mechanics: Theory and Applications”,*** Tata McGraw-Hill.
3. Satya Prakash and Vibhav saluja, ***“Engineering Physics”,*** Pragti Prakashan Meerut.
4. A.S.Vasudeva, ***“Modern Engineering Phys**ics**”,*** S. Chand & Co. Ltd.

Reference Books:

1. Ajoy Ghatak, ***“Optics”,*** Tata McGraw-Hill.
2. N. Subrahmanyam, Brij Lal, M.N. Avadhanulu, ***“Optics”,*** S. Chand & Co. Ltd.
3. Anuradha De, ***“Fiber optics and laser Principles and Applications”,*** New Age International.
4. Arthur Beiser, ***“Concepts of Modern Physics***”, Tata McGraw-Hill.
5. David J Griffiths, ***“Introduction to electrodynamics***”, Prentice Hall of India, New Delhi.

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ME-101: ENGINEERING MECHANICS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	-	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction to engineering mechanics:** Basic concepts, Laws of motion, Principle of Transmissibility of forces; Resultants of force system: Parallogram law, Forces and components, Resultant of coplanar concurrent forces, Components of forces in space; Moment of force - Principal of moment, Coplanar applications, Couple, Resultant of any force system. **Equilibrium of Rigid Bodies:** Free body diagram, Types of supports, Equations of equilibrium, Stable equilibrium, Moments and couples, Moment of a force abount a point and about an axis, Equilibrium of planer and spacial rigid body systems.	8
II	**Friction:** Introduction, Theory of friction, Angle of friction, Laws of friction, Static and dynamic friction, Motion of bodies: Angle of repose, Angle of friction, Cone of friction, Motion on inclined rough surface, Lifting Machines: Wedge, Screw, Screw- Jack and Differential screw jack. **Centroid and Moment of Inertia:** Centroid of plane, curve, area, volume and composite bodies,Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorems, Principal Moment Inertia, Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis of Symmetry.	8
III	**Structural Analysis**: Plane Truss, Space Truss, Difference between truss and frame, Types of truss-Perect, Redundant, Deficient, Analysis of plane truss – Method of sections, Method of joints, Graphical method.	7

	Beams: Types of beams, Statically determinate beams, Shear Force and Bending Moment in beams,Shear Force and Bending Moment diagram, Relationship between Shear Force and Bending Moment.	
IV	**Kinematics of Rigid body:** Introduction, Plane Motion of Rigid Body - Rectilinear and curvilinear translation, fixed axis rotation and general plane motion; Relative Velocity; Problems. **Kinetics of Rigid Body:** Introduction, Force, Mass and Acceleration, Equations of motion, Work and Energy, Impulse and Momentum, D'Alembert's Principles and Dynamic Equilibrium; Problems.	**7**

Text Books:

1. K.L. Kumar, "***Engineering Mechanics***", Tata McGraw Hill.
2. Thimoshenko & Young , "***Engineering Mechanics***", 4^{th} ed, Tata McGraw Hill.

Reference Books:

1. Shames and Rao, "***Engineering Mechanics: Statics and Dynamics***", Pearson.
2. Beer & Johnston, "***Vector Mechanics for Engineers",*** Tata McGrawHill.
3. Meriam, ***"Statics and Dynamics***", John Wiley & Sons.
4. R.C Hibbler, "***Statics and Dynamics***", Pearson.

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CS -101: COMPUTER FUNDAMENTALS AND PROGRAMMING IN C++

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Computer Fundamentals:** Evolution of computers; Basics of computer and its operation; Functional Components and their interconnections, Concept of Booting. Classification of Computers. **Programming Languages**: Machine Language, Assembly Language and High Level Language; Software Concepts: Types of Software - System Software, Utility Software and Application Software; System Software: Complier, Interpreter and Assembler; Need and Functions of Operating System.	8
II	**Number System, Codes and Memories:** Binary, Octal, Decimal and Hexadecimal Number System and their Inter Conversion; BCD and ASCII Codes; Processor Clock Speed (MHz, GHz), 16 bit, 32 bit and 64 bit processors. **Storage Units:** Byte, Kilo Byte, Mega Byte, Giga Byte, Tera Byte, etc.; Memory Types: Cache; RAM, ROM; Secondary Memory –Internal and External storage.	8
III	**Introduction to C++:** C++ character set, C++ Tokens (Identifiers, Keywords, Constants, Operators,), Structure of a C++ Program (include files, main function), Header files - iostream.h, iomanip.h, cout, cin; use of I/O operators (<<and>>), Use of endl and setw (), Cascading of I/O operators, Error Messages; Use of editor, basic commands of editor, compilation, linking and execution. **Concept of Data types:** Built-in Data types: char, int, float and double;	10

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	Constants: Integer Constants, Character constants - \n, \t, \b), Floating Point Constants, String Constants; Access modifier: const; Variables of built-in-data types, Declaration/Initialization of variables, Assignment statement, Type modifier: signed, unsigned, long Operator and Expressions: Operators: Arithmetic operators (-,+,*,/,%), Unary operator (-), Increment (++) and Decrement (--) Operators, Relation operator (>,>=,<=,=,!=), Logical operators (!,&&,II), Conditional operator: <condition>?<if false>; Precedence of Operators; Automatic type conversion in expressions, Type casting; C++ shorthands (+=,- =,*=,/=,%=) .	
IV	**Programming in C++:** Conditional statements: if else, Nested if, switch case default, use of conditional operator, Nested switch case, break statement; Loops: while, do - while, for and Nested loops. Defining a function; function prototype, Invoking/calling a function, passing arguments to function, specifying argument data types, default argument, constant argument, call by value, call by reference, returning values from a function, calling functions with arrays, scope rules of functions and variables local and global variables. Introduction to Array and its advantages; One Dimensional Array: Declaration/initialization of One-dimensional array, inputting array elements, accessing array elements, manipulation of array elements (sum of elements, product of elements, average of elements, linear search, finding maximum/minimum value) Declaration / Initialization of a String, string manipulations (counting vowels/ consonants/ digits/ special characters, case conversion, reversing a string, reversing each word of a string); Two-dimensional Array: Declaration/initialization of a two-dimensional array, inputting array elements accessing array elements, manipulation of array elements (sum of row element, column elements, diagonal elements, finding maximum / minimum values). Defining a Structure (Keyword Structure), declaring structure variables, accessing structure elements, passing structure to functions as value and reference argument/parameter, function returning structure array of structure, passing an array of structure as an argument/ a parameter to a function.	10

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Text Books:

1. B. Gottfried, "***Schaum' sProgramming with C***," Tata McGraw-Hill.
2. J. Hubbard, "Schaum's *Outline of Programming with C++"* Tata McGraw-Hill.
3. E. Balaguruswamy, "***Programming in ANSI C,"*** Tata McGraw-Hill.
4. Y. Kanetkar, "***Let us C,"*** BPB Publications.
5. S. Lipschutz, "***Data Structures, Schaum's Outlines Series***," Tata McGraw-Hill.

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, "***The C Programming Language***", Prentice Hall of India.
2. Ellis Horowitz, SatrajSahni and Susan Anderson-Freed, "***Fundamentals of Data Structures in C",*** W. H. Freeman and Company.
3. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, ***"Operating System Concepts, (6th Edition)"***.

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ME-102: ENGINEERING DRAWING & GRAPHICS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	3	3	60	40	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction and Engineering Graphics:** Drawing instruments, freehand lettering (upper case & lowercase), types of lines, dimensioning, construction of conics, sections by eccentricity method, construction of cycloids, involutes, spirals, helix. Scales: Plain, Diagonal and Vernier. **Orthographic Projection of Lines and Planes:** Projections of points in different quadrants; Projections of straight lines inclined to one or both of the reference planes, true length and inclination of lines with reference planes, traces of lines. Projection of planes.	**6**
II	**Orthographic Projection of Solids**: Projections of simple solids in simple positions, axis inclined to one of the reference planes and axis inclined to both the reference planes-use change of position method OR auxiliary projection method. **Sections of Solids:** Sections of simple solids in simple vertical positions with section plane perpendicular/inclined to one of the reference planes – True shapes of sections. Sections and sectional views of right angular solids - Prism, Cylinder, Pyramid and Cone.	**8**
III	**Isometric Projections**: Isometric projections and views of simple and truncated simple solids, sphere, hemisphere and their combinations in simple position. Conversion of Pictorial views to Orthographic views by free hand sketching.	**8**

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IV	**Development of Surfaces:** Development of surfaces of simple and cut regular solids - Prism, Pyramid, Cylinder and Cone. **Intersection of surfaces:** Intersection of prism in prism & cylinder in cylinder- axis bisecting at right angles only.	**6**

Text Books

1. ***"Engineering Drawing",*** by N.D. Bhatt.
2. ***"Engineering Graphics",*** by P.S. Gill.

Reference Books:

1. Shah, M.B. & B.C. Rana, ***"Engineering Drawing and Computer Graphics***", Pearson Education, 2008.
2. ***"Engineering Drawing Practice for schools and colleges"***, Bureau of Indian Standards, New Delhi.

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HS-102: ENVIRONMENTAL SCIENCE

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction:** Multidisciplinary nature of environmental studies, Scope and Importance; Natural Resources-Renewable and non-renewable resources; Forest resources - Use and over-exploitation, deforestation; Water resources - Use and over-utilization, floods, drought, conflicts over water; Mineral resources - Use and exploitation; Food resources - World food problem, effects of modern agriculture; Energy resources - Growing energy needs, renewable and non-renewable energy sources.	6
II	**Ecosystems:** Structure and function of an ecosystem–ecological succession–primary and secondary succession - ecological pyramids – pyramid of number, pyramid of energy and pyramid of biomass. **Biodiversity:** Introduction - Genetic, species and ecosystem diversity, Value of biodiversity -consumptive use, productive use, social, ethical and aesthetic values, Biodiversity at global, national and local levels; Threats to biodiversity - habitat loss, endangered and endemic species of India.	7
III	**Environmental Protection:** National concern for environment: Important environmental protection actsin India – water, air (prevention and control of pollution) act, wild life conservation and forest act – functions of central and state pollution control boards - international effort – key initiatives of Rio declaration, Vienna convention, Kyoto protocol and Johannesburg summit.	6
IV	**Chemical Toxicology:** Toxic Elements in Water, Pesticides in Water, Impact of Toxic Chemicals on Enzymes. **Waste Management:** Waste water treatment (general)–primary, secondary and tertiary stages; Solid waste management: sources and effects of municipal waste, bio medical waste - process of waste management.	7

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Text Books:

1. J Krishnawamy, R J Ranjit Daniels, ***"Environmental Studies",*** Wiley India.
2. Bernard J. Nebel, Richard T. Right, ***"Environmental Science",*** Prentice Hall.

References Books:

1. R K Khandal, ***"Environment and Ecology",*** Wiley India.
2. 8th edition ISV, Botkin and Keller, ***"Environmental Science",*** Wiley India.
3. Soli. J Arceivala, Shyam, R Asolekar, ***"Environmental Studies***", McGrawHill India, 2012.
4. D.L. Manjunath, ***"Environmental Studies",*** Pearson Education India.

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CH-101: ENGINEERING CHEMISTRY

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Water Treatment:** Introduction, Sources of water, Common Impurities in water, Hardness of water & its determination by EDTA method, Alkalinity of water, BOD & COD; Hardness of water, Disadvantages of hard water, sludge and scale formation in boilers and its prevention, Techniques of water softening (Zeolite process and ion exchange process). Principles and processes used in domestic water purifiers. **Electrochemistry:** Introduction to electrochemistry, Electrodes–reference electrodes, Glass electrode (pH determination), Nernst equation–derivation and applications; Storage devices–lead-acid, Ni-Cd, Li-ion batteries, Hydrogen-oxygen Fuel Cell and Solar Cell.	**9**
II	**Corrosion:** Introduction, types of corrosion (dry and wet corrosion), theory of corrosion, types of electrochemical corrosion (galvanic, pitting, differential aeration and stress corrosion), Factors influencing corrosion and Prevention of corrosion. **Spectroscopy:** UV-Vis: Principle, instrumentation, Lambert-Beer's Law, electronic transitions, auxochrome, chromophore, effect of conjugation and solvent on transition of organic molecules, applications. **IR:** Principle, instrumentation, Fundamental vibrations, Hooke's Law, effect of masses of atoms, bond strength, nature of substituent and hydrogen bonding on IR frequency, applications. **XRD:** Basic principle and applications.	**9**

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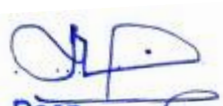
III	**Fuels and Combustion:** Introduction, classification of fuels (Solid, Liquid and Gases), Analysis of Coal(Proximate and Ultimate), Petroleum fuels, Cracking, Reforming, Octane no, Cetane no, Gaseous fuel – Water gas, producer gas. **Lubricants:** Principle of Lubrication, Mechanism of Lubrication**,** Types and selection of lubricants, Properties of Lubricants.	**8**
IV	**Polymers:** Introduction, Types of polymers, Thermoplastic and Thermosetting resins (Synthesis and applications of Bakelite, epoxy resin, Urea formaldehyde, teflon, PMMA, PVC, Polyurethane), Natural and synthetic rubbers, Fibres, Conducting & biodegradable polymers and their applications. **Nano Materials:** Introduction, Prepration, Properties of nanomaterials, Graphene, Graphite, Fullerenes, Carbonnano-tubes, nano-wires, nano-cones, Application of nano-materials.	**9**

Text Books:

1. ***"Engineering Chemistry"***, Wiley India
2. ***"Physical Chemistry",*** Gordon M. Barrow; McGraw Hill

References Books:

1. Shashi Chawala, ***"A Text Book of Engineering Chemistry"***, Dhanpat Rai & Co.
2. Peter Atkin, ***"Physical Chemistry***", W.H. Freeeman Publishers.



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EE -101: PRINCIPLES OF ELECTRICAL ENGG.

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction:** Sources of energy; General structure of electrical power systems, Power transmission and distribution via overhead lines and underground cables, Steam, Hydel, and Nuclear power generation. **D C Circuits and Network Theorems:** Circuit Concepts - Concepts of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements - R, L and C as linear elements, Source transformation Kirchhoff's laws; Loop and nodal methods of analysis; Delta-star and star-delta conversion; Network theorems - Superposition theorem, Thevenin's theorem, Norton's theorem and Maximum Power Transfer theorem.	**8**
II	**Single Phase AC Circuits:** Single phase EMF generation, average and effective values of sinusoids, joperations, complex representation of impedances, phasor diagrams, power factor, power in complex notation, solution of series and parallel circuits. Introduction to resonance in series RLC circuit, Numerical problems; Introduction to domesting wiring. **Three Phase AC Circuits**: Three-phase systems: Star and delta connections, three-phase three wire and three-phase four-wire systems, analysis of balanced and unbalanced star and delta connected loads, power in three-phase balanced circuits. Numerical problems.	**8**
III	**Measuring Instruments:** Types of instruments, Construction and working principles of PMMC and Moving Iron type voltmeters & ammeters, Use of shunts and multipliers; dynamometer, wattmeter, AC watt hour meter.	**8**

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	Magnetic circuits: Ampere's circuital law, B –H curve, Hysteresis, Permeability and Reluctance, Solution of magnetic circuits, Hysteresis and eddy current losses.	
IV	**Single Phase Transformer**: Transformers: Construction and operation of single phase transformer, EMF equation, ratings, phasor diagram on no load and full load, equivalent circuit, regulation and efficiency calculations, open and short circuit tests, single phase auto-transformers. **Electric Machines:** Working principle, Construction and applications of DC machines and AC machines, Single phase induction motors - split phase, capacitor start and capacitor start & run motors; EMF and Torque equations, Characteristics of DC generators and motors, Speed control of DC motors and DC motor starters.	**8**

Text Books:

1. E. Hughes, "**Electrical Technology**", Pearson Education, 2010.
2. I. J. Nagrath and D. P. Kothari, '**Basic Electrical Engineering'** TATA McGraw Hill Education, 2009.

References Books:

1. V. Del Toro, "**Electrical Engg Fundamentals**", PHI Learning, 2009.
2. B. Dwivedi & A. Tripathi "**Fundamentals of Electrical Engineering**", Wiley India.
3. D. A. Bell, **"Electric Circuits**", 7th Ed., Oxford Higher Education, 2009.

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EC -101: FUNDAMENTALS OF ELECTRONICS ENGG.

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Semiconductors:** Energy band concept of materials, difference between metal, insulator and semiconductor, Intrinsic and extrinsic semiconductors (n-type & p-type), current conduction in semiconductor, Photodiode, photo-transistor, LED and seven-segment display. **Semiconductor Diodes:** p-n junction diode, Depletion layer, Energy diagrams of p-n junction and depletion region, Biasing of dioade and V-I Charactristics; Rectifiers - half-wave, full-wave and bridge rectifiers; Filters - L, C, LC and π filters; Zener diode, V-I Characrristics and Zener diode as voltage regulator.	**8**
I	**Bipolar Junction Transistors (BJT):** Transistor operation and current components in p-n-p and n-p-ntransistors, input/output characteristics of CB and CE configurations, Biasing of transistors-fixed bias, emitter bias, potential divider bias, comparison of biasing circuits; Transistor as an Amplifier; Numerical problems as applicable. **Field Effect Transistors (FET):** Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristic equation CG, CS and CD configurations, fixed & self-biasing. **MOSFET:** Depletion and enhancement type MOSFET- Construction, operation and characteristics.	**8**
III	**Oscillators:** Introduction, Criteria for oscillation, types of oscillators -	**8**

	Hartley, Calpitt, RC Phase shift and Wein bridge oscillators. **Operational Amplifiers:** Concept of ideal operational amplifiers, ideal operational amplifier sparameters, inverting, non-inverting and unity gain amplifiers, adders and difference amplifiers.	
IV	**Number System and Logic Design**: Number systems, Conversions and code, conversion of bases(decimal, binary, octal and hexadecimal numbers), addition and subtraction, Boolean algebra, logic gates (AND, OR, NAND, NOR, XOR, XNOR), concept of universal gate. **Electronic Instruments:** Operation of CRO and its applications, Signal Generator, measurement of voltage, phase and frequency using CRO.	**8**

Text Books:

1. ***"Electronic Devices and Circuits",*** D. A. Bell - 5th Edition (Oxford).
2. ***"Electronics –Fundamentals & Applications",*** D. Chattopadhyay and P. C. Rakshit - 11th Edition (New Age International)
3. ***"Electronic Devices & Circuits",***R. L. Boylestad & L. Mashelsky – 10th Edition (Pearson)
4. ***"Digital Principles and Applications",*** A. Malvino and Leach - 7th Edition (TMH)

References Books:

1. A. Malvino & D. J. Bates ***"Electronic Principles",*** - 7th Edition (TMH)
2. J. Millman, Halkias & Parikh, ***"Integrated Electronics",*** - 2nd Edition (TMH)

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ME-103: WORKSHOP TECHNOLOGY

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	3	3	60	40	100	2 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	Introduction to Engineering Materials, and their classification; Steels, Cast Irons and their classification, their properties & applications; Wrought iron; Alloy steels: stainless steel and tool steel.	3
II	Introduction to Metal Forming Processes, and Tools, Hot-working versus cold-working, Introduction to Rolling, Wire & Tube-drawing/making and Extrusion, and their uses; Press-work, Die & Punch assembly, applications of forming.	3
III	Basic Casting Processes, Casting equipment, Type and composition of Molding sands and their desirable properties; Mould making with the use of a core, applications of casting.	3
IV	Non-Metallic Materials: Common types, Carpentry tools & uses of Wood, common types of Joints in wood.	3
V	Machining, Machinining Tools, Basic principles of Lathe and operations performed on it. Basic description of Shape, Planer, Drilling, Milling & Grinding.	3
VI	Introduction to Welding, classification of welding processes, Welding Tools, Introduction to Electric-Arc welding, Resistance welding, Gas-welding, types of flames and their applications, Soldering & Brazing processes and their uses.	3
VII	Fitting tools, fitting operations, sawing, filing, chipping, thread cutting (with taps and dies), marking and marking tools.	3

	Introduction to Manufacturing Systems, Fundamentals of Numerical Control (NC), Advantage of NC systems, Classifications of NC, Comparison of NC and CNC.	

Text Books:

1. Chapman, W. A. J. and Arnold, E., Vol. I & III, Viva Low, ***"Workshop Technology***", priced Student Edition.
2. Chaudhary, Hajra, "***Elements of Workshop Technology***", Media Promoters & Publishers.
3. Kalpakjian and Schmid, "***Manufacturing Processes***", Pearson

References Books:

1. H. N .Gupta, R. C. Gupta, ArunMital, "***Manufacturing Processes***", New Age
2. Raghuwanshi, B. S. Vol. I & II, "***Workshop Technology***", DhapatRai and Sons.
3. "***Manufacturing Process***", BEGEMAN, M. I. and Amsted, B. H., John Wiley.

Suggested list of jobs, a student is required to make in the workshop - at least one job in each shop:

1.	**Introduction:**
	Introduction to Need and importance of workshop, different materials to be utilized Applications of Ferrous and Non-Ferrous metals alloys.
2.	**Carpentry Shop:**
	Study of tools & operations and carpentry joints. Prepare half-lap corner joint, mortise & tennon joints Simple exercise on wood working lathe
3.	**Fitting Shop:**
	Study of tools & operations Simple exercises involving fitting work -drilling, tapping or dieing
4.	**Black Smithy Shop:**
	Study of tools, operations, hot and cold working, Simple exercises base on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.

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5.	**Welding Shop:**
	Study of equipments of Arc Welding and Gas welding (MIG/TIG) Preparation of Simple butt and Lap welded joints. Oxy-acetylene flame cutting and related job preparation
6.	**Sheet-metal Shop:**
	Introduction to Tools, Metals used in sheet metal work viz. Galvanised iron, Aluminium sheet, etc. Fabrication of Funnel, tool-box, tray, electric panel box etc.
7.	**Machine Shop:**
	Study of Lathe, Drilling, Shaper, Planer and Milling Machines and commonly done operations on these machines Making a job on lathe involving plane turning, step turning, taper turning and threading operations
8.	**Foundry Shop:**
	Study of tools & operations, and pattern allowances to prepare a Mould with the use of a core and cast it.

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HS-103: DISASTER MANAGEMENT

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction:** Principles of Disaster Management. Natural Disasters such as Earthquake, Floods, Fire, Landslides, Tornado, Cyclones, Tsunamis, Nuclear, Chemical, Terrorism, Extra Terrestrial and other natural calamities. Hazards, Risks and Vulnerabilities. Assessment of Disaster Vulnerability of a location and vulnerable groups, National policy on disaster Management.	**6**
II	Prevention, Preparedness and Mitigation measures for various Disasters, Post Disaster Relief & Logistics Management, Emergency Support Functions and their coordination mechanism, Resource & Material Management, Management of Relief Camp, Information systems & decision making tools, Voluntary Agencies & Community Participation at various stages of disaster, management, Integration of Rural Development Programmes with disaster reduction and mitigation activities.	**7**
III	Renewable and non-renewable resources, Role of individual in conservation of natural resources for sustainable life styles. Use and over exploitation of Forest resources, Deforestation, Timber extraction, Mining, Dams and their effects on forest and tribal people. Use and over exploitation of surface and ground water resources, Floods, Drought, Conflicts over water, Dams- benefits and problems. Causes, effects and control measures of Air pollution, Water pollution, Noise pollution and Nuclear hazards.	**7**
IV	Global Environmental crisis, Current global environment issues, Global Warming, Greenhouse Effect, role of Carbon Dioxide and Methane, Ozone Problem, CFC's and Alternatives, Causes of Climate Change Energy Use: Past, present and future, Role of Engineers.	**6**

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Text Books:

1. G. K. Ghosh, ***"Disaster Management",*** A. P. H. Publishing Corporation.
2. R Rajgopalan, ***"Environmental Studies"***, Oxford University Press

Reference Books:

1. B Narayan, ***"Disaster Management",*** A. P. H. Publishing Corporation.
2. Basak, ***"Environmental Studies"***, Pearson Publication.

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HS-204: BUISNESS COMMUNICATIONS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction to Business Communication:** Importance of communication in business, process models of communication, and Types of information- order, advise, suggestion, motivation, persuation, warning and education.	6
II	**Business Communication:** Letters, Cover Letter, Differences between bio-data, CV and Resume, Letter for Job Application, Thank You Letter, Letter of Complaint, Memos, Memorandum drafting; E. Communication: Email and Social Media. **Oral Communication:** Types of oral communication, Barriers to oral communication, Mass Communication – Nature & Scope of Mass Communication, function of mass communication – Media of mass communication.	7
III	**Business Report Writing:** Report Writing: Types, Structure of a report, Methods and Models of Report Writing, Technical Proposal - Concept, Layout, and Examples of Technical Proposals. **Types of reports:** Progress and Annual reports–format and Analysis of sample reports from industry–Synopsis and thesis writing.	6
IV	**Spoken and Presentation Skills:** Impromptu speech–tackling hesitation, shyness and nervousness inspeaking –Public speaking; Academic and professional presentations – Group discussions, Planning, preparing and delivering a presentation, essentials of presentation - etiquette, clarity, lively delivery – speech rhythm, speech initiators body language – voice, posture & gesture, eye contact, dress codes; Interviewing, Nagociating a job offer.	7

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Text Books:

1. ***"Essentials of Business Communication",*** by R. Pal and JS Korlahhi, Sultan Chand & amp; Sons, New Delhi.
2 ***"Basic Communication Skills for Technology",*** by Andre J. Rutherford, Pearson Education Asia, patparganj, New Delhi 92.

Reference Books:

1. ***"Business Communication",*** by Meenakshi Raman and Prakash Singh (Oxford)
2. ***"Advanced Communication Skills"***, V. Prasad, Atma Ram Publications, New Delhi.

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MA–202: ENGINEERING MATHEMATICS–II

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Ordinary Differential Equations:** Brief review of first order ordinary differential equations, Exact differential equations, Equations reducible to exact equations; Solution of differential equations – variable separable. **Linear Differential Equations of first order and Higher degree:** Equations of the first order and higher degree, Linear differential equations with constant coefficients (nth order): general solution, complementary function and particular integral; Method of variation of parameters, Equations reducible to linear equations with constant co-efficients (Cauchy's and Legendre's linear equations), Applications of differential equations to engineering problems.	6
II	**Series Solution of Differential Equations:** Series solution of second order differential equations with variable coefficient (Power series method and Frobeneous method). **Special Functions:** Bessel and Legendre equations and their series solutions, Properties of Bessel function and Legendre polynomials.	7
III	**Laplace Transforms:** Laplace **t**ransforms of simple functions, Basic operational properties, Transforms of derivatives and integrals, Initial and final value theorems; Inverse Laplace transforms – Convolution theorem; Periodic functions - Unit step function, Laplace transform of Periodic function; Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only.	6
IV	**Fourier Series:** Periodic Functions, Fourier Series of period 2π, Change of interval, Even and Odd periodic functions, Expansion of odd and even periodic functions, Half range Sine and Cosine Series, Typical wave-forms,	7

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	Parseval's formula. **Partial Differential Equations:** Harmonic analysis, Partial Differential Equations with constant coefficients, Complimentary function and particular integral.	

Text Books:

1 *B.S. Grewal****, "Higher Engineering Mathematics"***, Khanna Publishers.
2. H.K. Dass and Rama Verma, "***Engineering Mathematics"****,* S. Chand Publications.

Reference Books:

1. N.P. Bali and Manish Goel, ***"Engineering Mathematics***", Laxmi Publications
2. B.V. Ramana, ***"Higher Engineering Mathematics",*** Tata McGraw Hill Education Pvt. Ltd., New Delhi

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HS–111: COMMUNICATION LAB

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

NOTE: Practice sessions as per the topics in the syllabus for the course "**ENGLISH COMMUNICATION"** will be conducted in the laboratory class. Following is the suggested list of excercises that must be performed during the semester:

I	**Phonetic transcription:** Students will be trained to find out the correct pronunciation of words with the help of a dictionary, to enable them to monitor and correct their own pronunciation.	
	(a)	transcription of words and short sentences in normal English orthography (writing) into their IPA equivalents;
	(b)	transcription of words presented orally;
	(c)	conversion of words presented through IPA symbols into normal orthography;
	(d)	syllable division and stress marking (in words presented in IPA form).
2.	**Listening:** listening with a focus on pronunciation (ear-training), segmental sounds, stress, weak forms, intonation; the students should be exposed, if possible, to the following varieties of English during listening practice: Standard Indian, British and American.	
3.	**Speaking:** pronunciation practice (for accent neutralization), particularly of problem sounds, in isolated words as well as sentences, practising word stress, rhythm in sentences, weak forms, intonation; reading aloud of dialogues, poems, excerpts from plays, speeches etc. for practice in pronunciation;	
4.	**Grammar and usage:** The focus will be on the elimination of common errors. Some writing activities (e.g. writing of short paragraphs on assigned topics) can be used to identify these errors.	

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5.	**Project Work:** Students will be required to produce and submit by the end of Semester a 350-500word project report on a topic of their choice. The project should involve data collection, analysis and reporting.

<u>Recommended books:</u>

1. Grant Taylor ***"English Conversation Practice".***
2. R. C. Sharma & Krishna Mohan***"Business correspondence and Report Writing***".
3. Chrissie Wright (Ed.) "***Handbook of Practical Communication Skill",*** JAICO Books.
4. Veena Kumar, "***The Sounds of English, Makaav Educational Software"***, New Delhi.

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PH -111: ENGINEERING PHYSICS LAB

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

Note:- Practicals as per the topics in the syllabus for the course will be conducted in the laboratory class. Following is the suggested list of exercises out of which a minimum of 8-10 experiments must be performed by a student during the semester:

List of Experiments:	
1.	To determine the wavelength of monochromatic light by Newton's Ring.
2.	To find the wavelength of light from a given source using Michelson,s interferometer.
3.	To determine the wavelength of spectral lines using plane transmission grating.
4.	To find the value of Planck's constant.
5.	To verify Stefan's law by electrical method.
6.	To determine the numerical aperture of an optical fibre.
7.	To determine the attenuation & propagation losses in optical fibre.
8.	To determine the height of a tower with a Sextant.
9.	To determine the refractive index of a liquid by Newton's ring.
10.	To determine the hall co-efficient.
11.	To determine the band gap of an intrinsic semiconductor by four prove method.
12.	To study the LASER beam characteristics like wavelength using diffraction grating aperture & divergence.
13.	To calculate the hysteresis loss by tracing a B-H curve for a given sample.
14.	To compare the capacitances of two capacitors by De'sauty Bridge.

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15.	To study the variation of magnetic field with distance by Stewart and Gee's apparatus.
16.	To find the value of e/m for electron by helical method.

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CS – 111: COMPUTER PROGRAMMING LAB

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

Note:- Practicals as per the topics in the syllabus for the course will be conducted in the lab class. Following is the suggested list of suggestive exercises to be performed by a student during the semester:

Write following programs in C++:	
1.	Using basic statements like control statements, looping statements, various I/O statements and various data structures.
2.	Creating classes in C++ for understanding of basic OOPS features.
3.	Representing concepts of data hiding, function overloading and operator overloading.
4.	Using memory management features and various constructors and destructors.
5.	Representing Inheritance, virtual classes and polymorphism.
6.	Writing generic functions.
7.	File handling programs.
8.	Design and Implementation of some real life problems using Object Oriented techniques (Object Model/Dynamic Model/Functional Model)

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EE–111: ELECTRICAL ENGG. LAB

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

NOTE:- Experiments as per the topics in the syllabus for the course `**Principles of Electrical Engg** will be conducted in the laboratory class. Following is the suggested list of experiments out of which 7-8 experiments must be performed during the semester:

List of Experiments:		
1.	Verification of Kirchhoff's law	
2.	Verification of Norton's theorem	
3.	Verification of Thevenin's theorem	
4.	Verification of Series R-L-C circuit	
5.	Verification of Parallel R-L-C circuit	
6.	Measurement of Power and Power factor of three phase inductive load by two wattmeter method.	
7.	To draw the magnetization characteristics of separately excited dc motor.	
8.	To perform the external load characteristics of dc shunt motor.	
9.	To perform O.C. and S.C. test of a single phase transformer	
10.	Wiring Exercises:	
	(a)	Study of various wiring components (wires, switches, fuse, sockets, plugs, lamp holders, lamps etc. their uses and ratings).

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	(b)	Control of two lamps from two switches (looping system).
	(c)	Staircase wiring.
	Step down transformer winding of less than 5VA.	

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CH – 111: ENGINEERNG CHEMISTRY LAB

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

NOTE:- Practicals as per the topics in the syllabus for the course will be conducted in the laboratory class. Following is the suggested list of excercises out of which a minmum of 8/10 experiments must be performed by a student during the semester:

List of Experiments:	
1.	To determine surface tension of given liquid by drop number method using stalgmometer.
2.	To determine % age of moisture, volatile matter, ash and fixed carbon in given sample of coal by proximate analysis method.
3.	To determine total alkalinity in a given sample of water using standard acid.
4.	To determine the percentage of Chlorine in sample of CaOCl2 dissolved in one litre of solution.
5.	To determine total hardness of water using complexometric titration method.
6.	To determine the surface tension of the two given unknown liquids by using Stalgmometer and identify the given liquid.
7.	To determine the coefficient of viscosity of the given unknown liquids by using Ostwald's Viscometer and identify the given liquid.
8.	To determine the coefficient of viscosity of the given lubricating oil using Red Wood Viscometer.
9.	To determine total acid number value(total acid number TAN) of an oil sample.
10.	To determine the flash point and fire point of given sample of oil using Pens key Marten's

	apparatus.
11.	To determine the amount of Chlorine in given sample of water using N/20 sodium Thiosulphate solution.
12.	To determine the Beer's Law and apply it to find the concentration of given unknown solution by spectra-photometer.

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EC-111: ELECTRONICS ENGG. LAB

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
0	0	2	1	30	20	50	3 hrs

Experiments as per the topics in the syllabus for the course '**Fundamentals of Electronics Engg'** will be conducted in the laboratory class. Following is the suggested list of experiments out of which 7-8 experiments must be performed during the semester:

List of Experiments:		
1.	Familiarization with electronic components (Active & Passive).	
2.	Familiarization with electronic equipments (multimeters, CROs, power sypply and function generators).	
3.	(a)	Study of the characteristics of P-N junction diode.
	(b)	Study of the characteristics of Zener diode
4.	(a)	Construction of half-wave rectifier and full wave rectifier circuits & study of their output waveforms by CRO and calculation of efficiency and ripple factor.
	(b)	Construction of an unregulated DC power supply (using transformer, fullwave rectifier and capacitor filter) and study of its output waveform by CRO.
5.	Study of frequency response of any one oscillator.	
6.	Study of output characteristics of a Common Emitter Transistor.	
7.	Study of inverting and non inverting amplifiers using Op-Amp.	

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8.	Study of unity gain amplifier and Adder circuit using Op-Amp and observe their outputs using CRO.
9.	Study of truth tables of different logic gates (AND, OR, NAND, NOR, XOR, XNOR).

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CURRICULUM (CBCS)

CIVIL ENGINEERING

(3rd to 8th Semester)

Teaching and Examination Scheme

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SCHEME OF TEACHING AND EXAMINATION B.TECH CIVIL ENGINEERING SEMESTER –III										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**	**C**	**IA**	**ESE**	**Total**
1	FC	MA-301	Probability and Statistics	2	2	0	3	40	60	100
2	FC	HS – 305	Industrial Economics and Management	3	0	0	3	40	60	100
3	PC	CE-301	Mechanics of Solids	3	2	0	4	40	60	100
4	PC	CE-302	Mechanics of Fluids - I	3	1	0	4	40	60	100
5	PC	CE-303	Engineering Surveying–I	3	0	0	3	40	60	100
6	PC	CE-304	Building Materials	2	2	0	3	40	60	100
7	OE	-	Open Elective-I	2	0	0	2	40	60	100
Labs:										
1	PC	CE-307	Building Material Testing Lab	0	0	2	1	30	20	50
2	PC	CE-308	Fluid Mechanics Lab	0	0	2	1	30	20	50
3	PC	CE-309	Surveying Lab – I	0	0	3	2	30	20	50
			Total	16	7	7	24+2			

OPEN ELECTIVE – I										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**	**C**	**I.A Marks**	**ESE Marks**	**Total Marks**
1	OE	HS-306	Sociology & Elements of Indian History for Engineers	2	0	0	2	40	60	100
2	OE	HS-307	German Language – I	2	0	0	2	40	60	100
3	OE	HS-308	French Language - I	2	0	0	2	40	60	100

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SCHEME OF TEACHING AND EXAMINATION B.TECH CIVIL ENGINEERING SEMESTER –IV										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**	**C**	**IA**	**ESE**	**Total**
1	FC	MA-401	Optimization and Calculus of Variations	2	2	0	3	40	60	100
2	FC	HS-409	Human Values and Professional Ethics	2	2	0	3	40	60	100
3	PC	CE-401	Structural Analysis –I	3	2	0	4	40	60	100
4	PC	CE-402	Geotechnical Engg. –I	3	1	0	4	40	60	100
5	PC	CE-403	Engineering Surveying –II	3	0	0	3	40	60	100
6	PC	CE-404	Building Planning and Construction	2	2	0	3	40	60	100
7	OE	-	Open Elective – II	2	0	0	2	40	60	100
Labs:										
1	PC	CE-407	Geotechnical Engg. Lab-I	0	0	2	1	30	20	50
2	PC	CE-408	Surveying Lab - II	0	0	3	2	30	20	50
3	MC	CE-410	Computer Aided Building Drawing Lab	0	0	2	1	30	20	50
			Total	15	9	7	24+2			

OPEN ELECTIVE – II										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**	**C**	**I.A**	**ESE**	**Total**
1	OE	HS-410	Law for Engineers	2	0	0	2	40	60	100
2	OE	HS-411	German Language – II	2	0	0	2	40	60	100
3	OE	HS-412	French Language - II	2	0	0	2	40	60	100

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SCHEME OF TEACHING AND EXAMINATION
B.TECH CIVIL ENGINEERING

SEMESTER – V

S. N.	Categ.	Subject Code	Title	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		IA Marks	ESE Marks	Total Marks
1	PC	CE-501	Limit State Design of Concrete Structures - I	2	2	0	3	40	60	100
2	PC	CE-502	Structural Analysis - II	3	1	0	4	40	60	100
3	PC	CE-503	Geotechnical Engg. - II	2	2	0	3	40	60	100
4	PC	CE-504	Mechanics of Fluid - II	3	1	0	4	40	60	100
5	PC	CE-505	Environmental Engg. - I	3	0	0	3	40	60	100
6	PC	CE-506	Transportation Engg. - I	3	1	0	4	40	60	100
7	OE	-	Open Elective - III	2	0	0	2	40	60	100
Labs:										
1	PC	CE-511	Transportation Engg. Lab	0	0	2	1	30	20	50
2	PC	CE-512	Environmental Engg. Lab	0	0	2	1	30	20	50
3	PC	CE-513	Computer Aided Design Practice Lab-I	0	0	2	1	30	20	50
			Total	18	7	6	24+2			

Open Elective – III (For Students of Other Departments)

S. N.	Cat.	Subject Code	Title	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D	C	I.A	ESE	Total
1	OE	CE -508	Element of Civil Engineering	2	0	0	2	40	60	100
2	OE	CE -509	Optimization Methods in Engineering	2	0	0	2	40	60	100

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3	OE	CE -510	Environmental Impact Assessment	2	0	0	2	40	60	100

SCHEME OF TEACHING AND EXAMINATION
B.TECH CIVIL ENGINEERING

SEMESTER – VI

S. N.	Categ.	Subject Code	Title	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		IA Marks	ESE Marks	Total Marks
1	PC	CE-601	Design of Concrete Structures-II	3	1	0	4	40	60	100
2	PC	CE-602	Transportation Engg. - II	2	2	0	3	40	60	100
3	PC	CE-603	Environmental Engg. - II	2	2	0	3	40	60	100
4	PC	CE-604	Hydrology and Water Resources Engg.	3	1	0	4	40	60	100
5	PC	CE-605	Engineering Geology and Rock Mechanics	3	1	0	4	40	60	100
6	PC	CE-606	Concrete Technology	3	0	0	3	40	60	100
7	PE	-	Programme Elective – I	3	0	0	3	40	60	100
Labs:										
1	PC	CE-611	Engineering Geology and Rock Mechanics Lab.	0	0	2	1	30	20	50
2	PC	CE-612	Concrete Technology Lab.	0	0	2	1	30	20	50
3	PC	CE-613	Seminar	0	0	2	1	50	50	100
			Total	19	7	6	24+3			

PROGRAMME ELECTIVE- I										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**	**C**	**I.A**	**ESE**	**Total**
1	PE	CE-608	Remote Sensing and Applications of GIS	3	0	0	3	40	60	100
2	PE	CE-609	Hydraulic Machines	3	0	0	3	40	60	100
3	PE	CE-610	Energy Efficient Buildings	3	0	0	3	40	60	100

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NOTE: The student has to undergo 4 - 6 weeks Industry Training after 6th Semester during the summer vacation relevant to his/her stream.

SCHEME OF TEACHING AND EXAMINATION
B.TECH CIVIL ENGINEERING

SEMESTER – VII

Sr. No.	Categ.	Subject Code	Title	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		I. A Marks	ESE Marks	Total Marks
1	PC	CE-701	Limit State Design of Metal Structures	3	2	0	4	40	60	100
2	PC	CE-702	Quantity Surveying and Valuation	2	2	0	3	40	60	100
3	PC	CE-703	Irrigation and Design of Hydraulic Structures	3	1	0	4	40	60	100
4	PC	CE-704	Construction Engineering and Management	2	2	0	3	40	60	100
5.	PE	-	Programme Elective-II	3	0	0	3	40	60	100
Labs:										
1	MA	CE-711	Project Work -I	0	0	4	2	50	50	100
2	MA	CE-712	Industrial /Practical Training(Viva-Voce)*	0	0	0	2	50	50	100
3	MA	CE -713	Computer Aided Design Practice Lab-II.	0	0	3	2	30	20	50
			Total	13	7	7	20+3			

PROGRAMME ELECTIVE- II										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**	**C**	**I.A**	**ESE**	**Total**
1	PE	CE-708	Municipal Solid Waste Management	3	0	0	3	40	60	100
2	PE	CE-709	Bridge Engineering	3	0	0	3	40	60	100
3	PE	CE-710	Finite Element Method	3	0	0	3	40	60	100

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* The student will be evaluated on the basis of Industrial /Practical Training.

SCHEME OF TEACHING AND EXAMINATION B.TECH CIVIL ENGINEERING										
SEMESTER – VIII										
S. N.	**Categ.**	**Subject Code**	**Title**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**	**C**	**I. A Marks**	**ESE Marks**	**Total Marks**
1	MC	CE-808	Project Work - II	0	0	16	8	50	50	100
2	PE	-	Program Elective - III	3	0	0	3	40	60	100
3	PE	-	Program Elective - IV	3	0	0	3	40	60	100
			Total	0	0	16	8+ 6			
OR										
4	MC	CE-809	Industrial Project	0	0	16	8	50	50	100
			Total	0	0	16	8			

PROGRAMME ELECTIVE- III										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**	**C**	**I.A**	**ESE**	**Total**
1	PE	CE-801	Highway Pavement Design	3	0	0	3	40	60	100
2	PE	CE-802	Ground Water Hydrology	3	0	0	3	40	60	100
3	PE	CE-803	Water Power Engineering	3	0	0	3	40	60	100

PROGRAMME ELECTIVE- IV										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**	**C**	**I.A**	**ESE**	**Total**
1	PE	CE-804	Design of Pre-stressed Concrete Structures	3	0	0	3	40	60	100
2	PE	CE-805	Design of Earthquake Resistant Structures	3	0	0	3	40	60	100

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3	PE	CE-806	Transportation System Planning	3	0	0	3	40	60	100

Note: Industrial Project of one semester is to be carried out by the student exclusively in industry/start-up/ organization under the joint supervision of faculty advisors from institution as well as from the industry.

SEMESTER-III

MA -301: PROBABILITY AND STATISTICS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Probability and Random Variables:** Introduction, Basic concepts–Sample space, Events, Counting sample space, Conditional Probability and Independence, Permutations and Combinations, Rules of Probability, Bayes' Theorem. Random Variables – Concept of Random Variable, Percentiles, Probability Distributions – Discrete & Continuous, Mean, Variance and Covariance of Random Variables, Chebychev's inequality.	**6**
II	**Standard Probability Distributions:** Discrete distributions- Uniform, Binomial, Multinomial, Hyper geometric, Poisson, Negative Binomial, Poission; Continuous distributions - Normal, Exponential, Gamma, Weibull and Beta distributions and their properties -Function of Random variables.	**6**
III	**Sampling Distributions:** Random sampling, Sampling Distributions of Means, Estimation, Properties of point estimators, Confidence interval, Maximum likelihood and Bayes estimators, Prediction intervals.	**6**
IV	**Testing of Hypothesis:** Sampling distributions – testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions, tests for independence of attributes and Goodness of fit. **Linear Correlation and Regression Analysis:** Introduction, Linear Regression	**6**

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	model, Regression coefficient, Lines of correlation, Rank correlation.	

Text Books:

1. Gupta, S.C, and Kapur, J.N., "***Fundamentals of Mathematical Statistics",*** Sultan Chand, Ninth Edition, New Delhi,1996.
2. Johnson. R. A., ***"Miller & Freund's Probability and Statistics for Engineers",*** Sixth Edition, Pearson Education, Delhi, 2000.
3. Douglas C. Montgomery and George C. Runger, ***"Applied Statistics and Probability for Engineers***", 5th Edition, 2011.

Reference books:

1. Walpole, R. E., Myers, R. H. Myers R. S. L. and Ye. K, ***"Probability and Statistics for Engineers and Scientists",*** Seventh Edition, Pearson Education, Delhi, 2002.
2. Lipschutz. S and Schiller. J, "***Schaum's outlines - Introduction to Probability and Statistics***", McGraw-Hill, New Delhi, 1998.
3. S. M. Ross, "***Introduction to Probability and Statistics for Engineers and Scientists***" 4th edition.

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HS -305: INDUSTRIAL ECONOMICS AND MANAGEMENT

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction to Engineering Economics** - Technical efficiency, economic efficiency - cost concepts: elements of costs, opportunity cost, sunk cost, private and social cost, marginal cost, marginal revenue and profit maximization. **Supply and Demand:** Determinants of demand, law of demand, determinants of supply, law of supply, market equilibrium - elasticity of demand - types of elasticity, factors affecting the price elasticity of demand. **National Income Concepts:** GDP and GNP, per capita income, methods of measuring national income. Inflation and deflation:	**8**
II	**Value Analysis** - Time value of money - interest formulae and their applications: single-payment compound amount factor, single-payment present worth factor, equal-payment series compound amount factor, equal-payment series sinking fund factor, equal-payment series present worth factor, equal-payment series capital recovery factor, effective interest rate. **Investment Analysis:** Payback period—average annual rate of return, net present value; Internal rate of return criteria, price changes, risk and uncertainty.	**8**
III	**Principles of Management:** Evolution of management theory and functions of management organizational structure - principle and types - decision making - strategic, tactical & operational decisions, decision making under certainty, risk & uncertainty and multistage decisions & decision tree. **Human Resource Management:** Basic concepts of job analysis, job evaluation, merit rating, wages, incentives, recruitment, training and industrial relations.	**8**
IV	**Financial Management**: Time value of money and comparison of alternative	**8**

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	methods; costing – elements & components of cost, allocation of overheads, preparation of cost sheet, break even analysis - basics of accounting - principles of accounting, basic concepts of journal, ledger, trade, profit & loss account and balance sheet. **Marketing Management:** Basic concepts of marketing environment, marketing mix, advertising and sales promotion. **Project Management:** Phases, organization, planning, estimating, planning using PERT & CPM.	

Text Books:

1. Panneer Selvam, R, "***Engineering Economics***", Prentice Hall of India Ltd, New Delhi.
2. Dwivedi, D.N., "***Managerial Economics**, 7/E"*, Vikas Publishing House.

Reference Books:

1. Sullivan, W.G, Wicks, M.W., and Koelling. C.P., ***"Engg. Economy 15/E***", Prentice Hall, New York, 2011.
2. Chan S. Park, **"*Contemporary Engineering Economics***", Prentice Hall of India, 2002.
3. F. Mazda, "***Engg. Management"***, Addison Wesley, Longman Ltd., 1998.
4. O. P. Khanna, "***Industrial Engg. and Management"***, Dhanpat Rai and Sons, Delhi, 2003.
5. P. Kotler, "***Marketing Management, Analysis, Planning, Implementation and Control"***, Prentice Hall, New Jersey, 2001.
6. VenkataRatnam C.S & Srivastva B.K, "***Personnel Management and Human Resources"***, Tata McGraw Hill.
7. Prasanna Chandra, "***Financial Management: Theory and Practice"***, Tata McGraw Hill.
8. Bhattacharya A.K., "***Principles and Practice of Cost Accounting"***, Wheeler Publishing.
9. Weist and Levy, "***A Management guide to PERT and CPM"***, Prantice Hall of India.
10. Koontz H.,O'Donnel C.,& Weihrich H, ***Essentials of Management***, McGraw Hill.

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CE-301: MECHANICS OF SOLIDS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	2	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Stresses and Strains:** Introduction, Properties of Materials, Stress, Strain, Hook's law, Poisson's Ratio, Stress – Strain Diagram for structural steel and non-ferrous materials, Principles of superposition, Total elongation of tapering bars of circular and rectangular cross sections, elongation due to self – weight; Composite section, Volumetric strain, expression for volumetric strain, Elastic constants, relationship among elastic constants, Thermal stresses (including thermal stresses in compound bars). **Compound Stresses:** Introduction, Stress components on inclined planes, General two-dimensional stress system, Principal planes and stresses, Mohr's circle of stresses.	9
II	**Bending Moment and Shear Force Diagrams for Statically Determinate Beams:** Determinate beams, Type supports and loading, Shear force and Bending moment, Sign convention, SF and BM diagrams for cantilevers, simply supported and overhanging beams under point loads, UDL, UVL and Couples. **Bending and Shear Stresses in Beams:** Introduction – Bending stress in beam, Assumptions in simple bending theory, Derivation of Bernoulli's equation, Modulus of rupture, Section modulus, Flexural rigidity, Expression for horizontal shear stress in beam, Shear stress diagram for rectangular, symmetrical 'I' and 'T' section (Flitched beams not included).	9
III	**Torsion of Circular Shafts:** Introduction – Pure torsion-torsion equation of circular shafts, Strength and stiffness, Torsional rigidity and polar modulus, Power transmitted by shaft of solid and hollow circular sections. **Transverse Deflection of Beams:** Definitions of slope, deflection, Elastic curve - derivation of differential equation of flexure, Sign conventions, relationship between moment, slope and deflection, transverse deflection in determinate beams using	8

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	method of Successive integration.	
IV	**Thin Cylinders and Spheres:** Stresses in cylinders and spheres subjected to internal pressures. **Columns and Struts**: Introduction – Short and long columns, Euler's theory on columns, effective length, slenderness ration, radius of gyration, buckling load, assumptions, derivations of Euler's Buckling load for different end conditions, Limitations of Euler's theory, Rankine Gordon's empirical formula, problems.	**8**

Text Books:

1. Popov, E. P., *"**Engineering Mechanics of Solids**",* SI Version, Prentice Hall, New Delhi.
2. Timoshenko, S. P. and Young, D. H., *"**Elements of Strength of Materials**",* East West Press, New Delhi.
3. Subramanyam, *"**Strength of Materials**",* Oxford University Press, Edition, 2008

Reference Books:

1. Shames, I. H. Pitarresi, J. M., "***Introduction to Solid Mechanics***," Prentice-Hall, NJ.
2. NPTEL courses, *http://nptel.iitm.ac.in/courses.php*, web and video courses on Strength of Materials by Sharma, S. C., and Harsha, S. P.
3. M.L. Gambhir, ***Fundamentals of structural Mechanics and analysis***, Printice Hall India.
4. Beer, P. F. and Johson, E. R., "***Mechanics of Materials***", SI Version, McGraw Hill, NY.
5. Patel, A. H. and Singer, F. L., "***Strength of Materials***", Harper Collins, New Delhi.

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CE-302: MECHANICS OF FLUIDS-I

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Fluid Properties:** Introduction of fluid, system of units, Fluid properties -Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension& Capillarity, fluid as a continuum, Newton's law of viscosity, Capillary rise in a vertical tube and between two plane surfaces, vapour pressure of liquid, compressibility and bulk modulus, surface tension- pressure inside a water droplet, pressure inside a soap bubble, Numerical problems. **Fluid Statics:** Definition of pressure, Variation of pressure with depth, Pascal's law, Types of pressure, Introduction to pressure measurements of pressure using simple, differential &inclined manometers, Introduction to mechanical and electronic pressure measuring devices - Transducers, Hydrostatic forces on plane and curved surface, centre of pressure; Buoyancy, equilibrium, metacentre, meta centric height & its determination; Stability of floating & submerged bodies.	**9**
II	**Kinematics of Flow:** Kinematics of fluid flow, scalar, vector and tensor quantities, classification of fluid flow, methods of describing fluid motion, fundamentals of flow visualization, discharge or rate of flow, three-dimensional continuity equation in Cartesian coordinate, stream line, potential function, stream function, orthogonally of streamlines and potential lines. **Dynamics of Flow**: Surface and body forces, Euler's equations of motion along a steam line,Bernoulli's equation and its applications–Venturimeter, Orifice meter and Pitot tube; Kinetic energy correction factor; Momentum equation, application of momentum equation - forces on plates and pipe bends; Navier- Stokes equation (explanation only).	**9**
III	**Flow Measurement**: Introduction, Orifices - classification, hydraulic coefficients, Time for emptying tanks by orifices; Mouthpiece - classification, Borda's mouthpiece; Notches & Weirs –Introduction, classification, discharge over rectangular, triangular, trapezoidal notches, Cippoletti notch, broad crested weirs, relative error and sensitivity, Concept of proportional weir, advantages of proportional weirs, concept of	**9**

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	geometrically simple weirs. **Dimensional Analysis and Similitude:** Dimensional analysis - Rayleigh's method, Buckingham π-theorem; Ssignificance and use of dimensionless numbers in experimental investigation, Similitude -geometric, kinematic and dynamic similarities; Model testing- model laws, undistorted and distorted models.	
IV	**Flow through Pipes:** Introduction**,** Major and minor energy losses,Darcy-Weisbach equation for head loss due to friction in a pipe,hydraulic gradient and total energy lines, pipes in series and parallel, equivalent pipes;Pipe Networks - Hardy Cross method, Numerical problems. **Power transmission through pipe:** Flow through nozzle at end of pipe, water hammer phenomenon.	**8**

Text Books

1. Modi, P. M. and S. M. Seth, "***Hydraulics and Fluid Mechanics***", Standard Book House.
2. Dr. R.K. Bansal, "***A Text book of Fluid Mechanics and Hydraulic Machines***", Laxmi Publications, New Delhi.
3. R.K.Rajput, A Text Book of "***Fluid Mechanics & Hydraulic Machines***", S.Chand& Co, New Delhi, 2006.

Reference Books

1. Douglas, J.F., Gasiorek, J.M .and Swaffield, J.A., "***Fluid Mechanics 4thEdn***.", Pearson Education India.
2. Arora, K.R., "***Fluid Mechanics, Hydraulic and Hydraulic Machines***", Standard Publishers and Distributors, New Delhi.
3. Frank M. White, "***Fluid Mechanics (Sixth Edition)***", Tata McGraw-Hill, New Delhi (2008).
4. Streeter, "***Fluid Mechanics***", Wylie, Bedford New Delhi, 2008 (Ed).

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CE-303: ENGINEERING SURVEYING–I

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

.

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction:** Classification of surveys -reconnaissance – principles-provision of control -conventional signs. Chain survey: Instruments -principles of chain survey -field book -plotting -tie line and check line -chaining and ranging -obstacles -chaining on sloping ground -errors-uses of cross staff and optical square. **Compass Survey:** Prismatic compass –surveyor's compass -whole circle and reduced bearing-true and magnetic bearing -dip and declination -local attraction -traversing -plotting -error of closure -graphical and analytical adjustments.	**8**
II	**Plane Table Surveying:** Definitions, uses and advantages, temporary adjustments. Different methods of plane table surveying; Two point and three point problems. Errors in plane table survey. **Leveling:** Definition of level surfaces -mean sea level -reduced level -bench marks -leveling instruments -temporary and permanent adjustments -fly leveling -booking -reduction of levels -corrections for refraction and curvature -reciprocal leveling -longitudinal leveling and cross sectioning -contour survey -definition -characteristics of contour -uses of contour -methods of contouring -direct and indirect interpolation – plotting.Computation of volume bytrapezoidal and prismoidal formula, volume from spot levels, volume from contour plan; Trigonometric leveling considering refraction and curvature correction, axis signal correction.	**9**
III	**Theodolite Surveying:** Various parts andaxis of transit, technical terms, temporary adjustments. Measurement of horizontal and vertical angles -method of repetition and reiteration; Theodolite traverse - Different methods of running theodolite traverses, Gales' traverse table, balancing of traverse by Bow-Ditch's transit and modified transit rules; Problems on one-plane and two-plane methods, omitted measurements, errors in theodolite survey. **Setting out Works:** General horizontal and vertical control, setting out of foundation	**9**

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	plan for load bearing and framed structure, batter board, slope and grade stakes, setting out with theodolite; setting out of sewer line, culvert, use of laser for works; setting out center line for tunnel, transfer of levels to underground work project / route survey for bridge, dam and canal; checking verticality of high rise structures.	
IV	**Areas of Figures:** Area of an irregular figure by Trapezoidal rule, average ordinate rule, Simpson's 1/3 rule, various coordinate methods; Planimeter - types of planimeter including digital planimeter, area of zero circle, use of planimeter. **Curves**: Types of curves, elements of a curve, simple curves; different methods for setting out of simple curves –linear and angular methods; transition curves, vertical curves–types, characteristics and setting out; Methods of setting out super elevation.	**8**

Text Books:

1. N.N.Basak, "***Surveying and Leveling"***, 1stedition,Tata McGraw Hill.
2. A Banniister, S. Raymond and R Baker, "***Surveying"***, seventh edition, Pearson.

Reference Books:

1. Kanetkar and Kulkarni, "***Surveying and Leveling"***, Vol I & II, 24th edition, Pune VidyarthiGriha, Pune.
2. R.Agor, "***Surveying",*** Khanna Publishers.

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CE-304: BUILDING MATERIALS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Stones and Bricks:** Physical and mechanical properties of construction materials, commonly used stones - Artificial, decorative and cladding stones, Tests for stones. Bricks - Classification and testing of bricks, fire bricks. Building blocks- solid, hollow and paving blocks- types and applications. Lime –types and applications. Pozzolanic materials – fly ash, rice husk ash and GGBFS, Industrial wastes for concrete making. **Materials for Floors and Walls:** Ceramic, terrazzo and clay tiles – types and uses; Materials of finish for residential, commercial and industrial floors. Materials of wall finish – interior and exterior, wall panelling materials, materials for architectural finishes.	**8**
II	**Materials for Building Services**: Timber-Market forms, seasoning and various products; Structural Steel and Aluminium –Roofing material, physical descriptions of asbestos sheets, GI sheets, tubes and light weight roofing materials; Modern materials –Neoprene, decorative panels and laminates, architectural glass and ceramics, PVC, polymer base materials, fibre reinforced plastics.	**7**
III	**Bitumen and Bituminous Products:** Pavement grade bitumen – asphalt, cut back bitumen, bituminous emulsion, mastic bitumen, bituminous felt; Joint filler compound – Joint sealant compound, anti-stripping compound, Polymer modified bitumen, latex modified bitumen and crumb rubber modified bitumen.	**7**
IV	**Modern Materials:** Glass, Ceramics, and Sealants for joints; Sheets for pitched roof coverings; Fibre glass reinforced plastic; Clay products – Refractories; Composite materials –Types, application of laminar composites; Fibre textiles- Mats and pads for earth reinforcement; Polymers and resins for building repair.	**7**

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Text Books:

1. Surendra Singh, "***Building Materials***", Vikas Publishing Company, New Delhi, 2002.
2. Rajput,R.K., "***Engineering Materials***", S.Chand& Co. Ltd., New Delhi, 2000.

Reference Books:

1. Khanna, S.K., Justo, C.E.G, "***Highway Engineering***", Nem Chand & Bros, Roorkee, 2007.
2. Kadiyali, L. R, "***Highway Engineering***", Khanna Publishers, New Delhi, 2007

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HS-306: SOCIOLOGY & ELEMENTS OF INDIAN HISTORY FOR ENGINEERS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction to sociological concepts-** structure, system, organization, social institution, Culture social stratification (caste, class, gender, power). **Understanding social structure and social processes -** Perspectives of Marx and Weber.	6
II	**Political economy of Indian society** - Industrial, Urban, Agrarian and Tribal society. **Social change in contemporary India** - Modernization and globalization, Secularism and communalism.	6
III	**Introduction to Elements of Indian History -** What is history? ; History Sources - Archaeology, Numismatics, Epigraphy and Archival research. **Indian history and periodization -** evolution of urbanization process: first, second and third phase of urbanization.	6
IV	**From feudalism to colonialism -**the coming of British; Modernity and struggle for independence. **Issues and concerns in post-colonial India (upto 1991) -** Issues and concerns in post-colonial India 2ndphase (LPG decade post 1991)	6

Text Books:

1. Desai, A.R. (2005), "***Social Background of Indian Nationalism***", Popular Prakashan.
2. Giddens, A (2009), "***Sociology, Polity***", 6thEdition.
3. Chandoke, Neera & Praveen Priyadarshi (2009), "***Contemporary India: Economy, Society and Politics*",** Pearson.

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Reference Books:

1. Guha, Ramachandra (2007), "***India After Gandhi***", Pan Macmillan.
2. Haralambos M, RM Heald, M Holborn (2000), "***Sociology*****",** Collins.
3. Sharma R. S..(1965), "***Indian feudalism***", Macmillan.
4. Gadgil, Madhab & Ramchandra Guha (1999,) "***This Fissured Land: An Ecological History of India***", OU Press.

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HS-307: GERMAN LANGUAGE – I

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Wichtige Sprachhandlungen:** Phonetics – Sichbegrüßen - Sich und and erevorstellenformell / informell - Zahlen von 1 bis 1 Milliarde – verstehen & sprechen. **Grammatik:** regelmäßigeVerbenimPräsens - “sein” und habenimPräsens - PersonalpronomenimNominativ.	**6**
II	**WichtigeSprachhandlungen:** Telefon Nummernverstehen und sprechenUhrzeitenverstehen und sagenVerneinung “nicht und kein” (formell und informell) **Grammatik**: Wortstellung – Aussagesatz – W-Frage und Satzfrage (Ja/NeinFrage) Nomenbuchstabieren und notierenbestimmter und unbestimmterArtikelundNegativartikelim Nom. &Akkusativ	**6**
III	**WichtigeSprachhandlungen:** Tageszeitenverstehen und überTerminesprechen-Verabredungenverstehen - AufgabenimHaushaltverstehen **Grammatik:** PersonalpronomenimAkkusativ und Dativ - W-Fragen “wie, wer, wohin, wo, was usw.-Genitivbei Personennamen - ModalverbenimPräsens “können, müssen,möchten”	**6**
IV	**WichtigeSprachhandlungen:** Sichaustauschen, was man kann, muss – BezeichnungenLebensmittel – Mengenangabenverstehen – PreiseverstehenundEinkaufzettelschreiben **Grammatik:**Wortstellung in SätzenmitModalverben – Konnektor ”und” – “noch”-kein-------mehr – “wieviel, wieviele, wie alt, wielange” – PossessivartikelimNominativ.	**6**

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V	**WichtigeSprachhandlungen:** Freizeitanzeigenverstehen – Hobbysund Sportarten Anzeigenfür Freizeitpartnerschreibenbzw. daraufantworten –Vorlieben und Abneigungenausdrucken **Grammatik:** Verbenmit Vokalwechselim Präsens – ModalverbenimPräsens"dürfen, wollen und mögen - "haben und sein" imPräteritum – regelmäßigeVerbenimPerfekt – Konnektoren "denn, oder, aber.	**6**

Text Books:

1. Studio d A1. Deutsch alsFremdsprache with CD.(Kursbuch und Sprachtraining).

Reference Books:

1. German for Dummies
2. Schulz Griesbach

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HS-308: FRENCH LANGUAGE – I

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Grammar and Vocabulary:** Usage of the French verb "se presenter", a verbof self-introduction and how to greet a person- "saluer". **Listening and Speaking:** The authentic sounds of the letters of the French alphabet and the accents that play a vital role in the pronunciation of the words. **Writing:** Correct spellings of French scientific and technical vocabulary. **Reading:** Reading of the text and comprehension – answering questions.	**6**
II	**Grammar and Vocabulary:** Definite articles, "prepositions de lieu" subject pronouns. **Listening and Speaking:** Pronunciation of words like Isabelle, presentezandla liaison – vousetes, vousappelez and role play of introducing each other –group activity. **Writing:** Particulars in filling an enrolment / registration form. **Reading Comprehension:** reading a text of a famous scientist and answering questions.	**6**
III	**Grammar and Vocabulary:** Verb of possession "avoir' and 1st group verbs"er", possessive adjectives and pronouns of insistence- moi, lui..and numbers from 0 to 20. **Listening and Speaking: N**asal sounds of the words like feminine, ceinture, parfum and how to ask simple questions on one's name, age, nationality, address mail id and telephone number. **Writing:** Conjugations of first group verbs and paragraph writing on self – introduction and introducing a third person. **Reading Comprehension:** reading a text that speaks of one's profile and answering questions	**6**
IV	**Grammar and Vocabulary:** Negative sentences, numbers from 20 to 69, verb"aimer"and seasons of the year and leisure activities.	**6**

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	Listening and Speaking: To express one's likes and dislikes and to talk of one's pastime activities (sports activities), je fais du ping-pong and nasalsounds of words – janvier, champagne. **Writing**-Conjugations of the irregular verbs: faire and savoir and their usage. Paragraph writing on one's leisure activity- (passé temps favori). **Reading:** a text on seasons and leisure activities – answering questions.	
V	**Grammar and Vocabulary:** les verbes de direction- to ask one's way and to give directions, verbes- pouvoir and vouloir and 2nd group verbs, a droite, lapremiere a gauche and vocabulary relating to accommodation. **Listening and Speaking:** To read and understand the metro map and henceto give one directions – dialogue between two people. **Writing:** Paragraph writing describing the accommodation using the different prepositions like en face de, derriere- to locate. **Reading Comprehension:** A text / a dialogue between two on location and directions- ouest la poste/ la pharmacie, la bibliotheque?......	**6**

Text Book:

1. Tech French

Reference Books:

1. French for Dummies.
2. French made easy-Goyal publishers
3. Panorama

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CE-307: BUILDING MATERIAL TESTING LAB

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam/ Viva	Total	
0	0	2	1	30	20	50	3 hrs

Note: At least two tests must be conducted for each construction material.

List of experiments for different construction materials:	
1.	Tests on cement - Fineness, Normal consistency, Setting time, Soundness, Compressive strength.
2.	Test on bricks: Water absorption, Efflorescence, Compressive strength.
3.	Tests on aggregate: Physical Properties - Grain size distribution, Specific gravity, Density, Void ratio, bulking of sand; Aggregate crushing value.
4.	Properties of fresh concrete: workability tests - Flow &Vee-bee tests, Slump & Compaction factor test.
5.	Tests on Timber: Compressive strength –parallel to grain & perpendicular to grain, Bending tests
6.	Test on tiles: Transverse strength, Water Absorption of Flooring tiles and Roofing tiles.

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CE-308: FLUID MECHANICS LAB

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam/ Viva	Total	
0	0	2	1	30	20	50	3 hrs

Note: At least eight to nine experiments must be performed.

List of experiments:	
1.	To verify Bernoulli's theorem.
2.	To verify the momentum equation using the experimental set up on impact of jet.
3.	To determine the coefficient of discharge of Venturimeter.
4.	To determine the coefficient of discharge of Orifice meter.
5.	To determine the coefficient of discharge of Rectangular Notch.
6.	To determine the coefficient of discharge of Triangular Notch
7.	To determine the coefficient of discharge of an orifice of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice and mouth piece.
8.	To determine the variation of friction factor 'f' for turbulent flow in commercial pipes.
9.	To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
10.	To study the boundary layer velocity profile over a flat plate and to determine the boundary layer thickness.

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CE-309: SURVEYING LAB - I

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam/ Viva	Total	
0	0	3	2	30	20	50	3 hrs

Note: At least eight experiments must be performed.

List of experiments:	
1.	Chain & Compass Traversing -Traversing and plotting of Details.
2.	Plane table Survey - Method of Radiation and intersection.
3.	Plane table Survey - Solving Two Point and Three Point Problems
4.	Plane table Survey – Traverse
5.	Leveling - Fly leveling, Longitudinal and cross sectioning and Contour surveying.
6.	Setting out of foundation plan for load bearing and framed structure.
7.	Setting out of sewer line, culvert.
8.	Setting out center line for tunnel, transfer of levels to underground work Project.
9.	Checking verticality of high rise structures.
10.	Theodolite: temporary adjustments, measurement of horizontal and vertical angles.
11.	Theodolite traversing.
12.	Study of Minor instruments: Planimeter, pantagraph, clinometer, hand levels, Quick setting level, CylonGhat Tracer, Sextent, etc.

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SEMESTER-IV

MA-401: OPTIMIZATION AND CALCULUS OF VARIATIONS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction:** A survey of some simplified examples of common real world situations leading to optimization problems, basic formulation and theory of optimization problems. **Linear programming:** Linear programming (optimization of linear functions subject to linear constraints): basic theory; simplex method; duality, practical techniques.	6
II	**Linear programming:** Basic LPP - solution techniques (Simplex, Artificial Basis), Complimentary Slackness Theorem, Fundamental theorem of Duality, degenerate solutions, cycling; Applications - elements of dynamic programming including Hamiltonian, Bellman's optimality principle. **Transportation and Assignment Problems:** Solution of a balanced transportation problem, degeneracy in transportation problems and alternate solutions, Mathematical problems in formulation of assignment problems.	7
III	**Nonlinear programming:** Nonlinear programming (optimization of nonlinear functions subject to constraints) with Lagrange multipliers, Karush-Kuhn-Tucker optimality conditions, convexity, duality. **Approximation methods for nonlinear programming:** Line search methods, gradient methods, conjugate gradient methods; Networking techniques – PERT and CPM.	6
IV	**Calculus of Variations:**Basic definitions - functionals, extremum, variations, function spaces; Necessary conditions for an extremum, Euler-Lagrange Equation, convexity and it's role in minimization, minimization under constraints; Existence and	6

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	nonexistence of minimizers; Applications - Isoperimetric problems, Geodesics on the surface.	

Text Books:

1. C. B. Gupta, "***Optimization Techniques in Operation Research,"*** I. K. International Publishing House Pvt. Ltd.
2. A. S. Gupta, "***Calculus of Variations and Applications"***, PHI Prantice hall India.
3. Mukesh Kumar Singh, "***Calculus Of Variations",*** Krishna Prakashan Media (P) Ltd.
4. J. K. Sharma, Operations Research ***"Problems and Solutions***, Macmillian Pub.

Reference books:

1. I. M.Gelf and S. V. Fomin, "***Calculus of Variations"***, Dover Publications IncMineola, New York.
2. Purna Chand Biswal, "***Optimization in Engineering***", Scitech Publications India Pvt. Ltd.
3. B. S. GREWAL, "***Higher Engineering Mathematics",*** Krishna Publications.
4. G. Hadly, "***Linear Programming"***, Narosa Publishing House.
5. KantiSwarup, P. K. Gupta and Manmohan, "***Operations Research",*** Sultan Chand & Sons.

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HS-409: HUMAN VALUES AND PROFESSIONAL ETHICS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction –Need and Basic Guidelines** 1. Understanding the need , basic guidelines, content and process of value Education 2. Self-Exploration – purpose, content and process, 'Natural Acceptance' and Experiential Validation – as the mechanism for self-explanation.	**6**
II	**Process for Value Education** 1. Continuous Happiness and Prosperity – A look at basic Human Aspirations. 2. Right Understanding, Relationship and Physical Facilities – basic requirements for fulfillment of aspirations of every human being with their correct priority. 3. Understanding Happiness and prosperity – A critical appraisal of the current scenario. 4. Method to fulfill the human aspirations; understanding and living in harmony at various levels.	**7**
III	**Harmony in Human Beings** 1. Understanding human being as a co-existence of the self and the body. 2. Understanding the needs of Self ('I') and 'Body' – Sukh and Suvidha. 3. Understanding the Body as an instrument of 'I' (I being the doer, seer and	**7**

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	enjoyer)	
IV	**Harmony in Myself and body** 1. Understanding the characteristics and activities of 'I' and harmony in 'I' 2. Understanding the harmony of I with the Body: Sanyam and Swasthya: correct appraisal of Physical needs, meaning of Prosperity in detail.	**6**
V	**Harmony in Family, Society and Nature** 1. Understanding harmony in the family, society and nature. 2. Understanding values in human relationship; meaning of Nyaya and Program for its fulfillment to ensure Ubhay-tripti. 3. Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.	**6**

Text Books

1. R R Gaur, RSangal and GP Bagaria, "***A Foundation Course in value Education***", Published by Excel Books (2009).
2. R R Gaur, R Sangal and G P Bagaria, "***Teacher's Manual (English)***", 2009.

Reference Books

1. E.F. Schumacher, "***Small is Beautiful; a study of economics as if people mattered***", Blond & Briggs, Bratain, 1973.
2. PL Dhar, RR Gaur, "***Science and Humanism***", common wealth publishers, 1990.
3. A.N. Tripathy, "***Human values***", New Age International Publishers, 2003.
4. E.G. Seebauer& Robert, L BERRY, "***Foundational of Ethics for Scientists & Engineers***", Oxford University Press, 2000.
5. M. Govindrajran, S.Natrajan& V.S. Senthi Kumar, "***Engineering Ethics (including human Values)***", Eastern Economy Edition, Prentice hall of India Ltd.
6. B.L. Bajpai, 2004, "***Indian Ethos and Modern Management***", New Royal book Co; Lucknow, 2004, Reprinted 2008.

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CE-401: STRUCTURAL ANALYSIS – I

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	2	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction to Determinate Structures:** Statically determinate & indeterminate structures, static and kinematic indeterminacy, stability of structures, principle of superposition, Maxwell's reciprocal theorems; Computation of internal forces in statically determinate structures - plane truss, plane frame and grids. **Analysis of Statically Determinate Beams:** Deflection of statically determinate beams - Macaulay's Method, Moment Area Method, Conjugate Beam Method.	**9**
II	**Deflection of Beams, Frames and Plane Truss by Strain Energy:** Strain energy and complementary energy, strain energy due to axial loading, bending, transverse shear and torsion; applications to beams and frames; Clarke– Maxwell - Betti reciprocaltheorem. **Virtual Work:** Principal of virtual work, Unit load method, deflection of beams, frames and plane truss by unit load method.	**8**
III	**Analysis of Arches:** Three hinged circular and parabolic arches with supports at same and different levels, determination of normal thrust, radial shear and bending moment. **Analysis of Cables:** Analysis of cables under point loads and UDL, length of cables for supports at same levels and at different levels.	**8**
IV	**Moving loads and Influence Lines:** Introduction to moving loads - concept of influence lines - influence lines for reaction, shear force and bending moment in simply supported beams and over hanging beams; Muller Breslau principle - application to propped cantilevers - influence lines for forces in beams and trusses for different types of moving loads - concentrated load, uniformly distributed load shorter and longer than the span.	**8**

Text Books:

1. Reddy C S, ***"Basic structural Analysis"***, Tata McGrawHill, New Delhi.

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2. Wang C.K., “***Intermediate Structural Analysis”***, McGraw Hill, New Delhi.
3. M.L. Gambhir, “***Fundamentals of structural Mechanics and analysis”***, Printice Hall India

Reference Books:

1. Kinney S., “***Indeterminate Structural Analysis”***, Oxford & IBH
2. Coates, Coutie and Kong , “***Structural Analysis”***, ELBS Publishers
3. Timoshenko S.P.& Young D.H., “***Theory of Structures”***, McGraw Hill
4. Harry H West & Louis F Geschwindner, “***Fundamentals of Structural Analysis”***, Wiley India Publishers

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CE-402: GEOTECHNICAL ENGINEERING – I

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Introduction:** Introduction, origin and formation of soil, phase diagram, relationships and their inter - relationships; Determination of Index properties - specific gravity, water content, in-situ density, particle size analysis and sedimentation analysis, Atterberg's limits, relative density, thixotrophy, activity and sensitivity; Classification of soils as per BIS and HRB and their applications in construction of highways, earthen dams etc., BIS Plasticity chart and its practical application. **Soil Structure and Clay Mineralogy:**Single grained, honey combed, flocculent and dispersed structures; Valence bonds, Soil-Water system, Electrical diffuse double layer, adsorbed water, base-exchange capacity, Isomorphous substitution; Common clay minerals in soil and their structures- Kaolinite, Illite and Montmorillonite and their application in Engineering.	**9**
II	**Flow Through Soils**: Darcy's law- assumption and validity, coefficient of permeability and its determination (laboratory and field), permeability of stratified soils, seepage velocity, superficial velocity and coefficient of percolation, quick sand phenomena, capillary phenomena; Application problems with respect to the analysis of dams and sub-base of roads; Seepage analysis -Laplace equation, assumptions, limitations and itsderivation; Flow nets- characteristics and applications, flow nets for sheet piles and below the dam section. **Effective Stress:** Introduction, geostatic stresses, effective stress concept-total stress, effective stresseffect of water table, fluctuations of effective stress, effective stress in soils saturated by capillary action,neutral stress and impact of the effective stress in construction of structures.	
III	**Consolidation of Soils**: Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary	**8**

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	consolidation, Terzaghi's theory of consolidation, final settlement of soil deposits, consolidation settlement - one- dimensional method, secondary consolidation. Primary and secondary compression for normally and over consolidated clays, consolidation of partially saturated soils, creep/secondary compression in soils.	
IV	**Shear Strength of Soils:** Concept of shear strength, typical response of soilsto shearing forces - Effects of increasing the normal effective stress, over consolidation ratio in soils, drainage of excess pore water pressure, cohesion, tension and cementation; Mohr-Coloumb theory, concept of pore pressure, total and effective shear strength parameters, factors affecting shear strength of soils;Measurement of shear strength –Direct shear test, Unconfined compression test, Triaxial compression tests, Vane shear test, Test under different drainage conditions, Total and effective stress paths. **Stability of Slopes**: Introduction, different factors of safety, types of slope failures, analysis of finite and infinite slopes, Swedish circle method, friction circle method, stability numbers and charts	**9**

Text Books:

1. Braja, M. Das (2002), Fifth Edition, "***Geotechnical Engineering",*** Thomson Business Information India (P) Ltd., India.
2. Punmia B C, ***"Soil Mechanics and Foundation Engineering",*** Laxmi Publications.

Reference Books:

1. Taylor, ***"Fundamentals of Soil Engineering",*** John Wiley & Sons
2. Holtz R.D., ***"An Introduction to Geotechnical Engineering"***, Prentice Hall, NJ
3. Craig R.F., ***"Soil Mechanics",*** Chapman & Hall.
4. T.W. Lambe and R.V. Whitman, ***"Soil Mechanics"***, John Wiley & Sons, 1969.

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CE-403: ENGINEERING SURVEYING –II

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Tacheometric Surveying:** Classification, principal of stadia method, theory of anallatic lens, distance and elevation formulae, tangential method, errors in stadia surveying.	5
II	**Simple, Compound, Reverse Curves and Vertical Curves:** • Simple Curves: Elements of simple curves, methods of curve ranging, obstacles in setting out curves. • Compound Curves: Elements of compound Curves, setting out the curve. • Reverse Curves: Elements of reverse Curves, setting out the curve. • Vertical Curves: Elements of vertical curves, types, tangent correction, location of highest or lowest point. **Transition Curves:** Elements of transition curves, super elevation, length of transition curve, Ideal transition curve, characteristics of transition curve, setting out the transition curve.	7
III	**Geodetic Surveying and Triangulation Adjustment Geodetic Surveying:** Classification of triangulation survey, inter - visibility of stations, field work, reduction to centre, base line measurement, corrections. **Triangulation Adjustment:** Definitions, weighted observations, principal of least square, laws of weights, station adjustment and figure adjustment (Triangle only). **Photographic Surveying:** Basic definitions, terrestrial and aerial photography, scale of Aerial photo relief, tilt and height displacements, heights from relief displacement andparallax measurements, flight planning, study of photo theodolite and stereoscope.	8

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IV	**Advanced Techniques in Surveying:** Total station, electromagnetic distance measurement (EDM). **Remote Sensing:** Introduction, definitions, remote sensing systems, advantages, basic principles, energy interaction in the atmosphere and with targets, Indian remote sensing satellite series and their characteristics. **GIS & GPS:** Components of geographical information system (GIS),advantages, function of GIS, raster and vector data, advantages and disadvantages, global positioning system.(GPS),Introduction, definitions, GPS receivers, antenna, errors in GPS, advantages of GPS.	**7**

Text Books:

1. B.C.Punmiya, "***Surveying and Leveling***", Laxmi Publication
2. N.N.Basak, "***Surveying and Leveling***", Tata McGraw Hill
3. Kanetkar & Kulkarni, "***Surveying & Levelling".***
4. Dr. M. AnjiRddy, "***Remote sensing & G.I.S".***

Reference Books:

1. R Agor, "***Surveying",*** Khanna Publishers
2. Lo C.P.Yeung A K W, "***Concepts and Techniques of GIS***", Prentice Hall, India
3. Kang-tsung Chang, "***Introduction to GIS***", Tata McGraw Hil

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CE-404: BUILDING PLANNING AND CONSTRUCTION

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**PLANNING ASPECTS & REGULATIONS:** Functional Planning of buildings: General aspects to consider for planning, bye-laws and regulations, Selection of site for building construction, Principles of planning, Orientation of building and its different elements, Components of building.	**7**
II	**Masonry:** Definitions of terms used in masonry, Materials used, Stone masonry, Brick masonry, Different bonds used for brick masonry, Composite masonry. **Floors and Roofs:** Components of a floor, materials used for floor construction, Different types of flooring, Ground floor and upper floors, Types of roofs, Basic roofing elements and Roof coverings.	**7**
III	**Doors and Windows:** Location of roofs and windows, Definition of technical terms, Size of doors and windows, Door frames, Types of doors and windows, Ventilators, Fixtures and fastenings. **Damp proofing, Fire protection and Thermal insulation:** Causes and effect of dampness on buildings, Materials and methods used for damp proofing; Fire hazards, Grading of buildings according to fire resistance, Fire resisting properties of common building materials, Fire resistant construction; General methods of thermal insulation and thermal insulating materials.	**8**
IV	**Building Services:** Integration of services in buildings - water supply & plumbing layout for a residential building - elevators & escalators - planning & installation – basic components of the electrical system for a residence - typical electrical layout diagram. Lay out of external services -water supply- sewage disposal-electrical cabling.	**6**

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Text Books:

1. Varghese P. C. "***Building Construction***", PHI Learning Pvt. Ltd., 2008.
2. Punmia B. C., Jain A. J. and Jain A. J. "***Building Construction***", Laxmi Publications, 2005.
3. Arora S. P. and Bindra S. P. "***The text book of Building Construction***", Dhanpat Rai Publications, 2010.

Reference Books:

1. Joseph De chiara & John Callendar – ***"Time saver standards for building types",*** III Edition - McGraw Hill, 1990.
2. National Building Code, "***Bureau of Indian Standars***", New Delhi, 2005.

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HS-410: LAW FOR ENGINEERS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Constitutional Law:** Nature of Indian Constitution (features), fundamental rights, duties and directive Principles of State Policy (DPSP's), forms of Governments, structure of Government of India, role and responsibility of executive, legislature/parliament and judiciary, nature of Indian federal system, center state and relations. Basic structure of the Indian constitution, basic features of the Indian, constitutional amendments – Golak Nath, Keshwananda Bharti, Maneka Gandhi (1978) and S.R. Bommai case (1994), (floor test).	**6**
II	**Law of contract:** General principles of Indian Contract Act, 1862, kinds of Government contracts and dispute settlement, standard and printed form of contract, essential elements of valid contract proposal, acceptance communication and revocation thereof, relevance of time in contractual obligation. Main objectives of Arbitrates and Conciliation Act-1996, tort and law of tort, general principles of tort law, classifications of torts: property vs. person.	**6**
III	**Administrative Law:** Evolution, nature and its scope, conceptual objection against growth of administrative rule of law and separation of power, clarification of administrative actions, judicial review of administrative actions, exclusion of judicial review and concept of "Ombudsman";Right to Information Act, 2005 (Sub Section 1 - 20) **Environmental Law:** Definition, meaning and its nature, environmental (Protection) Act-1986, Water (Preservation and Control of Pollution) Act-1974, Air (Prevention and Control of Pollution) Act-1981; Environmental pollution, overall remedies and procedures.	**8**
IV	**Human Rights:** Legality of human rights, universal declaration of human rights, 1948, difference between civil and political rights, individual and human rights - human rights of child, weaker section of society, prisoners, and refugees, International Human Rights Commission.	**6**

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Text Books:

1. D.D. Basu, "***Shorter Constitution of India"***, Prentice Hall of India, (1996).
2. Meena Rao, "***Fundamental concepts in Law of Contract"***, 3rd Edn. Professional Offset, (2006).
3. H.O. Agarwal, "***International Law and Human Rights"***, Central Law Publications, (2008).

Reference Books:

1. H.M. Seervai, "***Constitutional Law of India"***, Tripathi Publications, (1993).
2. S.K. Kapur, "***Human Rights under International Law and Indian Law"***, Central Law Agency, (2001).
3. Neelima Chandiramani, "***The Law of Contract: An Outline"***, 2nd Edn. Avinash Publications Mum.
4. Avtarsingh, "***Law of Contract"***, Eastern Book Co., (2002).
5. Anson W.R, "***Law of Contract"***, Oxford University Press.

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HS-411: GERMAN LANGUAGE – II

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs
Prerequisite							
HS 302: GERMAN LANGUAGE - I							

COURSE CONTENTS:

Unit	Contents	No. of hours
I	Wichtige Sprachhandlungen: Zimmersuche, Möbel **Grammatik**: VerbenmittrennbarenVorsilbenim Präsens und Perfekt. Verbenmittrennbaren Vorsilben und Modalverbenim Präsens. Verbenmituntrennbaren Vorsilbenim Perfekt. Unregelmäßige undgemischte VerbenimPerfekt.	6
II	Wichtige Sprachhandlungen: Kleidung ,Farben, Materialien. **Grammatik:** formelleImperativsätzemit “Sie” informelleImperativsätzeVorschlägemit “wir” – “sollen/wollenwir” - Sollich? Modalpartikeln “doch”“mal” “doch mal.	6
III	WichtigeSprachhandlungen: Sehenswürdigkeite (Prater, BrandenburgerTör,Kolossium, Eifeltürm) **Grammatik:**OrtsangabenmitAkk. undDativ “alle”,”man” Indefinitepronomen“etwas”, “nichts”.	6
IV	WichtigeSprachhandlungen: Essen und TrinkenimRestaurant, Partyvorbereitung und Feier. **Grammatik:** NomenausAdjektivennach “etwas”und “nichts” NomenausdemInfinitiv von Verben, zusammegesetzteNomen und ihreArtikel. Adjektiveim Nom.und Akk.nachunbestimmten Artikel, Negativartikel und Possessivartikel.	6

Text Book:

1. Studio d A1. Deutsch alsFremdsprache with CD.(KursbuchundSprachtraining).

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Reference:

1. German for Dummies
2. Schulz Griesbach

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HS-412: FRENCH LANGUAGE - II

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs
Prerequisite							
HS 303: FRENCH LANGUAGE - I							

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Grammar and Vocabulary**: The second group verbs: Finir, rougir, grossir, grandir. “Les preposition de temps”: à, en, le, de 7h à 8h, jusqu’ à, vers. Listening and Speaking – the semi- vowels: Voilà, pollutant. Writing - thedays of the week, months, technical subjects, time, “les spécialitésscientifiques et l’ annéeuniversitaire, paragraph writing about time table. **Reading:** Reading of the text and comprehension – answering questions.	**6**
II	**Grammar and Vocabulary**: The adjectives, the nationality, feminine & masculinenoun forms “les métiersscientifiques”. Listening and Speaking – Vowels: soirée, année, près de, très. Writing: Countries name, nationality, “les métiersscientifiques”, numbers from:69 to infitive and some measures of unit. Reading Comprehension: reading a text.	**6**
III	**Grammar and Vocabulary:** near future, The demonstrative adjectives, Express the aim by using the verb, Listening and Speaking –“La liaison interdite – enhaut”. Writing – some scientific terms, French expressions to accept an invitation. Sentence framing. Reading Comprehension – reading a text.	**6**
IV	**Grammar and Vocabulary:**the verbs: manger, boire, the partitive articles **Listening and Speaking:** “le ‘e’ caduc Writing- the food, the ingredients, fruits, vegetables, expression of quantity, paragraph writing about food habits. Reading – reading a text.	**6**

Text Book:

1. Tech French

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Reference Book:

1. French for Dummies.
2. French made easy: Goyal publishers.
3. Panorama.

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CE-407: GEOTECHNICAL ENGG. LAB –I

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	2 hrs

Note: A minimum eight practical's to be performed out of following:

1.	Field Density using Core Cutter method.	
2.	Field Density using Sand replacement method.	
3.	Natural moisture content using Oven Drying method.	
4.	Field identification of Fine Grained soils.	
5.	Specific gravity of Soil grains.	
6.	Grain size distribution by Sieve Analysis.	
7.	Grain size distribution by Hydrometer Analysis.	
8.	Consistency limits by Liquid limit, Plastic limit and Shrinkage limit.	
9.	Permeability test using Constant Head test method / Falling Head method.	
10.	Compaction test: Standard Proctor test/ Modified Proctor test.	
11.	Relative density.	
12.	Consolidation Test.	
13.	Triaxial Test (UU)	
14.	Direct Shear Test.	
15.	Unconfined Compression Strength Test.	
16.	California Bearing Ratio.	

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CE-408: SURVEYING LAB –II

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
0	0	3	2	30	20	50	2 hrs

Note: A minimum eight practicals to be performed out of following List:

List of Experiments:		
1.	Determination of constants of Tacheometer	
2.	Determination of elevation of points by Tacheometric surveying	
3.	Determination of elevation of points and horizontal distance between them by Tacheometric survey.	
4.	Determination of gradient of given length of road by Tacheometric survey.	
5.	Setting out of simple circular curve by offsets from chord produced and Rankinemethod.	
6.	Setting out of simple transition curve by tangential angle method	
7.	Use of Total Station.	
8.	Study of Toposheets.	
9.	SURVEY PROJECT: Survey project should be carried out for minimum 2 days in any one of the following areas:	
	(a)	Road Project.
	(b)	Irrigation Project (canal alignment, watershed demarking, contouring)
	(c)	Water Supply Project.

After completion of survey, students have to complete profile, cross-section and volume calculation (Cut & Fill) using appropriate software wherever required.

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CE-410: COMPUTER AIDED BUILDING DRAWING LAB

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	2 hrs

Note: A minimum six drawings must be made out of following list:

List of Drawings:	
1.	Getting started with AutoCAD.
2.	Understanding the basic commands.
3.	Executing Electric drawings.
4.	Executing Mechanical drawings.
5.	Drawing a civil engineering structures with design notations.
6.	Drawing various building plans and elevations.
7.	Drawing panelled doors, glazed windows and ventilators in wood.
8.	Drawing roof truss in structural steel sections
9.	Executing a spiral stair case in 3D.

Reference Books:

1. AutoCAD Manual.
2. Balagopal T.S. Prabhu, Building drawing and detailing, Spades Publishers
3. Shah & Kale, Building Drawing, Tata McGraw Hill
4. B.P. Verma, Civil Engineering Drawing and housing Planning, Khanna Publishers

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SEMESTER-V

CE-501: LIMIT STATE DESIGN OF CONCRETE STRUCTURES – I

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

Note: ***Code of practice for Plain and Reinforced Concrete,*** IS 456-2000 is permitted in the examination.

COURSE OBJECTIVE:

To introduce different types of philosophies for the design of basic structural components such as beams, slabs, columns, footings which form part of any structural system with reference to Indian standard code of practice.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Reinforced Concrete Materials:** Cement, classification and composition of cement, aggregate, water, water-cement ratio, admixtures, grades of concrete and characteristic strength. Design of concrete mixes and acceptability criterion. Reinforcing steel – types, sizes and grades. Introduction to Loading codes. **Methods of Design of Concrete Structures:** Design philosophies of working stress method, ultimate load method and limit state method (LSM), advantages of limit state method, limit states, partial safety factors for materials and loads, design stress-strain curve for concrete and steel.	**7**
II	**Limit State Design for Flexure:** Assumptions for limit state of collapse due to flexure, analysis and design of singly and doubly reinforced rectangular and flanged beams, stress blocks parameters, ultimate and limiting moment of resistance, limiting percentage tensile steel, and curtailment of tension reinforcement. Design of slabs – cover, effective span to depth ratio, design shear strength of concrete in slabs, deflection control, one-way and two-way actions of slabs, and design of one-way, two-way and continuous slabs subjected to uniformly distributed loads for various boundary conditions.	**8**

III	**Limit State Design for Shear:** Distribution of shear stress in beams, nominal shear stress, critical sections for shear design, design shear strength and design of shear reinforcement. **Limit State Design for Torsion:** Torsional stiffness, design strength in torsion, torsional shear stress and design for torsional reinforcement. **Limit State Design for Bond:** Introduction, bond stress, anchorage, development length, bond failure, bond strength, anchoring of reinforcement and reinforcement splicing.	**6**
IV	**Limit State Design of Stair Cases:** Types, geometrical configurations, structural classifications, loads, design of simple staircases – straight (with and without intermediate landing), quarter turn and dog legged stairs. **Limit State Design of Compression Members:** Types of columns – braced and unbraced columns, effective length, minimum eccentricity, design of short rectangular and circular columns for axial load and axial load with uniaxial bending. Use of design charts. Slender columns.	**8**

Text Books:

1. A. K. Jain, "***Reinforced Concrete-Limit State Design***", Nem Chand & Bros., Roorkee.
2. P.C. Varghese, "***Limit State Design of Reinforced Concrete*",** Prentice Hall of India Pvt. Ltd., New Delhi.
3. S. UnnikrishnaPillai& D. Menon, "***Reinforced Concrete Design*",** (Third edition), Tata McGraw Hill,.

Reference Books:

1. B. P. Huges, "***Limit State Theory for Reinforced Concrete Design***", Pitman.
2. Shah &Karve, "***Limit State Theory &Design of Reinforced Concrete (I.S. 2000-456)***", Structures Publications, Pune.
3. M. L. Gambhir, "***Fundamentals of Reinforced Concrete Design***", Printice Hall of India, Pvt. Ltd., New Delhi.
4. IS Codes (latest): IS: 456, IS: 875(all parts), IS: 13920& SP: 16.

CE-502: STRUCTURAL ANALYSIS – II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE OBJECTIVE:

To introduce different methods of analysis for structural components. At the end of the course the student will be able apply these methods to analyse indeterminate structural components.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Force Methods**: Introduction, method of consistent deformation, Castigliano's theorems, analysis of statically indeterminate beams, trusses and frames. **Influence Line Diagram for Indeterminate Structures:** Influence lines for indeterminate beams and trusses, Muller-Breslau Principles and qualitative plot of influence lines, influence lines for reaction, shear and bending moment in beams.	**8**
II	**Slope-Deflection Method:** Introduction, degrees of freedom, slope and deflection equations. Application to beams including settlement of supports, analysis of single bay-single storey portal frames including side sway. **Moment Distribution Method:** Introduction, stiffness and carry over factors, distribution factors, analysis of continuous beams with and without sinking of supports, single bay-single storey portal frames including sway.	**6**
III	**Approximate Methods:** Introduction, substitute frame analysis by two cycle method. Assumptions in approximate analysis, application of approximate methods of analysis to building frames by portal and cantilever method (up to two bays and two storeys only).	**4**
IV	**Flexibility Method:** Fundamental concepts, co-ordinates, general procedure, analysis of beams, rigid jointed plane frames and trusses (involving not more than three unknowns).	**10**

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	Stiffness Method: Fundamental concepts, member coordinates, element and global stiffness matrices, transformation of stiffness matrices, load vectors and displacement vectors.Analysis continuous beams, pin-jointed plane frames, and rigid jointed plane frames (Involving not more than three unknowns).	

Text Books:

1. R. C. Hibbeler, "***Structures Analysis"***, Pearson Prentice Hall.
2. B.C. Punmia, "***Strength of Materials and Mechanics of Solids"***, Vol-II, Laxmi Publications, New Delhi.

Reference Books:

1. Vazirani & Ratwani, "**Analysis of Structures"**, Khanna Publications.
2. Pandit and Gupta, "**Structural Analysis (Matrix Approach)"**, Tata McGraw Hill, New Delhi.
3. C. S. Reddy, "**Structural Analysis"**, Tata McGraw Hill, New Delhi.

CE-503: GEOTECHNICAL ENGINEERING–II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
2	2	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

To impart knowledge and skill necessary for soil investigations, understand earth pressure theories, safe bearing capacity and settlement of soils, shallow foundation and deep foundation (pile foundation only).

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Soil Exploration and Soil Sampling:** Planning for sub-surface exploration, depth and spacing of exploration, methods of exploration, field testing. Geo-physical Exploration Methods: seismic refraction and electrical resistivity method. Methods of Boring: auger boring, wash boring, percussion boring and rotary drilling.Preparation of bore-log and soil investigation report. Soil Sampling: Disturbed and undisturbed soil samples, features of sampler affecting soil disturbance.	**7**
II	**Earth Pressure in Soils:** Types of earth pressures, active and passive earth pressure, Coloumb's wedge theory and Culmanns graphical construction for active and passive earth pressure.	**5**
III	**Shallow Foundations:** Types of shallow foundations, factors effecting locations of foundation, design considerations of shallow foundations, foundations on expansive soils. **Bearing Capacity of Soil:** Introduction, safe bearing capacity and allowable bearing pressure, estimation of ultimate bearing capacity based on Terzagis's theory, in-situ tests such as static and dynamic cone penetration tests, and palte test.general and local shear failure conditions, allowable bearing pressure based on N-values, bearing capacity from plate load tests.	**8**
IV	**Deep Foundations:** Types of deep foundations and load transfer mechanism. Pile foundations– classification, pile load carrying capacity from static &dynamic formulae	**8**

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	(ENR and Hiley), pile load test, group action of piles and negative skin friction. **Settlement Analysis:** Causes of settlement, computation of settlement, allowable settlement, measures to reduce settlement, introduction foundations on expansive and collapsible soils.	

Text Books:

1. B.C.Punmia, ***"Soil Mechanics and Foundation Engg.",***Laxmi Publications.
2. K.R.Arora, ***"Soil Mechanics and Foundation Engg.",*** Standard Publishers, New Delhi

Reference Books:

1. Murthy, V.N.S, ***"Textbook of Soil Mechanics and Foundation Engineering",*** CBS Publishers and Distributors, New Delhi.
2. K. Terzaghi& R.B. Peck,***"Soil Mechanics in Engineering Practice",*** Wiley Publishers.
3. N.V. Nayak, ***"Foundation Design Manual"***,DhanpatRai Publications, New Delhi.
4. GopalRanjan&Rao, ***"Basic &Applied Soil Mechanics",*** New Age international Publisher.
5. Das,.B.M., ***"Principles of Foundation Engineering"***, Thomson Books.

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CE-504: MECHANICS OF FLUIDS – II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE OBJECTIVE:

To introduce viscous flow and boundary layer theories, flow in open channels and its characteristics and hydraulic machinery.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Viscous Flow:** Reynolds number and Reynolds experiment, flow of viscous fluid through circular pipe - Hagen Poiseuille formula. Flow of viscous fluid between two parallel fixed plates. **Boundary Layer Theory:** Introduction, development of boundary layer over a flat plate, boundary layer thickness, moment integral equation, boundary layer over rough surface, drag on a flat plate due to laminar and turbulent boundary layer, boundary layer separation and its control.	**8**
II	**Uniform Flow in Open Channels:** Characteristics of uniform flow, Chezy's and Manning's formulae, uniform flow computations, most efficient channel sections, Manning's roughness coefficient and equivalent roughness. **Depth-Energy Relationships:** Specific energy, specific force, specific energy and specific force diagrams, critical depth, critical flow computations.	**8**
III	**Gradually Varied Flow:** Theory and analysis of gradually varied flow in prismatic channels, classification of surface profiles. **Rapidly Varied Flow in Open Channels:** Theory of hydraulic jump, application of momentum equation to hydraulic jump in rectangular channel - length, height and location of jump in rectangular channel. Energy dissipation.	**8**

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IV	**Turbo machinery:** Application of momentum principle, impact of jets on plane and curved plates. **Turbines:** Types, Study of Pelton, Kaplan and Francis turbines, velocity triangles, efficiency, work done, specific speed, unit quantities, performance of turbines, governing of turbines. **Pumps:** Centrifugal pumps – classification, blade angle, velocity triangle, efficiency, specific speed, characteristic curves.Reciprocating Pumps- Principle of working, slip, work done, frictional resistance and separation.	**9**

Text Books:

1. K. Subramanya, ***"Open Channel Flow",*** Tata McGraw Hill, New Delhi.
2. P. N. Modi and S.M. Seth, ***"Hydraulics, Fluid Mechanics and Hydraulic Machines",*** Standard Book Home, New Delhi.
3. R.K. Rajput, ***"Text Book of Fluid Mechanics and Hydraulic Machinery",*** S. Chand & Company, New Delhi.

Reference Books:

1. J.F., Douglas, J.M, Gasiorek, and J.A. Swaffield, ***"Fluid Mechanics",*** Pearson Education India, 2002.
2. Das M.M. Das, "***Fluid Mechanics and Turbimachines",*** Prentice Hall of India (P) Ltd New Delhi.
3. K.R. Arora, ***"Fluid Mechanics, Hydraulic and Hydraulic Machines,"*** Standard Publishersand Distributors, New Delhi.
4. VenTe Chow, ***"Open Channel Hydraulics",*** Tata McGraw Hill.

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CE-505: ENVIRONMENTAL ENGINEERING– I

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

Students shall be imparted knowledge of Environmental Engineering using basic principles of Fluid mechanics, Biological and Chemical Science to develop basic and empirical equations for Environmental Engineering Applications.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Sources of Water:** Types of sources—surface and ground Surface Water Sources: investigations for reservoir planning, determination of storage capacity and yield from reservoir. Intakes structures for surface water sources—lakes, streams and rivers, impounding reservoir and canal. Ground Water Sources: Types of aquifer and aquifer parameters, well hydraulics and Darcy's law. Rain water harvesting.	**8**
II	**Water Quantity/Demand:** Population forecast—arithmetic, incremental and geometric methods. **Estimation of Water Requirement:** Design period, per capita consumption, factors affecting per capita demand and fluctuations in demand pattern. **Quality of Water:** Common impurities of water, physical, chemical and biological characteristics of water, IS and WHO water quality standards, water borne diseases, water pollution, role of regulatory bodies &local bodies. Water Act 1974.	**8**

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III	**Water Purification:** Objective of water treatment, unit operations, introduction to physical, chemical and biological processes. Mixing, aeration, sedimentation, coagulation, flocculation and filtration–slow and rapid sand filters. **Softening of Water:** Definition, methods of removal of hardness by lime soda process and zeolite process, RO & Membrane technique. **Disinfection of Water:** Chlorination, chlorine demand, residual chlorine, use of bleaching powder, UV irradiation treatment.	**8**
IV	**Conveyance of Water:** Conveyance of water, pumping stations. **Distribution of Water:** Methods of distribution–direct supply from mains, direct pumping, hydro-pneumatic systems, overhead tanks distribution—pipes, laying of mains and pipes, jointing, backflow prevention, inspection and testing after installation. **Plumbing Services:** Terminology used for home plumbing systems and distribution of water for multi-story buildings.	**8**

Text Books:

1. Garg, S. K, ***"Environmental Engineering",*** Vol. I, Khannan Publishers, New Delhi.
2. Duggal, K. N, ***"Elements of Environmental Engineering",*** S. Chand & Company Ltd., New Delhi.
3. S.M. Patil**,*"Plumbing Engineering - Theory, design and Practice"***.

Reference Books:

1. Paneerselvam, R, ***"Environmental Engineering",*** Vol. I, SPGS Publishers Chennai.
2. Hammer, M. J. ***"Water and Wastewater Technology",*** Prentice Hall.
3. Peavy, H. S.,Rowe, D. R. and G. Tchobanoglous, ***"Environmental Engineering",*** McGraw-Hill Publishing Co., Delhi.
4. ***"Manual on Water Supply and Treatment,"*** CPHEEO, Ministry of Urban Development, Government of India, New Delhi.

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CE-506: TRANSPORTATION ENGINEERING – I

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE OBJECTIVE:

To introduce the elements related to highway engineering. The subject knowledge of traffic engineering, geometric design and pavement design shall be imparted along with highway material and construction.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Highway Planning and Alignment:** Significance of highway planning, history of highway development in India, classification of highways, factors affecting highway alignment, engineering surveys for alignment –conventional and modern methods. **Traffic Engineering:** Introduction, traffic characteristics, traffic studies, traffic flow characteristics, traffic control devices - roadway delineators, hazard markers, object marker, speed breakers and rumble strips etc., Traffic signs and road markings.	**8**
II	**Geometric Design of Highways:** Typical cross-sections of highway, cross sectional elements – payment structure, camber, width of carriageway, width of formation, road margins, widening of pavements at horizontal curves, right of way, super elevation, design speed and sight distances. Design of horizontal and Vertical alignments, IRC specifications.	**8**
III	**Highway Materials:** Sub grade soil, stone aggregates, binding materials (bitumen, emulsion tar and cut back). Introduction to modified binders and Geo-synthetics. **Design of Highway Pavements:** Flexible pavement and their design, IRC: 37-2012 method of design, rigid pavement and their design.	**8**
IV	**Highway Construction:** Construction practices including modern materials, construction of Water Bound Macadam and Soil Stabilized Roads. Use of Glass, Fiber,	**8**

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	Plastic, Geo-textiles and Geo-grids. Strengthening of existing pavements–types of overlays, design of different types of overlays. **Highway Evaluation:** Pavement distress in flexible and rigid pavements. Pavement evaluation - roughness, present serviceability index, skid resistance, evaluation by deflection measurement.	

Software Required: Introduction to MX Roads software.

Text Books:

1. Khanna, S. K., and Justo C.E.G., ***"Highway Engineering",***Nem Chand & Bros.
2. Kadiyali, L. R., ***"Traffic Engineering and Transport Planning",***Khanna Publishers.

Reference Books:

1. Chakraborthy P. and A. Das,***"Principles of Transportation Engineering",*** Prentice Hall of India.
2. Morlok, E.R., ***"An Introduction to Transportation Engineering and Planning",*** McGraw Hill, NY.
3. Hay, W.W., ***"Introduction to transportation Engineering",*** John Wiley & Sons, NY.
4. Papacostas C.S., ***"Fundamentals of Transportation Engineering",*** Prentice Hall of India.

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CE - 508: ELEMENTS OF CIVIL ENGINEERING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVE:

The course aims to make all engineering students aware of the properties and applications of different types of construction materials used in structures.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Bricks:** Manufacturing of bricks, Classification of bricks , Properties and uses of First Class, Second Class, Third Class and Over burnt bricks , Characteristics of good brick , Size and weight of a standard brick , Composition of brick earth , Test for burnt clay bricks, Fire bricks, its properties, uses and availability , Applications of bricks, Bonds in Bricks Masonry.	**8**
II	**Cement:** Uses of cement Composition of Portland cement ,Setting and hardening of cement , Types of cement, their properties and uses , Ordinary Portland Cement (OPC) , Rapid Hardening Cement ,High Alumina Cement , White Cement , Coloured Cement , Pozzolana Portland Cement , Sulphate Resisting Cement , Storage of Cement **Mortar:** Function of mortar ,, Preparation of cement mortar, lime mortar, lime cement mortar and their , Proportion of mortar for different building works Different types of sand , Bulking of Sand	**8**
III	**Concrete:** , Mixing, placing and uses of lime concrete and cement concrete, aggregate and its grading ,Placing of concrete , Compaction of concrete , Curing of concrete 6.5 Reinforced cement concrete (RCC) , Necessity of providing reinforcement , Properties of RCC :Elasticity, Creep & Shrinkage- Modulus of elasticity- - Posisson's ratio- Creep of concrete- Factors influencing creep- Relation between creep & time- Nature of creep- Effects of creep- Shrinkage - types of shrinkage, Use of Concrete Blocks	**8**
IV	**Foundations:** Different types of foundations with reference to advantage of one over the other, Foundations of different types with reference to method of construction. Foundations for special circumstance. Machine foundations. **Special Treatments in Buildings:** Fire resistant, water resistant, thermal insulation,	**8**

	acoustical construction and anti-termite treatment in buildings.	

Text Books:

1. ***"Properties of Concrete"*** by A.M.Naville
2. ***"Building Materials"*** by S K Duggal
3. ***"Concrete Technology"*** by M.S.Shetty. - S.Chand& Co.

Reference Books:

1. ***"Engineering materials"*** by Rangwala
2. ***"Planning and Designing of residential building***" by YN Raja Rao, Y Subrahmanyam

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CE-509: OPTIMIZATION METHODS IN ENGINEERING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVE:

To introduce the concept and methods of optimizations. At the end of the course, the students shall be able to use the different tool of optimization to practical problems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Optimization problem formulation, optimization algorithms, applications and examples, different optimization methods available.	7
II	**Single Variable Optimization:** Optimization criteria, single variable optimization methods–exhaustive search method, Fibonacci search method, Golden search method, Newton Raphson method and Bisection method.	7
III	**Multi Objective Optimization:** Optimization criteria, different search methods– unidirectional search method, direct search method, evolutionary optimization method, Powells conjugate direction method, Newton's method and variable metric method.	8
IV	**Specialized Methods:** Integer programming, geometric programming, simulated annealing, global optimization using steep descent method, simulated annealing.	8

Text Books:

1. Kalyanmoy Deb, ***"Optimization for Engineering design",*** Prentice Hall, India,.
2.

Reference Books:

1. Taha, ***"Operations Research",*** TMH.

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CE-510: ENVIRONMENTAL IMPACT ASSESSMENT

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVE:

The primary objective of the course is to familiarize the students with environmental impact analysis.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	Evolution of environmental impact assessment (EIA), EIA at project,regional and policy levels,strategic EIA, EIA process, screening and scoping criteria,rapid and comprehensive EIA,specialized areas - environmental health impact assessment and environmental risk analysis. Economic valuation methods and cost-benefit analysis.	**8**
II	Practical applications of EIA, EIA methodologies and baseline data collection.	**6**
III	Prediction and assessment of impacts on physical, biological and socio-economic environment. Environmental management plan, post project monitoring, EIA report and EIS, review process.	**6**
IV	Case studies on project, regional and sectoral EIA, legislative and environmental clearance procedures in India and other countries, siting criteria, CRZ, public participation, resettlement and rehabilitation.	**7**

Text Books:

1. B. M. Noble, ***"Introduction to Environmental Impact Assessment: A Guide to Principles and Practice",***. Oxford University Press, USA.
2. J. Glasson, ***"Introduction to Environmental Impact Assesment: Principles, and Procedures, Process, Practice and Prospects (The Natural and Built Environment Series)",***Routledge.

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Reference Books:

1. P. Morris, ***"Methods of Environmental Impact Assessment (The Natural and Built Environment Series),"*** Spon Press, USA.
2. R. K. Jain, L. V. Urban, G. S., Stacey, Harold, E. Balbach, ***"Environmental Assessment",*** McGraw-Hill Professional.
3. B. B. Marriott, ***"Environmental Impact Assessment: A Practical Guide",*** McGraw-Hill Professional.
4. D. P. Lawrence, ***"Environmental Impact Assessment: Practical Solutions to Recurrent Problems",*** Wiley-Interscience.

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CE- 511: TRANSPORTATION ENGINEERING LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	20	30	50	2 hrs

Objectives

To conduct the major and minor tests on road aggregates and bitumen.

LIST OF EXPERIMENTS:

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 7-8 experiments must be performed by a student during the semester:

1. Tests on Road Aggregates

a. Aggregate Crushing Value test
b. Los Angeles Abrasion test
c. Aggregate Impact test
d. Specific Gravity and Water absorption tests
e. Shape test (Elongation & Flakiness)
f. Stripping value of road aggregate

2. Tests on Bitumen

a. Penetration test
b. Softening point test
c. Specific gravity test
d. Viscosity test
e. Ductility test

3. **Field test:**

a. Traffic survey, Axle load survey and pavement condition survey.

Reference Books:

1. Khanna, S. K. and Justo, C. E. G., Highway Material Testing, Nem Chand Bros., Roorkee.
2. Relevant IS and IRS Codes

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CE-512: ENVIRONMENTAL ENGINEERING LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	20	30	50	2 hrs

Objectives

To conduct major tests on water and carry detailed analysis of water samples collected from field. After the course, the students shall be able to determine the quality of water samples.

LIST OF EXPERIMENTS:

Following is the suggested list of practicals out of which a minimum of 7 -8 experiments must be performed by a student during the semester:

To determine the following parameters for the given sample of water:-

1. color, pH and turbidity.
2. total Solids, Suspended Solids and Dissolved Solids.
3. concentration of Chlorides.
4. carbonate, bi-carbonate and hydroxide alkalinity.
5. hardness.
6. concentration of Fluorides.
7. concentration of Iron.
8. Optimum Alum Dose through Jar Test.
9. residual Chlorine.
10. chlorine Demand.
11. available Chlorine Percentage in a given sample of bleaching powder.
12. amount of Dissolved Oxygen (DO).
13. Biochemical Oxygen Demand (BOD) .
14. Chemical Oxygen Demand (COD).
15. Bacteriological quality of water: presumptive test, confirmative test and Determination of MPN.

Reference Books:

1. IS 10500 Indian Standards for drinking water.
2. IS 2490 Indian Standards for Industrial and sewage effluent discharge.

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CE - 513: COMPUTER AIDED DESIGN PRACTICE LAB-I

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	2 hrs

Objectives

The objective of the course is to help students to acquire fundamental and working knowledge of STAAD.Pro, SAP and MATLAB so as to enable them perform computationally intensive tasks faster than with traditional programming languages such as C, C++, and FORTRAN. This course is also intended to explore the impact of these software packages in the industry and Academic.

List of Exercises:

Students shall complete the following exercise during the semester:

1. Concept of computer aided design and introduction of software packages used for analysis and design of structures including STAAD.Pro and SAP.
2. Model generation for a building, assigning material properties, loads, creating load combination, analysis and design of a double storied building frame using STAAD.Pro and check by any of analytical methods.
3. Introduction to MATLAB, MATLAB tool box and MATLAB functions.
4. Hands on Civil Engineering problems using MATLAB.

NOTE:

1. Students are supposed to document each exercise/tutorial.

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RECOMMENDED SOFTWARE PACKAGES:

The following packages or their equivalent are recommended for the above listed exercises:

AutoCAD, SAP, STAAD.Pro, MATLAB, Grapher/Sigmaplot, ANSYS, NISA.

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SEMESTER-VI

CE-601: DESIGN OF CONCRETE STRUCTURES – II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

Note: ***Code of practice for Plain and Reinforced Concrete*** IS 456-2000 is permitted in the examination.

COURSE OBJECTIVE:

To introduce the design of concrete structures such as foundations, retaining walls, water retaining structures and basic philosophy of earthquake resistant design with reference to Indian standard code of practice.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Design of Footings:** Types of footings, safe bearing capacity of soil, depth of foundation, Indian standard code (IS: 456-2000) recommendations for footings – minimum cover, thickness at the edge of footing, bending moment, shear force, punching shear, tensile reinforcement, etc. Design of footings for walls, isolated columns, combined rectangular and trapezoidal footings.	**9**
II	**Design of Retaining Walls:** Types of retaining walls, stability of cantilever retaining walls. Design and detailing of cantilever and counter fort retaining walls with horizontal and sloping backfills.	**8**
II	**Design of Water Tank:** Classification of water tank, method of analysis, permissible stresses, codal provisions. Design of circular and rectangular under-ground water tanks using IS code method. Design of elevated water tank with Intze type of container, frame and shaft type of staging and foundation considering effect of earthquake and wind forces.	**10**

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IV	**Introduction to Earthquake Resistant Design of Buildings:** Behavior of concrete and steel structures under earthquake loads, terminology used, general principles of earthquake resistant design - ductility, requirements and advantages of ductility, factors affecting ductility, design lateral forces, distribution of design forces along the height of building, seismic coefficient method. Detailing of reinforcement for ductility as per IS: 13920-1993 in beams, columns and beam-column connections; Special confining reinforcement.	**9**

Text Books:

1. A. K. Jain, ***"Reinforced Concrete-Limit State Design",***Nem Chand & Bros., Roorkee.
2. P.C. Varghese,***"Limit State Design of Reinforced Concrete",*** Prentice Hall of India Pvt. Ltd., New Delhi.
3. S. U. Pillai and DevdasMenon, ***"Reinforced Concrete Design",*** Tata McGraw Hill, New Delhi.

Reference Books:

1. Shah & Karve, ***"Limit State Theory & Design of Reinforced Concrete (I.S. 2000-456)" ,*** Structures Publications, Pune, 2014.
2. M. L. Gambhir, ***"Fundamentals of Reinforced Concrete Design",***Printice Hall of India, Pvt. Ltd., New Delhi.
3. N. Krishna Raju, "***Advanced Reinforced Concrete Design",*** CBS Publishers.
4. R. Karve and V. L. Shah, ***"Illustrated Design of Reinforced Concrete Buildings",*** Structures Publishers.
5. IS Codes (latest): IS: 456, IS: 875 (all parts), IS: 1893 (P - 1, 2), IS: 4326, IS: 13920, IS: 3370 (P - 1 to 4), SP: 16, SP: 34

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CE-602: TRANSPORTATION ENGINEERING - II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
2	2	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

To introduce the elements related to railway engineering, airport engineering and intelligent transport systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Railway Engineering:** Role of railways in transportation system, railways and highways comparisons, classification of Indian railways, railway zones in India, railway gauges, creep, coning of wheels and traction resistance. **Permanent Ways:** Rail & rail joints (welding of rails, LWR, SWR, CWR), Sleepers, Ballast, Formation and its drainage, track fitting and fastening, Stresses in railway tracks.	**7**
II	**Geometric Design of Railway Tracks**: Alignment and grades, cross section and its elements (at filling & cutting), grade compensation, cant and cant deficiency, negative cant and widening of gauges on curves, curves used for railway track (horizontal and vertical curves), level crossing, points and crossing, stations and yards, signals and interlocking system. **Railway System in the Urban Area:** Surface railways, Elevated railways, Underground railway .	**8**

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III	**Airport Overview:** Air transportation in India, classification of airports, airport terminology, outline of technical planning process, terminal area and building – terminal location, planning of terminal building, hangers and parking. **Runway Geometric:** Geometric design of runway & taxiway, visual aids – markings, lighting and signage, airport layout –runway orientation and runway length.	**9**
IV	**Runway Pavement Design:** Design of flexible and rigid pavement. **Intelligent Transport Systems (ITS):** Introduction, objectives, benefits, ITS tools - detectors, GPS, ITS Architecture, Components and Standards. ITS applications.	**6**

Text Books:

1. L.R. Kadiyali, ***"Traffic Engineering and Transportation Planning",*** Khanna Publishers
2. Saxena S.C. and Arora S. P., ***"A Course of Railway Engineering",*** DhanpatRai, New Delhi
3. Khanna and Arora, ***"Airport Planning & Design",*** Nemchand Bros, Roorkee

Reference Books:

1. Satish Chandra and Agarwal, M.M (2007) ***"Railway Engineering",***Oxford Higher Education, University Press New Delhi.
2. Agarwal, M. M. (1991). ***Indian Railway Track***, Sachdeva Press, New Delhi.
3. Horonjeff&Mcklerey, ***Planning & Design of Airport***
4. Rao G.V., ***Airport Engineering,*** Tata McGraw Hill.
5. http://www.abc.net.au/news/stories/2007/06/28/1964129.htm

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CE-603: ENVIRONMENTAL ENGINEERING - II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

To introduce the importance and methods of sewage treatment and solid waste management with special attention to design and applications.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Wastewater and Wastewater Characteristics:** Wastewater composition,Physical Chemical and Biological characteristics of wastewater,significance of BOD, COD, BOD, estimations of wastewater and storm water. **Wastewater Collection and Conveyance:** Separate and combined systems, patterns of sewage collection systems.Types and shapes of sewers, sewer materials, hydraulics of flow in sewers.	6
II	**Primary Treatment of Sewage:** Anaerobic Processes- anaerobic digester, UASB reactor, septic tanks, Imhoff tank, sludge handling, disposal of effluent and sludge. **Secondary Treatment of Sewage:** Biological wastewater treatment systems - aerobic processes, activated sludge process and its modifications, trickling filter, RBC,Oxidation Ponds and Aerated lagoons.	7
III	**Design and Construction of Sewers:** Design of severs - design period, design flow for separate, storm and combined sewers, full flow and partial flow conditions, design of separate sewers using Manning's formula. Sever cconstruction: shoring, trenching, laying to grade, jointing and testing of sewers. **Sewer Appurtenances:** Plumbing system for buildings, One pipe and two pipe systems, sanitary fittings and appliances -traps, anti-syphonage, inspection chambers,	7

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	intercepting traps, manhole, street inlets, storm water overflows, inverted siphons.	
IV	**Wastewater Disposal:** Wastewater disposal standards, methods of disposal, dilution, self-purification of surface water bodies (Streeter Phelp's equation, Oxygen sag curve), land disposal, sewage farming, deep well injection, soil dispersion systems. **Introduction to Solid Waste Management:** Generation, onsite storage, collection, separation, processing and disposal.	**7**

Text Books:

1. M. J. Hammer, "***Water and Wastewater Technology***", Prentice Hall.
2. S. K. Garg, "**Sewage Disposal & Air Pollution**", Khanna Publishers, New Delhi.
3. M. N. Rao& H. V.N.Rao, "**Air Pollution",** McGraw Hill Publication.

Reference Book:

1. Duggal . K.N., "**Elements of Environmental Engineering**", S. Chand & Com. Ltd., New Delhi.
2. Metcalf & Eddy Inc., George Tchobanoglous, Franklin, L., Burton, H. D. Stensel, "***Wastewater Engineering: Treatment and Reuse".***
3. T. J. McGhee, E. W. Steel, "***Water Supply and Sewerage***", McGraw-Hill College.
4. ***"Manual on Sewerage & Sewage Treatment"***, CPHEEO, Ministry of Urban Development, Government of India, New Delhi.

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CE- 604: HYDROLOGY AND WATER RESOURCES ENGG.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	1	0	4	40	60	100	3 hrs

COURSE OBJECTIVE:

To introduce hydrological and meteorological processes namely precipitation, evaporation, infiltration, and runoff.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Hydrologic cycle, climate and water availability, water balances. **Precipitation and Evaporation:** Precipitation– forms, classification, variability, measurement, data analysis, evaporation and its measurement, evapotranspiration and its measurement, Penman Monteith method.	9
II	**Infiltration:** Factors affecting infiltration, estimation- Horton's equation and Green Ampt method, infiltration Indices. **Hyetograph and Hydrograph Analysis:** Runoff – drainage basin characteristics, hyetograph and hydrograph concepts, assumptions and limitations of unit hydrograph, derivation of unit hydrograph, S-hydrograph, flow duration curve.	8
III	**Reservoirs:** Types or reservoir,site selection, geological investigations, zones of storage, safe yield, reservoir capacity, reservoir sedimentation and control. **Hydrologic Analysis:** Design flood, flood estimation, frequency analysis, flood routing through reservoirs and open channels.	8
IV	**Ground Water Hydrology:** Zones of underground water, aquifers, aquifer parameters – porosity, specific yield, permeability, transmissibility and storage coefficient. Darcy's law, determination of discharge through unconfined and confined aquifers with steady flow	9

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	conditions, Well hydraulics, types of wells, well construction and well development. **Drought Management and Water Harvesting:** Definition of drought, causes, measures for water conservation and augmentation, drought contingency planning, water harvesting — rainwater collection, small dams, runoff enhancement, runoff collection, ponds, tanks.	

Text Books:

1. K. Subramanya, **"*Engineering Hydrology*",** Tata McGraw Hill Pub. Co. New Delhi.
2. R.K.Sharmaand, T.K.Sharma,**"*Hydrology and Water Resources Engineering*",** Dhanpat Rai Publications,NewDelhi.

Reference Books:

1. K.G. Rangaraju, ***"Flow in Open Channels",*** Tata McGraw Hill Pub. Co. Ltd., New Delhi.
2. Rajesh Srivastava, ***"Flow through Open Channel",*** Oxford Publication.
3. V.T. Chow, ***"Applied Hydrology*** McGraw Hill International, New York.
4. D.K. Todd, "***Groundwater Hydrology"***, John Wiley and Sons.

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CE- 605: ENGINEERING GEOLOGY AND ROCK MECHANICS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

To introduce hydrological and meteorological processes namely precipitation, evaporation, infiltration, and runoff.

COURSE CONTENT:

Content:

UNIT	CONTENT	No. of Hrs.
I	**General Geology:** Importance of Engg. Geology applied to Civil Engineering Practices.Weathering - definition, types and effect. Geological works of rivers, wind, glaciers asagents of erosion, transportation and deposition. **Rocks & Minerals:** Minerals, their identification, igneous, sedimentary &metamorphic rocks.	7
II	**Structural Geology:** Brief idea about stratification, apparent dip, true dip, strike and in-conformities. Folds, faults & joints - definition, classification with regard to civil engineering. **Engineering Geology:** Geological considerations for projects like tunnels, highways, foundation, dams, and reservoirs.	7
III	**Rock Mechanics:** Need of rock mechanics, application areas of rock mechanics in civil engineering, classification of rock and rock masses, empirical methods of tunnel design. **Engineering Properties of Rocks and Laboratory Measurement:** Uniaxial compression test, tensile tests, permeability test, shear tests, size and shape of specimen, rate of testing; Confining pressure, stress strain curves of typical rocks; failure theories, shear strength of intact and fissured rocks, effect of anisotropy, effect of saturation and temperature.	9

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IV	**In-situ Determination of Engg. Properties of Rock masses:** Necessity of in-situ tests, uniaxial load tests in tunnels and open excavations, cable tests, flat jack test, shear test, pressure tunnel test; Simple methods of determining in situ stresses, bore hole test. **Improvement in properties of Rock Masses:** Grouting for dams, caverns and tunnels. Rock reinforcement and rock bolting.	**7**

Text Books:

1. Parbin Singh, **"Engineering and General Geology",** 8th Edition, S K Kataria& Sons.
2. Chennkesavulu, n., ***"Engineering Geology",*** Mac-Millan, Publishers,India Ltd.

Reference Books:

1. Kesavvalu,***"Text Book of Engineering Geology"***, MacMillan India.
2. Harvey, J. C.,***"Geology for Geotechnical Engineers",*** Cambridge University Press.
3. Varghese,P. C.,***"Engineering Geology for Civil Engineering",*** PHI Learning & private Limited.
4. Krynine& Judd, "***principles of Engineering Geology &Geotechnics",*** CBS Publishers & Distribution.
5. Bell, F.G.,"***Fundamental of Engineering Geology Butterworths",*** Publications, New Delhi.
6. Gangopadhyay, S.,***"Engineering Geology",*** Oxford University press.

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CE- 606: CONCRETE TECHNOLOGY

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

To introduce hydrological and meteorological processes namely precipitation, evaporation, infiltration, and runoff.

COURSE CONTENT:

Content:

UNIT	CONTENT	No. of Hrs.
I	**Grades of Concrete:** Concrete for ordinary work, light weight concrete, high density concrete, workability, durability and strength requirements, effect of w/c ratio, acceptability criteria, laboratory testing of fresh and hardened concrete. **Concrete Mix Design:** Mix design for compressive strength by I.S. methods.	7
II	**High Performance Concrete:** Constituents of high grade concrete, various tests and application of high performance concrete. **Admixtures:** Plasticizers, retarders, accelerators and other admixtures, test on admixtures, chemistry and compatibility with concrete.	6
III	**Ready Mix Concrete:** Requirements of ready mix concrete, transit mixer details, mix design of RMC. **Concrete for Repairs and Rehabilitation of Structures**: Polymer concrete, fiber reinforced concrete, polymer impregnated concrete, polymer modified cement concrete and Ferro cement, different tests.	6
IV	**Non-Destructive Testing of Concrete:** Hammer test, ultrasonic pulse velocity test, load test, carbonation test, half cellpotentio-meter, corrosion of steel, core test and relevant provision of I.S. codes.	5

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Text Books:

1. ***Concrete technology, theory and practice"***, M.S. Shetty

Reference Books:

1. ***Properties of concrete***, Neville, El, Society & Pub.
2. Relevant I.S. codes.
3. Special Publication of ACI on Polymer concrete and FRC.
4. Proceedings of International Conferences on Polymer Concrete and FRC.

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CE - 608: REMOTE SENSING AND APPLICATIONS OF GIS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

To introduce the students to the basic concepts, principles of remote sensing, digital image processing, data types and the applications of remote sensing and GIS in various fields of civil engineering.

COURSE CONTENT:

UNIT	Content	No of hrs.
I	**Basic Concepts of Remote Sensing**: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Spectral properties of water bodies, introduction to digital data analysis.	7
II	**Geographic Information System:** Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, theoretical framework for GIS. **Raster GIS, Vector GIS:** File management, spatial data – layer based GIS and feature based GIS mapping. Introduction to Arc-GIS.	7
III	**GIS Spatial Analysis:** Computational analysis methods (CAM), visual analysis methods (VAM), data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.	6
IV	**Applications of GIS in Civil Engineering:** Application areas of GIS in Water resources, Transportation, Construction, Environment and Surveying, Land use/land cover in water resources.	8

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Text Books:

1. Narayana, L.R.A., "***Remote Sensing and its applications***" University Press.
2. Anji Reddy, M. ***"Textbook of Remote Sensing and Geographical Information System"***, BS Publications, Hyderabad.
3. Burrough P.A. and Rachel A. McDonell, "***Principles of Geographical Information Systems",*** Oxford Publication.

Reference Books:

1. C.P.Lo and Albert, K.W. ***"Yonng, Concepts & Techniques of GIS***, Prentice Hall (India) Publications.
2. M.Anji Reddy,"***Remote Sensing and Geographical Information Systems"***, B.S.Publications.
3. KangTsungChang, "***Geographical Information Systems"***, TMH Publications & Co.
4. S.Kumar, ***"Basics of Remote sensing & GIS",***Laxmi Publications.

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CE - 609: HYDRAULIC MACHINES

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

The objective of this course is to get exposure about the working principles, components, and functions of pumps and turbines.

COURSE CONTENT:

UNIT	Content	No of hrs.
I	**Impact of Jet on Vanes:** Impulse-momentum equation and its applications – Force exerted by a jet on stationary and moving flat, inclined and curved vanes –Force exerted by a jet on a series of curved vanes – Velocity triangles and expressions for work done – Problems.	8
II	**Centrifugal Pumps:** Classification of pumps – centrifugal, reciprocating submersible, rotary and vacuum pumps. Centrifugal Pumps: construction, working, and applications, performance – Characteristics, priming, work done and efficiencies. Reciprocating pump: component and working, discharge, work done, slip, indicator diagram, effect of acceleration and friction.	8
III	**Turbines:** Classification – Pelton, Francis and Kaplan turbines. Components, velocity triangles, work done & efficiency, specific speed, performance characteristics, selection of turbines, draft tube and governing of turbines.	8
IV	**Deep well pumps**: submersible, jet and airlift pumps, general principle of working(Numerical examples based only on velocity triangle are expected in the case of pumps and turbines).	**7**

Text Books:

1. Modi, P.N. and Seth, S.M, ***"Hydraulics and Fluid Mechanics",*** Standard Book House.

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2. Bansal, R. K., ***"Fluid Mechanics and Hydraulic Machines",***Laxmi Publications.

Reference Books:

1. Rajput, R.K, ***"Fluid Mechanics and Hydraulic Machines",*** S.Chand and Company Ltd.

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CE - 610: ENERGY EFFICIENT BUILDINGS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

The objective of this course is to get exposure about the design and construction of energy efficient buildings.

COURSE CONTENT:

UNIT	Content	No of hrs.
I	**Introduction:** Fundamentals of energy, Energy Production Systems, Heating, Ventilating and Air Conditioning, Solar Energy and Conservation, Energy Economic Analysis, Energy conservation and audits, Energy use in Residential & Commercial buildings. **Environment:** Energy and Resource conservation - Design of green buildings, Evaluation tools for building energy, Embodied and operating energy, Peak demand, Comfort and Indoor air quality, Visual and acoustical quality, Airborne emissions and waste management.	8
II	**Design:** Natural building design consideration, Energy efficient design strategies, Contextual factors, Longevity and process Assessment -Renewable energy sources and design. Introduction to Sunpath Diagrams and Trombe wall. **Advanced building Technologies:** Smart buildings, Economies and cost analysis. **Services:** Energy in building design, Energy efficient and environment friendly building, Thermal phenomena, thermal comfort, Indoor Air quality, Climate, sun and Solar radiations.	8

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III	**Energy Audit:** Types of energy audit, analysis of results, energy flow diagram, energy consumption/ unit production and identification of wastage. Priority of conservative measures - maintenance of management programme.	6
IV	**Energy Management:** Energy management of electrical equipment, Improvement of power factor, management of maximum demand, Energy savings in pumps,Fans - Compressed air systems, Energy savings in Lighting systems,Air conditioning systems - Applications.	7

Text Books

1. Moore, F., "***Environmental Control System",*** McGraw Hill, Inc.
2. Brown, G. Z., Sun, "***Wind and Light: Architectural design strategies"***, John Wiley.

References

1. Cook, J, Award "***Winning passive Solar Design"***, McGraw Hill.

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CE- 611: ENGINEERING GEOLOGY AND ROCK MECHANICS LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	2 hrs

COURSE OBJECTIVE:

To introduce students to different types of rocks and to find out the characteristics, suitability and engineering properties of various types of rocks. At the end of the course, the students will be able to conduct the various tests on the given specimen of the rock.

COURSE CONTENT:

Following is the suggested list of practicals out of which a minimum of 6 to 7 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

To conduct following tests on the given rock specimens:-

1. Void index test
2. Permeability test.
3. Uniaxial compressive strength test.
4. Point load test.
5. Brazilian Tensile strength test
6. Bending test.
7. Slake durability test.
8. Shear strength test.
9. Punching shear test.
10. Shear testing for discontinuities.
11. Rock toughness measurement.
12. Rock bolt pull out test.

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CE - 612: CONCRETE TECHNOLOGY LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
0	0	2	1	30	20	50	2 hrs

OBJECTIVE:
To expose students to different properties and uses of concrete in different situations. The students will learn the different testing techniques for concrete.

List of Exercises:

The students shall conduct 7-8 experiments during the semester. The list of experiments is suggested below:

1. Effect of w/c ratio on workability (slump cone, compaction factor, V-B test, flow table)
2. Effect of w/c ratio on strength of concrete.
3. Indirect tensile test on concrete.
4. Study of admixtures & their effect on workability and strength of concrete.
5. Modulus of rupture of concrete.
6. Permeability test on concrete.
7. Tests on polymer modified mortar / concrete.
8. Tests on fiber-reinforced concrete.
9. Flexure test on beam (central point load and two point load) (plotting of load deflection curve and finding value of E)
10. Non-destructive testing of concrete – some applications (hammer, ultrasonic).

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CE 613: SEMINAR

Evaluation Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Evaluation
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Evaluation/ Viva**	**Total**	
0	0	2	1	50	50	100	-

OBJECTIVE:

To measure as well as flourish the ability of the student to study a topic, in Civil Engineering, of current relevance, from technical literature and present a seminar on that topic.

PROCEDURE:

Individual students should be asked to choose a topic in any field of civil engineering, preferably from outside the B.Tech syllabus and give a seminar on that topic for about thirty minutes. It enables the students to gain knowledge in any of the technically relevant current topics and acquire the confidence in presenting the topic. The student will undertake a detailed study on the chosen topic under the supervision of a faculty member, by referring papers published in reputed journals and conferences. Each student has to submit a seminar report (in two copies), based on these papers; the report must not be reproduction of any original paper. A committee consisting of three/four faculty members (preferably specialized in various sub-fields of Civil Engineering) will evaluate the seminar. One of the two copies submitted by the student should be returned to him/her after duly certifying it by the staff in charge of the seminar and Head of the department and the other copy shall be kept in the departmental library.

Internal Continuous Assessment
As per ordinance

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SEMESTER-VII

CE-701: LIMIT STATE DESIGN OF METAL STRUCTURES

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	2	0	4	40	60	100	3 hrs

Note: Code of practice for Plain and Reinforced Concrete IS 800-2007is permitted in the examination.

COURSE OBJECTIVE:

To introduce the students to limit state design of structural steel systems such as tension and compression members, beams, roof trusses, gantry girders as per provisions of current code (IS 800 – 2007) of practice.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Introduction:** Properties of structural steel, Indian standard specifications and sections, factor of safety, permissible and working stresses, Design philosophy - elastic and plastic methods - Introduction to Limit States Design (LSD). **Connections:** Bolted connections - bearing type and friction grip bolts. Welded connections, hanger connections, eccentrically loaded connections and splice connections. Design of bolted and welded connections.	**9**
II	**Tension Members:** Type of sections, net area, net effective sections for Angles and Tee in tension, design of tension members subjected axial loads and bending, use of lug angles. **Compression Members:** Modes of failure of a column, buckling failure, buckling strength of ideal columns, Euler's theory - effective length, slenderness ratio, design formula, I.S. Code formula. Design of single rolled steel section columns and built-up columns subjected to axial load, laced and battened columns.	**9**

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III	**Flexural Members:** Behaviour of steel beams, limit state design of steel beams, web buckling and crippling, lateral torsion behavior of unrestrained beams, design approach for unrestrained beams, unsymmetrical sections and bi-axial bending, Built-up sections, shear behavior of transversely stiffened plate girder webs, provision of moment and shear capacity for plate girders and design of stiffeners. **Column Bases:** Introduction, slab base, gusseted base, column base subjected to moment, grillage foundation.	**9**
IV	**Tubular Structures:** Permissible stresses, tube columns and compression members, tube tension members, tubular roof trusses, joints in tubular trusses, tubular beams and purlins. **Aluminium Structures:** Permissible stresses, tension members, compression members, local buckling of compression members, design of beams and connections	**8**

Text Books:

1. Subramanian, N., ***"Design of Steel Structures",*** Oxford University Press, New Delhi.
2. Gambhir, M.L., ***"Fundamentals of Structural Steel Design",*** McGraw Hill Education India Pvt. Ltd.
3. Shiyekar, M.R., ***"Limit State Design in Structural Steel",*** Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd Edition.

Reference Books:

1. Narayanan.R.et.al. ***"Teaching Resource on Structural Steel Design",*** INSDAG, Ministry of Steel Publications.
2. Duggal, S.K, ***"Limit State Design of Steel Structures",*** Tata McGraw Hill Publishing Company.
3. Bhavikatti, S.S., ***"Design of Steel Structures",*** By Limit State Method as per IS:800–2007, IK International Publishing House Pvt. Ltd.
4. Shah, V.L. and Veena Gore, ***"Limit State Design of Steel Structures",*** IS 800–2007 Structures Publications.
5. IS: 800-2007, General Construction in Steel – Code of Practice, Bureau of Indian Standards, New Delhi.

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CE-702: QUANTITY SURVEYING AND VALUATION

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

This subject covers the various aspects of estimating of quantities of items of works involved in buildings, roads, water supply and sanitary. It also covers the rate analysis, valuation of properties and preparation of reports and tender documents. At the end, the student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare a tender document. The student shall also be able to prepare value estimates.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Estimation of Quantities:** Types of estimates, methods of computing the quantities: centreline method, long wall and short wall method. Detailed estimate of compound wall, two room building up to plinth, single storey and two-storey (G+1) residential building with flat and pitched roof. Detailed estimate of RCC beam, slab and column with footing. Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc. Estimation of sanitary and water supply installations: septic tank, soak pit, water supply pipe line, sewer line, tube well, open well etc. Estimation of bituminous and cement concrete roads, retaining walls and culverts.	**9**
II	**Analysis of Rates:** Definitions, importance, purpose & factors affecting the rate analysis. Analysis of rates for earth work, mortars, brick masonry, stone masonry, cement concrete, cement mortar, plastering, different types of flooring, floor finish, color washing, distemper, varnish, painting, items for sanitary work, wood work. Analysis of rates for road works**:** bituminous painting, premix carpet, bituminous macadam, laying and consolidation of stone etc. Rate analysis of the special items such as carving works, Anti-termite treatment, etc. Study of schedule of rates (CWPD) and use of Computer Software.	6

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III	**Specifications and Tenders:** Definition, purpose & importance of specifications, types of specifications, design and drafting of specifications. Specification writing for some useful items viz. Brick masonry, Excavation, Concrete, etc. Tenders, contracts and types of contract.	**5**
IV	**Valuation:** Definition of terms – cost, price, value, real estate, personal estate, mortgage, freehold property, lease-hold property, property income, gross income, net income, depreciation, obsolescence and escalation. **Types of values:** market value, book value, distress value, monopoly value, scraps value, salvage value, replacement value, speculative value. **Depreciation:** methods of calculating depreciation-Straight Line Method, Declining Balance Method, Sinking Fund Method, Quantity Survey Method. Valuation of real properties: Rental Method and Profit and Loss Method. Valuation of landed properties: Belting Method and Development Method. Rent Calculation: Types of rent, Procedure of fixing standard rent. Valuation table and their use.	**7**

Text Books:

1. Dutta, B.N., ***"Estimating and Costing in Civil Engineering",*** UBS Publishers & Distributors Pvt. Ltd..
2. Chakraborti, M,***"Estimating Costing",*** Specification and Valuation in Civil Engineering.

Reference:

1. Birdie, G.S., **"*A Text Book on Estimating and Costing*",**DhanpatRai and Sons, New Delhi.
2. Kohli, D.D and Kohli, R.C., **"A Text Book of Estimating and Costing (Civil)",** S.Chand & Company Ltd.
3. Rangwala, S.C.,**"*Elements of Estimating and Costing*",**Charotar Publishing House, Anand.
4. Rangwala, S.C, **"*Valuation of Real Properties*",**Charotar Publishing House,Anand.

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CE-703: IRRIGATION AND DESIGN OF HYDRAULIC STRUCTURES

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	1	0	4	40	60	100	3 hrs

COURSE OBJECTIVE:

The purpose of this course is to learn about the irrigation engineering aspects andto obtain knowledge about operation and management of irrigation water.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Irrigation:** Irrigation, need, advantages and disadvantages and sources of irrigation. Irrigation methods, surface and subsurface method, pressurized irrigation, drip, sprinkler and lift irrigation.	9
II	**Soil-Water Relationship:** Field capacity, permanent wilting point, evapotranspiration and consumptive use, measurements, crop and cropping seasons, assessment of crop water requirement, net irrigation requirement, duty and delta relationship.	8
III	**Storage Head Works:** Types of dams, gravity dam - selection of site, forces acting on dams, drainage gallery, joints in dams, elementary profile, limiting height of gravity dam, high and low dam, practical profile of a high gravity dam, design methods and design by gravity analysis only; arch dam, design methods, design by cylinder theory only; spillways and their types.	9
IV	**Diversion Head Works:** Components, layout, design of surface and subsurface weirs and canal head regulator. **Canal Falls:** Types of canal falls, Design of Sarda type and glacis falls.	6

Text books:

1. Asawa, ***"Irrigation Engineering"***, Wiley Eastern Publication
2. Sathyanarayana Murthy, ***"Water Resources Engineering"***, Wiley Eastern
3. S. K Garg, ***"Irrigation Engineering and Hydraulics"***,Khanna Publishers

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Reference books:

1. Varshney R.S., ***"Theory & Design of Irrig. Structures",***Nem Chand
2. Punmia B.C., ***"Irrigation & Waterpower Engg.",***Laxmi Publications

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CE-704: CONSTRUCTION ENGINEERING AND MANAGEMENT

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	2	3	40	60	100	3 hrs

COURSE OBJECTIVE:

To make the students familiar with the various facets of construction, planning and scheduling of projects, resource and material management, construction procedures and professional ethics.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Construction Procedures**: Different methods of construction, types of contract, tenders, pre-qualification procedure, earnest money, security deposit, contract document, general and important conditions of contract, measurement and measurement book. **Inspection and Quality Control:** Construction quality, inspection, quality control and quality assurance, total quality management. **Construction Cost and Budget:** Construction cost, classification of construction cost, unit rate costing of resources. Budget – Types of budget, project master budget.	9
II	**Construction Methods and Equipment**: Brief study of equipment required for earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting. Investment and operating costs and output of various equipment. **Construction disputes and settlement**: Types of dispute, modes of settlement of disputes, arbitration, arbitrator, advantages and disadvantages of arbitration, and arbitration award.	8
III	**Construction Planning and Management**: Network Techniques–bar charts, use of CPM and PERT for planning, drawing network diagrams, time estimates, slack, critical path, crashing and time-cost trade off, resource smoothing, resources levelling, construction, equipment, material and labour schedules. Preparation of job layout. **Management techniques:** CPM cost model, resource allocation and histograms. Project	9

	Management Software.	
IV	**Concept of Materials Management:** Inventory, inventory control, economic order quantity-safety stock, ABC analysis. **Safety in Construction:** Safety measures in different stages of construction, implementation of safety programme. **Project Management Information System**: PMIS concept, information system computerization, benefits of computerized information system.	**9**

Text Books:

1. L.S.Srinath – PERT and CPM ***"Principles and Applications",*** Affiliated East-West Press
2. Peurifoy and Schexnayder,***"Construction Planning, Equipment, and Methods",*** Tata McGraw Hill
3. S.Seetharaman, ***"Construction engineering and management" ,***Umesh publications.

Reference Books:

1. Shrivastava, ***"Construction Planning and Management",***Galgotia Publications
2. Gahlot and Dhir, ***"Construction Planning and Management",*** New Age International
3. K.K. Chitkara, ***"Construction project management",*** Tata McGraw Hill
4. P.P. Dharwadkar, ***"Management in Construction Industry",*** Oxford and IBH
5. V.N.Vazirani and S.P.Chandola, ***"Heavy Construction",***
6. Patil B.S., ***"Civil Engineering Contracts and Estimates",*** 3rd Edition, University Press.

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CE-708: MUNICIPAL SOLID WASTE MANAGEMENT

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

Note: Code of practice for Plain and Reinforced Concrete IS 800-2007is permitted in the examination.

COURSE OBJECTIVE:

To learn the fundamental concepts of handling municipal solid waste generated around the globe.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Sources and types of municipal solid wastes:** Sources and types of solid wastes, factors affecting generation of solid wastes, characteristics, methods of sampling and characterization effects of improper disposal of solid wastes, public health effects, principle of solid waste management, social & economic aspects, public awareness, role ofNGOs.	7
II	**On-site Storage & Processing:** On-site storage methods, materials used for containers, on-site segregation of solid wastes,public health & economic aspects of storage. Processing techniques and equipment, resource recovery from solid wastes, composting, incineration, pyrolysis, options under Indian conditions.	8
III	**Collection and Transfer:** Methods of Collection, types of vehicle, manpower requirement, collection routes, transfer stations, selection of location, operation & maintenance, options under Indian conditions.	**7**
IV	**Disposal of Solid Waste:** Dumping of solid waste, MSW landfills, site selection, design and operation of MSW landfills, Leachate and gas collection/ treatment facility. Environmental monitoring during lad filling, closer and post closer plans.	**7**

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Text Books:

1. George Tchobanoglouset.al., **"*Integrated Solid Waste Management*",** McGraw-Hill Publishers.

Reference Books:

1. Bilitewski .B, HardHe .G, Marek .K, Weissbach.A, and Boeddicker .H, **"*Waste Management*",** Springer.
2. Manual on Municipal Solid Waste Management, **"*CPHEEO",*** Ministry of Urban Development, Government of India, New Delhi.
3. Landreth .R.E and Rebers, P.A, **"Municipal Solid Wastes – problems and Solutions",** Lewis Publishers.
4. Bhide .A.D. and Sundaresan .B.B, **"Solid Waste Management in Developing Countries",** INSDOC.

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CE-709: BRIDGE ENGINEERING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

To learn the basic fundamentals of bridge engineering with special emphasis on concrete and steel bridges.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Investigation of Bridges:** Definition, classifications, selection of bridge site, preliminary data to be collected, design discharge and its determination, linear waterway, economical span, vertical clearance above HFL, scour depth and choice of bridge type. **Standard Specifications:** Road bridges, I.R.C. loadings, code provisions for carriageway width, clearances, loads considered, etc. Standard specifications for railway bridges, railway bridge code.R.C.C. culvert.	**8**
II	**Reinforced Concrete Bridges:** T-beam bridge, Courbon's theory for load distribution, balanced cantilever bridges, pre-stressed concrete bridges, (General discussions).	**7**
III	**Steel Bridges:** Introduction to suspension bridges, cantilever bridges, cable stayed bridges,general arrangement of single-track broad-gauge railway bridge with open floor, design of stringers, cross girders, main trusses, top and bottom lateral bracing, complete design of through type truss bridge. **Sub Structure:** Types of piers and abutments, design forces, design of piers and abutments.	**8**
IV	**Bearing and Joints:** Various types of expansion bearing and fixed bearings, elastomeric bearings, joints and their types, design of bearings, inspection and maintenance of bridges.	**7**

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Text Books:

1. Johnson Victor, D,***"Elements of Bridge Engineering",*** Oxford and IBH Publishing Co., Ltd.
2. Rishnaraju, N,***"Design of Bridges"***, Oxford and IBH Publishing Co., Ltd.
3. PonnuSwamy, ***"Bridge Engineering",***McGraw-Hill Publication.

References:

1. Raina, V. K. **"Analysis, Design and Construction of Bridges**", Tata McGraw-Hill Publication.
2. Vazirani, Ratvani&Aswani, "***Design of Concrete Bridges***", Khanna Publishers.
3. Jagadish T.R. & M.A. Jayaram, "***Design of Bridge Structures",***Prentice Hall India Pvt., Ltd.
4. Swami Saran, "***Analysis and Design of sub-structures***", Oxford IBH Publishing co ltd.

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CE-710: FINITE ELEMENT METHOD

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

The course aims at introducing the fundamental principles of the modeling structures for statics and dynamics analyses. In the second half of the module the student's will be taught how to use the finite element method in practice and to critically assess and evaluate the results of analysis. The module aims to provide an introduction to this important stress analysis technique, and by way of case studies shows how it may be used to design components.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Introduction to Finite Element Analysis:** Introduction, basic concepts of Finite Element Method, introduction to elasticity, steps in Finite Element Analysis. **Finite Element Formulation Techniques:** Virtual work and variational principle, Raleigh-Ritz method, Galerkin method, stiffness matrix and boundary conditions.	**8**
II	**Element Properties:** Natural coordinates, triangular elements, rectangular elements, Lagrange and Serendipity elements, solid elements, isoparametric formulation, stiffness matrix of isoparametric elements, numerical integration, worked out examples.	**9**
III	**Analysis of Frame Structures:** Stiffness of truss members, analysis of truss, stiffness of beam elements, Finite Element Analysis of continuous beam, plane frame analysis, analysis of grid and space frame.	**6**
IV	**FEM for Two and Three Dimensional Solids:** Constant strain triangle, linear strain triangle, rectangular elements, numerical evaluation of element stiffness, computation of stresses, ax symmetric element, Finite Element formulation using ax symmetric element, Finite Element formulation for 3-dimensional elements, worked out examples.	**8**

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Text Books:

1. T. R. Chandrupatla and A. D. Belegundu, ***"Introduction to Finite Elements in Engineering",***2nd Edition, Prentice Hall, New Jersey.
2. J. N. Reddy, ***"An Introduction to the Finite Element Method",*** 2nd Edition, McGraw Hill, Inc., New York.
3. O. C. Zienkiewicz and Y. K. Cheung, ***"The Finite Element Method in Structural and Soild Mechanics",*** McGraw Hill, London.
4. W. Weaver Jr. and J. M. Gere, ***"Matrix Analysis of Framed Structure",*** CBS Publishers & Distributors, New Delhi, India.

Reference Books:

1. D. Maity, ***"Computer Analysis of Framed Structures",*** I. K. International Pvt. Ltd. New Delhi
2. Erik G. Thompson, ***"Introduction to the Finite Element Method: Theory, Programming and Applications",*** John Wiley
3. H. C. Martin and G. F. Carey, ***"Introduction to Finite Element Analysis - Theory and Application",***NewYork, McGraw-Hill
4. K. H. Huebner, D. L. Dewhirst, D. E. Smith and T. G. Byron, ***"The Finite Element Method for Engineers",*** John Wiley & Sons Inc., New York.
5. K. J. Bathe, ***"Finite Element Procedures",*** Prentice-Hall of India, New Delhi, India
6. R. D. Cook, ***"Concepts and Applications of Finite Element Analysis",*** Wiley.

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CE -711: PROJECT WORK - I

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
0	0	4	2	50	50	100	-

COURSE OBJECTIVE:

To expose students to simulate real life situations related to civil engineering and carry out a design project in one of the specializations of civil engineering with substantial multidisciplinary component.

PROCEDURE:

1. Students should be exposed to different Civil Engineering construction worls such as R. C. C. Structures, Steel Structures, Bridges, culverts, Hydraulic Structures, water tanks, Roadwork, Railways, Water supply and Sanitary works, Geotechnical Exploration, Maintenance and Rehabilitation works, Irrigation systems, Formwork, Reconnaissance and Detailed Surveying &levelling etc. At least two visit to sites are expected.

2. The students will carry out a project in one of the following civil engineering areas but with substantial multidisciplinary component involving Architecture, Mechanical engg. Electrical engg., Biotechnology, Chemical engg., Computer science:
   - Structural Engineering
   - Geotechnical Engineering
   - Water Resources Engineering and environmental engg.
   - Geomatics Engineering and surveying
   - Construction management
   - Transportation engineering

3. Student groups will be formed (4- 6 in a group) and a faculty member will be allocated to guide them. There will be three reviews in the semester. First review will not carry any marks but the project topic will be finalized in it. Of remaining 2 reviews one will be carried out in the mid-semester and the last one by the end of semester.

CE - 712: INDUSTRIAL PRACTICAL TRAINING

(Training to be undergone after VI semester)

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
0	0	0	2	50	50	100	-

COURSE OBJECTIVE:

To expose students to simulate real life situations related to civil engineering in different organizations.

TRAINING REPORT:

1. Each student shall maintain a log book of activities of the training. It should have entries related to the work done, problems faced, solution evolved etc.
2. Each student shall submit the final report signed by the training supervisor/head for the evaluation. The student is expected to prepare the report in the prescribed format based on the training undergone, experience gained and relevance.
3. Each student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made.

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CE - 713: COMPUTER AIDED DESIGN PRACTICE LAB-II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	3	2	30	20	50	2 hrs

COURSE OBJECTIVE:

The objective of the course is to help students to acquire fundamental and working knowledge of popular civil engineering software's so as to enable them perform computationally intensive tasks faster than with traditional programming languages such as C,C++, and FORTRAN.

1. **Transportation Engineering**: Modeling, analysis and design of rigid and flexible pavements, Rail Infrastructure Design and Optimization using software MAX ROAD, Power Rail Track, etc.
2. **Environmental Engineering**: Modeling, analysis and design of water distribution system and sanitary sewers using WATER CAD /SEWER CAD /WATER GEM/SEWER GEM.
3. **GIS:** Working on Latest Version of GIS software (ArcGIS Pro/ENVI/Gypsy)
4. **Project Management**: Working on Project Management software such as Primavera/ MS Project.

NOTE:

1. Students are supposed to document each exercise/tutorial.

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Recommended software packages:

The following packages or their equivalent are recommended for the above listed exercises:

AutoCAD, Grapher/Sigmaplot, MAX Road, Power Rail Track. Water CAD, Sewer CAD, WaterGEM, SewerGEM, ArcGIS Pro, ENVI, Gyps, Primavera/MS.

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CE 808: PROJECT WORK - II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
0	0	16	8	50	50	100	3 hrs

COURSE OBJECTIVE:

To simulate real life situations related to civil engineering and impart adequate training so that confidence to face and tackle any problem in the field is developed in the college itself.

PROCEDURE:

1. The project work started in the seventh semester will continue in this semester. The students should complete the project work in this semester and present it to the assessing committee (as constituted in the seventh semester). The performance of the students in the project work shall be assessed on a continuous basis by the project evaluation committee through progress seminars and demonstrations conducted during the semester.
2. Each project group should maintain a log book of activities of the project. It should have entries related to the work done, problems faced, solution evolved etc. There shall be at least an Interim Evaluation and a final evaluation of the project in the 8^{th}semester.
3. Each project group has to submit an interim report in the prescribed format for the interim evaluation. Each student is expected to prepare a report in the prescribed format, for final evaluations based on the project work. Members of the project group will present the relevance, design, implementation, and results of the project to the project evaluation committee. Each group will submit the copies of the completed project report signed by the guide to the department.
4. The head of thedepartment will certify the copies and return them to the students. One copy will be kept in thedepartmental library and one by the respective guide. The assessment committee and project guides will award the marks for the individual students in a project as follows:

   50% of the marks is to be awarded by the guide and
   50% by the evaluation committee.

   Internal Continuous Assessment:
   40% - Data collection, Planning/ Design and detailing/Simulation and analysis
   30% - Presentation & demonstration of results
   20% - Report
   10% - Regularity in the class

CE-801: HIGHWAY PAVEMENT DESIGN

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

Note:IRC 37 2001 and 58-2002 and design charts are permitted for University Examinations

COURSE OBJECTIVE:

To equip the students to carry out design and evaluation of flexible and rigid pavements in varied field conditions.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Introduction:** Types and component parts of pavements - Factors affecting design and performance of pavements - Functions and significance of sub grade properties – Various methods of assessment of sub-grade soil strength for pavement design - Cause and effects of variations in moisture content and temperature - Depth of frost penetration - Design of bituminous mixes by Marshall method.	**8**
II	**Design of flexible pavements:** Stresses and deflections in homogeneous masses, Burmister 2 layer and 3 layer theories, Wheel load stresses, ESWL of multiple wheels, Repeated loads and EWL factors, Empirical, semi-empirical and theoretical approaches for flexible pavement design:Group index, CBR, Triaxial, Mcleod and Burmister layered system methods	**9**
III	**Design of rigid pavements:** Types of stresses in rigid pavements: Wheel load stresses, Warping stresses, Friction stresses, Combined stresses, Factors influencing stresses, Design and detailing of slab thickness - Types of joints in cement concrete pavements: Longitudinal, contraction and expansion joints, Design of Joint Details for Longitudinal Joints, Contraction Joints and Expansion Joints - IRC Method of Design, IRC recommendations.	**9**

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IV	**Pavement Evaluation:** Structural and functional requirements of flexible and rigid pavements - Pavement distress, Evaluation of pavement structural condition by Benkelman beam, Rebound deflection and Plate load tests, Introduction to design of pavement overlays, Problems of highway rehabilitation, Pavement rehabilitation programming.	**8**

Text Books:

1. Khanna S.K. and Justo, CEG, ***"Highway Engineering",***Nem Chand and bros.
2. Yoder and W Nitezak, ***"Principles of Pavement Design",*** John Wiley

Reference Books:

1. Yang, ***"Design of Functional Pavements",*** McGraw Hill
2. David Croney, ***"The Design and Performance of Road pavements",*** HMSO publications
3. Hass and Hudson, ***"Pavement Management System",*** McGraw Hill Book Co.
4. IRC 81-1981- **"*Tentative Guidelines for Strengthening of Flexible Pavements by Benklman Beam Deflections Techniques".***
5. IRC: 37 - 2001, ***'Guidelines for the Design of Flexible Pavements'***
6. IRC: 58 - 2002, ***'Guidelines for the Design of Rigid Pavements'***

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CE-802: GROUND WATER HYDROLOGY

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

To make the students aware of the importance of groundwater resources and to impart strategic background information for its effective and wise utilization.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Occurrence of ground water:** Origin, Rock properties affecting ground water vertical distribution, Geologic formations as aquifers, Types of aquifers, Aquifer parameters,Laplace equation,Potential flow lines, Flow net -Seepage under a dam, Steady unidirectional flows in aquifers, Confined and unconfined, Steady radial flow towards a well, Well in uniform flow, Steady flow with uniform discharge,Partially penetrating wells,Steady flow in leaky aquifer.	8
II	**Unsteady flow:** General equation, Cartesian and polar coordinate, Unsteady radial flow in to a well, Confined, unconfined and leaky aquifers, Multiple well system,Pumping tests,Non equilibrium equation for pumping tests,Thies‟ method - Jacob method – Chow's method -Characteristics well losses, Step draw down test,Well near aquifer boundaries, Determination of boundaries from pumping test, Image wells for various boundary conditions, Cavity well and open well, yield tests-pumping and recuperation test.	9
III	**Design of Tube wells:** Types of wells,Gravel packed wells,Well loss, Selection of screen size, Yield ofa well,Test holes,Well logs,Methods of construction,Dug wells, Shallow tube wells,Deep wells, Gravity wells,Drilling in rocks,Screen installation ,Well completion,Well development, Testing wells for yield,Collector or radial wells,Infiltration galleries,Failure of tubewells.	9

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IV	**Ground water investigation:** Geographical investigation: Electrical resistivity method, Seismic refraction method, Gravity and magnetic method - Test drilling, Resistivity logging, Potential logging. Artificial recharge of ground: Recharge by water spreading, pits, shafts and wells. Rain water harvesting.	**8**

Text Books:

1. Raghunath H. M., ***"Ground water Hydrology",*** Wiley
2. Yoder and W Nitezak, ***"Principles of Pavement Design",*** John Wiley

Reference Books:

1. Todd D.K., ***"Ground Water Hydrology",*** John Wiley
2. Garg S.P., ***"Ground Water & Tube wells",*** Oxford & IBH
3. Raghunath H.M., ***"Hydrology",***Wiely Eastern

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CE-803: WATER POWER ENGINEERING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

The aim of the course is to introduce the students to types of hydro-power stations, their components and functions and different types of loads on power plants.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Introduction:** Sources of power, estimation of water power, necessity and importance of harnessing small hydro power, flow duration and power duration curves, load curve, load factors, capacity factors, utilisation factors, firm and secondary power. **Types of Hydro Power Plants:** Elements of Hydro power, classification of hydro-power plants, run-of-river plants, storage plants diversion canal development, pumped storage plants, tidal power plants, base load and peak load plants in a power grid.	**8**
II	**Intakes:** Intake structures, functions and their types, Surge Tanks, components of intakes-forebay, trash racks, gates and valves, force required to operate gates.	**9**
III	**Conveyance System:** Penstocks, design criterion, economical diameter anchor blocks, cradles and footings, water hammer, instantaneous closure of power canal, surge tank, surges in canals.	**9**
IV	**Turbines:** Types of turbines, specific speed and classification of turbines, synchronous speed, scroll casing, flumes and draft tubes, dimensions of scroll casing and draft tubes, setting of turbines. **Power House:** General layout and arrangements of hydro-power units, number and size of units, sub-structure, spacing of units, super-structure, underground power stations, tidal power.	**8**

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Text Books:

1. ***"Water Power Engineering",***Dandekar, M.M., Sharma,K.N.
2. ***"Water Power Engineering",*** Borrows, H.K
3. ***"Water Power Engineering",***M.M.Deshmukh.

Reference Books:

1. *Barrows, H.K.,* ***"Water Power Engineering",*** *McGraw Hill.*
2. ***"Hydro-Electric Engineering Practice Vol.I ,II&III",*** *Brown J.G.*
3. ***"Water Power Development, Vol.I& II",****Mosonyi,E.*
4. ***"Hydro Power Structures",*** *R S Varshney, Nem Chand& Bros*

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CE-804: DESIGN OF PRE-STRESSED CONCRETE STRUCTURES

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

Note: Code of practice for Plain and Reinforced Concrete IS 800-2007is permitted in the examination.

COURSE OBJECTIVE:

Toprovide an exposure to the design of Prestressed Concrete Structures and Structural Elements.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Introduction:** Basic concepts of prestressing, terminology, applications. Materials for prestressing: High strength concrete, permissible stresses in concrete, high strength steel, permissible stresses in steel. **System of pre-stressing:** Pre-tensioning and post tensioning systems, tensioning devices,Lec-Macallsystems, Magnel Blaton post tensioning, Freyssinet systems, Gifford Udal system.	**7**
II	**Losses of Prestress:** Types of losses of prestress, loss due to elastic deformation of concrete, shrinkage, creep, relaxation of stress in steel,friction,anchorage slip. Total loss in pretensioned and post tensioned members. **Analysis of Prestress and Bending stresses:** Basic assumptions, resultant stresses at a section, concept of load balancing, cracking moment.	**7**
III	**Deflections:** Factors influencing deflections, short term deflections of un-cracked members, deflections of cracked members, prediction of long term deflections. **Shear and Torsional Resistance:** Ultimate shear resistance of pre stressed concrete members, pre stressed concrete members in torsion, design of reinforcements for torsion, shear and bending.	**6**

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IV	**Design of Flexural Members:** Dimensioning of flexural members, design of pre-tensioned and post tensioned beams, design of partially pre stressed members, design of one way and two way slabs, continuous beams. Design for axial tension, compression and bending, bond and bearing.	**8**

Text Books:

1. Krishnaraju .R, **"*Prestressed Concrete",***Tata McGraw-Hill Education, New Delhi.
2. Pandit, G. S., Gupta, S. P., **"P*restressed Concrete",*** CBS Publishers & Distributors.
3. Rajagopalan .N, **"*Prestressed Concrete",***Alpha Science International, Limited.

Reference Books:

1. Lin T.Y, Design of, **"*Prestressed Concrete Structures",*** Asia Publishing House, Bombay.
2. Guyon .V, **"*Limit State Design of Prestressed Concrete",***Vol.I& II Applied Science Publishers, London.
3. *IS: 1343- 1980,* ***"IS Code Of Practice For Prestressed Concrete",***BIS, New Delhi.

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CE 805: DESIGN OF EARTHQUAKE RESISTANT STRUCTURES

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

The course aims to introduce to the students the basics of Earthquake Engineering, seismology, building geometrics & characteristics, structural irregularities, cyclic loading behaviour of RC, steel, pre-stressed concrete elements and various codal provisions and their application on different types of structures.

COURSE CONTENT:

UNIT	CONTENT	No of hrs.
I	**Elements of Engineering Seismology**: Theory of Vibrations, Indian Seismicity, Earthquake History, Behavior of structures in the past Earthquakes.	**7**
II	**Seismic Design Concepts:** Cyclic loading behavior of RC, Steel and Prestressed Concrete elements, Response Spectrum, Design spectrum, capacity based design.	**7**
III	**Provision of Seismic Code frames:** shear walls, Braced frames, Combinations, Torsion. Performance of Regular Buildings 3D Computer Analysis of Building Systems (Theory only), Design and Detailing of frames, Shear walls and Frame walls.	**6**
IV	**Seismic performance:** Irregular Buildings -Soil performance, Modern Concepts, Base Isolation, Adoptive systems, Case studies.	**8**

Text Books:

1. PankajAgarwal and Manish ShriKhande, ***"Earthquake Resistant Design of Structures",*** Prentice- Hall of India, New Delhi.

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Reference Books:

1. Bullen K.E., ***"Introduction to the Theory of Seismology",*** Great Britain at the University Printing houses, Cambridge University Press.

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CE 806: TRANSPORTATATION SYSTEM PLANNING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	2	4	40	60	100	3 hrs

COURSE OBJECTIVE:

The course aims at introducing the fundamental principles of the modelling for statics and dynamics analyses. In the second half of the module the student's will be taught how to use the method in practice and to critically assess and evaluate the results. The module aims to provide an introduction to this important stress analysis technique, and by way of case studies shows how it may be used to design components.

COURSE CONTENT:

UNIT	Content	No of Hrs.
I	**Transportation Planning Process:** Introduction, elements of Transportation planning, definition of goals and objectives, identification of needs, generation,evaluation and implementation of alternatives. **Land use and transportation system:** Urban system components, Concept and definitions, criteria for measuring and comparing urban structure, land use and transportation.	8
II	**Transport demand analysis:** Nature and analysis of Transportation demand, sequential demand analysis, Trip generation models, Trip distribution models, Model split analysis, Traffic assignment models.	9
III	**Public transportation:** Historical development of urban transportation, Mass Transit definitions and classifications, Route development, stop location and stopping policy, schedule development.	6

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IV	**Transportation economics:** Scope of transportation economics, Transportation demand, demand, supply and equilibrium, sensitivity of travel demand, factors affecting elasticities, elements of engineering conomics.	**8**

Text Books:

1. Kadyali,L.R., ***"Traffic engineering and Transport planning",*** Khanna Publishers.
2. Papacostas, C.S.,***"Fundamentals of Transportation Engineering".***

Reference Books:

1. Hutchinson B.G., ***"Principles of Urban Transportation System Planning",*** McGraw Hill.
2. Bruton M.J., ***"Introduction to Transportation Planning, Hutchinson",*** London.
3. C. JotinKhisty, B. Kent Lall, ***"Transportation Engineering",*** Prentice Hall of India.

CE-809: INDUSTRIAL PROJECT

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	16	8	50	50	100	3 hrs.

Note: Industrial Project of Four months duration is to be carried out by the student in industry under the joint supervision of faculty advisers from institution as well as from the industry

Suggested List of projects:

1. Any productive project involving application of engineering fundamentals to solve problems encountered by human kind, in collaboration with industry, R&D institutes, institutes of international/national/state importance as deemed fit by the faculty members/concerned supervisor.

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Himachal Pradesh Technical University, Hamirpur (H.P.)

CURRICULUM (CBCS)

COMPUTER SCIENCE ENGINEERING

(3rd to 8th Semester)

Teaching and Examination Scheme

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SCHEME OF TEACHING AND EXAMINATION COMPUTER SCIENCE & ENGINEERING										
SEMESTER – III										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	FC	MA-301	Probability and Statistics	2	2	0	3	40	60	100
2	FC	HS – 305	Industrial Economics and Management	3	0	0	3	40	60	100
3	PC	CS-301	Data Structures	3	1	0	4	40	60	100
4	PC	CS-302	Object Oriented Programming using C++	3	1	0	4	40	60	100
5	PC	EC-302	Digital Electronics	3	1	0	4	40	60	100
6	PC	CS-303	Computer Architecture & Organization	3	0	0	3	40	60	100
7	OE	-	Open Elective – I	2	0	0	2	40	60	100
Labs:										
1	PC	CS-311	Data Structures Lab	0	0	2	1	30	20	50
2	PC	CS-312	C++ Programming Lab	0	0	2	1	30	20	50
3	PC	EC-306	Digital Electronics Lab	0	0	2	1	30	20	50
			Total	**19**	**5**	**6**	**24+2**			

OPEN ELECTIVE I										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	OE	HS-306	Sociology & Elements of Indian History for Engineers	2	0	0	2	40	60	100
2	OE	HS-307	German Language - I	2	0	0	2	40	60	100
3	OE	HS-308	French Language – I	2	0	0	2	40	60	100

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SCHEME OF TEACHING AND EXAMINATION COMPUTER SCIENCE & ENGINEERING										
SEMESTER – IV										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	FC	MA-401	Optimization and Calculus of Variations	2	2	0	3	40	60	100
2	FC	HS-409	Human Values and Professional Ethics	2	2	0	3	40	60	100
3	PC	CS-401	Database Management System	3	0	0	3	40	60	100
4	PC	CS-402	Operating System	3	1	0	4	40	60	100
5	PC	CS-404	Theory of Computation	3	1	0	4	40	60	100
6	PC	EC-402	Microprocessor & Peripherals	3	1	0	4	40	60	100
7	OE	-	Open Elective –II	2	0	0	2	40	60	100
Labs:										
1	PC	CS-411	Database Management System Lab	0	0	2	1	30	20	50
2	PC	EC-405	Microprocessor & Peripherals Lab	0	0	2	1	30	20	50
3	PC	CS-412	Operating System Lab	0	0	2	1	30	20	50
			Total	**18**	**7**	**6**	**24+2**			

OPEN ELECTIVE II										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	OE	HS-410	Law for Engineers	2	0	0	2	40	60	100
2	OE	HS-411	German Language - II	2	0	0	2	40	60	100
3	OE	HS-412	French Language – II	2	0	0	2	40	60	100

Industrial Training after IV Semester of four weeks duration.

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SCHEME OF TEACHING AND EXAMINATION B.TECH COMPUTER SCIENCE & ENGINEERING											
SEMESTER – V											
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**			
				L	**T**	**P/D**		**I.A Marks**	**ESE Marks**	**Total Marks**	
1	PC	CS-501	Computer Networks	3	1	0	4	40	60	100	
2	PC	CS-502	Core Java	3	0	0	3	40	60	100	
3	PC	CS-503	Computer Graphics	2	2	0	3	40	60	100	
4	PC	CS-504	Artificial Intelligence & Expert System	3	0	0	3	40	60	100	
5	PC	CS-505	Software Engineering	3	1	0	4	40	60	100	
6	PC	CS-506	Analysis and Design of Algorithm	3	1	0	4	40	60	100	
7	OE	-	Open Elective -III	2	0	0	2	40	60	100	
Labs:											
1	PC	CS-511	Computer Networks Lab	0	0	2	1	30	20	50	
2	PC	CS-512	Core Java Lab	0	0	2	1	30	20	50	
3	PC	CS-513	Computer Graphics Lab	0	0	2	1	30	20	50	
4	MC	CS-514	Industrial Training (Viva-Voce)	0	0	0	Satisfactory / Unsatisfactory				
			Total	**17+2**	**6**	**4**	**24+2**				

OPEN ELECTIVE – III (FOR STUDENTS OF OTHER DEPARTMENT)										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	OE	CS-507	Basics of Operating Systems	2	0	0	2	40	60	100
2	OE	CS-508	PC Maintenance & Troubleshooting	2	0	0	2	40	60	100
3	OE	IT-501	Management of Information System	2	0	0	2	40	60	100

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SCHEME OF TEACHING AND EXAMINATION B.TECH COMPUTER SCIENCE & ENGINEERING										
SEMESTER – VI										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I. A Marks**	**ESE Marks**	**Total Marks**
1	PC	CS-601	Advance Java	3	1	0	4	40	60	100
2	PC	CS-602	Distributed Operating System	3	0	0	3	40	60	100
3	PC	CS-603	Compiler Design	3	1	0	4	40	60	100
4	PC	CS-604	Linux Administration	2	2	0	3	40	60	100
5	PC	CS-605	Data Mining & Data Warehousing	3	1	0	4	40	60	100
6	PC	CS-606	Modeling & Simulation	3	0	0	3	40	60	100
7	PE	-	Programme Elective – I	3	0	0	3	40	60	100
Labs:										
1	PC	CS-611	Advanced Java Lab	0	0	2	1	30	20	50
2	PC	CS-612	Modeling & Simulation Lab	0	0	2	1	30	20	50
3	MC	CS-613	Seminar	0	0	2	1	50	50	100
			Total	**17+3**	**5**	**6**	**24+3**			

PROGRAM ELECTIVE – I										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	PE	IT-601	Management Information Systems	3	0	0	3	40	60	100
2	PE	IT-602	Enterprise Resource Planning	3	0	0	3	40	60	100
3	PE	IT-603	Multimedia Technology	3	0	0	3	40	60	100

Industrial Training after VI Semester of six weeks duration

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SCHEME OF TEACHING AND EXAMINATION B.TECH: COMPUTER SCIENCE & ENGINEERING										
SEMESTER – VII										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I. A Marks**	**ESE Marks**	**Total Marks**
1	PC	CS-701	Advance Computer Architecture	3	1	0	4	40	60	100
2	PC	CS-702	Wireless & Mobile Computing	2	2	0	3	40	60	100
3	PC	CS-703	Information Security	3	1	0	4	40	60	100
4	PC	CS-704	Cloud Computing	3	1	0	4	40	60	100
5.	PE		Programme Elective-II	3	0	0	3	40	60	100
Labs:										
1	PC	CS-711	Cloud Computing Lab	0	0	2	1	30	20	50
2	MC	CS-712	Project Work - I	0	0	4	2	50	50	100
3	PC	CS-713	Industrial Training (Viva-Voce)	0	0	0	2	50	50	100
			Total	**11+3**	**5**	**6**	**20+3**			

PROGRAM ELECTIVE – II										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	PE	IT-701	Big Data Analytics	3	0	0	3	40	60	100
2	PE	CS-705	Embedded Systems	3	0	0	3	40	60	100
3	PE	CS-706	Web Technology	3	0	0	3	40	60	100

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SCHEME OF TEACHING AND EXAMINATION B.TECH COMPUTER SCIENCE & ENGINEERING										
SEMESTER – VIII										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I. A Marks**	**ESE Marks**	**Total Marks**
1	PE		Programme Elective - III	3	0	0	3	40	60	100
2	PE		Programme Elective - IV	3	0	0	3	40	60	100
3	MC	CS-804	Project Work - II	0	0	16	8	50	50	100
			Total	**6**	**0**	**16**	**8 + 6**			
OR										
4	MC	CS-811	Industrial Project	0	0	16	8	50	50	100
			Total	**0**	**0**	**16**	**8**			

PROGRAM ELECTIVE – III										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	PE	CS-801	Mobile Adhoc & Sensor Networks	3	0	0	3	40	60	100
2	PE	CS-802	Distributed Systems	3	0	0	3	40	60	100
3	PE	CS-803	Soft Computing	3	0	0	3	40	60	100

PROGRAM ELECTIVE – IV										
S. N.	**Cat.**	**Subject Code**	**Title**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**LA Marks**	**ESE Marks**	**Total Marks**
1	PE	IT-801	Mobile Application Development	3	0	0	3	40	60	100
2	PE	IT-802	Natural Language Processing	3	0	0	3	40	60	100
3	PE	IT-803	Cyber Security & Cyber Laws	3	0	0	3	40	60	100

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Note: Industrial Project of Four months duration is to be carried out by the student exclusively in industry under the joint supervision of faculty advisers from institution as well as from the industry.

Categorization of Subjects in CSE Department

	S. No.	**Semester**	**Category**	**Paper Code**	**Subject**	**Credits**	Implementation
Foundation Courses	1	1	FC	MA-101	Engineering Math –I	4	Student have to study all FC Courses
	2	1	FC	PH-101	Engineering Physics	4	
	3	1	FC	ME-101	Engineering Mechanics	3	
	4	1	FC	CS -101	Computer Fundamentals and Programming in C++	3	
	5	1	FC	PH-111	Engineering Physics Lab	1	
	6	1	FC	CS -111	Computer Programming Lab	1	
	7	2	FC	CH -101	Engineering Chemistry	4	
	8	2	FC	EE -101	Principles of Electrical Engg.	3	
	9	2	FC	EC -101	Fundamentals of Electronics Engg.	3	
	10	2	FC	EE- 111	Electrical Engg. Lab	1	
	11	2	FC	CH-111	Engineering Chemisty Lab	1	
	12	2	FC	EC- 111	Electronics Engg. Lab	1	
	13	2	FC	MA -202	Engineering Math –II	4	
	14	3	FC	MA-301	Probability and Statistics	3	
	15	3	FC	HS – 305	Industrial Economics and Management	3	
	16	4	FC	MA-401	Optimization and Calculus of Variations	3	
	17	4	FC	HS-409	Human Values and Professional Ethics	3	
					Total	**45**	**45**
Mandatory Courses	1	1	MC	HS-101	English Communication Skills	2	Student have to study all MC Courses but either Project II or Industrial Project so 34-8=26
	2	1	MC	ME-102	Engineering Drawing & Graphics	3	
	3	1	MC	HS-102	Environmental Science	2	
	4	1	MC	HS -111	Communication Lab	1	
	5	2	MC	ME -103	Workshop Technology	3	
	6	2	MC	HS- 103	Disaster Management	2	
	7	2	MC	HS -204	Business Communication	2	
	8	5	MC	CS-514	Industrial Training (Viva - Voce)	0	
	9	6	MC	CS-613	Seminar	1	
	10	7	MC	CS-712	Project Work -I	2	
	11	8	MC	CS-804	Project Work - II	8	
	12	8	MC	CS-811	Industrial Project	8	
					Total	**34**	**26**
Open Electives	1	3	OE		Open Elective – I	2	Student have to study any 1 OE Courses
	2	4	OE		Open Elective –II	2	
	3	5	OE		Open Elective -III	2	
					Total	**6**	**2**

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Program Core	1	3	PC	CS-301	Data Structures	4	Student have to study all PC Courses
	2	3	PC	CS-302	Object Oriented Programming using C++	4	
	3	3	PC	EC-302	Digital Electronics	4	
	4	3	PC	CS-303	Computer Architecture & Organization	3	
	5	3	PC	CS-311	Data Structures Lab	1	
	6	3	PC	CS-312	C++ Programming Lab	1	
	7	3	PC	EC-306	Digital Electronics Lab	1	
	8	4	PC	CS-401	Database Management System	3	
	9	4	PC	CS-402	Operating System	4	
	10	4	PC	CS-404	Theory of Computation	4	
	11	4	PC	EC-402	Microprocessor & Peripherals	4	
	12	4	PC	CS-411	Database Management System Lab	1	
	13	4	PC	EC-405	Microprocessor & Peripherals Lab	1	
	14	4	PC	CS-412	Operating System Lab	1	
	15	5	PC	CS-501	Computer Networks	4	
	16	5	PC	CS-502	Core Java	3	
	17	5	PC	CS-503	Computer Graphics	3	
	18	5	PC	CS-504	Artificial Intelligence & Expert Systems	3	
	19	5	PC	CS-505	Software Engineering	4	
	20	5	PC	CS-506	Analysis and Design of Algorithm	4	
	21	5	PC	CS-511	Computer Networks Lab	1	
	22	5	PC	CS-512	Core Java Lab	1	
	23	5	PC	CS-513	Computer Graphics Lab	1	
	24	6	PC	CS-601	Advanced Java	4	
	25	6	PC	CS-602	Distributed Operating System	3	
	26	6	PC	CS-603	Compiler Design	4	
	27	6	PC	CS-604	Linux Administration	3	
	28	6	PC	CS-605	Data Mining & Data Warehousing	4	
	29	6	PC	CS-606	Modelling & Simulation	3	
	30	6	PC	CS-611	Advanced Java Lab	1	
	31	6	PC	CS-612	Modeling & Simulation Lab	1	
	32	7	PC	CS-701	Advance Computer Architecture	4	
	33	7	PC	CS-702	Wireless & Mobile Computing	3	
	34	7	PC	CS-703	Information Security	4	
	35	7	PC	CS-704	Cloud Computing	4	
	36	7	PC	CS-713	Industrial /Practical Training(Viva-Voce)	2	
	37	7	PC	CS-711	Cloud Computing Lab	1	
	Total					**101**	**101**
Program Electives	1	6	PE		Programme Elective – I	3	Student have to study any 2 PE Courses
	2	7	PE		Programme Elective-II	3	
	3	8	PE		Programme Elective - III	3	
	4	8	PE		Programme Elective - IV	3	
	Total					**12**	**6**

Total Credits	**198**	**180**

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MA 301: PROBABILITY AND STATISTICS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Probability and Random Variables:** introduction, basic concepts–sample space, events, counting sample space, conditional probability and independence, permutations and combinations, rules of probability, bayes' theorem. random variables – concept of random variable, percentiles, probability distributions – discrete & continuous, mean, variance and covariance of random variables, chebychev's inequality.	**6**
II	**Standard Probability Distributions:** Discrete distributions - uniform, binomial, multinomial, hyper geometric, poisson, negative binomial, poission; continuous distributions - normal, exponential, gamma, weibull and beta distributions and their properties -function of random variables.	**6**
III	**Sampling Distributions:** Random sampling, sampling distributions of means, estimation, properties of point estimators, confidence interval, maximum likelihood and bayes estimators, prediction intervals.	**6**
IV	**Testing of Hypothesis:** Sampling distributions – testing of hypothesis for mean, variance, proportions and differences using normal, t, Chi-square and F distributions, tests for independence of attributes and goodness of fit. **Linear Correlation and Regression Analysis:** Introduction, linear regression model, regression coefficient, lines of correlation, rank correlation	**6**

Text Books:

1. Gupta, S.C, and Kapur, J.N., ***"Fundamentals of Mathematical Statistics***", Sultan Chand, Ninth Edition, New Delhi,1996.
2. Johnson. R. A., ***"Miller & Freund's Probability and Statistics for Engineers",*** Sixth Edition, Pearson Education, Delhi, 2000.
3. Douglas C. Montgomery and George C. Runger, "***Applied Statistics and Probability for Engineers",*** 5th Edition, 2011.

Reference books:

1. Walpole, R. E., Myers, R. H. Myers R. S. L. and Ye. K, ***"Probability and Statistics for Engineers and Scientists",*** Seventh Edition, Pearson Education, Delhi, 2002.

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2. Lipschutz. S and Schiller. J, ***"Schaum's outlines - Introduction to Probability and Statistics"***, McGraw-Hill, New Delhi, 1998.
3. S. M. Ross, "***Introduction to Probability and Statistics for Engineers and Scientists***" 4th edition.

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HS 305: INDUSTRIAL ECONOMICS AND MANAGEMENT

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Engineering Economics** - Technical efficiency, economic efficiency - cost concepts: elements of costs, opportunity cost, sunk cost, private and social cost, marginal cost, marginal revenue and profit maximization. **Supply and Demand:** Determinants of demand, law of demand, determinants of supply, law of supply, market equilibrium - elasticity of demand - types of elasticity, factors affecting the price elasticity of demand **National Income Concepts:** GDP and GNP, per capita income, methods of measuring national income. Inflation and deflation:	**8**
II	**Value Analysis** - Time value of money - interest formulae and their applications: single-payment compound amount factor, single-payment present worth factor, equal-payment series compound amount factor, equal-payment series sinking fund factor, equal-payment series present worth factor, equal-payment series capital recovery factor, effective interest rate. **Investment Analysis:** Payback period—average annual rate of return, net present value; Internal rate of return criteria, price changes, risk and uncertainty.	**8**
III	**Principles of Management:** Evolution of management theory and functions of management organizational structure - principle and types - decision making - strategic, tactical & operational decisions, decision making under certainty, risk & uncertainty and multistage decisions & decision tree. **Human Resource Management:** Basic concepts of job analysis, job evaluation, merit rating, wages, incentives, recruitment, training and industrial relations.	**8**
IV	**Financial Management**: Time value of money and comparison of alternative methods; costing – elements& components of cost, allocation of overheads, preparation of cost sheet, break even analysis - basics of accounting - principles of accounting, basic concepts of journal, ledger, trade, profit & loss account and balance sheet. **Marketing Management:** Basic concepts of marketing environment, marketing mix, advertising and sales promotion.	**8**

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	Project Management: Phases, organization, planning, estimating, planning using PERT & CPM.	

Text Books:

1. PanneerSelvam, R, "***Engineering Economics***", Prentice Hall of India Ltd, New Delhi.
2. Dwivedi, D.N**., "*Managerial Economics*** *, 7/E"*, Vikas Publishing House.

Reference Books:

1. Sullivan, W.G, Wicks, M.W., and Koelling. C.P., **"*Engg. Economy 15/E*"**,Prentice Hall, New York, 2011.
2. Chan S. Park, "***Contemporary Engineering Economics***", Prentice Hall of India, 2002.
3. F. Mazda, ***Engg.Management***, Addison Wesley, Longman Ltd., 1998.
4. O. P. Khanna***, Industrial Engg.and Management,***DhanpatRai and Sons, Delhi, 2003.
5. P. Kotler, ***Marketing Management, Analysis, Planning, Implementation and Control***,Prentice Hall, New Jersey, 2001.
6. VenkataRatnam C.S &Srivastva B.K, ***Personnel Management and Human Resources,*** Tata McGraw Hill.
7. Prasanna Chandra, ***Financial Management****: Theory and Practice*, Tata McGraw Hill.
8. Bhattacharya A.K., ***Principles and Practice of Cost Accounting***, Wheeler Publishing.
9. Weist and Levy, ***A Management guide to PERT and CPM***, Prantice Hall of India.
10. Koontz H.,O'Donnel C.,&Weihrich H, ***Essentials of Management***, McGraw Hill.

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CS-301: DATA STRUCTURE

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Data Structures:** Definition, primitive and derived data types, abstract data types, need for data structures, types of data structures. **Algorithm**: Definition, characteristics, development of algorithm, analysis of complexity:- time complexity, space complexity, order of growth, asymptotic notation with example, obtaining the complexity of algorithm. **Arrays:** Definition**,** 1d and 2d arrays, operations on arrays**,** sparse matrices, structures and arrays of structures.	**10**
II	**Linked list**: Representation of linked list in memory, allocation & garbage collection, operations on linked list, doubly linked lists, circular linked list, linked list with header node, applications. **Stacks:** representation of stack in memory, operations on stack and applications. **Queues:** Representation of queues in memory, operations on queues, circular queues, double ended queues, priority queues, applications.	**10**
III	**Trees**: Introduction, representation of tree in memory. **Binary Trees:** Terminology, binary tree traversal, binary search tree, insertion, deletion & searching in binary search tree, heap trees, types of heap trees, insertion, deletion in heap tree with example, heap sort algorithm, introduction of AVL trees & B-trees. **Graphs:** Definition, representation of graph (adjacency matrix, adjacency list), traversing a graph (DFS & BFS), dijkstra's algorithm for shortest distance, minimum spanning tree.	**10**
IV	**Searching and sorting:** Need for searching and sorting, linear and binary search, insertion sort, selection sort, merge sort, quick sort, radix sort and bubble sort. **Hash Tables:** Introduction, hash function, collision resolution techniques in hashing, deletion from hash table.	**9**

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Text Books:

1. Seymour Lipschutg : Theory and practice of Data structure , Tata Mc. Graw Hill 1998
2. Tenebaum, A. Lanhgsam Y and Augensatein , A. J: Data structures using C++ , Prentice Hall of India.

Reference Books:

1. Data structure and Algorithms in C++ by Micheal T. Goodrich, Wiley India publication.
2. Data structures, R.Venkatesan, S.Lovelyn Rose, Wiley India publication.
3. Data Structure using C++ By Patil, Oxford University press.
4. Data Structure , Algorithm and Object-Oriented programming , Gregory L. Heileman, Tata Mc-Graw Hills.
5. S. Sahni , " Data structure Algorithms ad Applications in C++", WCB/McGraw Hill.
6. J.P. Tremblay and P.G. Sorenson, "An Introduction to Data Structures with applications", Tata McGraw Hill.

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CS-302: OBJECT ORIENTED PROGRAMMING USING C++

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	Review of basic concepts of object-oriented programming, comparison between procedural programming paradigm and object-oriented programming paradigm. **Classes and Objects:** Specifying a class, creating class objects, accessing class members, access specifiers – public, private, and protected, classes, objects and memory, static members, the const keyword and classes, static objects, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes. **Console Based I/O:** Concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> and << and member functions of I/O stream classes, formatting output, formatting using *ios* class functions and flags, formatting using manipulators.	**10**
II	**Constructors and Destructors:** Need for constructors and destructors, copy constructor, dynamic constructors, destructors, constructors and destructors with static members, initializer lists. **Operator Overloading and Type Conversion:** Defining operator overloading, rules for overloading operators, overloading of unary operators and various binary operators, overloading of new and delete operators, type conversion - basic type to class type, class type to basic type, class type to another class type. **Inheritance:** Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors.	**10**
III	**Pointers and Dynamic Memory Management:** Understanding pointers, accessing address of a variable, declaring & initializing pointers, accessing a variable through its pointer, pointer arithmetic, pointer to a pointer, pointer to a function, dynamic memory management - new and *delete* operators, pointers and classes, pointer to an object, pointer to a member, *this* pointer, self-referential classes, possible problems with the use of pointers - dangling/wild pointers, null pointer assignment, memory leak and allocation failures.	**10**

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	Virtual Functions and Polymorphism: Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors &polymorphism.	
IV	**Exception Handling:** Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, re-throwing an exception, specifying exceptions. **Templates and Generic Programming:** Function templates, class templates, class templates and nontype parameters, templates and inheritance, templates and friends, templates and static members. **Managing Data Files:** File streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files, data formatting in memory buffers.	**9**

Text Books:

1. Lippman, S.B. and Lajoie, J., C++Primer, Pearson Education (2005) 4th ed..
2. Stroustrup, Bjarne, The C++ Programming Language, Pearson Education (2000)3rd ed.
3. Kanetkar Y., Let Us C++, BPB Publications, 2nded.
4. Balaguruswamy E., Object Oriented Programming with C++, McGraw Hill, 2013.

Reference Books:

1. Eills, Margaret A. and Stroustrup ,Bjarne, The Annonated C++ Reference Manual, Pearson Education (2002).
2. Rumbaugh, J.R., Premerlani, W. and Blaha, M., Object Oriented Modeling and Design with UML, Pearson Education (2005) 2nd ed.
3. Kanetkar, Yashvant, Let us C++, Jones and Bartlett Publications (2008) 8th ed.
4. Brian W. Kernighan, Dennis M. Ritchie, The C++ Programming Language, Prentice Hall)
5. Schildt H., C++: The Complete Reference, Tata Mcgraw Hill, 2003.

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EC-302: DIGITAL ELECTRONICS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Number system & codes:** Binary arithmetic (addition, subtraction, multiplication and division), floating point numbers, diminished radix and radix compliments, BCD codes, 8421 code, excess-3 code, gray code, error detection and correction: parity code, hamming code. **Logic gates:** Positive & negative logic, tristate logic gates, schmitt gates, totem pole output and open collector output; fan in and fan out of logic gates, buffer & trans-receivers, IEEE/ANSI standards symbols.	**10**
II	**Boolean algebra simplification techniques:** Sum of products and product of sums simplification, NAND and NOR implementation incompletely specified functions, Ex-OR functions, the map method: two, three, four and five variable maps; the tabulation method, determination of prime implicants, selection of essential prime implicants. **Logic families:** Classification of digital IC's, significance & types, characteristics parameters, TTL, ECL, CMOS logic families, NMOS & PMOS logic, interfacing between TTL & CMOS.	**10**
III	**Combinational logic circuits:** Implementing combinational logic, arithmetic circuits: half adder, full adder, half subtractor, full subtractor, multiplexer, encoder, demultiplexer & decoder. **Flip flops:** Introduction, S-R flip -flops, Level & edge triggered flip flops, JK flip-flop, D flip-flop, T flip-flop, Master slave JK flip-flop, Flip flop timing parameters & applications.	**10**
IV	**Shift Registers:** Shift register, ring counter, universal shift registers, SISO, PISO, SIPO & PIPO. **Counters:** Asynchronous ripple counter, synchronous counter, modulus of a counter, binary ripple counter, up & down, decade counter. **Semiconductor Memories:** Classification of memories, ROM, RAM, static	**9**

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	memory and dynamic memory, programmable logic arrays, charged-coupled device memory	

Text Books

1. Digital Electronics -Principle & Integrated circuits, Anil K Maini, Wiley India edition
2. Modern Digital Electronics, R.P.Jain, TMH
3. M. Morris Mano, Digital Design, Prentice Hall of India.

Reference Books

1. Digital Principle and Applications, Malvino and Leach, TMH
2. Digital Electronics, Kharate, Oxford University Press

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CS-303: COMPUTER ARCHITECTURE AND ORGANIZATION

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Basics of Digital Electronics:** Codes, logic gates, flip flops, registers, counters, multiplexer, demultiplexer, decoder, and encoder. **Register Transfer and Micro operations:** Register transfer language, register transfer, bus & memory transfer, logic micro operations, shift micro operation. **Computer Arithmetic:** Unsigned, signed and floating point data representation, addition, subtraction, multiplication and division algorithms. booths multiplication algorithm.	10
II	**Basic Computer Organization:** Instruction codes, computer instructions, timing & control, instruction cycles, memory reference instruction, input/output & interrupts, complete computer description & design of basic computer. **Control Unit:** Hardwired vs. micro programmed control unit. **Central Processing Unit:** General register organization, stack organization, instruction format, addressing modes, data transfer & manipulation, program control, RISC, CISC.	10
III	**Input-Output Organization:** Peripheral devices, I/O interface, Modes of data transfer: Programmed I/O, Interrupt-Initiated I/O, DMA transfer, I/O processor. Serial Communication. **Memory Unit:** Memory hierarchy, processor vs. memory speed, main memory, auxiliary memories, high-speed memories, cache memory, associative memory, virtual memory, and memory management hardware.	10
IV	**Introduction to Parallel Processing:** Flyn's classification, pipelining, arithmetic pipeline, instruction pipeline, characteristics of multiprocessors, interconnection structures, interprocessor arbitration, interprocessor communication & synchronization. Performance evaluation SPEC marks LINPACK Whetstone Dhrystone etc., transaction processing benchmarks. **Case Studies:** Case studies of some contemporary advanced architecture for	9

	processors of families like Intel, AMD, IBM etc./Seminar on state-of the-art technology.	

Text Books:

1. Mano, Morris M., Computer System Architecture, Prentice Hall
2. Hayes, J.P., Computer Architecture and Organization, McGraw Hill

Reference Books:

1. Hennessy, J.L., Patterson, D.A, and Goldberg, D., Computer Architecture A Quantitative Approach, Pearson Education Asia
2. Leigh, W.E. and Ali, D.L., System Architecture: software and hardware concepts, South Wester Publishing Co.

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HS 306: SOCIOLOGY AND ELEMENTS OF INDIAN HISTORY FOR ENGINEERS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVE:

- To familiarize the students with elements of Indian history and sociological concepts and theories by which they could understand contemporary issues and problems in Indian society.
- The enable the students to analyse critically the social processes of globalization, modernization and social change.
- To help the students imbibe such skills that will enable them to be better citizens and human beings.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to sociological concepts** - Structure, system, organization, social institution, culture social stratification (caste, class, gender, power). **Understanding social structure and social processes -** Perspectives of Marx and Weber.	6
II	**Political economy of Indian society** - Industrial, urban, agrarian and tribal society. **Social change in contemporary India** - Modernization and globalization, secularism and communalism.	6
III	**Introduction to Elements of Indian History -** What is history? History sources - archaeology, numismatics, epigraphy and archival research. **Indian history and periodization -** Evolution of urbanization process: first, second and third phase of urbanization.	6
IV	**From feudalism to colonialism -**The coming of British; modernity and struggle for independence. **Issues and concerns in post-colonial India (upto 1991) -** Issues and concerns in post-colonial India 2nd phase (LPG decade post 1991)	6

Text Books:

1. Desai, A.R. (2005), ***Social Background of Indian Nationalism***, Popular Prakashan.
2. Giddens, A (2009), ***Sociology, Polity***, 6thEdition.

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3. Chandoke, Neera & Praveen Priyadarshi(2009), ***contemporary India: Economy, Society and Politics***, Pearson.

Reference Books:

1. Guha, Ramachandra(2007), ***India After Gandhi***, Pan Macmillan.
2. Haralambos M, RM Heald, M Holborn (2000), ***Sociology, Collins***.
3. Sharma R. S..(1965), ***Indian feudalism***, Macmillan.
4. Gadgil, Madhab&RamchandraGuha(1999) - ***This Fissured Land: An Ecological Histry of India,*** OU Press.

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HS 307: GERMAN LANGUAGE – I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVES:

- To read and write short, simple texts.
- To understand a dialogue between two native speakers and also take part in short, simple conversations using the skills acquired.
- To offers opportunities for students of engineering for higher studies, research and employment in Germany.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**WichtigeSprachhandlungen:** Phonetics – Sichbegrüßen - Sich und anderevorstellenformell / informell - Zahlen von 1 bis 1 Milliarde - verstehen&sprechen. **Grammatik:** regelmäßigeVerbenimPräsens - “sein” und habenimPräsens - PersonalpronomenimNominativ	**6**
II	**WichtigeSprachhandlungen:** Telefon Nummernverstehen und sprechen Uhrzeitenverstehen und sagenVerneinung “nicht und kein” (formell und informell). **Grammatik**: Wortstellung – Aussagesatz – W-Frage und Satzfrage (Ja/NeinFrage) Nomenbuchstabieren und notierenbestimmter und unbestimmter Artikelund Negativartikelim Nom. &Akkusativ	**6**
III	**WichtigeSprachhandlungen:** Tageszeitenverstehen und über Terminesprechen-Verabredungenverstehen – Aufgabenim Haushaltverstehen. **Grammatik:** PersonalpronomenimAkkusativ und Dativ - W-Fragen “wie, wer, wohin,wo, was usw.-Genitivbei Personennamen - ModalverbenimPräsens “können, müssen,möchten”	**6**
IV	**WichtigeSprachhandlungen:** Sichaustauschen, was man kann, muss – BezeichnungenLebensmittel – Mengenangabenverstehen – PreiseverstehenundEinkaufzettelschreiben	**6**

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	Grammatik: Wortstellung in SätzenmitModalverben – Konnektor ”und” – “noch”-kein-------mehr – “wieviel, wieviele, wie alt, wielange” – PossessivartikelimNominativ	
V	**WichtigeSprachhandlungen:** Freizeitanzeigenverstehen – HobbysundSportarten Anzeigenfür Freizeitpartnerschreibenbzw. daraufantworten –Vorlieben und Abneigungenausdrucken **Grammatik:**Verbenmit Vokalwechselim Präsens – ModalverbenimPräsens“dürfen, wollen und mögen - “haben und sein” imPräteritum – regelmäßigeVerbenimPerfekt – Konnektoren “denn, oder, aber.	**6**

Text Book

1. Studio d A1. Deutsch alsFremdsprache with CD.(Kursbuch und Sprachtraining).

References

1. German for Dummies
2. Schulz Griesbach

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HS 308: FRENCH LANGUAGE - I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVES:

- To read and write short, simple texts.
- To understand a dialogue between two native speakers and also take part in short, simple conversations using the skills acquired.
- To offers opportunities for students of engineering for higher studies, research and employment in French.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Grammar and Vocabulary:** Usage of the French verb "se presenter", a verbof self- introduction and how to greet a person- "saluer". **Listening and Speaking:** The authentic sounds of the letters of the Frenchalphabet and the accents that play a vital role in the pronunciation of thewords. **Writing:** Correct spellings of French scientific and technical vocabulary. **Reading:** Reading of the text and comprehension – answering questions.	5
II	**Grammar and Vocabulary:** Definite articles, "prepositions de lieu" subject pronouns. **Listening and Speaking:** Pronunciation of words like Isabelle, presentezandla liaison – vousetes, vousappelez and role play of introducing each other –group activity. **Writing:** Particulars in filling an enrolment / registration form. **Reading Comprehension:** reading a text of a famous scientist and answeringquestions.	6
III	**Grammar and Vocabulary:**Verb of possession "avoir' and 1st group verbs"er", possessive adjectives and pronouns of insistence- moi, lui..andnumbers from 0 to 20. **Listening and Speaking:** Nasal sounds of the words like feminine, ceinture,parfum and how to ask simple questions on one's name, age, nationality,address mail id and telephone number. **Writing:** Conjugations of first group verbs and paragraph writing on self – introduction and introducing a third person. **Reading Comprehension:** reading a text that speaks of one's profile and	6

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	answering questions	
IV	**Grammar and Vocabulary:** Negative sentences, numbers from 20 to 69, verb"aimer"and seasons of the year and leisure activities. **Listening and Speaking:** To express one's likes and dislikes and to talk ofone's pastime activities (sports activities), je fais du ping-pong and nasalsounds of words – janvier, champagne. **Writing-**Conjugations of the irregular verbs: faire and savoir and their usage.Paragraph writing on one's leisure activity- (passé temps favori). **Reading:** a text on seasons and leisure activities – answering questions.	**6**
V	**Grammar and Vocabulary:** les verbes de direction- to ask one's way and togive directions, verbes- pouvoir and vouloir and 2nd group verbs, a droite, lapremiere a gauche and vocabulary relating to accommodation. **Listening and Speaking:**To read and understand the metro map and henceto give one directions – dialogue between two people. **Writing:** Paragraph writing describing the accommodation using the differentprepositions like en face de, derriere- to locate. **Reading Comprehension:**A text / a dialogue between two on location anddirections- ouest la poste/ la pharmacie, la bibliotheque?.....	**6**

Text Book

1. Tech French

References

1. French for Dummies.
2. French made easy-Goyal publishers
3. Panorama

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CS-311: DATA STRUCTURE LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	2 hrs

Experiments as per the topics in the syllabus for the course 'Data Structure lab.' will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

1. Write recursive programme which computes the nth Fibonacci number
2. Write recursive programme which computes the factorial of a given number.
3. Write a program to implement linear search using arrays
4. Write a program to implement binary search using arrays
5. Write c program to implement bubblesort, to sort a given list of integers in ascending order.
6. Program to implement insertion sort to sort a given list of integers in ascending order.
7. program to implement INSERTION SORT to sort a list of numbers
8. Write a C program that implement mergesort, to sort a given list of integers in ascending order.
9. Write C programs that implement stack using arrays
10. Write C programs that implement stack using linked list Program
11. Write c programs that implement Queue using array
12. Write C programs that implement Queue using linked lists.
13. Write program to implement linked list operations (Creation, Insertion, Deletion, reversing).
14. Write a program to implement binary tree
15. Write a program to implement heap sort using arrays

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CS-312: C++ Programming Lab

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	2 hrs

Experiments as per the topics in the syllabus for the course 'C++ Programming lab.' will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

1. Write a program in C++ to exchange the content of two variables using call by reference
2. Write a program in C++ to search the 2nd largest & smallest element in an array.
3. Write a C++ program to implement a student class having roll no., name, rank, addresses as data members.
4. Write a program in C++ demonstrating the Static Data member.
5. Write a program in C++ demonstrating the public, protected and private parameters.
6. Write a program in C++ to demonstrate constructor with default argument.
7. Write a program in C++ to demonstrate the Constructor Overloading, assume desired parameters.
8. Write a program in C++ to create the class shape, and overload the function to return the perimeters of the different shapes.
9. Write a program in C++ to demonstrate destructor in inheritance.
10. Write a program in C++ to demonstrate multiple inheritance.
11. Write a program in C++ to demonstrate multilevel inheritance.
12. Write a program in C++ to demonstrate public, private and protected inheritance.
13. Write a program in C++ to demonstrate virtual function.
14. Write a program in C++ to demonstrate friend function.
15. To demonstrate function overriding.
16. Write a program in C++ to copy & append the content of file into another. (Assume suitable data)
17. Write a C++ program implement a class 'Complex' of complex numbers. The class should be include member functions to add and subtract two complex numbers. .
18. Write a C + + program to implement matrix class. Add member function to transpose the matrix.
19. Write a C ++ program to implement a class for complex numbers with add and multiply as member functions. Overload ++ operator to increment a complex number.

EC-306: DIGITAL ELECTRONICS LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	I.A.	ESE	Total	
0	0	2	1	30	20	50	2 hrs

Experiments as per the topics in the syllabus for the course ‘Digital Electronics lab.’ will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

List of Experiments:

1. To verify the truth table of logic gates realize AND, OR, NOT gates
2. To realize AND, OR gates using diodes and resistors
3. Implementation of X-OR and X-NOR using NAND and NOR gates.
4. Design of a digital circuit using K-map and realise by using NAND-NAND or NOR-NOR gates.
5. Design of an adder logic circuit.
6. Design of a subtractor logic circuit.
7. Implementation of logic equations using MUX, DEMUX
8. Design of an encoder logic circuit.
9. Design of a decoder logic circuit.
10. Conversion from one flip flop to another.
11. Design of a counter and its realization using FFs.
12. Design of a shift register and its realization using FFs.
13. Design BCD to seven-segment display using 7447 IC

NOTE: The above experiments may also be performed on simulation software

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MA 401: OPTIMIZATION AND CALCULUS OF VARIATIONS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
2	2	0	3	40	60	100	3 hrs

COURSE OBJECTIVES:

The objective of this course is to present different methods of solving optimization problems in the three areas of linear programming, nonlinear programming, and classical calculus of variations. In addition to theoretical treatments, there will be some introduction to numerical methods for optimization problems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** A survey of some simplified examples of common real world situations leading to optimization problems, basic formulation and theory of optimization problems. **Linear programming:** Linear programming (optimization of linear functions subject to linear constraints): basic theory; simplex method, duality, practical techniques.	6
II	**Linear programming:** Basic LPP - solution techniques (Simplex, Artificial Basis), complimentary slackness theorem, fundamental theorem of duality, degenerate solutions, cycling, applications - elements of dynamic programming including hamiltonian, bellman's optimality principle. **Transportation and Assignment Problems:** Solution of a balanced transportation problem, degeneracy in transportation problems and alternate solutions, mathematical problems in formulation of assignment problems.	7
III	**Nonlinear programming:** Nonlinear programming (optimization of nonlinear functions subject to constraints) with lagrange multipliers, Karush-Kuhn-Tucker optimality conditions, convexity, duality. **Approximation methods for nonlinear programming:** Line search methods, gradient methods, conjugate gradient methods, Networking techniques – PERT and CPM.	6

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IV	**Calculus of Variations:** Basic definitions -functional, extremum, variations, function spaces; necessary conditions for an extremum, euler-lagrange equation, convexity and it's role in minimization, minimization under constraints; existence and nonexistence of minimizers, applications - isoperimetric problems, geodesics on the surface.	**6**

Text Books:

1. C. B. Gupta, ***"Optimization Techniques in Operation Research,"*** I. K. InternationalPublishing House Pvt. Ltd.
2. A. S. Gupta, ***Calculus of Variations and Applications***, PHI Prantice hall India.
3. Mukesh Kumar Singh, ***"Calculus Of Variations"***, Krishna Prakashan Media (P) Ltd.
4. J. K. Sharma, ***Operations Research – Problems and Solutions***, Macmillian Pub.

Reference books:

1. I. M.Gelf and S. V. Fomin, ***"Calculus of Variations"*** Dover Publications IncMineola,New York.
2. Purna Chand Biswal, ***"Optimization in Engineering***, Scitech Publications India Pvt. Ltd.
3. B. S. GREWAL, ***Higher Engineering Mathematics***, Krishna Publications.
4. G. Hadly, ***Linear Programming***, Narosa Publishing House.
5. KantiSwarup, P. K. Gupta and Manmohan, ***"Operations Research,"*** Sultan Chand & Sons.

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HS 409: HUMAN VALUES AND PROFESSIONAL ETHICS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE OBJECTIVES:

- To enable students to explore the purpose of value education.
- To understand the purpose of harmony with oneself, family, society and nature.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction –Need and Basic Guidelines** 1. Understanding the need, basic guidelines, content and process of value education 2. Self-exploration – purpose, content and process, 'natural acceptance' and experiential validation – as the mechanism for self-explanation.	6
II	**Process for Value Education** 1. Continuous Happiness and Prosperity – A look at basic Human Aspirations. 2. Right Understanding, Relationship and Physical Facilities – basic requirements for fulfillment of aspirations of every human being with their correct priority 3. Understanding Happiness and prosperity – A critical appraisal of the current scenario. 4. Method to fulfill the human aspirations; understanding and living in harmony at various levels	**7**
III	**Harmony in Human Beings** 1. Understanding human being as a co-existence of the self and the body. 2. Understanding the needs of Self ('I') and 'Body' – Sukh and Suvidha. 3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)	**7**
IV	**Harmony in Myself and body** 1. Understanding the characteristics and activities of 'I' and harmony	**6**

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	in 'I' 2. Understanding the harmony of I with the Body: Sanyam and Swasthya: correct appraisal of Physical needs, meaning of Prosperity in detail.	
V	**Harmony in Family, Society and Nature** 1. Understanding harmony in the family, society and nature. 2. Understanding values in human relationship; meaning of Nyaya and Program for its fulfillment to ensure Ubhay-tripti. 3. Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.	**6**

Text Books

1. R R Gaur, RSangal and GP Bagaria, ***A Foundation Course in value Education***, Published by Excel Books (2009).
2. R R Gaur, R Sangal and G P Bagaria, ***Teacher's Manual (English),*** 2009.

Reference Books

1. E.F. Schumacher, ***Small is Beautiful; a study of economics as if people mattered***, Blond & Briggs, Bratain, 1973.
2. PL Dhar, RR Gaur, ***Science and Humanism***, common wealth publishers, 1990.
3. A.N. Tripathy, ***Human values,*** New Age International Publishers, 2003.
4. E.G. Seebauer& Robert, L BERRY, ***Foundational of Ethics for Scientists &Engineers***, Oxford University Press, 2000.
5. M. Govindrajran, S.Natrajan& V.S. Senthi Kumar, ***Engineering Ethics (including human Values),*** Eastern Economy Edition, Prentice hall of India Ltd.
6. B.L. Bajpai, 2004, ***Indian Ethos and Modern Management***, New Royal book Co; Lucknow, 2004, Reprinted 2008.

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CS-401: DATABASE MANAGAMENT SYSTEMS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Concept & overview of dbms, data models, database languages, database administrator, Database Users, Three Schema architecture of DBMS. **Entity-Relationship Model:** Basic concepts, design issues, mapping constraints, keys, entity-relationship diagram, weak entity sets, extended E-R features.	10
II	**The Relational Data Model & Algebra :** Relational model, structure of relational databases, relational algebra, relational calculus, introduction to views, updates on views **SQL and Integrity Constraints:** Concept of DDL, DML, DCL, basic structure, set operations, aggregate functions, null values, domain constraints, referential integrity constraints, assertions, views, nested sub queries, database security application development using SQL, stored procedures and triggers.	10
III	**Relational Database Design:** Functional dependency, different anomalies in designing a database., normalization using functional dependencies, decomposition, Boyce-Codd normal form, 3NF, normalization using multi-valued dependencies, 4NF, 5NF. **Internals of RDBMS:** Physical data structures, query optimization, join algorithm, statistics and cost base optimization, transaction processing, concurrency control and recovery management, transaction model properties, state serializability, lock base protocols, two phase locking.	10
IV	**Failure Recovery and Concurrency Control:** Issues and models for resilient operation -undo/redo, logging-protecting against media failures. **Concurrency Control:** Serial and serializable schedules, conflict serializability, enforcing serializability by locks-locking systems with several lock modes, concurrency control by timestamps, validation. **Transaction Management:** Serializability and recoverability-view, serializability, resolving deadlocks-distributed databases: commit and lock.	9

Text Books

1. Ramez Elmasri, Shamkant B. Navathe, ***"Fundamentals of Database systems"***, Pearson.
2. Korth, Silberschatz, Sudarshan, ***"Database concepts"***, MGH.

Reference Books:

1. R. Ramakrishnan and J. Gehrks, ***"Database Management System"***, MGH, International edition.

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2. C. J. Date, ***"Data Base Systems"***, Addison Wesley, Pearson Education,
3. Chakrabarti, ***"Advance Database Management Systems"*** , Wiley Dreamtech.
4. Ivan Bayross, ***"SQL and PL/SQL"***, BPB Publication.

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CS-402: OPERATING SYSTEMS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Basic Concept of Operating System:** Evolution of operating system, fundamental of operating system functions, multiprogramming, multiprocessing, time-sharing systems and real time systems, software layers & virtual machine, operating system principles, structuring methods (monolithic, layered, modular, microkernel models).	10
II	**Process Management:** Processor scheduling, threads, scheduling model, CPU scheduling algorithms, CPU scheduling algorithm, concurrent process - introduction, concurrency specifications, process graphs, process creation & termination, introduction to conflicts due to concurrency, simple examples to illustrate the problem, critical section problem, semaphores, classical process co-ordination problem. **Deadlock:** introduction, analysis of conditions, prevention & avoidance, detection & recovery.	10
III	**Memory Management:** Contiguous memory allocation, overlays, fixed partitioning vs. variable partitioning, paged memory, segmentation and virtual memory, page replacement algorithms. **File Management:** File concepts, access methods, directory structure, file protection, file system structure, allocation methods, and secondary storage management - disk structure, disk scheduling, disk management, swap-space management, and disk reliability.	10
IV	**Protection and security:** Security attacks, security mechanisms and policies. **Virtual Machines:** Types of virtualization (including hardware/software, OS, server, service, network). Unix/Linux/ case study / seminar on state-of the-art technology.	9

Text Books

1. Silberschatz A, Galvin P.B. and Gagne G., ***"Operating System Concepts"***, John Wiley.
2. Stallings Willam, ***"Operating Systems Internals and Design Principles"***, Prentice Hall.

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Reference Books

1. Dhamdhere D.M., ***"Operating Systems: A Concept Based Approach"***, McGraw Hill.
2. Flynn I.M. and Mc Hoes A.M., ***"Understanding Operating Systems"***, Thomson.

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CS-404: THEORY OF COMPUTATION

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals:** Automata Definition, applications, finite state machine, definitions, finite automaton model, acceptance of strings, deterministic finite automaton and non deterministic finite automaton, transition diagrams. **Finite Automata**: NFA with Λ-transitions, significance, equivalence of NFA & DFA, equivalence between NFA with and without Λ-transitions, minimization of FSM, equivalence between two FSMs, finite automata with output- Moore and Melay machines.	**10**
II	**Regular Languages:** Regular sets, regular expressions, identity rules, constructing finite automata for a given regular expressions, Arden's theorem, conversion of finite automata to regular expressions, pumping lemma of regular sets, closure properties of regular sets (proofs not required), Myhill-Nerode theorem and minimization of finite automata, minimization algorithm.	**10**
III	**Grammar Formalism:** Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, context free grammar, derivation trees, sentential forms, right most and leftmost derivation of strings. **Context Free Grammars:** Ambiguity in context free grammars, minimization of context free grammars, Chomsky normal form, Greibach normal form. **Push Down Automata**: Push down automata, definition, model, acceptance of CFL, acceptance by final state and acceptance by empty state and its equivalence, applications of push down machines.	**10**
IV	**Turing Machine**: Turing Machine, definition, model, design of TM, types of turing machines (proofs not required), post correspondence problems and halting problem of turing machine. **Chomsky Hierarchies:** Chomsky hierarchies of grammars, unrestricted grammars, context sensitive languages, relation between languages of classes.	**9**

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	Computability: Basic concepts, primitive recursive functions.	

Text Books:

1. Hopcroft H. E. and Ullman J. D., ***"Introduction to Automata Theory Languages and Computation"***, Pearson Education.
2. Sipser, ***"Introduction to Theory of Computation"*** Thomson.

Reference Books:

1. Daniel I.A. Cohen, ***"Introduction to Computer Theory"***, John Wiley
2. John C Martin, ***"Introduction to languages and the Theory of Computation"***, TMH
3. Lewis H.P. and Papadimition C.H., ***"Elements of Theory of Computation"***, Pearson /PHI
4. Mishra and Chandrashekaran, ***"Theory of Computer Science, Automata Languages and Computation"***, PHI

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EC-402: MICROPROCESSORS & PERIPHERALS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Evolution of microprocessor, 8085 microprocessor: features, architecture and pin configuration; 8085 instruction: instruction word size, opcode format, data format, addressing modes; 8085 machine cycles and timing diagrams. **Typical instruction set of 8085:** Data transfer instructions, arithmetic instructions, logic and bit manipulation instructions, branch instructions, machine control instruction.	**10**
II	**Programming:** Development of assembly language program. **Interrupts & data transfer:** Interrupt system of 8085, Stack and subroutine. **Memory interfacing:** Types of memory, memory map and address range, memory interfacing decoding techniques: absolute and partial.	**10**
III	**I/O interfacing:** Basic interfacing concept using mapping techniques: I/O mapped I/O and memory mapped I/O **Serial I/O:** Basic concepts in serial I/O, asynchronous serial data communication using SOD and SID. **Peripheral devices & applications of microprocessor:** Description of the 8251 programmable communication interface, the 8255 programmable peripheral interface, the 8257 DMA controller.	**10**
IV	**Trends in microprocessor Technology:** 8086/8088 microprocessor: main features, architecture-the execution unit and bus interface unit, memory segmentation, memory addressing, 8086/8088 hardware pin signals, 8086 minimum and maximum modes of operation; introduction to 8087 floating point coprocessor and its connection to host 8086.	**9**

Text Books:

1. Gaonkar, ***"Microprocessor Architecture, Programming and Application with 8085"***, PHI.
2. D.V.HALL, ***"Microprocessors and Interfacing"***, McGraw Hill.
3. Senthil, Saravanam, ***"Microprocessor and Microcontrollers"***, Oxford University Press.

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Reference Books:

1 A.P. Mathur, ***"An Introduction to Microprocessor"***, TMH.
2 Kenneth J Ayala, ***"The 8086 Microprocessor"***, Cengage Learning
3. B.Ram, ***"Fundamentals of Microprocessor & Microcomputers"***, Dhanpat Rai & Co.

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HS 410: LAW FOR ENGINEERS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVE:

- To familiarize students (Prospective engineers) with elementary knowledge of laws that would be of utility in their profession.
- To familiarize students with the constitution of India and laws in new areas viz. IPR, ADR, Human Rights, Right to Information, Corporate law, Law relating Elections and Gender Studies.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Constitutional Law:** Nature of Indian Constitution (features), fundamental rights, duties and directive Principles of State Policy (DPSP's), forms of Governments, structure of Government of India, role and responsibility of executive, legislature/parliament and judiciary, nature of Indian federal system, center state and relations. Basic structure of the Indian constitution, basic features of the Indian, constitutional amendments – Golak Nath, Keshwananda Bharti, Maneka Gandhi (1978) and S.R. Bommai case (1994), (floor test).	6
II	**Law of contract:** General principles of Indian Contract Act, 1862, kinds of Government contracts and dispute settlement, standard and printed form of contract, essential elements of valid contract proposal, acceptance communication and revocation thereof, relevance of time in contractual obligation. Main objectives of Arbitrates and Conciliation Act-1996, tort and law of tort, general principles of tort law, classifications of torts: property vs. person.	6
III	**Administrative Law:** Evolution, nature and its scope, conceptual objection against growth of administrative rule of law and separation of power, clarification of administrative actions, judicial review of administrative actions, exclusion of judicial review and concept of "Ombudsman";Right to Information Act, 2005 (Sub Section 1 - 20) **Environmental Law:** Definition, meaning and its nature, environmental (Protection) Act-1986, Water (Preservation and Control of Pollution) Act-1974, Air (Prevention and Control of Pollution) Act-1981; Environmental pollution, overall remedies and procedures.	8

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IV	**Human Rights:** Legality of human rights, universal declaration of human rights, 1948, difference between civil and political rights, individual and human rights - human rights of child, weaker section of society, prisoners, and refugees, International Human Rights Commission.	**6**

Text Books:

1. D.D. Basu, ***Shorter Constitution of India***, Prentice Hall of India, (1996)
2. MeenaRao, ***Fundamental concepts in Law of Contract***, 3rd Edn. Professional Offset, (2006)
3. H.O.Agarwal, ***International Law and Human Rights***, Central Law Publications, (2008)

Reference Books:

1. H.M. Seervai, ***Constitutional Law of India***, Tripathi Publications, (1993).
2. S.K. Kapur, ***Human Rights under International Law and Indian Law,*** Central Law Agency, (2001)
3. NeelimaChandiramani, ***The Law of Contract: An Outline***, 2nd Edn. Avinash Publications Mum, (2000)
4. Avtarsingh, ***Law of Contract***, Eastern Book Co., (2002).
5. Anson W.R.(1979), ***Law of Contract***, Oxford University Press

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HS 411: GERMAN LANGUAGE – II

<table>
<tr><th colspan="3">Teaching Scheme</th><th>Credits</th><th colspan="3">Marks</th><th rowspan="2">Duration of End Semester Examination</th></tr>
<tr><th>L</th><th>T</th><th>P/D</th><th>C</th><th>Sessional</th><th>End Semester Exam</th><th>Total</th></tr>
<tr><td>2</td><td>0</td><td>0</td><td>2</td><td>40</td><td>60</td><td>100</td><td>3 hrs</td></tr>
<tr><td colspan="4">Prerequisite</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">HS 302: GERMAN LANGUAGE - I</td><td></td><td></td><td></td><td></td></tr>
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COURSE OBJECTIVES:

- To enable the students to speak and understand about most of the activitiesin the day to day life.
- The students will be able to narrate their experiences in Past Tense.
- The students will be able to understand and communicate even with German Nationals.
- By the end of Phase – II the students will have a reasonable level of conversational skills.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Wichtige Sprachhandlungen:** Zimmersuche, Möbel **Grammatik**: Verbenmittrennbaren Vorsilbenim Präsens und Perfekt. Verbenmittrennbaren Vorsilben und Modalverbenim Präsens. Verbenmituntrennbaren Vorsilbenim Perfekt.Unregelmäßige undgemischteVerbenimPerfekt.	6
II	**Wichtige Sprachhandlungen**: Kleidung ,Farben, Materialien. **Grammatik:** formelle Imperativsätzemit “Sie” informelle Imperativsätze Vorschlägemit “wir” – “sollen/wollenwir” - Sollich? Modalpartikeln “doch”“mal” “doch mal.	6
III	**Wichtige Sprachhandlungen:** Sehenswürdigkeite (Prater, BrandenburgerTör, Kolossium, Eifeltürm). **Grammatik:** Ortsangabenmit Akk. Und Dativ “alle”,”man” Indefinitepronomen“etwas”, “nichts”.	6
IV	**Wichtige Sprachhandlungen:** Essen und TrinkenimRestaurant, Partyvorbereitung und Feier. **Grammatik:** NomenausAdjektivennach “etwas”und “nichts” NomenausdemInfinitiv von Verben, zusammegesetzteNomen und ihreArtikel. Adjektiveim Nom.undAkk.nachunbestimmten Artikel, Negativartikel und Possessivartikel	6

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Text Books

1. Studio d A1. Deutsch alsFremdsprache with CD.(KursbuchundSprachtraining).

References

1. German for Dummies
2. Schulz Griesbach

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HS 412: FRENCH LANGUAGE - II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs
Prerequisite							
HS 303: FRENCH LANGUAGE - I							

COURSE OBJECTIVES:

- To enable the students communicate effectively with any French speaker
- To enable students to access information on the internet, send e mails, pass level 1 exam conducted by Alliance Française de Madras.
- To enable students to enhance their lexical and technical competence and have a competitive edge in the international market.By the end of Phase – II the students will have a reasonable level of conversational skills.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Grammar and Vocabulary:** The second group verbs: Finir, rougir, grossir,grandir. “Les preposition de temps”: à, en, le, de 7h à 8h, jusqu’ à, vers. Listening and Speaking – the semi- vowels: Voilà, pollutant. Writing - thedays of the week, months, technical subjects, time, “les spécialitésscientifiques et l’ annéeuniversitaire, paragraph writing about time table. Reading: Reading of the text and comprehension – answering questions.	**6**
II	Grammar and Vocabulary – The adjectives, the nationality, feminine &masculinenoun forms “les métiersscientifiques”. Listening and Speaking – Vowels: soirée, année, près de, très. Writing: Countries name, nationality, “les métiersscientifiques”, numbers from:69 to infitive and some measures of unit.Reading Comprehension: reading a text.	**6**
III	Grammar and Vocabulary – near future, The demonstrative adjectives, Expressthe aim by using the verb, Listening and Speaking –“La liaison interdite – enhaut”. Writing – some scientific terms, French expressions to accept an invitation. Sentence framing. Reading Comprehension – reading a text.	**6**
IV	Grammar and Vocabulary –the verbs: manger, boire, the partitive articles Listening and Speaking – “le ‘e’ caduc Writing- the food, the ingredients, fruits, vegetables, expression of quantity, paragraph writing about food habits. Reading – reading a text.	**6**

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Text Books

1. Tech French

References

1. French for Dummies.
2. French made easy: Goyal publishers.
3. Panorama.

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CS-411: DATABASE MANAGEMENT SYSTEM LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

Experiments as per the topics in the syllabus for the course ‘Database Management System lab.’ will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

1. Introduction and concepts of SQL Basics: DDL DML DCL.
2. To create a simple database.
3. **To create a table with constraints:**
   a) Primary Key
   b) Unique
   c) Not Null
4. **Alter Table:**
   a) Adding column & multiple column
   b) changing column width
   c) Dropping column
   d) adding & dropping not null
   e) adding & dropping check constraints
   f) adding & removing primary key
   g) adding & removing foreign key
5. **Add a record to a database:**
   a) Simple insertion
   b) Accepting values from users
   c) inserting values into specific column
6. **Updating Tables:** updating with & without where clause
7. Generating Sub Query
8. **Deleting Records:** Delete Single, Multiple & All records
9. **Dropping tables:**
   a) Dropping table that has primary key
   b) Dropping table that has foreign key
10. **Retrieving data:**
    a) Retrieving all records
    b) retrieving specific coloumn,
    c) printing with user defined heading
11. Retrieving records using logical AND, OR, NOT, Between AND, IN, LIKE etc.
12. **Ordering Records:**
    a) Ascending
    b) Descending
    c) Concatenation
    d) Initcap
    e) Lower
    f) Upper
13. **Group Functions:**
    a) Group by clause
    b) having clause
    c) all clause

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14. Adding and removing permissions (Grant and Revoke)
15. To implement the concept of join Cartesian product of tables selection of rows that matches project column specified in the select clause.

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EC-405: MICROPROCESSOR & PERIPHERALS LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	I.A.	ESE	Total	
0	0	2	1	30	20	50	3 hrs

Experiments as per the topics in the syllabus for the course 'Microprocessor & peripherals lab' will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

List of Experiments:

1. Addition and subtraction of two 8-bit numbers with programs based on different addressing modes of 8085A.
2. Addition and subtraction of two 16-bit numbers using 2's complement method.
3. Addition and subtraction of two 16-bit BCD numbers using DAA instruction.
4. Multiplication of two 8-bit numbers using the method of successive addition or shift & add method.
5. Division of two 8-bit numbers using the method of successive subtraction or shift & subtract method.
6. Program for block transfer and block exchange of data bytes.
7. Finding the smallest and largest element in a block of data.
8. Arranging the elements of a block of data in ascending and descending order.
9. Generating delays of different time intervals using delay subroutines.
10. To study the interfacing of 7 segment LED display with microprocessor.
11. To study the interfacing of ADC and DAC with microprocessor.
12. To study the interfacing of stepper motor with microprocessor.
13. To study and compare main features of Intel core i3, i5 and i7

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CS-412: OPERATING SYSTEM LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	I.A.	ESE	Total	
0	0	2	1	30	20	50	3 hrs

Experiments as per the topics in the syllabus for the course ‘Operating System lab’ will be conducted in the laboratory class. Following is the list of experiments out of which 8-9 experiments must be performed during the semester:

List of Experiments:

1. Overview of single user systems, network operating system and multiuser system.
2. User administration in windows and linux operating system.
3. Write a program for the simulation of following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time.
   a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority
4. Write a program for the simulation of following file allocation strategies.
   a) Sequential b) Indexed c) Linked
5. Write a program for the simulation of following contiguous memory allocation techniques
   a) Worst-fit b) Best-fit c) First-fit
6. Write a program for the simulation of following file organization techniques
   a) Single level directory b) Two level directory c) Hierarchical
7. Write a program for the simulation of Bankers algorithm for the purpose of deadlock avoidance.
8. Write a program for the simulation of following disk scheduling algorithms
   a) FCFS b) SCAN c) C-SCAN
9. Write a program for the simulation of following page replacement algorithms
   a) FIFO b) LRU c) LFU
10. Write a program for the simulation of producer-consumer problem using semaphores.
11. Study the Linux operating system and implement various commands.
12. Write a program do the following:
    a) Find the attribute of file. b) To change the attribute of file. c) Create the directory. d) Delete the directory. e) Create the file. f) Delete the file g) Find the size of Hard Disk, RAM, and VRAM, cache.

12\. Study of various viruses / worms and tools.

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SEMESTER-V
CS-501: COMPUTER NETWORKS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts of data communications and to study the functions & protocols of OSI model.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Data communication, networks, Internet, protocols and standards. **Network Models:** Layered tasks, the OSI model, layers in the OSI model, TCP/IP protocol suite, addressing. **PHYSICAL LAYER** **Data & Signals:** Analog & digital, periodic analog signals, digital signals, transmission impairments, data rate limits, performance, multiplexing, spread spectrum. **Transmission Media:** Guided media, unguided media, media comparison **Switching:** Circuit switched networks, datagram networks, virtual circuit networks, structure of a switch.	10
II	**DATA LINK LAYER** **Error Detection and Correction:** Introduction, block coding, linear block codes, cyclic codes, checksum. **Data Link Control:** Framing, flow & error control, protocols, noiseless channels, hdlc, point to point protocol. **Multiple Accesses:** Random access, controlled access, channelization. **Wired LANs:** Ethernet: IEEE standards, standard ethernet, changes in the standards, fast ethernet, gigabit ethernet, token bus, token ring, FDDI, comparison.	10

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	Wireless LANs: IEEE 802.11, bluetooth, other wireless networks. **Connecting LANs and Virtual LANs:** Connecting devices, backbone networks, virtual LANs	
III	**NETWORK LAYER** **Network Layer Logical Addressing:** Introduction to network layer, IPv4 addresses, IPv6 addresses. **Network Layer Protocols:** Internetworking, IPv4, IPv6, transition from IPv4 to IPv6, address mapping, ICMP, IGMP, ICMPv6, delivery, forwarding, unicast routing protocols, multicast routing protocols	**10**
IV	**TRANSPORT LAYER** **Introduction to Transport Layer:** Process to process delivery, internet transport-layer protocol, user data gram protocol (UDP), TCP, SCTP. **APPLICATION LAYER** **Introduction to Application Layer**: Domain name system, remote logging, electronic mail, file transfer, architecture of WWW, web documents, HTTP, standard client server protocols, network management, SNMP	**9**

Text Books:

1. Forouzan, B.A., "***Data communication and Networking",*** McGraw Hill
2. Tanenbaum, A.S., "***Computer Networks",*** Prentice Hall

Reference Books:

1. Kurose and Ross, "***Computer Networking: A Top Down Approach",*** Addison-Wesley
2. Stallings, W. "***Computer Networking with Internet Protocols and Tech",*** Prentice Hall of India

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CS-502: CORE JAVA

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts in Java, gain knowledge in the concepts of methods, packages and applets and build a sample application using Java technologies.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Java:** Features of java, object oriented concepts, data types, variables, arrays, and system class-print(), println(), and printf() methods. Operators: arithmetic operators, bitwise operators, relational operators, boolean logical assignment operators, '?' operator, operator precedence. Control statements: java's selection statements, iteration statements, jump statements	**10**
II	Classes, objects, constructors, overloading method, access control, static and fixed methods, inner classes, string class, inheritance, overriding methods, using super, abstract class, dynamic method dispatch, using 'final' with inheritance.	**10**
III	GUI components, common GUI Event types and listener interfaces J option Pane, J Label, J text field, J button, J check box, J text area, J combo box, J list, J panel, mouse event handling, adapter classes, key event handling	**10**
IV	Layout managers, flow layout, border layout, grid layout, graphics and java 2D, graphics contexts and graphics objects, color control, font control, drawing lines, rectangles and ovals, J slider, using menus with frames. Packages, access protection, importing packages, interfaces, exception handling, throw and throws, thread, synchronization, runnable interface, inter thread communication, multithreading, I/O streams, file streams, applets, introduction to java API packages (java.lang and java.util)	**9**

Text Books:

1. C. Muthu, "***Programming in Java***", TMH Publication

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2. Deitel & Deitel, "***Java How to Program",*** PHI Publication

Reference Books:

1. Herbert Schildt, ***"The Complete Reference Java"***, TMH Publication

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CS-503: COMPUTER GRAPHICS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exams**	**Total**	
2	2	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts in computer graphics, rules and algorithms in generating graphical outputs and to develop 3-D objects using suitable transformations.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals of computer graphics:** Overview of graphic systems, video display devices, raster and random systems, graphic softwares and standards, applications of computer graphics. **Output primitives:** Points and lines, line drawing algorithms, line function, circle and ellipse generating algorithms, pixel addressing and object geometry, filled area primitives.	**6**
II	**Two dimensional geometric transformations:** Matrix representation and homogeneous coordinates, composite transformations, reflection and shearing, two dimensional viewing-viewing pipeline, viewing coordinate reference frame, window-to-viewport coordinate transformation, clipping operations- point, line and polygon clipping algorithm.	**7**
III	**Three dimensional concepts and object representation:** 3D display methods, polygon surfaces and tables, Plane equations, polygon meshes, curved lines and surfaces, quadratic surfaces, spline representations: Bezier curves and surfaces, B-spline curves and surfaces. **Three dimensional transformations and viewing:** 3D geometric and modeling transformations- translation, rotation, scaling, composite transformations, 3D viewing-viewing pipeline and coordinates, projections, clipping, parallel and perspective transformation, visible surface detection methods.	**8**
IV	**Illumination and Color models:** Basic illumination models-halftone patterns and dithering techniques, properties of light, XYZ, RGB, YIQ and CMY color models. **Computer graphics realism:** Tilling the plane- recursively defined curves- Koch curves-C curves, Dragons- space filling curves- fractals.	**5**

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Text books:

1. D. Hearn and M.P. Baker, ***"Computer Graphics",*** Prentice Hall of India.

Reference Books:

1. D.Hearn and M.P. Baker, warren Carithers ***"Computer Graphics with OpenGL",*** Pearson Education.
2. Jeffery McConnel, ***"Computer Graphics: Theory into Practice",*** Jones and Bartlett Publishers.

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CS-504: ARTIFICIAL INTELLIGENCE & EXPERT SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the representation of agents & agent environment, searching techniques, and various concepts of learning and expert system.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Introduction to artificial intelligence, background and applications, turing test and rational agent approaches, introduction to intelligent agents, their structure, behavior and environment. **Problem Solving and Searching Techniques**: Problem characteristics, production systems, breadth first search, depth first search, heuristics search techniques, best first search, A* algorithm, hill climbing, AND/OR graph AO*, constraint satisfaction problem, means-end analysis, introduction to game playing, min max and alpha beta pruning.	**10**
II	**Knowledge Representation:** introduction to first order predicate logic, well-formed formulas, quantifiers, rule based system, resolution principle, unification, forward reasoning: conflict resolution, backward reasoning , structured knowledge representation. AI programming language: PROLOG: Syntax, procedural and declarative meaning, PROLOG unification mechanism, converting english to PROLOG facts and rules, goals, anonymous variable, lists, use of fail, CUT, NOT	**10**
III	**Introduction to Neural Network:** Hopfield network, single and multilayer networks, perceptions, back-propagations learning, Boltzman machine. Introduction to genetic algorithm: The genetic algorithm, genetic operators, working of genetic algorithm, problem with genetic algorithm.	**10**
IV	**Expert System:** introduction, skill v/s knowledge, characteristics of expert system, knowledge engineering, inferencing, forward chaining and backward chaining expert system tools, applications and future scope Natural language processing: Introduction, language parsing, syntactic and semantic analysis, top down and bottom up parsing, chart parsing, knowledge representation languages, ELIZA, speech recognition	**9**

Text Books:

1. Russell and Norvig, ***"Artificial Intelligence- A Modern Approach"***, Pearson Prentice Hall.

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2. D W Patterson, ***“Artificial Intelligence and Expert Systems”***, Prentice Hall of India.
3. B.Vegnanarayana, ***“Artificial neural networks”***, Prentice Halll of India P Ltd

Reference Books:

1. Elaine Rich, Kevin Knight, ***“Shivashankar B. Nair, Artificial Intelligence”***, Tata McGraw Hill.
2. Nils J Nilsson, ***“Artificial Intelligence A New Synthesis”***, Morgan Kaufmann

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CS-505: SOFTWARE ENGINEERING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the software life cycle models, to design and develop correct and robust software products and to understand business requirements pertaining to software development.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Software Evolution:** Need for software engineering, software crisis, generic v/s customer made software product, distinctive characteristics of software product, software development process models (SDLC), waterfall model, prototype model, spiral model. **Software requirement analysis and specification**: Requirement specification, crucial process step, classification of requirements, structured requirement definition, structured analysis & design technique, software prototyping, software requirements specification, nature of the SRS, characteristics of a good SRS, organization of the SRS.	10
II	**Software Project Management:** Software project, project feasible study, project planning, project organization, estimate of project effort (COCOMO), staffing level estimation, staffing, risk management, project scheduling, project monitoring and control.	10
III	**Software Quality Management:** Quality dimension, process quality and product quality, quality assurance planning, quality measurement, software configuration management, software process improvement, ISO 9000 quality standards, ISO approach to quality assurance systems, SEI capability maturity model (CMM), PSP. **Coding and unit Testing:** Unit testing, non execution based testing, code inspection, testing process, black box testing, white box testing, metric, debugging, program analysis tool, integration testing, system testing, testing distributed implementation, testing of real time system, accepting testing some general issue associated with testing, , recovery testing, security testing, stress testing, performance testing.	10
IV	**Software maintenance:** Planning for maintenance, maintenance activities, reengineering, characteristics, potential solution to maintenance problems, s/w maintenance process models. **Software Reuse & Emerging Trends:** S/w reverse engineering, s/w reuse concepts, basic issues in reuse program, reuse approach, client server software, SOA.	9

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	Fundamentals of Agile: The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software, Development, Agile project management, Design and development practices in Agile projects, Test Driven, Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile, Testing, Agile Tools	

Text Books:

1. Pankaj Jalote, ***"Software Engineering: A Precise Approach"***, Wiley India Publications.
2. S.Thangasamy, ***"Essentials of Software Engineering",*** Wiley India Publications.
3. Agile Software Development with Scrum By Ken Schawber, Mike Beedle Publisher: Pearson
4. Agile Software Development, Principles, Patterns and Practices By Robert C. Martin Publisher: Prentice Hall

Reference Books :

1. Rajib Mall, ***"Fundamental of Software Engineering",*** PHI Publication.
2. K.K. Aggarwal &Yogesh, ***"Software Engineering"",*** New Age International Publishers.

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CS-506: ANALYSIS AND DESIGN OF ALGORITHM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable students to introduce the basic concepts of algorithms, mathematical aspects and analysis of algorithms, sorting and searching of algorithms and various algorithms design methods.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Basics of algorithms:** Algorithms and characteristics**,** algorithm design paradigms, fundamentals of algorithmic problem solving, fundamental data structures. **Analysis of algorithms:** The efficient algorithm-average, worst and best case analysis, asymptotic notations and its properties, amortized analysis, recurrences: substitution method, recursion tree method and master's method.	10
II	**Divide and conquer:** Binary search, Strassen's matrix multiplication, closest-pair and convex-hull problems. **Sorting Algorithm:** Counting sort, radix sort. **Dynamic Programming:** Overview, difference between dynamic programming and divide and conquer, multistage graphs, optimal binary search trees, knapsack problem, fast fourier transform.	10
III	**Greedy Method:** Traveling salesman problem, job sequencing with deadlines, minimum spanning trees (Prim's and Kruskal's algorithms). **Single source Shortest path**: Bellman ford algorithm, single source shortest path in directed acyclic graph. **Approximation Algorithms**: Vertex cover problem, set covering problem , the subset sum problem.	10
IV	**Flow networks**: Ford-Fulkerson, maximum bipartite matching, sorting networks, cryptographic, computations, multicast routing, BIN packing. **Computational Complexity:** Polynomial time vs non-polynomial time complexity, polynomial reduction, NP-hard and NP-complete problems, Cook's theorem (without proof).	9

Text Books:

1. T.cormen, C. Lieserson. R. Rivest and C. Stein, "***Introduction to Algorithms",*** Prentice-Hall/India.
2. Ellis Horowitz, Sartaz Sahni and Rajasekharan, ***"Fundamentals of Computer Algorithms",*** Galgotia publications pvt. Ltd.

Reference Books:

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1. Sara Basse, A.V.Gelder, ***"Computer Algorithms",*** Addision Wesley.
2. Michal T. Goodrich, ***"Älgorithm Design",*** Wiley India Publication.
3. Aho, ullman, and Hopcroft, ***"Design and Analysis of Algorithms",*** Pearson education.

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CS-511: COMPUTER NETWORKS LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Write specifications of latest desktops and laptops.
2. Familiarization with networking components and devices: LAN adapters, hubs, switches, routers etc.
3. Familiarization with transmission media and tools: Co-axial cable, UTP cable, crimping tool, connectors etc.
4. Preparing straight and cross cables.
5. Implementation of various LAN topologies using network devices, cables and computers.
6. Configuration of TCP/IP protocols in Windows and Linux.
7. Implementation of directory/file and printer sharing.
8. Designing and implementing class A, B, C networks
9. Subnet planning and its implementation
10. To plan IPv6 address scheme for a local area network comprising of ‘n’ terminals.
11. Study different type of classes and bridges, routers, hubs, gateway etc.
12. Configuration a switch, router.

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CS-512: CORE JAVA LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Demonstrating the use of methods of math class.
2. Programs to implement the methods of string class
3. To demonstrate interfaces
4. To demonstrate inheritance
5. To demonstrate super and this
6. To demonstrate static variables and methods
7. To demonstrate exceptions
8. To demonstrate file input stream and file output stream classes
9. To demonstrate the creation of applets and passing parameters to applets
10. To demonstrate mouse and keyboard events in an applet
11. To demonstrate the creation of a frame.
12. To demonstrate labels and buttons with proper events
13. To demonstrate checkboxes with proper events
14. To demonstrate check box groups with proper events
15. To demonstrate lists and text fields with proper events
16. To demonstrate scroll bars with proper events
17. To demonstrate menu bars and menus.
18. To demonstrate dialog boxes.

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CS-513: COMPUTER GRAPHICS LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Familiarize yourself with creating and storing digital images using scanner and digital camera (compute the size of image when stored in different formats) and convert the stored images from one format to another (BMP, GIF, JPEG, TIFF, PNG, etc.) and analyze them.
2. Implement Bresenham's line algorithm. Also provide Provision to change attributes of graph primitives such as stippling (Dotted and Dashed pattern), colors. Implement Bresenham's circle algorithm. Also provide to change attributes of graph primitives such as stippling (Dotted and Dashed pattern) and colors.
3. Implement 2-D transformation with translation, scaling, rotation, reflection, Shearing and scaling
4. Implement tweening procedure for animation with key frames having equal or different no. of edges.
5. Write a program for 2D line drawing as Raster Graphics Display.
6. Write a program for 2D circle drawing as Raster Graphics Display.
7. Write a program for 2D polygon filling as Raster Graphics Display.
8. Write a program for line clipping.
9. Write a program for polygon clipping.
10. Implement Flood Fill Method to fill interior and exterior of a polygon.
11. Write a program for displaying 3D objects as 2D display using perspectives transformation.
12. Write a program for rotation of a 3D object about arbitrary axis.
13. Write a program to draw different shapes and fill them with various pattern.

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CS-514: INDUSTRIAL TRAINING (VIVA-VOCE)

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exams**	**Total**	
0	0	0	0	Satisfactory / Unsatisfactory			2Hrs

This 4 weeks training will be related to Industrial Projects to be undertaken under the guidance of Faculty preferably at Industry / Software Park / Incubation Centre or related areas. This may also be undertaken within the Institute. This training will be undertaken during vacation. Student is supposed to submit the project report at the end of the training.

Evaluation will be based on Project Report, presentation and comprehensive Viva-voce examination related to the project.

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OPEN ELECTIVE-III

CS-507: BASICS OF OPERATING SYSTEMS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exams**	**Total**	
2	0	0	2	40	60	100	3Hrs

COURSE OBJECTIVES:

To learn the functional and operational details of operating system.This course should provide the students with good understanding of Operating System including its architecture and all its components. Good conceptions on all the subjects like processes, scheduling, memory management, file systems, security and protection mechanism etc. should be provided.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**History of Operating Systems:** Zeroth, first, second, third and fourth generations, structure and types of operating system, functions of operating system.	**6**
II	**Process Management:** States of process, interprocess communication, processor scheduling, threads, CPU scheduling algorithms: first come first serve, shortest job first, round robin scheduling. **File system:** introduction, types of file systems: NTFS, FAT, ext3, ext4, Directory structure and its implementation	**7**
III	**Memory Management:** Contiguous memory allocation, overlays, fixed partitioning vs. variable partitioning, paged memory, segmentation and virtual memory, page replacement algorithms.	**7**
IV	**Protection and security:** Introduction to protection, Security attacks, security mechanisms and policies, computer worms, computer viruses, different types of virus.	**6**

Text Books:

1. Silberschatz A, Galvin P.B. and Gagne G., ***"Operating System Concepts"***, John Wiley.
2. Stallings Willam, ***"Operating Systems Internals and Design Principles"***, Prentice Hall.

Reference Books:

1. Achyut S Godbole "***Operating Systems", Tata McGraw Hill***.

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2. Stallings, Willam, "***Operating Systems Internals and Design Principles",*** Prentice Hall.

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CS-508: PC MAINTENANCE & TROUBLESHOOTING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
2	0	0	2	40	60	100	3Hrs

COURSE OBJECTIVE:

To learn the functional and operational details of various peripheral devices.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Peripheral Devices:** Overview and Technical Specification: Keyboard, Display Devices, Printers, Magnetic Storage Devices, FDD, HDD, Special Types of Disk Drives, Mouse and Trackball, Modem, Fax, CD ROM Drive, Scanner, Digital Camera, DVD.	6
II	**PC Hardware Overview:** Introduction – Hardware BIOS, DOS Interaction, The PC family, PC hardware, Inside the System Box, Types of Motherboard, Peripheral Interfaces and Controllers on Mother board, Keyboard Interface, CRT Display interface, FDC, HDC. Connectors and Ports of various given computer peripherals and components with their technical specifications Display Devices, SMPS, RAM, CD ROM drive, hard disk, keyboard and mouse, Lan Card, VGA /AGP Card, Printers and Scanners	7
III	**Installation and Preventive Maintenance:** Introduction, system configuration, pre installation planning of operating system, Installation practice, routine checks, PC Assembling and integration, BIOS setup, Engineering versions and compatibility, preventive maintenance, DOS, Virus, Data Recovery.	6
IV	**Troubleshooting: Introduction:** computer faults, Nature of faults, Types of faults, Diagnostic programs and tools, Microprocessor and Firmware, Systematic Troubleshooting, Symptoms observation and analysis, fault diagnosis, fault rectification, Troubleshooting levels – FDD, HDD, CD ROM Problems. Basic troubleshooting using beep Sound, by checking various supply voltages of SMPS. Overview of device Manager, Disk Management, Drive Properties and Folder Properties, Backup & Restore.	7

Text Books:

1. B. Govindarajalu, ***"IBM PC Clones Hardware, Troubleshooting and Maintenance",*** 2/E, TMH.
2. Mark Mines, ***"Complete PC upgrade & maintenance guide",*** BPB publ.

Reference Books:

1. Craig Zacker& John Rouske, ***"PC Hardware: The complete reference"***, TMH.
2. Scott Mueller, ***"Upgrading and Repairing PCs",*** PHI.

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IT-501: MANAGEMENT OF INFORMATION SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
2	0	0	2	40	60	100	3Hrs

COURSE OBJECTIVE:

The objective of this course is to introduce the students to the management information systems and its application in organizations. The course would expose the students to the managerial issues relating to information systems and help them identify and evaluate various options in management information systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to MIS:** Meaning and role of MIS, definition of MIS, system approach to MIS, MIS organization within a company, importance of MIS, modern organization, role of internet. **Concepts of management information systems:** Data and information, information as a resource, information in organizational functions, types of information systems, decision making with MIS.	7
II	**MIS planning:** General business planning, appropriate MIS response, general MIS planning. **Conceptual design of MIS:** Definition of the problem, system objective and system constraints, analysis of information source, conceptual system design document.	7
III	**Management information systems:** Challenges of managing the IT function, vendor management, IT governance. **Information technology infrastructure and choices:** What is the IT infrastructure? **Infrastructure components:** Hardware, software, networks, enterprise systems, IT outsourcing. Managing data resources, business process integration and enterprise system.	6
IV	**Managing Data Resources:** The need for data management, challenge of data management, database concepts, database design, elements of database, data warehouses. ICT for development, type of ICT interventions, example of ICT for development project, E-governance concept, E-participation.	6

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Text Books:

1. RAHUL DE, ***"Management Information Systems in Business",*** Wiley India Publications.
2. Murdick, Ross & Claggett ***"Information system for modem management",*** Prentice-Hall of India.

Reference Book:

1. S. Sadagopan ***"Management Information Systems",*** Prentice-Hall of India.

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SEMESTER-VI

CS-601: ADVANCED JAVA

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the advanced java concepts, java applets, java beans, and swing programming. To learn various animation techniques and advanced networking concepts.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to java Programming:** History of java, characteristics of java, the java environment – JVM, JDK & JRE, different versions of java, OOP principles, comparison of java with C and C++. Language Fundamentals.	**10**
II	**GUI Components (AWT & SWING) :** GUI concepts in java, basic GUI components in AWT, container classes, layout managers, flow layout, border layout, card layout, box Layout. **SWING:** Difference between AWT and SWING, java foundation classes-javax, swing and model view controller, creating a Frame in Swing, displaying image in swing, J component class methods, creating components in swing, writing GUI programs in java (with AWT or SWING), event handling, handling keyboard events and mouse events.	**10**
III	**SERVLETS:** The life cycle of a servlet, a simple servlet, the servlet API, servlet package, reading servlet parameters, handling HTTP requests and responses, java server pages-introduction to java server pages, a simple JSP example, scripting.	**10**
IV	**JDBC:** JDBC architecture. JDBC-ODBC relationship, types of JDBC drivers, JDBC components, JDBC interfaces and classes, steps for querying the database with JDBC, creating an ODBC data source, querying and updating database tables, passing parameters to a statement.	**9**

Text Book:

1. Schildt Herbert, "***Java: The Complete Reference",*** Tata McGraw-Hill.
2. E Balagurusamy***, "Programming with java A Primer Fourth Edition".***

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Reference Books:

1. Deitel & Deitel, "***Java How to Program",*** Pearson Education Asia.
2. Rao Nageswara , "***Core Java: An Integrated Approach",*** Dreamtech Press.

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CS-602: DISTRIBUTED OPERATING SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exams**	**Total**	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

This subject provides students with an in-depth knowledge about the operating system. It covers the distributed operating system in detail, including inter process communication, synchronization, shared memory and distributed file system.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Introduction to network operating system and distributed operating system, issues in the design of distributed operating systems, overview of computer networks. inter process communication, linux, IPC mechanism, remote procedure calls, RPC exception handling, security issues, RPC in heterogeneous environment (case study linux RPC)	**10**
II	**Synchronization in Distributed Systems:** Clock synchronization-logical and physical clocks, clock synchronization algorithms, mutual exclusion, election algorithms, deadlocks in distributed systems, thrashing, heterogeneous DSM, resource management (load balancing and load sharing approach), process management–process migration, thread.	**10**
III	**Distributed Shared Memory:** Introduction to shared memory, consistency model, page based distributed shared memory, shared variable distributed memory, object based distributed memory.	**10**
IV	**Distributed File System:** File models, file access, file sharing, file caching, file replication, fault tolerance, network file system, security in distributed file system.	**9**

Text Books:

1. Tanenbaum A, ***"Distributed Operating System"***, PHI

Reference Books:

1. A. Silberschatz, P.B. Galvin, "***Operating System Concepts"***, John Wiley and Sons (Asia).

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CS-603: COMPILER DESIGN

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic principles of compiler, compiler construction tools, context free grammars and various parsing techniques.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to compliers:** A simple traditional modular compiler, compiler architecture, frontend and backend of compiler, compiler writing tools, properties of good compiler, translators, types of compilers, bootstrapping, regular expressions, finite automata, closure algorithm.	**10**
II	**Parsing:** Context free grammar, derivation & parse trees, bottom-up parsers: shift reduce, operator precedence, top-down parsers: prediction and backtracking, recursive decent and predictive parser, efficient parsers; LR parsers: LR(0), SLR, LALR, implementation of parsers	**10**
III	**Syntax Directed Translation:** Syntax directed program evaluation, different schemes &implementation, immediate code generation, syntax-trees, three address code generation, quadruples triple, translation of assignment statements. **Code Optimization:** Sources of optimization, optimizing transformations: compile time evaluation, common sub expression elimination, dead code elimination, loop optimization, strength reduction, DAG representation of basic blocks, value number & algebraic laws, global data-flow analysis, dominators, reducible flow graphs.	**10**
IV	**Code Generation:** Major tasks, issues in designing code generators, object programs, basic blocks and flow graphs, a simple code generator, register allocation & assignment code generation from DAG's., peephole optimization.	**9**

Text Books:

1. Alfred V. Aho, J.D. Ullman , ***"Principles of Compiler",*** Narosa Publishing Design.
2. Rajesh K. Maurya, ***"Compiler Design",*** Dreamtech Press.

Reference Book:

1. D.M. Dhamdhere , ***"Compiler Construction",*** Macmillan India Ltd.

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CS-604: LINUX ADMINISTRATION

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
2	2	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to provide general introduction to Linux server, imparting knowledge on user administration and to give an introduction to process and shell programming.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Installing Linux as a Server:** Linux distributions, open source software and GNU, difference between windows and linux, installing linux in a server configuration, GNOME and KDE- X windows system, managing software. **Linux Administration:** Managing users, user text files-user management tools, command line, boot loaders, file systems, compiling linux kernel, linux security.	7
II	**Internet Services:** DNS, FTP-Mechanics-installing and customizing the server, setting up web server using apache, SMTP- install, configure and run postfix server, POP and IMAP, SSH- public key cryptography, creating a secure tunnel.	6
III	**Intranet Services:** NFS- enable and configure NFS server and client, NIS- configuring master and secondary NIS server and client, NIS tools, SAMBA-administration, printing-install cups-add and manage print jobs, DHCP, virtualization.	6
IV	**Linux Process Control:** Linux process environment, login processes, parent child relationship, process variable, process monitoring, invoking foreground and background processes, terminating process, daemons. **Shell Programming:** Introduction, shell scripts, executing shell scripts, creating scripts, simple examples.	7

Following practicals are to be performed in tutorials:

1. Installation Linux operating system.
2. To study basic Linux Commands.
3. To study and create various types of files in linux.
4. To study vi and vim editors
5. To study user, group, owner and access permissions of a file.

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6. Study of Bash shell, Bourne shell and C shell in linux operating system
7. Study Shell scripting in Linux.
8. To study various filters in Linux.
9. Administration of LINUX Operating System.
10. Introduction to variables in shell scripting.
11. Introduction of various constructs in shell scripting.
12. Write the program to mount the various devices (i.e. floppy, CD-Rom etc).
13. To study Process synchronization.

Textbooks:

1. Wale Soyinka, ***"Linux Administration A Beginners Guide",*** Tata McGraw Hill.
2. Mc Kinnon, ***"Installing and Administrating Linux",*** Wiley.

Reference Books:

1. Richard Peterson, ***"Linux: The complete Reference",*** Tata McGraw Hill.
2. Mark G. Sobell, ***"Practical Guide to Fedora and Red Hat Enterprise Linux",*** Prentice Hall.
3. www.linuxhomenetworking.com
4. www.linux.org
5. www.linux.com

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CS-605: DATA MINING & DATA WAREHOUSING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts of data mining and its functionalities, obtain knowledge in different data mining techniques and algorithms and to go through various application domains of data mining.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Data warehousing:** Definition, data warehouse users, 3- Tier data warehouse architecture, data warehouse features: subject oriented data, integrated data, time variant data, nonvolatile data, data granularity. **Data warehouse process & architecture:** Introduction, characteristics of data warehouse architecture, goals, OLTP vs. OLAP, OLAP in the data warehouse, types of OLAP servers (MOLAP, ROLAP and HOLAP), distributed and virtual data warehouses, infrastructure as the foundation for data warehousing, data ware house security, backup and recovery.	**10**
II	**DW tools and technologies:** Reporting and query tools, the need for applications, extraction, cleansing and transformation tools, DW admin and management tools, data marts-reasons and issues. **Data warehouse schema:** Dimensional modeling, the star schema, the snowflake schema, aggregate tables, data warehouse and the data model. **Data Warehousing Design:** Designing, dimensionality modeling, design methodology, data warehousing and web, DW design using Oracle, data warehouse development, testing, growth and maintenance.	**10**
III	**Data mining:** Basics & tasks, data mining user's perspective, other issue, foundation of data mining, measuring data mining effectiveness, data mining architecture, the knowledge discovery process, integrating data mining with data warehousing, KDD vs. data mining, DBMS vs. data mining. **Frequent pattern mining:** Mining associate rule, application, variation, FIM, optimal FIM algorithm, incremental mining, and sequential rule.	**10**

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	Data mining techniques: Clustering techniques, decision tree, clustering analysis, case-based reasoning, genetic algorithms, knowledge discovery through neural networks & generic algorithm, rough sets, support victor machines and fuzzy techniques.	
IV	**Moving into Data mining:** Relational data, transactional data, and multi-dimensional data, data stream, application of data mining, web mining, text mining, temporal data mining, sequence mining, time series analysis, spatial data mining, issue and challenges in data mining, current trends in data mining. **Mining Complex data objects:** Multimedia databases, time series and sequence data, mining text databases and mining world wide web.	**9**

Text Books:

1. Paulraj Ponniah , ***"Data warehousing Fundamentals",*** India Edition.
2. ReemaThareja***, "Data warehousing"*** , Oxford University press.
3. Jiawei Han &Micheline Kamber ,Morgan Kaufmann ***,"Data Mining concepts & Techniques"*** .

Reference Book:

1. Pudi, ***"Data Mining"***, Oxford University press.
2. Arun Pujari , ***"Data Mining Techniques***", University Press; Hyderabad .
3. Alex Berson***, "Data Warehousing , Data Mining and OLAP",***, McGraw Hill
4. Mallach, ***"Data Warehousing System",*** McGraw Hill
5. W.H. Longhman, C.Klelly, ***"Managing the Data Warehouses***", John Wiley & Sons.
6. Miner, RandallMatignon,***"Data Mining using SAS Enterprise",*** Willey India Edition.
7. Ravindernath, B ***, "Decision support Systems & Data Warehouses",*** New Age International Publishers, New Delhi.

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CS-606: MODELING & SIMULATION

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to provide a strong foundation on concepts of simulation and modeling, understand the techniques of random number generation, understand the techniques of testing randomness, practice on simulation tools and impart knowledge on building simulation systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals** Definition and reasons for simulation, continuous (time-oriented) and discrete (event) systems, modeling/programming simple deterministic systems, rates and system dynamics.	9
II	**Concepts in Simulation** Stochastic variables; discrete vs continuous probability, Monte Carlo Simulations; Monte Carlo methods, normally distributed random numbers, Monte Carlo V/S Stochastic Simulations.	10
III	**Queuing Models** Single server queuing system, introduction to arrival and departure time, flowcharts for arrival and departure routine, event graphs of queuing model, determining the events and variables, event graphs for inventory model. Random Numbers: Introduction to Random Numbers, importance of random numbers in simulation, mid-square random number generator, residue method, arithmetic congruential generator, testing numbers for randomness, Chi-Square test.	10
IV	**Discrete Event System Simulation** Discrete events, representation of time, queues and servers, generation of arrival patterns, resource seizing, departures simulation of a telephone system and computer networks, simulating components of an operating system, delayed calls; modeling policies, priority queues, tasks, gathering statistics, counters and summary statistics, measuring utilization and occupancy, recording distributions and transit times. **Introduction to a Simulation Languages** Simulation in C++, GPSS/ MATLAB/Network Simulators.	10

Text Books:

1. Law and Kelton, ***"Simulation Modeling and Analysis"***, McGraw-Hill.

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2. J. Banks, J. Carson and B. Nelson***, “Discrete-Event System Simulation”,*** Prentice-Hall.
3. Deo, Narsing, ***“System Simulation with Digital Computers”***, PHI.
4. D.S Hira, ***“System Simulation”*** S.Chand publication.

Reference Books:

1. K.A. Dunning ***“Getting Started in GPSS”***, Engineering Press, San Jose, CA.
2. P. Fishwick, ***“Simulation Model Design and Execution”,*** Prentice-Hall.

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CS-611: ADVANCED JAVA LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Write a JAVA servlet program to implement a dynamic HTML using Servlet (user name and Password should be accepted using HTML and displayed using a servlet).
2. Write a JAVA servlet program to auto web page refresh (consider a webpage which is displaying date and time or stock market status. For all such type of pages, you would need to refresh your web page regularly; java servlet makes this job easy by providing refresh automatically after a given interval).
3. Write a JAVA servlet program to implement and demonstrate get() and post methods (using HTTP servlet class).
4. Write a JAVA servlet program using cookies to remember user preferences.
5. Write a JAVA jsp program to implement verification of a particular user login and display a welcome page.
6. Write a JSP program to demonstrate the import attribute.
7. Write a program to develop a swing application with different layouts.
8. Write a program to create a menu-based application using swing which opens a file dialog box and allows user to select a file from local hard drives. Display name of a file selected into textbox and create an executable jar file for this application.
9. Write a program to create the user interface for the text editor application and implement some functions. (using SWING classes)
10. Write an application that finds out all the loaded JDBC compliant drivers and their details.
11. Write a database application that is JDBC driver and data source independent.
12. Write an application that finds out number of records, no. of columns and types of the columns within a table.

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CS-612: MODELING & SIMULATION LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Write a program for the random number generation and perform its testing and validation for various discrete and random variables.
2. Perform modeling and simulation of queuing system (i.e. in computer system).
3. Perform modeling and simulation of the ATC (Air Traffic Control System).
4. Perform modeling and simulation of the Monte-Carlo method.
5. Study the GPSS and implement various program in it.
6. Introduction to MATLAB and implementation of Branching statements.
7. Loops and functions in MATLAB.
8. Plots and Arrays in MATLAB.
9. Introduction regarding usage of any Network Simulator.
10. Practical Implementation of Queuing Models using C/C++.

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CS-613: SEMINAR

Evaluation Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Evaluation
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Evaluation/ Viva**	**Total**	
0	0	2	1	50	50	100	-

PROCEDURE:

Individual students should be asked to choose a topic in any field of computer science engineering, preferably from outside the B.Tech syllabus and give a seminar on that topic for about thirty minutes. It enables the students to gain knowledge in any of the technically relevant current topics and acquire the confidence in presenting the topic. The student will undertake a detailed study on the chosen topic under the supervision of a faculty member, by referring papers published in reputed journals and conferences. Each student has to submit a seminar report (in two copies), based on these papers; the report must not be reproduction of any original paper. A committee consisting of three/four faculty members (preferably specialized in various sub-fields of Computer Science Engineering) will evaluate the seminar. One of the two copies submitted by the student should be returned to him/her after duly certifying it by the staff in charge of the seminar and Head of the department and the other copy shall be kept in the departmental library.

Internal Continuous Assessment
As per ordinance

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IT-601: MANAGEMENT INFORMATION SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The objective of this course is to introduce the students to the management information systems and its application in organizations. The course would expose the students to the managerial issues relating to information systems and help them identify and evaluate various options in management information systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to MIS:** Meaning and role of MIS. Definition of MIS, System approach to MIS, MIS organization within a company. Importance of MIS, Modern organization, role of internet, managing internet era, challenge for manager. **Concepts of Management Information Systems:** Data and Information, Information as a Resource, Information in Organizational Functions, Types of Information Systems, Decision Making with MIS, Communication in organizations.	10
II	**MIS Planning:** General business planning, Appropriate MIS response, MIS Planning: General, MIS Planning: Details. **Conceptual Design of MIS:** Definition of the problem, System objective and system constraints, Analysis of information source, Conceptual system design document. Information system and Managing Strategy.	10
III	**Management Information Systems:** Challenges of Managing the IT Function, Vendor Management, IT Governance. **Information Technology Infrastructure and Choices:** What is the IT Infrastructure? **Infrastructure Components:** Hardware, software, Networks, Solutions: Cloud Computing, Virtualization, Enterprise Systems, IT Outsourcing. Managing data resources, Business process integration and enterprise system.	10
IV	**Managing Data Resources:** The need for Data Management, Challenge of Data Management, Database Concepts, Database Design, Elements of Database, Data Warehouses. ICT for development, Type of ICT interventions, Example of ICT for development project, E governance concept, E-participation, The society of the internet, Open source software.	9

Text Books:

1. Gordon B Davis, Margrethe H Olson, ***"Management Information System"***, TMH
2. Rahul De, ***"Management Information Systems in Business",*** Wiley India Publications.

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3. Murdick, Ross &Claggett, ***"Information System for Modern Management",*** Prentice-Hall of India.

Reference Book:

1. S. Sadagopan, ***"Management Information Systems",*** Prentice-Hall of India.

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IT-602: ENTERPRISE RESOURCE PLANNIG

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

This course examines the evolution and implementation of ERP systems. It also covers the types of issues that manager will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to ERP:** Integrated management information seamless integration, supply chain management, integrated data model, benefits of ERP, definition of business engineering, business engineering and ERP, principle of business engineering, business engineering with information technology.	**10**
II	**Business Modeling for ERP:** Building the business model, ERP implementation, an overview of role of consultant, vendors and users, customization, precautions, ERP post implementation options, ERP implementation technology, guidelines for ERP implementation.	**10**
III	**ERP and Competitive Advantage:** ERP domain MPGPRO, IFS/Avalon, industrial and financial systems, Baan IV SAP, market dynamics and dynamic strategy.	**10**
IV	**Commercial ERP:** Description, multi-client server solution, open technology, user interface, application integration. **VSAP Architecture:** Basic architectural concepts, the system control interfaces, services, presentation interface, and database interface.	**9**

Text Books:

1. Bret Wagner, Ellen Monk, ***"Enterprise Resource Planning",*** Course Tech.
2. Alexis Leon***, "Enterprise Resource Planning",*** Tata McGraw Hill.

Reference Books:

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1. Vinod Kumar Garg and N.K. Venkita Krishnan, ***"Enterprise Resource Planning – Concepts and Practice"***, PHI.
2. Jose Antonio Fernandz, ***"The SAP R/3 Handbook",*** TMH.

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IT-603: MUTIMEDIA TECHNOLOGY

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to adapt the architecture for design of multimedia system and standards used in developing multimedia applications.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introductory concepts:** Basic definitions, components of multimedia system, uses of multimedia, introduction of making multimedia-the stages of the project, the requirements to make a good multimedia, multimedia skills and training, motivation for multimedia usage, frequency domain analysis, application domain and ODA. Multimedia software- basic tools, making instant multimedia, multimedia software and authoring tools, production standards.	**10**
II	**Multimedia building blocks**- Text, sound, images, animation and video, digitization of audio and video objects, different compression algorithms concern to text, audio, video and images, working exposure on tools like dream weaver, 3D effects, flash etc.	**10**
III	**Multimedia and the Internet:** History, Internet working, connections, Internet services, the world wide web, tools for WWW–web servers, web browsers, web page makers and editors. Multimedia applications–Media communication, media consumption, media entertainment, media games.	**10**
IV	**Synchronization:** Temporal relationships, synchronization accuracy, specification factors, quality of service(QoS), multimedia-looking towards future: digital communication and new media, interactive television, digital broadcasting, digital radio, multimedia conferencing	**9**

Text Books:

1. Steve Heath, ***"Multimedia and Communication Systems",*** Focal Press, UK.
2. Tay Vaughan, ***"Multimeia: Making it Work",***TMH.
3. K. Andleigh and K. Thakkar, ***"Multimedia System Design",*** PHI, PTR.

Reference Books:

1. Keyes, ***" Multimedia Handbook",*** TMH.

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2. Ralf Steinmetz and Klara Naharstedt, ***"Multimedia: Computing, Communications and Applications",*** Pearson.
3. Steve Rimmer. ***"Advanced Multimedia Programming",*** MHI.

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SEMESTER VII

CS-701: ADVANCE COMPUTER ARCHITECTURE

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

With increase in availability of system resources, concept of parallel architecture has obtained immense popularity. This course provides a comprehensive study of scalable and parallel computer architectures for achieving a proportional increase in performance with increasing system resources.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**The State of Computing:** System attributes to performance, multiprocessors and multicomputer, shared memory and distributed memory, taxonomy of MIMD computers, multivector and SIMD computers, PRAM and VLSI models. **Parallelism:** Data and resource dependencies, hardware and software dependencies; program partitioning and scheduling: grain sizes and latency, grain packaging and scheduling; program flow mechanism: control flow versus data flow, demand driven mechanism, comparisons of flow mechanisms; system interconnect architectures: network properties and routing, static connection networks.	**10**
II	**Performance Metrics and Measures:** Parallelism profile in programs, harmonic mean performance, efficiency, utilization and quality, standard performance measures, speedup performance law: Amdahl's law for a fixed workload, Gustafson's law for scaled problems, scalability analysis and approaches, scalability metrics and goals, evolution of scalable computers. **Advance Processor Technology:** Design space of processors, instruction set architecture, CISC and RISC scalar processors; superscalar and vector processors: superscalar processors, the VLIW architecture, vector and symbolic processors; memory hierarchy technology: hierarchical memory technology, inclusion, coherence and locality, memory capacity planning.	**10**
III	**Multiprocessor System Interconnects:** Hierarchical bus system, crossbar switch and, multiport memory, multistage and combining networks; cache coherence and synchronization mechanism, the cache coherence problem, snoopy bus protocol, directory	**10**

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	based protocols, hardware synchronization mechanisms. **Vector Processing principles:** Vector instruction types, vector access memory schemes. **Multivector Multiprocessors:** Performance directed design rules, Cray Y – MP, C-90 and MPP, SIMD computer organization: implementation models, the CM-2 architecture, introduction to multicore architecture	
IV	**Parallel Programming Models:** Shared variable model, message passing model, data parallel model, object oriented model, function and logic models. **Parallel Language and Compilers:** Language feature for parallelism, parallel language constructs, optimizing compiler for parallelism. **Parallel Programming Environment:** Software tools and environment, Y-MP, Pargon and CM-5 environment, visualization and performance testing. **Synchronization and Multiprocessing Modes:** Principles of synchronization, multiprocessor execution models, shared-variable program structures, locks for protected access, semaphores and applications, monitors and application, message-passing program development, distributing the computation, synchronous message passing, asynchronous message passing. **Mapping Programs on to Multicomputer:** Domain decomposition techniques, control decomposition techniques, heterogeneous processing.	**9**

Text Books:

1. Kai Hawang: ***"Advance Computer Architecture – Parallelism, Scalability and Programmability"***, McGraw Hill International Edition.
2. Michael J. Quinn, ***"Parallel Computing – Theory and Practice",*** McGraw Hill International.

Reference Books:

1. Sima, ***"Advance Computer Architecture : A Design Space Approach",*** Pearson Publication.
2. Kain ***"Advance computer architecture",*** PHI publication.
3. S. G. Akl, ***"Design and Analysis of parallel algorithms" ,***Prentice Hall, Englewood Cliff NJ.
4. S.K. Ghosal, ***"A practical approach to parallel Computing"***, University press (India) Ltd.

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CS-702: WIRELESS & MOBILE COMPUTING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
2	2	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

To enable the students to synthesis and analyze wireless and mobile cellular communication systems, understanding the concept of GSM, different network components and wireless adhoc networks in detail.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	Mobile communication, mobile computing, mobile computing architecture, mobile devices, mobile system network, mobility management, GSM services and architecture, radio interfaces of GSM, protocols of GSM, 2G,3G,4G	7
II	Cellular network and frequency reuse, handheld device, limitation of mobile device, wireless switching technology, wireless communication problem, wireless network reference model, wireless networking issue, wireless network standards, wireless body area network architecture and component, design issue, network protocols, WBAN technologies. Mobile IP network layer: IP and mobile IP network layer, packet delivery and handover management, tunneling and encapsulation.	8
III	Network components, design requirements of WLAN, network architecture, WLAN standards, WLAN protocols, IEEE 802.11p, WLAN applications, WMAN network architecture, network protocols, broadband wireless networks, WMAN applications.	6
IV	Wireless Ad Hoc networks, mobiles Ad Hoc networks (MANET), routing protocols of MANET, wireless sensor networks, wireless mesh networks, vehicular Ad Hoc networks (VANETs).	5

Following practicals are to be performed in tutorials:

1. Getting in Touch: Basics of WSN programming using TinyOS.
2. Gathering Data: Sensing data using WSN motes.
3. To implement code division multiple acces (CDMA).
4. To study frequency reuse.
5. To study Choice Group class and its implementation in J2ME.
6. To study Canvas class and its implementation in J2ME.
7. Write WML page using various tags such as select and option tags.
8. Write a WML page to display an image and to accept input from the user.
9. Study Assignment: Detailed study of Bluetooth.

Text Books:

1. Manvi & Kakkasageri , ***"Wireless and Mobile networks",*** Wiley India Publication.

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2. Raj Kamal , ***"Mobile Computing",*** Oxford university press.
3. Sandeep K. S. Gupta, Frank Adelstein, Golden G. Richard III, Loren Schwiebert, ***"Fundamentals of Mobile and Pervasive Computing"***, TMH
4. D P Aggarwal, "***Introduction to Wireless and Mobile Systems",*** Cengage Learning

Reference Books:

1. Theodore S. Rappaport , ***"Wireless Communication"*** , Pearsons.
2. W.C.Y.Lee , ***"Mobile Cellular Telecommunication",*** McGraw Hill.
3. W. Stallings, ***"Wireless Communications and Network",*** Pearson Education

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CS-703: INFORMATION SECURITY

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to know the methods of conventional encryption, public key encryption, number theory. Understanding hash functions and various network security tools.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Importance of information system:** Basic of information system, security goals, techniques for security goal implementation. **Mathematical Background for Cryptography**: Modular arithmetic, greatest common divisor, Euclidean algorithm, computing the inverse, extended Euclidean algorithm, Fermat's theorem, Euler totient function. Role of cryptography in information security, plain text, cipher text, key, encryption, decryption, Kerckhoff's principle. substitution ciphers, transposition ciphers, types of attacks on ciphers	**10**
II	**Introduction to Ciphers:** Monoalphabetic and polyalphabetic ciphers, perfect substitution cipher such as the vernam cipher, stream and block cipher, confusion and diffusion, unicity distance. **Cryptanalysis:** Introduction of cryptanalysis, cryptanalysis of monoalphabetic ciphers such as affine cipher, cryptanalysis of polyalphabetic ciphers such as vigenere cipher	**10**
III	**Public key(Asymmetric key) Encryption Systems**: Concept and characteristics of public key encryption system, introduction to Merkle-Hellman knapsacks, Rivest–Shamir-Adlman (RSA) encryption. **Digital Signature**: Introduction to digital signature algorithms, RSA digital signature scheme algorithm, the digital signature standard (DSA).	**10**
IV	**Secure Secret Key (Symmetric) Systems:** The data encryption standard (DES), introduction to advance encryption standard (AES). **Law and legal Framework**: Information security and law, understanding the law for information security, the Indian IT act, patent law, copyright law, Indian copyright law, privacy on internet, privacy consideration in web services, ethical issue owing to information warfare, cryptographic tools and ethical issues, understanding ethical hacking,	**9**

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	social engineering issue, ethical domain for information security.	

Text Books:

1. Behrouz A Farouzan , ***"Cryptography and N/W Security",*** McGraw Hill.
2. Charles P.Pfleeger, ***"Security in Computing",*** Prentice Hall International, Inc.

Reference Books:

1. Nina Godbole***, "Information System security"***, Wiley India Publication
2. Eric Cole & Ronald Krutz, ***"Network Security bible"*** , Wiley India Publication.
3. Patel ***, "Information security"***, PHI publication.
4. C K Shyamala & N Harini, ***"Cryptography and Security"*** , Wiley India publication
5. William Stallings, ***"Cryptography and N/W Security",*** Pearson.

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CS-704: CLOUD COMPUTING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exams**	**Total**	
3	1	0	4	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts in cloud, migration to cloud, enterprise cloud and security aspects in cloud.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Cloud Computing:** Online social networks and applications, cloud introduction and overview, different clouds, risks, novel applications of cloud computing. **Cloud Computing Architecture:** Introduction cloud computing architecture, on demand computing virtualization at the infrastructure level, CPU virtualization, discussion on hypervisors storage virtualization, the SPI framework for cloud computing, the cloud services delivery model	10
II	**Cloud Deployment Models:** Key drivers to adopting the cloud, the impact of cloud computing on users, governance in the cloud, barriers to cloud computing adoption in the enterprise. **Security Issues in Cloud Computing:** Security in cloud computing environment, infrastructure security: the network level, the host level, the application level, data security and storage, aspects of data security, data security mitigation provider data and its security	10
III	**Identity and Access Management:** Trust boundaries and IAM, IAM challenges, relevant IAM standards and protocols for cloud services, IAM practices in the cloud, cloud authorization management. **Security Management in the Cloud:** Security management standards, security management in the cloud, availability management: SaaS, PaaS, IaaS	10
IV	**Privacy Issues:** Privacy issues, data life cycle, key privacy concerns in the cloud, protecting privacy, changes to privacy risk management and compliance in relation to cloud computing, legal and regulatory implications, U.S. laws and regulations, international laws and regulations. **Audit and Compliance:** Internal policy compliance, governance, risk, and compliance (GRC), regulatory/external compliance, cloud security alliance, auditing the cloud for compliance, security as a cloud.	9

Text Books:

1. John Rhoton , ***"Cloud Computing Explained",*** Implementation Handbook for Enterprises.

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2. Tim Mather, ***"Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance",*** (Theory in Practice), ISBN-10: 0596802765,O'Reilly Media
3. ***"Cloud Application Architectures: Building Applications and Infrastructure in the Cloud"***, Publisher: O'Reilly Media; ISBN-10: 0596156367, ISBN-13: 978-0596156367

Reference Books:

1. Barrie Sosinsky, ***"Cloud Computing Bible",*** Wiley Publication, ISBN-10: 0470903562
2. Timothy Chou***, "Introduction to Cloud Computing".***

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CS-711: CLOUD COMPUTING LAB

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	2	1	30	20	50	2Hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 8 – 10 experiments must be performed by a student during the semester:

LIST OF EXPERIMENTS:

1. Introduction to cloud computing.
2. Creating a Warehouse Application in Sales Force.com
3. Creating an Application in SalesForce.com using Apex programming Language.
4. Implementation of SOAP Web services in C#/JAVA Applications.
5. Implementation of Para-Virtualization using VM Ware‘s Workstation/ Oracle‘s Virtual Box and Guest O.S.
6. Installation and Configuration of Hadoop.
7. Create an application (Ex: Word Count) using Hadoop Map/Reduce.
8. Case Study: PAAS(Facebook, Google App Engine)
9. Case Study: Amazon Web Services.

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CS-712: PROJECT WORK - I

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	4	2	50	50	100	2Hrs

This project work shall be carried out by the students during the entire semester under the guidance of Supervisor allotted by the institute and its viva will be conducted at the end of the semester.

Project Evaluation will consist of Three parts:
1. Evaluation of the project report along with source code in a CD in the required format by an external examiner 40% marks. Continuous evaluation by internal examiner 30% marks.
2. Viva-voce examination (20% marks).
3. Software evaluation with test runs (10% marks)

Viva-voce examination will be related to the projects executed by the candidate during the course of the semester.

Aim of this Project:
Aim of this project is to equip students in the methodology of the system analysis and design of a live project in the institution in which he/she is studying or in a place of work such as bank, school, college and office in the vicinity of the institute.
This will be a guided project under the close supervision of the faculty of the institute. Projects should be presented in the form of a project report giving a candidate system for solving a live problem.

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CS-713: INDUSTRIAL TRAINING (VIVA-VOCE)

Teaching and Examination Scheme:

Teaching Scheme			**Credits**	**Marks**			**Duration of End Semester Examination**
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exams**	**Total**	
0	0	0	2	50	50	100	2Hrs

This 6 weeks training will be related to Industrial Projects to be undertaken under the guidance of Faculty preferably at Industry / Software Park / Incubation Centre or related areas. This training will be undertaken during vacation. Student is supposed to submit the project report at the end of the training.

Evaluation will be based on Project Report, source code in CD, presentation and comprehensive Viva-voce examination related to the project.

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IT-701: BIG DATA ANALYTICS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course aims to help students to understand what big data analytics is, different data analytics methods, analyze the requirements for the big data analytics system for any organization , formulate an effective strategy to implement a successful data analytics project.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Big Data:** Introduction to bigdata platform, traits of big data, challenges of conventional systems, web data, evolution of analytic scalability, analysis vs reporting, statistical concepts: sampling distributions, re-sampling, statistical inference, prediction error. **Basic Data Analysis and Data Analytic Methods Using R:** Regression modelling, multivariate analysis, bayesian modelling, inference and bayesian networks, support vector and kernel methods, analysis of time series: linear systems analysis, nonlinear dynamics, rule induction, neural networks: learning and generalization, competitive learning, principal component analysis and neural networks, fuzzy logic: extracting fuzzy models from data fuzzy decision trees.	**10**
II	**Frequent Itemsets and Clustering:** Mining frequent itemsets, market based model, Apriori algorithm, handling large data sets in main memory, limited pass algorithm, counting frequent itemsets in a stream, clustering techniques: hierarchical, k-means, frequent pattern based clustering methods.	**10**
III	**Mining Data Streams:** Introduction to streams concepts: stream data model and architecture, stream computing, sampling data in a stream: filtering streams, counting distinct elements in a stream, estimating moments, counting oneness in a window, decaying window, real time analytics platform (RTAP) applications, case studies, real time sentiment analysis, stock market predictions.	**10**
IV	**Framework, Technologies, Tools and Visualization:** MapReduce: Hadoop, Hive, MapR, Sharding, NoSQL Databases: S3, Hadoop distributed file systems, visualizations: visual data analysis techniques, interaction techniques; systems and analytics applications, analytics using statistical packages, industry challenges and application of analytics.	**9**

Text Books:

1. Bart Baesens, ***"Analytics in a Big Data World: The Essential Guide to data Science and its Applications",*** Wiley publications.

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2. Michael Berthold, David J. Hand, ***"Intelligent Data Analysis",*** Springer.
3. Anand Rajaraman and Jeffrey David Ullman, ***"Mining of Massive Datasets",*** Cambridge University Press.

Reference Books:

1. Bill Franks, ***"Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics",*** John Wiley & sons.
2. Glenn J. Myatt, "***Making Sense of Data",*** John Wiley & Sons.

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CS-705: EMBEDDED SYSTEMS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the scientific principles and concepts behind embedded systems, and to obtain hands-on experience in programming embedded systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction To Embedded Systems:** Embedded systems, characteristics of embedded systems I/O, embedded systems/real time systems. embedded system software architecture, simple control loop, interrupts control system, co-operating multitasking, pre-emptive multitasking. **Timing Characteristics Of Embedded Systems:** Hard, soft and firm systems, performance analysis of embedded systems: software timing characterization and analysis methods.	10
II	**Real Time Operating Systems:** Real-time and non-real time applications. classification of real-time task scheduling algorithms, event-driven scheduler- simple priority-based, rate monotonic analysis, earliest deadline first, the simplest of task assignment and scheduling, priority scheduling, characteristics of tasks, task assignment and multi-tasking. **Memory Management And Synchronization For Embedded Software:** Semaphores, uses of semaphores, mutual exclusion, deadlock, starvation and lockouts, priority assignment, inversion, event flags and signals, inter task communication and resource sharing, synchronization, interrupt handlers.	10
III	**Software Engineering Issues In The Embedded Systems:** Domain analysis, software element analysis, requirement analysis, specification, software architecture, software analysis design, implementation, testing, validation, verification and debugging of embedded systems. iterative process development, agile software development process, introduction to use cases.	10
IV	**Programming languages for embedded systems:** Desirable characteristics of programming languages for embedded systems, low-level versus high-level languages, main language implementation issues: control, typing, exception handling, modularity and multi-threading. major programming languages for embedded systems: assembly, C/C++, Ada and Java, overview of PMC, effiel, forth.and overview of real time databases. **Compilation Techniques For Embedded Software:** code generation, retargetability, code optimization. Examples of embedded and real-time software systems**.**	9

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Text Books:

1. Gomaa, "***Software Design Methods For Concurrent and Real-Time systems***", Addison-Wesley.
2. Raj Kamal, "***Embedded Systems Architecture, Programming and Design***", Tata Mcgraw Hill, New Delhi.

Reference books:

1. S. Allworth, "***Introduction to real-time Software design***", Springer-Verlag.
2. C.M. Krishna, K.Shin, ***"Real-time Systems",*** Tata Mc-Graw Hill.
3. Peter Marwedel, G. Goosens, "***Code Generation for Embedded processors***", Kluwer Academic publishers.

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CS-706: WEB TECHNOLOGY

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic scripting languages, server side programming and web databases.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Information Architecture:** The role of information architect, collaboration and communication, organizing information, organizational challenges, organizing web sites and intranets, creating cohesive organization systems, designing navigation systems, types of navigation systems, integrated navigation elements, designing elegant navigation systems, Searching systems, searching your web site, designing the search interface, indexing the right stuff, to search or not to search grouping content, conceptual design, high level architecture blueprint. architectural page mockups, design sketches.	**10**
II	**Dynamic HTML and Web Designing:** HTML basic concepts, good web design, process of web publishing phases of web site development, structure of HTML documents, HTML elements- core attributes, language attributes, core events, block level events, text level events, linking basics, linking in HTML, images and anchors, anchor attributes, image maps, semantic linking meta information, image preliminaries, image download issues, images and buttons, introduction to layout: backgrounds, color and text, fonts, layout with tables. advanced layout: frames and layers, HTML and other media types. audio support in browsers, video support, other binary formats. style sheets, positioning with style sheets. basic interactivity and HTML: forms, form control, new and emerging form elements.	**10**
III	**Java Server Pages:** Basics, integrating scripts in JSPs, jsp objects and components, configuring and troubleshooting, JSP: request and response objects, retrieving the contents of an HTML format, retrieving a query string, working with beans, cookies, creating and reading cookies. using application objects and events. **XML:** Relationship between HTML, SGML and XML, basic XML, valid documents, ways to use XML, XML for data files, embedding XML into HTML documents. converting XML to HTML for display, displaying XML using CSS and XSL, rewriting HTML as XML, the future of XML.	**10**
IV	**Php Mysql Introduction:** What is PHP, history, why choose PHP. **Installation:** Installation overview, configuration**,** advantage of PHP over other scripting language, creating a PHP script, handle error in PHP script**.**	**9**

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	Data Types: variables, strings, string functions, numbers, arrays, array functions, booleans and NULL, type switching and casting, constants. **Control Structures:** if, else, else-if, and switch statements, logical operators, while, for, for each loops, continue and break statements. **Functions:** Defining & using functions, returning values from a function, setting global variables, setting default values. **Building Web Pages:** Links and URLs, using GET values, encoding GET values, encoding for HTML, building forms, setting cookies, establishing sessions, headers and page redirection, including and requiring pages. **My SQL Basics:** Introduction to web form, My SQL introduction, creating a database in My SQL, populating a My SQL database, Php My Admin, connecting to My SQL with PHP, accessing data in My SQL with PHP.	

Text Books:

1. Web technology, "***Black Book by Kogent learning Inc"*** , Dreamtech publication
2. Thomas A Powell, HTML "***The Complete Reference",*** Tata McGraw Hill Publications
3. ***"HTML 5, Black Book",*** Wiley India Publication

Reference Books:

1. Joseph L.Weber, ***"Using Java 2 platform",*** Prentice Hall of India Pvt Ltd.
2. John R Hubbard, ***"Programming with Java, Schaum's Outline Series",*** McGraw Hill International.
3. Ian S. Graham, "***XHTML 1.0 Language and design sourcebook"***, John Wiley & sons inc.
4. Peter Rossbach, Hendrik Schreiber, ***"Java Server & services".*** Pearson education Ltd.
5. Joshu Marketos, ***"The Java developer tool kit",*** John Wiley and Sons.

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SEMESTER VIII

CS-801: MOBILE ADHOC & SENSOR NETWORKS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to learn the concepts of sensor networks, to understand the MAC and transport protocols for adhoc networks, to understand the security of sensor networks, to understand the applications of adhoc and sensor networks.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Ad Hoc Wireless Networks:** Characteristics of MANETs, applications of MANETs, challenges. **Routing in MANETs:** Topology-based versus position-based approaches, topology based routing protocols, position based routing, other routing protocols.	**10**
II	**Data Transmission In MANETs:** The broadcast storm, multicasting, geocasting. **TCP over Ad Hoc Networks:** TCP protocol overview, TOP and MANETs, solutions for TOP over Ad Hoc	**10**
III	**Basics of Wireless Sensors and Applications:** The mica mote, sensing and communication range, design issues, energy consumption, clustering of sensors, applications. **Data Retrieval In Sensor Networks:** Classification of WSNs, MAC layer, routing layer, high-level application layer support, adapting to the inherent dynamic nature of WSNs.	**10**
IV	**Security:** Security in Ad hoc wireless networks, key management, secure routing, cooperation in MANETs, intrusion detection systems. sensor network platforms and tools: sensor network hardware, sensor network programming challenges, node-level software platforms.	**9**

Text Books:

1. Car/os Corderlo Dharma R Aggarwal, ***"Ad Hoc and Sensor Networks — Theory and Applications"***, World Scientific Publications /Cambridge University Press.
2. Feng Zhao, Leonidas Guibas ***"Wireless Sensor Networks: An Information Processing Approach",*** Elsevier Science imprint, Morgan Kauffman Publishers.

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Reference Books:

1. C.Siva Ram Murthy, B.S.Murthy, ***"Adhoc Wireless Networks — Architectures and Protocols"***, Pearson Education.
2. Fei Hu, Xiaojun Cao, ***"Wireless Sensor Networks — Principles and Practice"***, An Auerbach book, CRC Press, Taylor & Francis Group.
3. Subir Kumar Sarkar, et al.**,** ***"Wireless Ad hoc Mobile Wireless Networks — Principles, Protocols and Applications",*** Auerbach Publications, Taylor & Francis Group.
4. Charles E.Perkins, ***"Ad hoc Networking"***, Pearson Education.
5. Shih-Liri Wu, Yu-Chee Tseng, ***"Wireless Ad hoc Networking",*** Auerbach Publications, Taylor & Francis Group.
6. Jagannathan Sarangapani, ***"Wireless Ad hoc and Sensor Networks — Protocols, Performance and Control",*** CRC Press, Taylor & Francis Group.
7. Raheem Beyah, ***"Security in Ad hoc and Sensor Networks",*** World Scientific Publications / Cambridge University Press.
8. Ozan K.Tonguz, Giatuigi Ferrari,***"Ad hoc Wireless Networks — A communication-theoretic perspective",*** Wiley India.

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CS-802: DISTRIBUTED SYSTEMS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to learn the concepts of distributed systems, RPC & its importance, synchronization and distributed shared systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals:** Evolution of distributed computing systems, system models, issues in design of distributed systems, distributed computing environment, web based distributed model, computer networks related to distributed systems and web based protocols. **Message Passing:** inter process communication, desirable features of good message-passing systems, issues in IPC by message, synchronization, buffering, multidatagram messages, encoding and decoding of message data, process addressing, failure handling, group communication.	10
II	**Remote Procedure Calls:** The RPC model, transparency of RPC, implementing RPC mechanism, stub generation, RPC messages, marshaling arguments and results, server management, communication protocols for RPCs, complicated RPCs, client-server binding, exception handling, security, some special types of RPCs, lightweight RPC, optimization for better performance. **Distributed Shared Memory:** Design and implementation issues of DSM, granularity, structure of shared memory space, consistency models, replacement strategy, thrashing, other approaches to DSM, advantages of DSM.	10
III	**Synchronization:** Clock synchronization, event ordering, mutual exclusion, election algorithms. **Resource and Process Management:** Desirable features of a good global scheduling algorithm, task assignment approach, load balancing approach, load sharing approach, process migration, threads, processor allocation, real time distributed systems.	10
IV	**Distributed File Systems:** Desirable features of a good distributed file systems, file	9

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	models, file accessing models, file-shearing semantics, filecaching schemes, file replication, fault tolerance, design principles, sun's network file system, andrews file system, comparison of NFS and AFS. **Naming:** Desirable features of a good naming system, fundamental terminologies and concepts, systems-oriented names, name caches, naming & security, DCE directory services.	

Text Books:

1. Pradeep K. Sinha, ***"Distributed OS",*** PHI.
2. Tanenbaum S.: "***Distributed Operating Systems"***, Pearson Education.
3. George Coulouris, Jean Dollimore. Tim Kindberg: "***Distributed Systems concepts and design".***

Reference Books:

1. Tanenbaum S. Maarten V.S.: "***Distributed Systems Principles and Paradigms"***, (Pearson Education)
2. M. Singhal & N. Shivaratri, ***"Advanced Concepts in Operating Systems"***

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CS-803: SOFT COMPUTING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to learn the concepts of fuzzy sets, fuzzy logic and heuristics based on human experience. Learn the mathematical background for carrying out optimization associated with soft computing. Learn genetic algorithms and random search procedures.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Neural Networks:** Basic concepts, human brain, neural network architecture, characteristic of neural network, scope of neural network , hybrid system , evolution of neural network , basic models of artificial neural network , important terminologies of ANNs, Mcculloch-Pitts Neuron , liner separability, Hebb network, perceptron network, back propagation network, radital basis function network , tree neural network	10
II	**Associative Memory:** Training algorithm for pattern association, auto associative memory network, hetrocorrelation, exponential BAM, associative memory for real coded pattern pairs, kohonenself organizing features maps. **Adaptive Resonance theory network:** Introduction, ARTI1, ART2, application	10
III	**Probabilistic Reasoning Fuzzy Logic:** Introduction to fuzzy logic, fuzzy v/s crisp , fuzzy sets, crisp set, properties of fuzzy sets, crisp relation, cartesian product of relation, classical relation, fuzzy relation, tolerance and equivalence relation , crisp logic, fuzzy rule base system, fuzzification, method of membership value assignments, defuzzification method, application, fuzzy arithmetic and fuzzy measure, FIS.	10
IV	**Genetic Algorithms:** Introduction, traditional optimization and search technique, genetic algorithm and search space, genetic algorithm v/s traditional algorithm, fitness computations, cross over, mutation, reproduction, rank method, rank space method, genetic modeling: inversion and deletion, mutation operator, bitwise operator, introduction to hybrid system.	9

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Text Books:

1. S.N Sivanandam & Deep, ***"Principle of Soft Computing"***, Wiley India Publication.
2. S. rajasekaran, ***"Neural network, Fuzzy logic and Genetic alogritham"*** PHI.
3. Stuart J . Russel ,Norvig , ***"AI A Modern Approach"*** , Pearson Education.
4. Michael Negnevitsky, "***Artificial Intelligence: A Guide to Intelligent Systems"***, 2/E, AddisonWesley.

Reference Book:

1. James Freeman A. and David Skapura "***M Neural Networks - Algorithms, Applications & Programming Techniques",*** Addison Wesley.
2. Yegnanarayana B , ***"Artificial Neural Networks"***, Prentice Hall of IndiaPrivate Ltd., New Delhi.
3. Goldberg, David E ***"Genetic algorithms in search, optimization and machine learning"***, Addison Wesley.

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IT-801: MOBILE APPLICATION DEVELOPMENT

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to understand the basic concepts development tools in the Android development environment, use the major components of Android API set to develop their own apps, describe the life cycles of Activities, Applications and Fragments, Sensors like Gyroscopes, Accelerometers and GPS to add orientation and location to their apps.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Basic Android Concepts:** Introduction to android - history of android ,the open handset alliance, android SDK installation ,android SDK & their codenames , advantages of android, the android O/S architecture, overview of IDE for android application, what is AVD , how to launch and start the AVD (android virtual device) **Managing Application Resources** - what are resources, resource value types, storing different resource values types (string, string arrays, boolean, colors, integer, animation, & menus). **Android Application Components** - Activities & its life cycle , services & its life cycle, broadcast receiver, content provider, intents, shutting down component , android manifest file in detail ,use of intent filter.	10
II	**Widgets – User Interface Elements:** Form widgets – text view, basic button, toggle button, check box, checked text view, radio buttons, radio group, spinner control, date picker, time picker , chronometer, progress bar, rating bar, option menu, image view text fields - various type of text fileds (plain text, password text, numeric text, email text, phone text, multiline text etc) **Working with various type of dialog** - Simple dialog, alert dialog, character picker dialog, date picker dialog, progress dialog , list dialog, custom dialog toast – (custom toast) **Features of android:** Styles and themes - basic styles & themes in XML layout various layouts - what is layout, layouts common attribute, types of layout (linear layout, relative layout, table layout , frame layout ,tab layout)	10

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	Using Data-Driven Containers - List view, grid view, and gallery view (using the array adapter) **App widgets** - What is app widget, use of App widgets, creating app widget configuration activity	
III	**Data Storage:** Introduction to data storage - introduction to various storage options available in android system. **Working with Application Preferences**-Creating private and shared preferences, manipulating with shared preferences, read/write data on the android file system [internal storage]. **Storing Structured Data Using SQLite Databases** - Creating a SQLite database, creating tables and other SQLite schema objects, creating, updating, and deleting database records, querying SQLite databases, working with cursors, closing and deleting a SQLite database	**10**
IV	**Networking Features:** Using networking: understanding mobile networking fundamentals, accessing the internet (HTTP), browsing the web with web view, calling. **PHP From Android**: Pass android application data to PHP, manipulate android data in MYSQL using PHP. **Telephony API:** Basic of telephony manager, sending SMS, call state	**9**

Text Books:

1. Rick rogers,John Lombardo – O‟Reilly ***"Android Application Development",.***
2. Reto Meier – Wrox***, "Professional Android 2 application development".***

Reference Books:

1. Lauren Darcey and Shane Conder, ***"Android Wireless Application Development",*** Pearson Education.
2. Wei-Meng Lee, ***"Beginning Android Application Development"*** Wrox Publication.
3. Frank Ableson and Charlie Collins and Robi Sen***, "Unlocking Android Developers Guide"*** , Manning Publication Co.

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IT-802: NATURAL LANGUAGE PROCESSING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

This course provides an introduction to the field of natural language processing. It includes relevant background material in Linguistics, Mathematics, Probabilities and Computer Science. Some of the topics covered in the class are Text Similarity, Part of Speech Tagging, Parsing, Semantics, Question- Answering, Sentiment Analysis and Text Summarization.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Origin of natural language processing (NLP), challenges of NLP, NLP applications, processing indian languages. **Language Modeling:** Various grammar based language models, statistical language model.	**10**
II	**Word Level Analysis:** Morphological parsing, spelling errors detection and correction, part-of-speech tagging. **Syntactic and Semantic Analysis:** Parsing, lexical semantics, ambiguity, word sense disambiguation.	**10**
III	**NLP Tools:** Morphological analyzer, parser, part-of-speech tagger, WordNet. **Machine Translation:** Need of MT, problems of machine translation, MT approaches, direct machine translations, rule-based machine translation, knowledge based MT system, statistical machine translation, UNL based machine translation, translation involving indian languages.	**10**
IV	**Information Retrieval:** Features of information retrieval systems, natural language processing in IR, cross-lingual IR. **Other Applications:** Information extraction, question-answering system, natural language interface to databases.	**9**

Text Books:

1. Siddiqui and U.S. Tiwary, "***Natural Language Processing and Information Retrieval***", Oxford Press.

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2. J.Allen, “***Natural Language understanding”***, Benjamin/Cunnings.

Reference Books:

1. Akshar Bharati, Vineet Chaitanya, and Rajeev Sangal. “***NLP: A Paninian Perspective”***, Prentice Hall, New Delhi.

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IT-803: CYBER SECURITY & CYBER LAWS

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

This course will provide a basic introduction to of all aspects of cyber-security including business, policy and procedures, communications security, network security, security management, legal issues, political issues, and technical issues. This serves as the introduction to the cyber security track in electrical and computer engineering department.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Cybercrime:** Cybercrime definition and origins of the world, cybercrime and information security, classifications of cybercrime, cybercrime and the Indian ITA 2000, A global perspective on cybercrimes. **Cyber offenses & Cybercrime:** How criminal plan the attacks, social engg, cyber stalking, cybercafe and cybercrimes, botnets, attack vector, cloud computing, proliferation of mobile and wireless devices, trends in mobility, credit card frauds in mobile and wireless computing era, security challenges posed by mobile devices, registry settings for mobile devices, authentication service security, attacks on mobile/cell phones, mobile devices: security implications for organizations, organizational measures for handling mobile, devices-related security issues, organizational security policies and measures in mobile computing era, laptops.	**10**
II	**Tools and Methods Used in Cyber line:** Proxy servers and anonymizers, phishing, password cracking, keyloggers and spywares, virus and worms, steganography, DoS, DDoS attacks, SQL injection, buffer over flow, attacks on wireless networks, phishing, identity theft (ID theft). **Cybercrimes and Cyber security: The Legal Perspectives:** Why do we need cyberlaw: the indian context, the indian IT act, digital signature and the indian IT act, amendments to the indian IT act, cybercrime and punishment, cyberlaw, technology and students: indian scenario.	**10**
III	**Understanding Computer Forensics:** Historical background of cyber forensics, digital forensics science, the need for computer forensics, cyberforensics and digital evidence, forensics analysis of email, digital forensics lifecycle, chain of custody concept, network forensics, approaching a computer forensics investigation, setting of a computer forensics	**10**

	laboratory: understanding the requirements, computer forensics and steganography, relevance of the OSI 7 layer model to the computer forensics and social networking sites: the security/privacy threats, forensics auditing, anti forensics.	
IV	**Cyber security: Organizational Implications:** Cost of cybercrimes and IPR issues: lesson for organizations, web treats for organizations: the evils and perils, security and privacy implications from cloud computing, social media marketing: security risk and perils for organization, social computing and the associated challenges for organizations, protecting people's privacy in the organization, organizational guidelines for internet usage, safe computing guidelines and computer usage policy, incident handling: an essential component, intellectual property in the cyberspace of cyber security, importance of endpoint security in organizations.	**9**

Text Books:

1. Nina Godbole & Sunit Belapure ***"Cyber Security",*** Wiley India.

Reference Book:

1. Harish Chander, ***"Cyber laws & IT protection",*** PHI learning pvt.ltd.
2. Dhiren R Patel, ***"Information security theory & practice",*** PHI learning pvt ltd.
3. MS.M.K.Geetha & Ms.Swapne Raman ***"Cyber Crimes and Fraud Management",*** MACMILLAN.
4. Pankaj Agarwal : "***Information Security & Cyber Laws (Acme Learning)",*** Excel.
5. Vivek Sood, "***Cyber Law Simplified",*** TMH.

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CS-804: PROJECT WORK - II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	16	8	50	50	100	2Hrs

This project work shall be carried out by the students during the entire semester under the guidance of Supervisor allotted by the institute and its viva will be conducted at the end of the semester.

Project Evaluation will consist of Three parts:
1. Evaluation of the project report along with source code in a CD in the required format by an external examiner 40% marks. Continuous evaluation by internal examiner 30% marks.
2. Viva-voce examination (20% marks).
3. Software evaluation with test runs (10% marks)

Viva-voce examination will be related to the projects executed by the candidate during the course of the semester.

Aim of this Project:
Aim of this project is to equip students in the methodology of the system analysis and design of a live project in the institution in which he/she is studying or in a place of work such as bank, school, college and office in the vicinity of the institute.
This will be a guided project under the close supervision of the faculty of the institute. Projects should be presented in the form of a project report giving a candidate system for solving a live problem.

OR

CS-811: INDUSTRIAL PROJECT

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
0	0	16	8	50	50	100	2Hrs

Industrial Project of Four months duration is to be carried out by the student exclusively in industry under the joint supervision of faculty advisers from institution as well as from the industry. Student is supposed to submit the project report at the end of the training.

Project Evaluation will consist of Three parts:
1. Evaluation of the project report along with source code in a CD in the required format by an external examiner 40% marks. Continuous evaluation by internal examiner 30% marks.
2. Viva-voce examination (20% marks).
3. Software evaluation with test runs (10% marks)

Viva-voce examination will be related to the projects executed by the candidate during the course of the semester.

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Aim of this Project:

Aim of this project is to equip students in the methodology of the system analysis and design of a live project in the industry or in a place of work such as bank, school, college and office in the vicinity.

Projects should be presented in the form of a project report giving a candidate system for solving a live problem.

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Himachal Pradesh Technical University, Hamirpur (H.P.)

CURRICULUM(CBCS)
ELECTRICAL ENGINEERING
(3rd to 8th Semester)
Teaching and Examination Scheme

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SCHEME OF TEACHING AND EXAMINATION B.TECH - ELECTRICAL ENGINEERING										
SEMESTER – III										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I.A Marks**	**ESE Marks**	**Total Marks**
1	FC	MA-301	Probability and Statistics	2	2	0	3	40	60	100
2	FC	HS – 305	Industrial Economics and Management	3	0	0	3	40	60	100
3	PC	EE-301	Electrical Machine -1	3	1	0	4	40	60	100
4	PC	EE-302	Power Electronics-I	3	1	0	4	40	60	100
5	PC	EC-302	Digital Electronics	3	0	0	4	40	60	100
6	PC	EC-303	Network Analysis & Synthesis	3	0	0	3	40	60	100
7	OE	-	Open Elective-I	2	0	0	2	40	60	100
Labs:										
1	PC	EE-311	Electrical Machine -1 Lab	0	0	2	1	30	20	50
2	PC	EE-312	Power Electronics-I Lab	0	0	2	1	30	20	50
3	PC	EE-313	Digital Electronics Lab	0	0	2	1	30	20	50
			Total	17	5	6	24+2	370	480	850

Open Elective-I

S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I.A Marks**	**ESE Marks**	**Total Marks**
1	OE	HS-306	Sociology & Elements of IndianHistory for Engineers	2	0	0	2	40	60	100
2	OE	HS-307	German Language - I	2	0	0	2	40	60	100
3	OE	HS-308	French Language - I	2	0	0	2	40	60	100

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SCHEME OF TEACHING AND EXAMINATION
B.TECH - ELECTRICAL ENGINEERING

SEMESTER – IV

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		I.A Marks	ESE Marks	Total Marks
1	FC	MA-401	Optimization and Calculus of Variations	2	2	0	3	40	60	100
2	FC	HS-409	Human Values and Professional Ethics	2	2	0	3	40	60	100
3	PC	EE-401	Electrical Machine-II	3	1	0	4	40	60	100
4	PC	EE-402	Electrical Measurement & Measuring Instruments	3	1	0	4	40	60	100
5	PC	EE-403	Transmission & Distribution of Electrical Power	3	1	0	4	40	60	100
6	PC	EE-404	Communication Engineering	3	1	0	4	40	60	100
7	OE	-	Open Elective-II	2	0	0	2	40	60	100
Labs:										
1	PC	EE-411	Electrical Machine-II Lab	0	0	2	1	30	20	50
2	PC	EE-412	Electrical Measurement & Measuring Instruments Lab	0	0	2	1	30	20	50
3	MC	EE-413	Electrical Simulation Lab-I	0	0	3	2	30	20	50
			Total	16	8	7	26+2	370	480	850

Open Elective-II

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		I.A Marks	ESE Marks	Total Marks
1	OE	HS-410	Law for Engineers	2	0	0	2	40	60	100
2	OE	HS-411	German Language - II	2	0	0	2	40	60	100
3	OE	HS-412	French Language - II	2	0	0	2	40	60	100

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SCHEME OF TEACHING AND EXAMINATION
B.TECH - ELECTRICAL ENGINEERING

SEMESTER – V

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		I.A Marks	ESE Marks	Total Marks
1	PC	EE-501	Power Electronics-II	3	1	0	4	40	60	100
2	PC	EE-502	Linear Control System	3	1	0	4	40	60	100
3	PC	EE-503	Electrical Power Generation	3	0	0	3	40	60	100
4	PC	EE-504	High Voltage Engineering	2	2	0	3	40	60	100
5	PC	EE-505	Electromagnetic Field Theory	3	1	0	4	40	60	100
6	PC	EE-506	Flexible AC Transmission System	3	1	0	4	40	60	100
7	OE	-	Open Elective-III	2	0	0	2	40	60	100
Labs:										
1	PC	EE-511	Power Electronics-II Lab	0	0	2	1	30	20	50
2	PC	EE-512	Linear Control System Lab	0	0	2	1	30	20	50
3	MC	EE-513	Electrical Simulation Lab-II	0	0	2	1	30	20	50
			Total	18	4	6	25+2	370	480	850

Open Elective-III (For Students of Other Departments)

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		I.A Marks	ESE Marks	Total Marks
1	OE	EE-507	Non-Conventional Electrical Power Generation	2	0	0	2	40	60	100
2	OE	EE-508	Energy Assessment & Audit	2	0	0	2	40	60	100
3	OE	EE-509	Robotics	2	0	0	2	40	60	100

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SCHEME OF TEACHING AND EXAMINATION
B.TECH - ELECTRICAL ENGINEERING

SEMESTER – VI

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		I. A Marks	ESE Marks	Total Marks
1	PC	EE-601	Switchgear & Protection	3	0	0	3	40	60	100
2	PC	EE-602	Microprocessors & Applications	2	2	0	3	40	60	100
3	PC	EE-603	Power System Analysis	3	1	0	4	40	60	100
4	PC	EE-604	Electrical Drives	3	1	0	4	40	60	100
5	PC	EE-605	Digital Signal Processing	3	1	0	4	40	60	100
6.	PC	EE-606	Electrical Energy Utilization	3	0	0	3	40	60	100
7	PE	-	Programme Elective-I	3	0	0	3	40	60	100
Labs:										
1	PC	EE-611	Switchgear & Protection Lab	0	0	2	1	30	20	50
2	PC	EE-612	Microprocessors & Applications Lab	0	0	2	1	30	20	50
3	MC	EE-613	Seminar	0	0	2	1	50	50	100
			Total	18	3	6	24+3	370	480	850

PROGRAMME ELECTIVE - I

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		I.A Marks	ESE Marks	Total Marks
1	PE	EE-607	Advanced Control System	3	0	0	3	40	60	100
2	PE	EE-608	Illumination Engineering	3	0	0	3	40	60	100
3	PE	EE-609	Neural Network & Fuzzy Logic	3	0	0	3	40	60	100

Industrial /Practical Training after VI^{th} Semester of six weeks duration

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SCHEME OF TEACHING AND EXAMINATION B.TECH - ELECTRICAL ENGINEERING										
SEMESTER – VII										
S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I. A Marks**	**ESE Marks**	**Total Marks**
1	PC	EE-701	Energy Management	3	0	0	3	40	60	100
2	PC	EE-702	Electrical Power Quality	3	0	0	3	40	60	100
3	PC	EE-703	Non-conventional Electrical Power Generation	3	0	0	3	40	60	100
4	PC	EE-704	Electrical Machine Design	2	2	0	3	40	60	100
5	PE	-	Programme Elective-II	3	0	0	3	40	60	100
Labs:										
6	MC	EE-711	Project Work -I	0	0	4	2	50	50	100
7	PC	EE-712	Industrial /Practical Training(Viva-Voce)	0	0	0	2	50	50	100
8	MC	EE-713	Electrical Simulation Lab-III	0	0	2	1	30	20	50
			Total	12	0	10	17+3	290	360	650

PROGRAMME ELECTIVE-II

S. N.	**Cat.**	**Course Code**	**Subject**	**Teaching Hours Per Weak**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I.A Marks**	**ESE Marks**	**Total Marks**
1	PE	EE-705	Hydro Power Station Design	3	0	0	3	40	60	100
2	PE	EE-706	Testing & Commissioning of Electrical Equipments	3	0	0	3	40	60	100
3	PE	EE-707	High Voltage DC Transmission System	3	0	0	3	40	60	100

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SCHEME OF TEACHING AND EXAMINATION
B.TECH - ELECTRICAL ENGINEERING

SEMESTER – VIII

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		I. A Marks	ESE Marks	Total Marks
1	PE		Programme Elective - III	3	0	0	3	40	60	100
2	PE		Programme Elective - IV	3	0	0	3	40	60	100
3	MC	EE-801	Project Work - II	0	0	16	8	50	50	100
			Total	6	0	16	8+6			
OR										
4	MC	EE-802	Industrial Project	0	0	16	8	50	50	100
			Total	0	0	16	8			

PROGRAMME ELECTIVE-III

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		I.A Marks	ESE Marks	Total Marks
1	PE	EE-803	Power System Planning	3	0	0	3	40	60	100
2	PE	EE-804	Direct Energy Conversation	3	0	0	3	40	60	100
3	PE	EC-804	Digital Image Processing	3	0	0	3	40	60	100

PROGRAMME ELECTIVE-IV

S. N.	Cat.	Course Code	Subject	Teaching Hours Per Weak			Credits	Examination		
				L	T	P/D		I.A Marks	ESE Marks	Total Marks
1	PE	EE-806	Power System Stability	3	0	0	3	40	60	100
2	PE	EE-807	Optimization Techniques	3	0	0	3	40	60	100
3	PE	EE-808	Advanced Power Electronics	3	0	0	3	40	60	100

Note: Industrial Project of Fourmonths duration is to be carried out by the student exclusively in industry under the joint supervision of faculty advisers from institution as well as from the industry.

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SEMESTER-III

MA 301: PROBABILITY AND STATISTICS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Probability and Random Variables:** Introduction,Basic concepts–Sample space, Events, Counting sample space, Conditional Probability and Independence, Permutations and Combinations, Rules of Probability,Bayes' Theorem. Random Variables – Concept of Random Variable, Percentiles, Probability Distributions – Discrete & Continuous, Mean, Variance and Covariance of Random Variables, Chebychev's inequality.	6
II	**Standard Probability Distributions:** Discrete distributions - Uniform, Binomial, Multinomial, Hypergeometric, Poisson, Negative Binomial, Poission; Continuous distributions - Normal, Exponential, Gamma, Weibull and Beta distributions and their properties -Function of Random variables.	6
III	**Sampling Distributions:**Random sampling, Sampling Distributions of Means, Estimation, Properties of point estimators, Confidence interval, Maximum likelihood and Bayes estimators, Prediction intervals.	6
IV	**Testing of Hypothesis:**Sampling distributions – testing of hypothesis for mean, variance, proportions and differences using Normal,t, Chi-square and F distributions, tests for independence of attributes and Goodness of fit. **Linear Correlation and Regression Analysis:**Introduction, Linear Regression model, Regression coefficient, Lines of correlation, Rank correlation.	6

Text Books:

1. Gupta, S.C, and Kapur, J.N., "Fundamentals of Mathematical Statistics", Sultan Chand, Ninth Edition, New Delhi,1996.
2. Johnson. R. A., "Miller & Freund's Probability and Statistics for Engineers", Sixth Edition, Pearson Education, Delhi, 2000.
3. Douglas C. Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", 5th Edition, 2011.

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Reference books:

1. Walpole, R. E., Myers, R. H. Myers R. S. L. and Ye. K, “Probability and Statistics for Engineers and Scientists”, Seventh Edition, Pearson Education, Delhi, 2002.
2. Lipschutz. S and Schiller. J, “Schaum’s outlines - Introduction to Probability and Statistics”, McGraw-Hill, New Delhi, 1998.
3. S. M. Ross, “Introduction to Probability and Statistics for Engineers and Scientists” 4th edition.

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HS 305: INDUSTRIAL ECONOMICS AND MANAGEMENT

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to Engineering Economics** - Technical efficiency, economic efficiency - cost concepts:elements of costs, opportunity cost, sunk cost, private and social cost, marginal cost, marginal revenue and profit maximization. **Supply and Demand:**Determinants of demand, law of demand, determinants of supply, law of supply,market equilibrium - elasticity of demand - types of elasticity, factors affecting the price elasticity ofdemand. **National Income Concepts:** GDP and GNP, per capita income, methods of measuring national income. Inflation and deflation.	8
II	**Value Analysis** - Time value of money - interest formulae and their applications: single-paymentcompound amount factor, single-payment present worth factor, equal-payment series compound amount factor, equal-payment series sinking fund factor, equal-payment series present worth factor,equal-payment series capital recovery factor, effective interest rate. **Investment Analysis:** Payback period—average annual rate of return, net present value; Internal rate of return criteria,price changes, risk and uncertainty.	8
III	**Principles of Management:** Evolution of management theory and functions of management organizational structure - principle and types - decision making - strategic, tactical & operational decisions, decision making under certainty, risk & uncertainty and multistage decisions & decision tree. **Human Resource Management:** Basic concepts of job analysis, job evaluation, merit rating, wages,incentives, recruitment, training and industrial relations.	8
IV	**Financial Management**: Time value of money and comparison of alternative methods; costing – elements& components of cost, allocation of overheads, preparation of cost sheet, break even analysis - basics of accounting - principles of accounting, basic concepts of journal, ledger, trade, profit&loss account and balance sheet. **Marketing Management:** Basic concepts of marketing environment, marketing	8

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	mix, advertising and sales promotion. **Project Management:** Phases,organization, planning, estimating, planning using PERT & CPM.	

Text Books:

1. PanneerSelvam, R, “*Engineering Economics*”, Prentice Hall of India Ltd, New Delhi.
2. Dwivedi, D.N., “*Managerial Economics, 7/E”*, Vikas Publishing House.

Reference Books:

1. Sullivan, W.G, Wicks, M.W., and Koelling. C.P., “*Engg. Economy 15/E*”,Prentice Hall, New York, 2011.
2. Chan S. Park, “*Contemporary Engineering Economics*”, Prentice Hall of India, 2002.
3. F. Mazda, *Engg.Management*, Addison Wesley, Longman Ltd., 1998.
4. O. P. Khanna, *Industrial Engg.andManagement*,DhanpatRai and Sons, Delhi, 2003.
5. P. Kotler, *Marketing Management, Analysis, Planning, Implementation and Control*,Prentice Hall, New Jersey, 2001.
6. VenkataRatnam C.S &SrivastvaB.K,*Personnel Management and Human Resources*, Tata McGraw Hill.
7. Prasanna Chandra, *Financial Management: Theory and Practice*, Tata McGraw Hill.
8. Bhattacharya A.K., *Principles and Practice of Cost Accounting*, Wheeler Publishing.
9. Weist and Levy, *A Management guide to PERT and CPM*, Prantice Hall of India.
10. Koontz H.,O’Donnel C.,&Weihrich H, *Essentials of Management*, McGraw Hill.

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EE-301: ELECTRICAL MACHINES-I

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Single-Phase Transformers**: principle of transformer operation,emf equation,voltage ratio and turns ratio,construction of single-phase transformers,ideal transformer,transformer on no load: phasor diagram and equivalent circuit, practical transformer:phasor diagram and equivalent circuit, voltage regulation, losses,open circuit, short circuit,back to backtest,transformer efficiency,condition for maximum efficiency,per unit transformer values,all day efficiency. Single-phase auto transformer, volt ampere relation, step up auto transformer, auto transformer efficiency, saving in conductor material, conversion of at wounding transformer to an auto transformer, advantages & disadvantages of auto transformer, applications of auto transformer.	8
II	**Three- phase Transformer:** Three-phase transformer,Comparison between three phase transformer bank and three phase transformer units,three-phase transformer construction,three-phase transformer groups,three-phase transformer connections, factors affecting the choice of connections,delta-delta connection,star-star connection,star-delta connection, delta-star connection, open delta connection, scott three-phase/ two phase connection, Comparison of Distribution and Power Transformer ,application of transformers Three winding transformers: equivalent circuit, determination of parameters,voltage regulation,polarity of the transformers,parallel operation of single-phase transformers and Three-phase transformers,wave shape of no load (exciting)current, in rush of magnetizing current, construction of current transformers and voltage transformers,transformer cooling.	8
III	**DC Machines-I: B**asic structure of electric machine, dc generator construction, equivalent circuit of dcmachine,type of dcmachine, emf equation of dc machine, armature reaction in dc generators, commutation, methods of improving commutation, demagnetizing and cross magnetizing ampere turns, characteristics of dc generator.	8

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IV	**DC Machine-II**: Motorprinciple, significance of back emf,equivalent circuit of a dcmotor,torque equation of dcmotor,types of dcmotor,characteristics of shunt,series &compound motors,speed control of dc motors, starting of dcmotors & starters, losses in dc machine,efficiency of a dc machine,testing of a dc machines,application of dc machines.	**8**

Recommended Books:

1. "ElectricalMachinery"byP.S.Bimbhra, KhannaPublishers,Delhi.
2. "Generalized theory of electrical machines" by P. S.Bimbhra,KhannaPublishers,Delhi.
3. "Electric Machinery"byFitzgerald&Kingsley,MGH.

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EE-302: POWER ELECTRONICS-I

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Power electronics devices**: Role of power electronics,construction and characteristics of powerdiode,power transistor, powerMOSFET, SCR,GTO,TRIAC&DIAC.SCR: two transistor model ,methodsofturn-on,R, RC and UJT firing circuit,commutation techniques,series and paralleloperation.	6
II	**Phase-controlled converters (ACtoDC converters):** One, two, three,six pulse converters, fullyandhalf controlled converters, load voltage waveforms with different types of loads, output voltage equations, continuousanddiscontinuousmodesofoperation,inputpowerfactorofconverter,reactivepowerdemand,effectof source inductance, introduction to four quadrant/dual converter.	10
III	**Cycloconverters (AC to AC converters):** basic principle of frequency conversion, types of cyclo converter, principle of operation of step up and step down cyclo converter,single-phase to single-phase cyclo converter with resistive and inductive load.Three-phase to single-phase cyclo converter,three-phase to three-phase cyclo converter,output voltage equation of cyclo converter	8
IV	**Choppers(DC to DC converter):** classification of choppers,principle of operation, steady state analysis of class-a choppers, stepup chopper:steady state analysis,current commutated and voltage commutated chopper,output voltage control techniques,one,two and fourquadrant choppers.	8

<u>Recommended Books:</u>

1. "PowerElectronics:Circuits, Devices&Applications"byM.H. Rashid, PrenticeHallofIndia Ltd,2004.
2. "PowerElectronics" byP.S.Bimbhra,KhannaPublishers,2006.
3. "PowerElectronics" byM.D. SinghandK.B. Khanchandani,TataMCGrawHillPub,2005.
4. "PowerElectronics:Converters,Applicationsand Design" byNedMohan,T.M.Undeland.

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EC-302: DIGITAL ELECTRONICS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Number system & codes:-**Binary arithmetic (Addition, Subtraction, Multiplication andDivision),Floatingpoint numbers.Diminished radix and radix compliments, BCD codes, 8421 code,Excess-3 code, Gray code, Error detection and correction: Parity code, Hamming code. **Logic Gates:-** Positive & negative logic, Tristate logic gates, Schmitt gates, Totem pole output and open collector output;Fan in and Fan out of logic gates, Buffer & trans-receivers, IEEE/ANSI standards symbols.	8
II	**Boolean algebra simplification techniques:-** Sum of products and product of sums simplification, NAND and NOR implementation, Incompletely specified functions, Ex-OR functions, The map method: Two, Three, Four and Fivevariablemaps;The tabulation method, Determination of prime implicants, Selection of essential primeimplicants. **Logic families:-**Classification of digital IC's, Significance & types, Characteristics parameters, TTL, ECL, CMOS logic families, NMOS & PMOS logic,Interfacing between TTL & CMOS.	9
III	**Combinational logic circuits:** Implementing combinational logic,Arithmetic circuits: Half adder, Full adder,Half substractor,Fullsubtractor; Multiplexer, Encoder, Demultiplexer & Decoder. **Flip flops:-** Introduction, S-R flip -flops, Level & edge triggered flip flops, JK flip-flop, D flip-flop, T flip-flop,Master slave JK flip-flop, Flip flop timing parameters & applications.	8
IV	**Shift Registers:-**Shift register, Ring counter, Universal shift registers, SISO, PISO, SIPO & PIPO. **Counters:-** Asynchronous ripple counter, Synchronous counter, Modulus of a counter,Binary ripple counter, Up& down, Decade counter. **Semiconductor Memories:-**Classification of memories,ROM, RAM, Static memory and Dynamic memory. Programmable logic arrays, Charged-coupled device memory.	8

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Text Books

1. Digital Electronics -Principle & Integrated circuits, Anil K Maini, Wiley India edition
2. Modern Digital Electronics, R.P.Jain, TMH
3. M. Morris Mano, Digital Design, Prentice Hall of India.

Reference Books

1. Digital Principle and Applications, Malvino and Leach, TMH
2. Digital Electronics, Kharate, Oxford University Press

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EC-303 : NETWORK ANALYSIS & SYNTHESIS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Analysis of coupled circuits and application of network theorem in AC circuits:** Active element conventions: Modelling of coupled circuits, Dot convention in coupled circuits; Network theorems in AC circuits:Thevenin's and Norton's theorems, Superposition theorem, Reciprocity and maximum power transfer theorem. **Graph theory and network equations:** Introduction and graph of a network, The incidence matrix, Fundamental cut set matrix, Fundamental tie set matrix and loop currents, Relation between various matrices. Network equilibrium equations: using KVL and KCL; Networks with mutual inductance, Duality.	9
II	**Application of Laplace transform in circuit analysis:** Review of Laplace transform: Definition of Laplace transform and its inverse, Laplace transform of basic functions, Properties of Laplace transform; Application of Laplace transforms in circuit analysis: Transformation of time domain circuit components to s- domain, Laplace transform to solution of network problems. **Transient response:** Transient response of R-L, R-C, R-L-C circuits(series combinations only) for DC and sinusoidal excitations.	9
III	**Two port networks:** Concept of two port networks, Classification of parameters: Open circuit and Short circuit parameters, Transmission and inverse transmission parameters, Hybrid and inverse hybrid parameters;Condition for reciprocity and symmetry, Inter-relationship between the parameters. Interconnection of two port networks: Series, Parallel,Cascade and series-parallel connection.T and pi representations.	8
IV	**Fundamentals of network synthesis:** Network functions, Concept of poles and zeros,Necessary condition of a stability of a network function. Hurwitz polynomial and its properties, Positive real function, Properties of positive real functions, Testing a positive real function, Synthesis of R-L, R-C and L-C driving point functions: Foster and Cauer forms.	8

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Text Books

1. Fundamentals of Electric circuits, Charles K Alexander, Matthew N O Sadiku, TMH
2. Circuit Theory -Analysis and synthesis, A. Charkrabarti,DhanpatRai& co.
3. Network analysis and synthesis, Franklin F. Kuc, PHI.

Reference Books

1. Networks and Systems, D.RoyChoudhury, New Age International.
2. Network Analysis, Van valkenberg, PHI
3. Engineering Circuit Analysis, WiliamHayt and Jack Kemmerly, TMH
4. Circuits and Networks- Analysis and Synthesis,A.Sudhakar and S.P.Shyam Mohan, TMH

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HS 306: SOCIOLOGY AND ELEMENTS OF INDIAN HISTORY FOR ENGINEERS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVE:

- To familiarize the students with elements of Indian history and sociological concepts and theories by which they could understand contemporary issues andproblems in Indian society.
- The enable the students to analyse critically the social processes of globalization, modernization and social change.
- To help the students imbibe such skills that will enable them to be better citizens and human beings.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction to sociological concepts**: structure, system, organization, social institution, Culture social stratification (caste, class, gender, power). **Understanding social structure and social processes:** Perspectives of Marx and Weber.	6
II	**Political economy of Indian society:** Industrial, Urban, Agrarian and Tribal society. **Social change in contemporary India**: Modernization and globalization, Secularism and communalism.	6
III	**Introduction to Elements of Indian History:** What is history? ; History Sources - Archaeology, Numismatics, Epigraphy and Archival research. **Indian history and periodization:** evolution of urbanization process: first, second and third phase of urbanization.	6
IV	**From feudalism to colonialism:** The coming of British; Modernity and struggle for independence. **Issues and concerns in post-colonial India (upto 1991):** Issues and concerns in post-colonial India 2ndphase (LPG decade post 1991)	6

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Text Books:

1. Desai, A.R. (2005), Social Background of Indian Nationalism, Popular Prakashan.
2. Giddens, A (2009), Sociology, Polity, 6thEdition.
3. Chandoke, Neera& Praveen Priyadarshi (2009), contemporary India: Economy, Society and Politics, Pearson.

Reference Books:

1. Guha, Ramachandra (2007), India After Gandhi, Pan Macmillan.
2. Haralambos M, RM Heald, M Holborn (2000), Sociology, Collins.
3. Sharma R. S..(1965), Indian feudalism, Macmillan.
4. Gadgil, Madhab&RamchandraGuha(1999) - This Fissured Land: An Ecological Histry of India, OU Press.

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HS 307: GERMAN LANGUAGE – I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVES:

- To read and write short, simple texts.
- To understand a dialogue between two native speakers and also take part in short, simple conversations using the skills acquired.
- To offers opportunities for students of engineering for higher studies, research and employment in Germany.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**WichtigeSprachhandlungen:** Phonetics – Sichbegrüßen - Sich und anderevorstellenformell / informell - Zahlen von 1 bis 1 Milliarde - verstehen&sprechen. **Grammatik:** regelmäßigeVerbenimPräsens - "sein" und habenimPräsens - PersonalpronomenimNominativ.	6
II	**WichtigeSprachhandlungen:** TelefonNummernverstehen und sprechenUhrzeitenverstehen und sagenVerneinung "nicht und kein" (formell und informell) **Grammatik**: Wortstellung – Aussagesatz – W-Frage und Satzfrage (Ja/NeinFrage) Nomenbuchstabieren und notierenbestimmter und unbestimmterArtikelundNegativartikelim Nom. &Akkusativ	6
III	**WichtigeSprachhandlungen:** Tageszeitenverstehen und überTerminesprechen-Verabredungenverstehen - AufgabenimHaushaltverstehen **Grammatik:** PersonalpronomenimAkkusativ und Dativ - W-Fragen "wie, wer, wohin,wo, was usw.-GenitivbeiPersonennamen - ModalverbenimPräsens "können, müssen,möchten"	6
IV	**WichtigeSprachhandlungen:** Sichaustauschen, was man kann, muss – BezeichnungenLebensmittel – Mengenangabenverstehen – PreiseverstehenundEinkaufzettelschreiben	6

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	Grammatik: Wortstellung in SätzenmitModalverben – Konnektor ”und” – “noch”-kein-------mehr – “wieviel, wieviele, wie alt, wielange” – PossessivartikelimNominativ.	
V	**WichtigeSprachhandlungen:** Freizeitanzeigenverstehen – HobbysundSportartenAnzeigenfürFreizeitpartnerschreibenbzw. daraufantworten –Vorlieben und Abneigungenausdrucken **Grammatik:**VerbenmitVokalwechselimPräsens – ModalverbenimPräsens“dürfen, wollen und mögen - “haben und sein” imPräteritum – regelmäßigeVerbenimPerfekt – Konnektoren “denn, oder, aber.	**6**

Text Book
1. Studio d A1. Deutsch alsFremdsprache with CD.(Kursbuch und Sprachtraining).

References
1. German for Dummies
2. Schulz Griesbach

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HS 308: FRENCH LANGUAGE - I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVES:

- To read and write short, simple texts.
- To understand a dialogue between two native speakers and also take part in short, simple conversations using the skills acquired.
- To offers opportunities for students of engineering for higher studies, research and employment in French.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Grammar and Vocabulary:** Usage of the French verb “se presenter”, a verbof self- introduction and how to greet a person- “saluer”. **Listening and Speaking:** The authentic sounds of the letters of the Frenchalphabet and the accents that play a vital role in the pronunciation of thewords. **Writing:** Correct spellings of French scientific and technical vocabulary. **Reading:** Reading of the text and comprehension – answering questions.	6
II	**Grammar and Vocabulary:** Definite articles, “prepositions de lieu” subjectpronouns. **Listening and Speaking:**Pronunciation of words like Isabelle, presentezandla liaison – vousetes, vousappelez and role play of introducing each other –group activity. **Writing:** Particulars in filling an enrolment / registration form. **Reading Comprehension:** reading a text of a famous scientist and answeringquestions.	6
III	**Grammar and Vocabulary:**Verb of possession “avoir’ and 1st group verbs“er”, possessive adjectives and pronouns of insistence- moi, lui..andnumbers from 0 to 20. **Listening and Speaking: N**asal sounds of the words like feminine, ceinture,parfum and how to ask simple questions on one’s name, age, nationality,address mail id and telephone number. **Writing:** Conjugations of first group verbs and paragraph writing on self – introduction and introducing a third person. **Reading Comprehension:** reading a text that speaks of one’s profile andanswering questions	6

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IV	**Grammar and Vocabulary:** Negative sentences, numbers from 20 to 69, verb“aimer”and seasons of the year and leisure activities. **Listening and Speaking:** To express one’s likes and dislikes and to talk of one’s pastime activities (sports activities), je fais du ping-pong and nasal sounds of words – janvier, champagne. **Writing-**Conjugations of the irregular verbs: faire and savoir and their usage.Paragraph writing on one’s leisure activity- (passé temps favori). **Reading:** a text on seasons and leisure activities – answering questions.	6
V	**Grammar and Vocabulary:** les verbes de direction- to ask one’s way and togive directions, verbes- pouvoir and vouloir and 2nd group verbs, a droite, lapremiere a gauche and vocabulary relating to accommodation. **Listening and Speaking:**To read and understand the metro map and hence to give one directions – dialogue between two people. **Writing:**Paragraph writing describing the accommodation using the different prepositions like en face de, derriere- to locate. **Reading Comprehension:**A text / a dialogue between two on location and directions- ouest la poste/ la pharmacie, la bibliotheque?......	6

Text Book
1. Tech French

References
1. French for Dummies.
2. French made easy-Goyal publishers
3. Panorama

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EE-311: ELECTRICAL MACHINES-I LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

LISTOFEXPERIMENTS:

TRANSFORMERS

1. Tofindturnsratio&polarityof single-phasetransformer.
2. Toperformopen&short-circuittestsonsingle-phasetransformer.
3. Toper form Sumpner's(BacktoBack) testontwoidentical1-Φ transformers.
4. Paralleloperationof twosingle-phasetransformers&tostudytheloadsharedbyeachtransformer.
5. To convertthree-phasetoTwo-phaseByScott-connectionof transformers.

DCMACHINES

6. Toplotthemagnetizingcharacteristicsofadcgeneratorrunningatratedspeed.
7. Toobtainandplottheexternalcharacteristicsofadcshuntgenerators&todeducetheinternal characteristics from the above.
8. Toper form load test on DC shunt generator.
9. SpeedcontrolofDCshuntmotor.
10. Swinburne'stestsofDCshuntmotor.
11. ToobtainandplotthecharacteristicsofDCseriesmotor.
12. ToperformloadtestonDCseriesmotor.

NOTE: Atleasteightexperiments aretobeperformedinthesemesterfromtheabove list.

Recommended Books:

1. "Experimentation and viva voce on electrical machines" by V.N.Mittal&A.Mittal, Standard Publications.

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EE-312: POWER ELECTRONICS-I LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

LISTOFEXPERIMENTS:

1.Experimenttostudycharacteristicsofdiode, SCRand TRIAC.
2.Experimenttostudycharacteristicsoftransistorand MOSFET.
3.ExperimenttostudyRand R-Cfiringcircuits.
4.ExperimenttostudyUJTfiringcircuit.
5.ExperimenttostudyACphase control.
6.Tostudythree-phasefull-waveuncontrolledrectifieroperationwithRandR-Lloadand observe its input/output Wave form.
7.Experimenttostudydcchopper.
8.Experimenttostudysingle-phasecycloconvertercharacteristics.
9.Tostudysingle-phasefullwavecontrolledrectifierusingSCRandUJTwithRandR-Lloadand observeitsinput/outputWaveformwithandwithoutfreewheeling(commutating)diode.
10.ExperimenttostudyLamp-DimmercircuitusingDiac&Triacwith lampload.

Note: Atleasteightexperimentshavetobeperformedinthesemesterfromtheabovelist.

EE-313: DIGITAL ELECTRONICS LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

LISTOFEXPERIMENTS

1. Verify truth tables of AND,OR, NOT, NAND,NOR and XOR gates.
2. Implement(i)half adder(ii) full adder using AND–OR gates.
3. Implement full adder using NAND gates as two level realizations.
4. Implement full subtractor using 8 to1multiplexer.
5. Verify truth tables ofRS &JK flip flops and convert JKflip flops into D type & T type flip flops.
6. Use 555 timer as(i) monostable(ii) as table multivibrator.
7. (a) Use of 4-bit shift register for shift left and shift right operations.
   (b) Use4-bit shift register as a ring counter.
8. Implement mod–10 counter and draw its output wave forms.

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9. Implement 4-bit DAC using binary weighted resistance technique/R-2R ladder network technique.
10. Implement8–bit ADC using IC(ADC0800/0801).
11. a) Implement(i)Single level clipping circuit (ii)Two level clipping circuit.
    b) Implement clamping circuit to clamp,at peak +ve voltage/peak –ve voltage of aninput signal.

ADDITIONAL EXERCISES:

1. Construct bounce less witch.
2. Construct a pulser of1Hzand10Hz,1kHz and manual.
3. Construct logic state detector.
4. Construct op to–sensor based.
    a. Measurement rotational speed of motor.
    b. Measurement time elapse between two events. c.
    Measurement of linear velocity.
    d. Measurement of acceleration.
5. Construct a memory using TTL Circuits. Read and write data on to a memory from bus.
6. Construct a security latch that can be operated by an identity card.

Note: At least eight experiments have to be performed in the semester from the above list.

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SEMESTER IV

MA 401: OPTIMIZATION AND CALCULUS OF VARIATIONS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE OBJECTIVES:

The objective of this course is to present different methods of solving optimization problems in the threeareas of linear programming, nonlinear programming, and classical calculus of variations.In addition to theoretical treatments, there will be some introduction tonumerical methodsfor optimization problems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** A survey of some simplified examples of common real world situations leading to optimization problems, basic formulation and theory of optimization problems. **Linear programming:** Linear programming (optimization of linear functions	6

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	subject tolinear constraints): basic theory; simplex method; duality, practical techniques.	
II	**Linear programming:** Basic LPP - solution techniques (Simplex, Artificial Basis), Complimentary Slackness Theorem,Fundamental theorem of Duality,degenerate solutions, cycling; Applications - elements of dynamic programming including Hamiltonian, Bellman'soptimality principle. **Transportation and Assignment Problems:** Solution of a balanced transportation problem, degeneracy in transportation problems and alternate solutions, Mathematical problems in formulation of assignment problems.	**6**
III	**Nonlinear programming:** Nonlinear programming (optimization of nonlinear functions subject to constraints) with Lagrange multipliers, Karush-Kuhn-Tucker optimality conditions, convexity, duality. **Approximation methods for nonlinear programming:** Line search methods, gradient methods, conjugate gradient methods; Networking techniques – PERT and CPM.	
IV	**Calculus of Variations:**Basic definitions -functionals, extremum, variations, function spaces; Necessary conditions for an extremum, Euler-Lagrange Equation, convexity and it's role in minimization, minimization under constraints; Existence and nonexistence of minimizers;Applications - Isoperimetric problems, Geodesics on the surface.	

Text Books:

1. C. B. Gupta, "Optimization Techniques in Operation Research," I. K. InternationalPublishing House Pvt. Ltd.
2. A. S. Gupta, Calculus of Variations and Applications, PHI Prantice hall India.
3. Mukesh Kumar Singh, "Calculus Of Variations" Krishna Prakashan Media (P) Ltd.
4. J. K. Sharma, Operations Research – Problems and Solutions, Macmillian Pub.

Reference books:

1. I. M.Gelf and S. V. Fomin, "Calculus of Variations" Dover Publications IncMineola,New York.
2. Purna Chand Biswal, "Optimization in Engineering, Scitech Publications India Pvt. Ltd.
3. B. S. GREWAL, Higher Engineering Mathematics, Krishna Publications.
4. G. Hadly, Linear Programming, Narosa Publishing House.
5. KantiSwarup, P. K. Gupta and Manmohan, "Operations Research," Sultan Chand & Sons.

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HS 409: HUMAN VALUES AND PROFESSIONAL ETHICS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3 hrs

COURSE OBJECTIVES:

- To enable students to explore the purpose of value education.
- To understand the purpose of harmony with oneself, family, society and nature.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction –Need and Basic Guidelines** 1. Understanding the need , basic guidelines, content and process of value Education 2. Self-Exploration – purpose, content and process, 'Natural Acceptance' and Experiential Validation – as the mechanism for self-explanation.	6

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II	**Process for Value Education** 1. Continuous Happiness and Prosperity – A look at basic Human Aspirations. 2. Right Understanding, Relationship and Physical Facilities – basic requirements for fulfillment of aspirations of every human being with their correct priority 3. Understanding Happiness and prosperity – A critical appraisal of the current scenario. 4. Method to fulfill the human aspirations; understanding and living in harmony at various levels	7
III	**Harmony in Human Beings** 1. Understanding human being as a co-existence of the self and the body. 2. Understanding the needs of Self ('I') and 'Body' – Sukh and Suvidha. 3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)	7
IV	**Harmony in Myself and body** 1. Understanding the characteristics and activities of 'I' and harmony in 'I' 2. Understanding the harmony of I with the Body: Sanyam and Swasthya: correct appraisal of Physical needs, meaning of Prosperity in detail.	6
V	**Harmony in Family, Society and Nature** 1. Understanding harmony in the family, society and nature. 2. Understanding values in human relationship; meaning of Nyaya and Program for its fulfillment to ensure Ubhay-tripti. 3. Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.	6

Text Books

1. R R Gaur, RSangal and GP Bagaria, A Foundation Course in value Education, Published by Excel Books (2009).
2. R R Gaur, R Sangal and G P Bagaria, Teacher's Manual (English), 2009.

Reference Books

1. E.F. Schumacher, Small is Beautiful; a study of economics as if people mattered, Blond & Briggs, Bratain, 1973.
2. PL Dhar, RR Gaur, Science and Humanism, common wealth publishers, 1990.
3. A.N. Tripathy, Human values, New Age International Publishers, 2003.

4. E.G. Seebauer& Robert, L BERRY, Foundational of Ethics for Scientists &Engineers, Oxford University Press, 2000.
5. M. Govindrajran, S.Natrajan& V.S. Senthi Kumar, Engineering Ethics (including human Values), Eastern Economy Edition, Prentice hall of India Ltd.
6. B.L. Bajpai, 2004, Indian Ethos and Modern Management, New Royal book Co; Lucknow, 2004, Reprinted 2008.

EE-401: ELECTRICAL MACHINES-II

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Three-phase Induction machine:** Constructional features, Rotating magnetic field, production of torque, phasor diagram, equivalent circuit, performance analysis, torque slip characteristics, no-load and blocked rotor test, load test, effect of rotor resistance, induction Generator. Deep bar and double cage induction motor, starting method of squirrel cage and wound rotor induction motor, various methods of speed control of squirrel cage and wound rotor induction motor.	8
II	**Single phase induction motors:** Introduction, production of rotating fields, principle, double revolving field theory,rotor slip, equivalent circuit, determination of equivalent circuit parameters, starting methods, types of single-phase induction motors, characteristics and applications of single-phase motors.	7

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III	**Synchronous generators**: Introduction, construction of 3-phase synchronous machines, emf equation, armature winding, coil span factor, distribution factor, actual voltage generated, armature leakage reactance, armature reaction, synchronous impedance, equivalent circuit & Phasor diagram, voltage regulation,measurement of synchronous impedance. Two reaction theory,salient pole synchronous machine- two reaction model, torque angle characteristic of salient pole synchronous machine,maximum reactive power for a synchronous generator, determination of Xdand Xq,parallel operation of alternators, synchronizing power and synchronizing torque coefficient,transient conditions of alternators.	**8**
IV	**Synchronous motors:** Introduction, construction, principle of operation, main features,equivalent circuit and phasor diagram of a cylindrical rotor synchronous motor, different orquesin synchronous motor, effect of varying excitation and loadchanges,synchronous motor Vcurves and inverted Vcurves, starting ofsynchronous motors,hunting,synchronous condenser,applications of synchronous motors.	**7**

Recommended Books:

1. "Electrical Machinery"by P.S.Bimbhra,Khanna Publishers,Delhi.
2. "Generalized theory of electrical machines"byP.S. Bimbhra,Khanna Publishers,Delhi.
3. "Electric Machinery"byFitzgerald&Kingsley,MGH.

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EE-402: ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Measuring System fundamentals**: Classification of Instruments (Absolute &Secondary Instruments; Indicating, Recording &Integrating instruments; Based upon Principle of operation),three forces in Electromechanical Indicating Instrument (Deflecting,controlling &damping forces),Comparison between gravity &spring controls, Comparison of damping methods &their suitability. **Units Standards & Errors**: S.Iunits, Absolute standards (International, Primary. Secondary &Working Standards), True Value, Errors (Gross, Systematic, Random) ;Static Characteristic of Instruments (Accuracy, Precision, Sensitivity, Resolution &threshold). **Transducers:** Classification of transducers (Active, Passive, Primary & secondary), Basic construction and principle of LVDT ,Strain gauge and Thermocouple transducers.	8
II	**Measuring instruments**: Construction, operating principle, Torque equation, Shape of scale, use as Ammeter or As Voltmeter (Extension of Range), Use on AC/DC or both, Advantages & disadvantages, Errors (Both on AC/DC) of PMMC types, Electrodynamics Type, Moving iron type (attraction, repulsion & combined types), Hotwire type,Induction type & Electrostatic type Instruments. **Wattmeter & Energy Meters**: Construction, operating principle, Torque equation, Shape of scale, Errors, Advantages &Disadvantages of Electrodynamics &Induction type Wattmeter &single phase induction type Energy meter, Compensation & Creep in energy meter.	8
III	**Power Factor & Frequency Meters**: Construction, operation, principle, Torque equation, advantages & disadvantages of Single-phase power factor meters (Electrodynamics &Moving Iron types) & Frequency meters (Electrical Resonance ,Ferro dynamic & Electro dynamic types). **Resistance Measurement** Low &High Resistance Measurements: Limitations of Wheatstone bridge; Kelvin's double bridge method, Difficulties in high resistance measurements, Measurement of high resistance by direct deflection, loss of charge method, Megohm bridge & Meggar.	8
IV	**A.C. Bridges:** General balance equation, Circuit diagram, Phasor diagram,	8

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	advantages, disadvantages, applications of Maxwell's inductance, inductance-capacitance, Hays, Anderson, Owens, De-Sauty's,Schering & Weinsbridges, Shielding & earthing.	

Recommended books

1. A Course in Elect.& Electronic Measurement & Instrumentation byA.KSawhney;KhannaPub.
2. Electronic & Elect. Measurement & Instrumentation by J.B.Gupta;Kataria&Sons.
3. Electrical Measurements by E.W.Golding
4. Electronic Measurement and Measuring technique by W.D. Cooper&A.D.Helfrick.
5. Measuring Systems by E.O. Doeblin;TMHPublishers.

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EE-403: TRANSMISSION &DISTRIBUTION OF ELECTRICAL POWER

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction:** Structure of a power system, indoor and outdoor substations, equipment for substation layout, auxiliary supply. **Distribution Systems:** Radial, ring mains and network distribution system, comparison of various types of Supply systems (overhead).	8
II	**Transmission Lines Parameters:** Introduction: inductance of a conductor due to internal flux and external flux, inductance of a single phase two-wire line,inductance of three phase line,capacitance of three phase line,charging current due to capacitance,skin effect,Ferranti effect, proximity effect. **Performance of Lines:** Models of short, medium and long transmission lines, performance of transmission lines, capacityof synchronous condenser,tunedlines, voltage control.	8
III	**Corona:** Corona phenomenon, formation, Calculation of potential gradient, corona loss, factor effecting corona, method of reducing corona. **Insulators:** Types of insulator and application, voltage distribution over insulator string, Method of equalizing the potential gradient, String efficiency,insulator failures,testing of the insulators.	8
IV	**Mechanical Design:** Sag and stress calculations, effect of ice and wind, string chart, line supports, conductor material, dampers. **Cables:** Types of cables, construction of cables, grading of cables, capacitance, ratings, power factor in cables, thermal characteristics and applications.	8

Recommended Books:

1. Power System Engg:byI.J.Nagrathand D.P Kothari (TMH)
2. A CourseinElectrical Power by Gupta, Soni&Bhatnagar(DhanpatRai&Sons).
3. Power system by AqshafHussain, DhanpatRai, Delhi

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4. Elements of power system analysis by W.D.Stevenson(MGH)
5. Electric Power by S.L.UppaI(KhannaPub.)
6. Electrical power by J.B.Gupta(S.K.Kataria&Sons).
7. Power System Engineering by B.R. Gupta.
8. Electric Power System by B.M.Weedy,JohnWiley &Sons.
9. Transmission &Distribution o fElectricalEngineering by H.Cotton.

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EE-404: COMMUNICATION ENGINEERING

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Frequency Bands And Signals:** Various frequency bands used for communication and their special features, Need for wireless communication,Types of communication based on modulation systems,types of various signals. **Modulation Techniques:** Introduction to AM, FM, PM, PCM, PPM, DSBSC, SSB,, vestigial side band system. Comparison between analogand digital modulation, frequency division multiplexing and time division multiplexing.	8
II	**Amplitude Modulation:** Representations of AM, Frequency spectrum of AM Waves, need and descriptions of SSB, suppression of carrier. **AM Transmitters:** generation of AM, Low Level and High-level modulation, Comparison of levels, AM transmitter block diagram, collector class C modulator, and Base modulator, DSBS/C Modulator. **AM Receiver:** Tuned radio frequency (TRF)receiver, Super heterodyne receiver, RF section and characteristics, mixers, frequency changing and tracking, IF rejection and IF amplifiers, detection and automatic gain control(AGC),AM receiver characteristics.	9
III	**Frequency Modulation:** Mathematical representation of FM, Frequency spectrum of the FM waves, wideband and narrow band FM. **FM Transmitters:** Basic requirements and generation of FM, FM Modulation methods: Direct methods, varacter diode methods, FET reactance modulator, Transistor reactance modulation, Pre-emphasis,direct FM modulator, AFM in reactance modulation, RC Phase Shift modulation, Armstrong FM systems. **FM Receiver:** Limiters, single and double tuned demodulator, balanced slope detector, fosterseely of phase discriminator, de-emphasis, ratiodetector, blockof FM receiver, RFamplifiers, FMreceiver characteristics.	8
IV	**Digital Modulation:** Broad overview of PCM,DM, and ADM.Review of sampling, flattop sampling, quantization, Analogto digital conversion,overview of performance of anlong modulations chemein presence of noise. Digital modulation techniques (ASK,FSK, BPSK,QPSK,M-ary PSK). An introduction to satellite Communication.	9

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Recommended Books:

1. Electroniccommunications systems by Kennedy/TMH
2. Communications systems by Taub&Schilling/TMH
3. Communication systems by Simon Haykins/John Wiley & sons
4. Communication systems by Bruce Carlson
5. Communication systems by Singh &Sapre/TMH

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HS 410: LAW FOR ENGINEERS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs

COURSE OBJECTIVE:

- To familiarize students (Prospective engineers) with elementary knowledge of laws that would be of utility in their profession.
- To familiarize students with the constitution of India and laws in new areas viz. IPR, ADR, Human Rights, Right to Information, Corporate law, Law relating Elections and Gender Studies.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Constitutional Law:** Nature of Indian Constitution (features), fundamental rights, duties and directive Principles of State Policy (DPSP's), forms of Governments, structure of Government of India, role and responsibility of executive, legislature/parliament and judiciary, nature of Indian federal system, center state and relations. Basic structure of the Indian constitution, basic features of the Indian, constitutional amendments - GolakNath, KeshwanandaBharti, Maneka Gandhi (1978) and S.R. Bommai case (1994), (floor test).	6
II	**Law of contract:** General principles of Indian Contract Act, 1862, kinds of Government contracts and dispute settlement, standard and printed form of contract, essential elements of valid contract proposal, acceptance communication and revocation thereof, relevance of time in contractual obligation. Main objectives of Arbitrates and Conciliation Act-1996, tort and law of tort, general principles of tort law, classifications of torts: property vs. person.	6
III	**Administrative Law:** Evolution, nature and its scope, conceptual objection against growth of administrative rule of law and separation of power, clarification of administrative actions, judicial review of administrative actions, exclusion of judicial review and concept of "Ombudsman";Right to Information Act, 2005 (Sub Section 1 - 20) **Environmental Law:** Definition, meaning and its nature, environmental (Protection) Act-1986, Water (Preservation and Control of Pollution) Act-1974,	6

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	Air (Prevention and Control of Pollution) Act-1981; Environmental pollution, overall remedies and procedures.	
IV	**Human Rights:** Legality of human rights, universal declaration of human rights, 1948, difference between civil and political rights, individual and human rights - human rights of child, weaker section of society, prisoners, and refugees, International Human Rights Commission.	**6**

Text Books:

1. D.D. Basu, ***Shorter Constitution of India***, Prentice Hall of India, (1996)
2. MeenaRao, ***Fundamental concepts in Law of Contract***, 3rd Edn. Professional Offset, (2006)
3. H.O.Agarwal,***International Law and Human Rights***, Central Law Publications, (2008)

Reference Books:

1. H.M. Seervai, ***Constitutional Law of India***, Tripathi Publications, (1993).
2. S.K. Kapur, ***Human Rights under International Law and Indian Law,***Central Law Agency, (2001)
3. NeelimaChandiramani, ***The Law of Contract: An Outline***, 2nd Edn. Avinash Publications Mum, (2000)
4. Avtarsingh, ***Law of Contract***, Eastern Book Co., (2002).
5. Anson W.R.(1979), ***Law of Contract***, Oxford University Press

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HS 411: GERMAN LANGUAGE – II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs
Prerequisite							
HS 302: GERMAN LANGUAGE - I							

COURSE OBJECTIVES:

- To enable the students to speak and understand about most of the activitiesin the day to day life.
- The students will be able to narrate their experiences in Past Tense.
- The students will be able to understand and communicate even with German Nationals.
- By the end of Phase – II the students will have a reasonable level of conversational skills.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**WichtigeSprachhandlungen:**Zimmersuche, Möbel **Grammatik**: VerbenmittrennbarenVorsilbenimPräsens und Perfekt. VerbenmittrennbarenVorsilben und ModalverbenimPräsens.VerbenmituntrennbarenVorsilbenimPerfekt.Unregelmäßigeundg emischteVerbenimPerfekt.	6
II	**WichtigeSprachhandlungen**: Kleidung ,Farben, Materialien. **Grammatik:** formelleImperativsätzemit “Sie” informelleImperativsätzeVorschlägemit “wir” – “sollen/wollenwir” - Sollich? Modalpartikeln “doch”“mal” “doch mal.	6
III	**WichtigeSprachhandlungen:**Sehenswürdigkeite (Prater, BrandenburgerTör,Kolossium, Eifeltürm). **Grammatik:**OrtsangabenmitAkk. UndDativ “alle”,”man” Indefinitepronomen“etwas”,	6

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	“nichts”.	
IV	**WichtigeSprachhandlungen:** Essen und TrinkenimRestaurant,Partyvorbereitung und Feier. **Grammatik:** NomenausAdjektivennach “etwas”und “nichts” NomenausdemInfinitiv von Verben, zusammegesetzteNomen und ihreArtikel. AdjektiveimNom.undAkk.nachunbestimmtenArtikel, Negativartikel und Possessivartikel	**6**

Text Books

1. Studio d A1. Deutsch alsFremdsprache with CD.(KursbuchundSprachtraining).

References

1. German for Dummies
2. Schulz Griesbach

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HS 412: FRENCH LANGUAGE - II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hrs
Prerequisite							
HS 303: FRENCH LANGUAGE - I							

COURSE OBJECTIVES:

- To enable the students communicate effectively with any French speaker
- To enable students to access information on the internet, send e mails, pass level 1 exam conducted by Alliance Française de Madras.
- To enable students to enhance their lexical and technical competence and have a competitive edge in the international market.By the end of Phase – II the students will have a reasonable level of conversational skills.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Grammar and Vocabulary:** The second group verbs: Finir, rougir, grossir,grandir. “Les preposition de temps”: à, en, le, de 7h à 8h, jusqu’ à, vers. Listening and Speaking – the semi- vowels: Voilà, pollutant. Writing - thedays of the week,months, technical subjects, time, “les spécialitésscientifiques et l’ annéeuniversitaire, paragraph writing about time table. Reading: Reading of the text and comprehension – answering questions.	6
II	Grammar and Vocabulary – The adjectives, the nationality, feminine &masculinenoun forms “les métiersscientifiques”. Listening and Speaking – Vowels: soirée, année, près de, très. Writing: Countries name, nationality, “les métiersscientifiques”, numbers from:69 to infitive and some measures of unit.Reading Comprehension: reading a text.	6
III	Grammar and Vocabulary – near future, The demonstrative adjectives, Expressthe aim by using the verb, Listening and Speaking –“La liaison interdite – enhaut”. Writing – some scientific terms, French expressions to accept an invitation.Sentence framing. Reading Comprehension – reading a text.	6

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IV	Grammar and Vocabulary –the verbs: manger, boire, the partitive articles Listening and Speaking – "le 'e' caduc Writing- the food, the ingredients, fruits,vegetables, expression of quantity, paragraph writing about food habits. Reading –reading a text.	**6**

Text Books

1. Tech French

References

1. French for Dummies.
2. French made easy: Goyal publishers.
3. Panorama.

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EE-411: ELECTRICAL MACHINES-II LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

LISTOFEXPERIMENTS:
INDUCTIONMOTORS

1. To perform no load test & block rotor test on three-phases quirrel cage induction motor.
2. To perform no load test & block rotor test on three-phase slip ring induction motor.
3. To study the starting methods of three-phase induction motors.
4. To study the cascading of two induction motors.
5. To conduct the load test to determine the performance characteristics of the induction motor.
6. To study speed changing by pole changing method.

SYNCHRONOUSMACHINES

1. To draw characteristics of alternator under different loading condition.
2. To findout regulation by synchronous impedance method.
3. To findout regulation by ZPF method.
4. To draw characteristics of alternator under different loading condition.
5. Top lot V-Curves of asynchronous motor.
6. To measure steady state reactances (X_d,X_q) of asynchronous machine.

NOTE: At least eight experiments are to be performed in the semester from the above list.

<u>Recommended Books:</u>

1. "Experimentation and vivavoce on electrical machines"byV.N.Mittal&A. Mittal, Standard Publications

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EE-412: ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS LAB

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3 hrs

LIST OFEXPERIMENTS

1. To identify meters from the given lot.
2. To calibrate an energymeter with the help of a standard wattmeter & a stopwatch.
3. Tomeasure power & powerfactor by3-Ammeter method.
4. Tomeasure power & powerfactor by3-Voltmeter method.
5. Tomeasure power & power factor in 3-phase circuit by2-Wattmeter method.
6. To measure capacitance by DeSauty’s bridge.
7. To measure inductance by Maxwell’sbridge.
8. To measure frequency by Wein’s bridge.
9. To measure the power with the help of C.T&P.T.
10. To measure low resistance by Kelvin’s double bridge.

Note: At least eight experiments to be performed from above list

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EE-413:- ELECTRICAL SIMULATION LAB-1

Teaching Scheme			Credits	Marks			Duration End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	3	2	30	20	50	3 hrs

List of Experiments
Software to be used: SimPower Systems (MATLAB Simulink)

1. At least eight computer simulation based electrical models to be studied on SimPower Systems.
2. To verify Kirchhoff's Current and Voltage laws in ac circuit.
3. To verify Superposition and Maximum-Power transfer theorem for a linear electrical system.
4. To study voltage and current relations in a balanced three-phase electrical system for star and delta Load.
5. To simulate no-load and open circuit tests of a two-winding transformer.
6. To simulate speed-torque characteristics of a dc shunt motor
7. To simulate variation of power factor and efficiency of a 3-phase induction motor with load.
8. To simulate ABCD constants of a transmission line.
9. To simulate performance of a long line at various loading conditions.
10. To study the dynamic characteristics of an SCR.
11. To simulate string efficiency of series and parallel connected SCRs.

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SEMESTER-V
EE-501: POWER ELECTRONICS-II

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3hrs

COURSE OBJECTIVE:

After learning the course the students should be able to analyse, operate and design dc-to-ac inverters, ac-to-ac converters. Also simulate power electronic converters and their control scheme.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Inverter:** Single phase and three phase voltage source inverter, its operating principle, working (steady state analysis derivation not required) Forced-commutated thyristor inverters, Voltage control in single-phase inverters. Pulse-width modulated inverters.	12
II	Single phase current source inverter with ideal switch, capacitor commutated CSI with RL load, series inverter, basic series inverter, half bridge series inverter and modified series inverter, single phase parallel inverter, design specification like turn off time, source current, commutating capacitance(derivation not required).	11
III	**Utility application of power electronics:** Distributed general application, introduction of wind electrical system,photo voltaic system, fuel cell system, micro turbine system, energy storage system, thyristor protection scheme.	8
IV	**Power electronics solution:** Uninterruptable power supplies, dynamic voltage restorer, dual feeder,static switches, static circuit breaker, solid state relay.	8

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Text books:

1. ***"Power Electronics: Circuits, Devices& Applications"*** by M.H. Rashid, Prentice Hall of India Ltd,2004.
2. ***"Power Electronics"***by P.S. Bimbhra, Khanna Publishers,2006.
3. ***"Power Electronics"***by M.D. Singhand K.B. Khanchandani, TataMCGrawHillPub,2005.

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EE-502: LINEAR CONTROL SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			**Credit**	**Marks**			**Duration of End Semester Examination**
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	**1**	**0**	**4**	**40**	**60**	**100**	**3hrs**

COURSE OBJECTIVE:

The objective of this course is to emphasize the importance of control and empower the students with basic concepts on modelling, analysis and design of control systems restricted to linear continuous time system. The specific objectives of each unit are to introduce the classical way of modelling systems, commonly used control components and their mathematical models from physical laws. Also to educate on drawing of specification, choosing of control structures and methods of designing the controllers.

UNIT	**CONTENT**	**NO. OF HOURS**
I	**Introduction:** General schematic diagram of control system. Open loop and closed loop control systems, feedback, effects of feedback, linear and non-linear control system. Block diagrams, examples of various control systems. Basic concept of automatic control. **Modelling:** Formulation of differential equations of linear electrical and mechanical system, electrical and mechanical analogies, use of Laplace transform and transfer function, block diagram algebra , signal flow graphs, characteristic equation.	**10**
II	**Time domain analysis:** Standard test signals, transient response of the first order, second order systems, time domain specifications, dominant closed loop poles of higher order systems, steady state error and error coefficients. **Stability:** Concept of absolute and relative stability, pole - zero location, Routh – Hurwitz criterion.	**9**
III	**Frequency domain analysis:** Closed loop frequency response,	**10**

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	correlation between time and frequency response, Bode diagram, polar plots, log magnitude vs. phase plot. **Stability in frequency response:**Nyquist stability criterion, stability analysis relative stability.	
IV	**Compensation design:** Necessity of compensation, compensating network, phase margin, gain margin, lag and lead compensation. **Control system components:** Error detectors – potentiometers and synchronous, stepper motor, servo motor.	**10**

Text book:

1. ***"Linear Control System with MATLAB"***by B.S. Manke,Khannna publishers
2. ***"Control System Engineering"***by I.J.Nagrath&M.Gopal fifth edition, New Age International Publishers

Reference books:

1. ***"Automatic Control System"***byDr. F. Golnaraghi,B.C.Kuo ninth edition ,Willey Publication

2. ***"Control System Components"*** by J.F.Gibsen,F B Tuteur , TATA Mc-Graw Hill publishers (MGH)

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EE-503: ELECTRICAL POWER GENERATION

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

This course will provide understanding of power generation technology using conventional and nonconventional energy sources which will be useful for understanding the operation and working of power plants.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Conventional Methods Of Generation:** HydroStations-Location, Layout, types and selection of prime mover,Thermal stations-Location, Layout, calculation of energy generated,nuclear stations-Principle of nuclear generation, Location, Layout,calculation of energy generated.	10
II	**Load Curves:** Energy Requirements, Maximum demand,Group Diversity Factor, Peak Diversity Factor, Types of load,Variation in Demand, Load Duration Curve Energy Load Curve,Load Factor, Capacity Factor, utilization Factor, Base Load, PeakLoad and Stand By Stations, Stand By Capacity in Power Plants.	9
III	**Optimal System Operation:** Introduction, optimaloperation of generator on a bus bar. Optimal unit commitment.Reliability consideration, optimum generation scheduling, optimumload flow solution, optimum scheduling of hydrothermal system.	10
IV	**Economic Load Dispatch Of Thermal System:**The economic dispatch problem, thermal system dispatchingneglecting network losses and considering network losses.Economic dispatch by gradient search, base point and participationfactor.	10

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Text book:

1. ***"Generation of electrical energy"***by Dr.B.R.Gupta
2. ***"A course in electrical power"***by A.K. Chakrabathi,Soni Gupta Bhatnagar,DhanpatRaiPublishier

Reference book:

1. ***"Elements of electrical power station design"***by M.V. Deshpande

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EE-504: HIGH VOLTAGE ENGINEERING

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

From this course students will understand the basic generation and measurement of high voltage and high current for testing purposes. Also test the high voltage electrical equipment with various testing devices**.**

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Introduction:** Insulation system, types of insulation system. **Discharges in gases:** General characteristics of gaseous insulation, basic processes of ionization in a gas, discharges in uniform and non-uniform fields, Paschen's law, commonly used gases for insulation and their properties. **Breakdown of solids and liquids:** Different mechanisms of breakdown of solids, Intrinsic breakdown, theories of intrinsic breakdown, different theories of breakdown in liquids, commonly used solid and liquid insulating materials and their properties.	9
II	**Lightning phenomenon:** Charge accumulation in clouds – formation and characteristics of lightning stroke, current and voltage magnitudes, protection of transmission lines and substations against lightning, lightning arrestors, switching surges, Insulation co-ordination.	10
III	**Impulse generator:** Definition of impulse wave, single stage and multistage impulse generators and their equivalent circuits, determination of front and tail resistance to produce a given wave shapes.	11

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IV	**Measurement of high voltages:** Measurement of direct, alternating and impulse voltages by electrostatic voltmeters, sphere gap, uniform field gap, ammeter in series with high voltage resistors and voltage divider.	**9**

Text book:

1. ***"High Voltage Engineering"*** by M.S.Naidu&V.Kamaraju, Mc-Graw Hill Education.
2. ***"An introduction to high voltage engineering"*** by Subir Ray, PHI Publisher

Reference books:

1. "***High Voltage Engineering"*** – by C.L.Wadhwa , New Age Publication.
2. "***A course in Electrical power"*** by A. Chakrabarti,M.L.Soni, P.V.Gupta, U.S.Bhatnagar, DhanpatRai Publication.

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EE-505: ELECTROMAGNETIC FIELD THEORY

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3hrs

COURSE OBJECTIVE: To impart knowledge on the concepts and the computation of Electro-magnetic field which is essential for understanding the working principle, design and analysis of Electrical machines and Systems.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Introduction:** Review of vector analysis, scalar and vector product, gradient, divergence and curl of a vector and their physical interpretation, transformation amongst rectangular, cylindrical and spherical co-ordinate system. **Electrostatic Field:** Coulomb's law, electric field intensity from point charges, Electric field due to continuous field distribution of charges, gauss's law, electric displacement and displacement density, potential functions, potential field of a charge, Laplace's and Poisson's equation, capacitance and electrostatic energy.	10
II	**Steady Magnetic Fields:** Faraday Induction law, Ampere's Work law in the differential vector form, Ampere's law for a current element, magnetic field due to volume distribution of current. Ampere's Force Law, vector potential (Alternative derivation), equation of continuity.	10
III	**Time Varying Fields:** Equation of continuity for time varying fields, inconsistency of Ampere's law, Maxwell's field equations and their interpretation; solution for free space conditions, electromagnetic waves in a homogeneous medium, propagation of uniform plane wave, relation between E & H in a uniform plane-	10

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	wave, wave equations for conducting medium, Maxwell's equations using phasor notation, wave propagation in a conducting medium, conductors, dielectrics, wave propagation in good conductor and good dielectric.	
IV	**Reflection And Refraction of EM Waves:** Reflection and refraction of plane at the surface of a perfect conductor & perfect dielectric (both normal incidence as well as oblique incidence), Brewster's angle and total internal reflection, reflection at the surfaces of a conductive medium, surface impedance, transmission-Line analogy, pointing theorem. **Transmission Line Theory:** Transmission line as a distributed circuit, transmission line equation, travelling & standing waves, characteristic impedance, input impedance of terminated line, reflection coefficient, Smith's chart and its applications.	**9**

Text book:

1. ***"Electromagnetic field theory and transmission lines"***: G.S.N. Raju.
2. ***"Electromagnetic field theory***" PV Gupta.

Recommended books:

1. ***"Electro-magnetic Waves and Radiating System"***: Jordan &Balmain, PHI.
2. ***"Engineering Electromagnetic"***: Hayt; TMH.
3..“***Electro-Magnetics".*** Krauss J.DF; McGraw Hill.

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EE-506: FLEXIBLE AC TRANSMISSION SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	**1**	**0**	**4**	**40**	**60**	**100**	**3hrs**

COURSE OBJECTIVE:

To understand the concept of flexible ac transmission and the associated problems.Also to review the static devices for series and shunt control and the operation of controllers for enhancing the transmission capability**.**

UNIT	CONTENT	NO. OF HOURS
I	**Introduction:** The concept of flexible AC transmission, reactive power control in electrical power transmission lines, uncompensated transmission line, series and shunt compensation, Overview of FACTS devices - Static Var Compensator (SVC),Thyristor Switched Series capacitor (TCSC),Unified Power Flow controller (UPFC),Integrated Power, Flow Controller (IPFC).	**10**
II	**Static var compensator (svc) and applications:** Voltage control by SVC, influence of SVC on system voltage. Applications, steady state power transfer, enhancement of power system damping, prevention of voltage instability.	**10**
III	**Thyristor controlled series capacitor (tcsc) and applications:** Operation of the TCSC, Different modes of operation, Applications, Improvement of the system stability limit, enhancement of system damping, voltage collapse prevention. **Emerging facts controllers-**Static Synchronous Compensator (STATCOM), operating principle,V-I characteristics, Unified Power Flow Controller (UPFC), Principle of operation - modes of operation, applications.	**10**
IV	**Co-ordination of facts controllers:** FACTs Controller interactions,	**9**

	SVC–SVC interaction, co-ordination of multiple controllers using linear control techniques, Quantitative treatment of control co-ordination.	

Text book:

1. Mohan Mathur, R., Rajiv. K. Varma, *“**Thyristor: Based Facts Controllers for ElectricalTransmission Systems”,***IEEE press and John Wiley & Sons, Inc.
2. ***“Flexible ac Transmission System: Modelling and Control”*** by Xiao Ping zhang, ChristianRehtanz, Bikash Pal.

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OPEN ELECTIVE-III

EE-507: NON CONVENTIONAL ELECTRICAL POWER GENERATION

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3hrs

COURSE OBJECTIVE:

It introduces solar energy, its radiation, collection, storage and application. It also introduces the wind energy, bio-mass energy, geothermal energy and ocean energy as energy sources.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Introduction To Energy Sources:** energy consumption as a measure of prosperity, future of world energy, energy sources and their availability (commercial and non-commercial energy sources).	7
II	**Wind Energy:** Introduction, Origin of wind, Basic principles of wind energy, site selection consideration, and Basic components of wind energy conversion system, Classification of WEC system, Advantages and Disadvantages of WEC system. **Solar Energy**: Introduction, solar constant, solar radiation, solar energy collector, applications of solar energy.	7
III	**Energy From Biomass:** Introduction, biomass definition, Biomass conversion technologies, Photosynthesis, factors effecting the Bio-digestion or generation of gas.	5
IV	**Geo-Thermal Energy:** Introduction, Geothermal sources development of geothermal power in India. Advantages and disadvantages of geothermal energy over other energy form.	7

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Text book:
1. ***Non-Conventional Energy Resources*** by G.D Rai.

Reference books:
1. ***An Introduction To Power Plant Technology*** by G.D.Rai.
2. ***Renewable Energy Sources*** by MaheshwarDyal.

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OPEN ELECTIVE-III

EE-508: ENERGY ASSESSMENT AND AUDIT

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3hrs

COURSE OBJECTIVE: This subject will give the student overall idea about energyscenario, supply and demand side verification, methodology for their improvement in current scenarios and energy auditing practice.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Introduction:** Review of different Energy Sources, Need and objectives of Energy Conservation, Significance of Energy Assessment, Supply and Demand Side Management.	6
II	**Energy Audit:** Need for Energy Audit**,** Types of Energy Audits, National Energy Plan and its impact on Energy Conservation, Energy audit team, Energy Audit Reporting format, Energy Audit Instruments.	7
III	**Energy Efficient Technologies:** Life cycle assessment, Energy efficient Motors, BIS Specifications for Energy Efficient Motors, Energy Efficient lighting sources.	6
IV	**Energy Audits Practice:** Energy Audits of building systems, electrical systems, maintenance and Energy Audits.	5

Text Book:

1. ***Handbook of Energy Audits*** by Albert Thuman – Fairman Press Inc.
2. ***Energy basis for man and nature*** by Howard T.Odum&ElisbethC.Odum.
3. ***Energy Management*** by UmeshRathore, Kataria Publications

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OPEN ELECTIVE-III

EE-509: ROBOTICS

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3hrs

COURSE OBJECTIVE:

After learning this course, the students should be able to:

4. Learn the mathematics of rigid motions, rotations, translations, velocity kinematics.
5. Evaluate the various parts of mechanical and electronic system of robots.
6. familiar with computer vision, visual servo control problems and applications in the industry.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Basic Concepts:** Definition and origin of robotics, different types of robotics, various generations of robots, degrees of freedom, Asimov‘s laws of robotics, dynamic stabilization of robots.	5
II	**Power Sources:** Hydraulic, pneumatic and electric drives, determination of HP of motor and gearing ratio, variable speed arrangements, path determination, micro machines in robotics.	**7**
III	**Manipulators, Actuators And Grippers Construction Of Manipulators:** manipulator dynamics and force control, electronic and pneumatic manipulator control circuits, end effectors, various types of grippers, design considerations.	**7**
IV	**Sensors And Intelligent Robots:** Introduction to robotic sensors, vision systems, Range detectors, assembly aid devices, force and torque sensors, machine vision, ranging, laser, acoustic, magnetic fiber optic and tactile sensors.	**7**

Text books:

1. ***Robot Modeling and Control*** by Spong, M.W., Hutchinson, H., &Vidyasagar, M., John Wiley (Wiley India Ed.), 2006, ISBN-13: 978-0471649908.

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2. ***Robotics Engineering – An integrated approach*** by R.D. Klafter, T.A. Chimielewski, Negin M., Prentice Hall of India, 1994, ISBN-13: 978-0134687520.
3. ***Introduction to Robotics*** by SAHA, Tata McGraw-Hill Education, 2008, ISBN 9781259083204.
4. ***Control in Robotics and Automation Sensor Based Integration (Engineering)*** by B. Ghosh, T. J. Tarn, Ning Xi, Academic Press, ISBN: 978-0122818455.

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EE-511: POWER ELECTRONICS-II LAB

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 7-8 experiments must be performed by a student during the semester.

LIST OF THE EXPERIMENTS TO BE PERFORMED:

1. To study triggering circuits for thyristor: Resistor triggering circuit; R-C triggering circuit.
2. To Study of 1- pulse and 2- pulse converter with R and R L load.
3. To Study of three phase full converter with R and R-L load.
4. To study SCR Half Wave and Full Wave Bridge Controlled Rectifier Output characteristics.
5. To study three Phase Full-Wave Uncontrolled Rectifier Operation with R and R-L Load and observe its input/output Characteristics.
6. To study Single Phase Cycloconverter output characteristics.
7. Series operation of SCR's.
8. Parallel operation of SCR's.
9. Lamp-Dimmer Using diac&triac with Lamp Load.
10. Speed Control of DC motor using SCR's

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EE-512: LINEAR CONTROL SYSTEM LAB

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 6-7 experiments must be performed by a student during the semester.

LIST OF THE EXPERIMENTS TO BE PERFORMED:

1. To plot speed torque characteristics of a 2 phase AC servomotor.
2. To plot speed torque characteristics of a 2 phase DC servomotor.
3. To study the close loop control of a three phase AC motor
4. To study the step response of a second order system for different damping factors.
5. To study the magnetic amplifier.
6. To study the microcontroller based stepper motor controller circuit.
7. To study various lag-lead compensation network.
8. To study the synchro transmitter rotor position versus stator voltage for three phase.

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EE-513: ELECTRICAL SIMULATION LAB-II

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 6-7 experiments must be performed by a student during the semester.

List of the experiments to be performed:

1. Study of matlab code for calculation of efficiency and voltage regulation of transformer.
2. Study of matlab code for calculation of efficiency and voltage regulation of dc motor.
3. Study of matlab code for calculation of efficiency and voltage regulation of poly phase induction motor.
4. Study of matlab code for calculation of efficiency voltage regulation of single phase induction motor.
5. Study of matlab code for calculation of efficiency voltage regulation of synchronous generator.
6. Plot 1storder and 2nd order open loop and closed loop system by matlab Simulink.
7. Find time domain analysis of 1st and 2nd order system and represent their parameters on graph itself.
8. Matrix operations like multiplication, inverse, transpose, conjugate, determinant, Eigen values.
9. Matrix to system gain and vice versa conversion by programming.
    A. Stability checking methods: Root locus technique method
    B. Polar plot
    C. Bode Plot
    D. Nyquist criteria
10. Compensation by lag, lead, compensator by both Simulink and programming method.
11. Cascade speed control of dc motor drive.

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SEMESTER-VI
EE-601: SWITCHGEAR AND PROTECTION

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

This subject gives descriptive and analytical idea about relays and different types of protection schemes of power system network.

COURSE CONTENT:

UNIT	CONTENT	NO.OF HRS
I	**Protective relays:** Introduction, Operating Principle of relay, Classification of relay, electromagnetic attraction relays. Electromagnetic induction relays, over current relays, Induction type directional power relay, Induction type directional over current relay, Universal relay torque equation, distance protection, Differential relay.	9
II	**Feeder protection:** Introduction, Over current protection and earth fault protection, time graded protection, current graded protection, differential Pilot wire protection, merz price voltage balance system, pilot protection, Bus Bar protection. **Transformer Protection:** Introduction, types of faults on transformer, bucholtz protection, Differential protection for power transformer, biased differential protection, Restricted earth fault protection, motor protection.	10
III	**Generator protection:** Introduction, generator faults, stator protection, rotor protection, motor protection. **Static Relays:** Basic concepts, Input Output devices, amplitude and Phase comparator,Over current relays, directional static over current relay, static differential relay.	10
IV	**Theory of arc interruption:** Arc Phenomenon, arc interruption, arc interruption theories. **Circuit Breakers:** Air break circuit breaker, oil circuit breaker, Air blast circuit breaker, Vacuum circuit breaker, SF6 circuit breaker Testing and	10

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	maintenance of circuit breakers. **Fuses**: Types, characteristics and construction of HRC fuses.	

Text book:

1. A course in Electrical Power by J.B Gupta: S K Kataria& Sons Publishing Company
2. A course in Electrical Power by A. Chakrabarti,M.L.Soni, P.V.Gupta,U.S.Bhatnagar, DhanpatRai Publishing Company (P) Limted.

Reference book:

1. Principle of power system by V.K Mehta
2. Power System Protection and Switchgear by B. RavinderNath&M.Chander, Wiley Eastern

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EE-602: MICROPROCESSORS & APPLICATIONS

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- To study the Architecture of 8085, 8086 & 8051.
- To introduce commonly used peripheral/ interfacing ICs.
- To study the addressing modes & instruction set of 8085 & 8051 and to develop skills in simple program writing.
- To study and understand typical applications of micro-processors and micro-controllers.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HRS
I	**Introduction:** Introduction, Evolution of microprocessor, 8085 microprocessor architecture and its functional blocks, 8085 pin diagram, address, data and control buses,8085features. **Addressing Modes:** Direct addressing, indirect addressing, indexed, register direct, register Indirect, implicit addressing mode, Timing diagrams, typical instruction set of 8085 microprocessor.	10
II	**Programming:** Development of Assembly language program. Interrupts: hardware &software & data transfer: Interrupt system of 8085 Types of memory and memory interfacing Decoding techniques – absolute and partial.	8
III	**Mapping Techniques:** I / O mapped I /O and memory mapped I / O, Serial I/O lines of 8085 and the implementation asynchronous serial data communication using SOD and SID. **Peripheral Devices & Applications Of Microprocessor:** Description of 8251, 8255, 8253, 8257, 8259, 8279.Cycle stealing and burst mode of DMA controller. Synchronous and asynchronous data transfer 8251.	8

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IV	**8086 Microprocessor:** Main features, Architecture-the execution unit and bus interface unit, Memory segmentation, Memory addressing, 8086 hardware pin signals, 8086 minimum and maximum modes of operation.	**5**

Text book:

1. ***Microprocessor & Architecture, programming and application*** by Gaonkar.
2. ***"Microprocessors and Digital Systems"***, D.V.HALL, McGraw Hill
3. ***"Microprocessor and Microcontrollers"***, Senthil, Saravanam (Oxford University Press)

Reference books:

1 "***An introduction to microprocessor",***A.P.Mathur.
2 "***The 8086 Microprocessor –Kenneth",*** J Ayala
3. "***Fundamentals of microprocessor & microcomputers",*** – B.Ram

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EE-603: POWER SYSTEM ANALYSIS

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3hrs

COURSE OBJECTIVE:

This subject is useful to get an comprehensive idea about economic aspect of power generation, its reliability, frequency and voltage stability and design of controller.

COURSE CONTENT:

Unit	Content	No. Of hours
I	**Power System Components:** Introduction, single phase solution of balanced three phase networks, single line diagram, per unit system, complex power, synchronous machine, representation of loads.	10
II	**Load Flow Studies:** Network model formulation, Formation of Y-Bus by singular transformation, load flow problem, gauss-siedel method, Newton-Raphson method, decoupled load flow method**.**	10
III	**Fault Analysis:** symmetrical component phase shift in star delta transformer, sequence impedance of transmission lines, sequence impedance of power system, symmetrical component analysis of unsymmetrical component. L-G fault, L-L fault, L-L-G fault, L-L-L fault.	10
IV	**Stability:** Dynamics of synchronous machine, power angle equation, nodal elimination technique, steady state stability, transient stability, equal area criteria, numerical solution of swing equation, factors affecting transient stability.	10

Text Books:

1. ***Power System Engineering*** by D. P. Kothari and I. J. Nagrath , TMH publication.
2. ***Power system Analysis*** J.J. Grainger, W.D. Stevenson jr, Mc-Graw Hill Education Publisher Company.
3. ***Electrical Power System*** by B.M. Weedy, B.J.Coryu, N.Jenkins , John Willey & sons Publisher Company.
4. ***Electrical Power System*** by C.L.Wadhwa.
5. ***Power System Analysis Design*** by B. R. Gupta S. Chand and Company.

EE-604: ELECTRICAL DRIVES

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3hrs

COURSE OBJECTIVE:

This subject is all about steady state transient state dynamics of motor load system and also study of different types of motor drive application.

COURSE CONTENT:

UNIT	CONTENTS	NO. OF HRS
I	**Introduction To An Electric Drive System:** Dynamic equations of an electric drive, torque equations, multi-quadrant operation, type of loads, energy loss during transients and load equalization.	10
II	**Control Of Electric Drives:** Speed control, closed loop position and speed control. Selection of motor rating thermal model of motor, classes of duty and determination of motor rating for different classes duty.	10
III	**Dc Motor Drives:** Starting, braking, speed control, controlled rectifier converters for DC drives and chopper fed DC drives.	10
IV	**Induction Motor Drives:** Starting, braking, speed control, ac controller fed induction motor, voltage source inverter. Current source inverter and cylco-converter fed induction motor drive.	10

TEXT BOOK:

1. ***"Electrical Drives",*** G.K. Dubey, Narosa Publishing House.

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EE-605: DIGITAL SIGNAL PROCESSING

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3hrs

COURSE OBJECTIVE:

After study of this subject student should be comfortable with design of filter and their design consideration by different techniques.

COURSE CONTENTS:

UNITS	CONTENTS	NO. OF HRS
I	**Continuous and Discrete Time Signal Analysis:** Basic elements of a digital signal processing system advances of digital over analog signal processing Signal analysis, signal characteristics, some elementary analog and discrete time signals, simple manipulations of discrete time system signals, properties of linear time, invariant digital systems and interconnection of LTI systems, sampling of analog signals and sampling rate conversion. Z-transform. Properties of Z-transform, inverse Z-transform, analysis of continuous and discrete time systems, properties of convolution, correlation of discrete time signals.	14
II	**Frequency domain analysis of continuous and discrete Time signals:** Fourier series for periodic signals, Fourier transform, discrete Fourier series, Discrete Fourier transform (DFT) and inverse Discrete time Fourier Transform properties, circular convolution, Fast Fourier Transform (FFT), Decimation-in-Time (DIT) algorithm, decimation in-frequency algorithm FFT, Radix-2 DIT and DIF implementation, applications of FFT algorithms.	10
III	**Filter Structures:** FIR filter structures and IIR filter structures, frequency sampling structure for FIR filter, direct form I and II, cascade structure, parallel structure, lattice structure.	6

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IV	**Digital Filters:** FIR Filters, design of linear phase filters, linear phase properties, design using window method, frequency sampling design, IIR filters, Pole-zero representation, Chebyshev and Butterworth filter,IIR filter design using approximation of derivative method,Impulse invariance method, Bilinear transform method, Matched z-transform method, Frequency transformations.	**10**

Text books:

1. John G. Proakis, Dimitris G. Manolakis, ***"Digital Signal Processing: Principles, Algorithms and Applications,"***Prentice Hall of India Pvt. Ltd., 2008.
2."***Digital Signal Processing",*** S.SalivahananAVallavaraj C Gnanapriya.
3.***Digital Signal Processing",***Shaila D. Apte- 2nd Edition Wiley India edition.

Recommended books:

1. Emmanual C. ifeachor, ***"Digital Signal Processing a practical approach".***Prentice Hall India.
2. Boaz Porat, "***A Course in Digital Signal Processing,"*** Prentice Hall Inc, 1998.
3. Oppenheim A. V., Schafer R. W., "***Discrete-Time Signal Processing,"*** Prentice Hall India, 1996.
4. Chi-Tsong Chen, "***Digital Signal Processing: Spectral Computation and Filter Design***," Oxford University Press, 2001

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EE-606: ELECTRICAL ENERGY UTILIZATION

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- To analyze the various types of traction system and their application.
- To introduce the energy saving concept by different ways of illumination.
- To understand the refrigerator and air conditioning system and its electrical energy conversion process.

COURSE CONTENTS:

UNITS	CONTENTS	NO. OF HRS
I	**Electric Traction:** Introduction, requirement, different systems traction, comparison of dc and ac systems of railways electrification, power supply, ac locomotive.	9
II	**Electric Heating:** Methods of electric heating**,** Constructional details and performance of resistance heating furnaces, direct and indirect induction and arc furnaces, estimation of power and energy requirement, power supply problems.	10
III	**Electrical Welding:** welding and its classification, resistance arc and atomic hydrogen welding, inert gas metal arc welding , carbon arc welding , electric supply for arc welding , ultrasonic welding, laser welding , different types of control equipment used for controlling temperature and pressure in arc and resistance welding , welding transformer.	10
IV	**Refrigeration And Air Conditioning:** Applications of refrigeration, Systems of refrigeration, vapor compression cycle, absorption and thermos electric refrigeration, unit of refrigeration, types of refrigerant, domestic refrigerator, water cooler, air conditioning.	10

Text Books

1. ***"Art and Science of Utilization of Electrical Energy"*** by H.Partab.
2. ***"Utilization of Electrical Energy"*** by Openshaw Taylor.

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Reference Book

1. "***Utilization of Electrical Energy"*** by R.K Rajput.

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PROGRAMME ELECTIVE-I
EE-607: ADVANCED CONTROL SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

- To gain knowledge in design of state variable systems, analysis of non-linear systems and introduction of optimal control.
- To study the state variable design.
- To provide adequate knowledge in the phase plane analysis.
- To study describing function analysis.
- To analyze the stability of the systems using different techniques.
- To introduce the concepts on design of optimal controller.

COURSE CONTENT:

UNITS	CONTENTS	NO. OF HRS
I	**State Variable Analysis:** Introduction, concept of state, state variable and state model, state space representation of systems, block diagram for state equation, Transfer function decomposition, direct, parallel and cascade decomposition, solution of state equations, concept of controllability and observability.	10
II	**Sampled Data Control Systems:** Introduction, digital control systems, quantization concept, data acquisition, conversion and distribution system, z-transform, important properties, inverse z transform, difference equation and solution using z-transform.	9
III	**Analysis of Discrete Time Systems:** Impulse sampling and data hold, reconstruction of original signals from the sampled version, pulse transfer function for open loop and closed loop systems, mapping between z-plane and s-plane, stability analysis using Jury’s test, bilinear transformation, state space representation of discrete time systems and solution of discrete time state equations.	10

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IV	**Non Linear Systems:** Introduction, different non-linearity's, phase plane method, singular points, stability of nonlinear systems, phase plane method, concepts of describing function method, stability analysis using describing function method, jump resonance phenomena, Liapunov and Popov stability criterion.	**10**

Text books:

1. "***Linear control system"*** by Prof. B.S. Manke
2. "***Control System Engineering"*** by Nagrath and Gopal, "New Age International".

Recommended books:

1. "***Discrete time Control Systems"*** by K. Ogata, "Prentice Hall International".

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PROGRAMME ELECTIVE-I
EE-608: ILLUMINATION ENGINEERING

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

This subject is about illumination principle, classification and designof different types of lightening system applications.

COURSE CONTENTS:

UNITS	CONTENTS	NO. OF HRS
I	**Introduction:** Laws of illumination - Inverse Square law and Lambert's Cosine law, their application in lighting calculations by point-by-point method. **General principles of illumination**: Definitions, units of light, definitions of flux, solid angles, luminous intensity and brightness, glare, polar curves.	9
II	**Electric light sources:** Brief description of characteristics of starting and application of incandescent lamp, sodium vapour lamp, mercury vapour lamp, fluorescent lamp, neon lamp, compact fluorescent lamp, led lamp. **General illumination design (lumen method):** Selection of equipment, equipment efficiency, room index and utilization factor, maintenance factor, computation for lamp size, core lighting design, optical design methods, Louver design.	10
III	Elementary idea of the special features required and minimum level of illumination required for (i) Domestic. (ii) Commercial (iii) Educational. (iv) Health (v) Industrial buildings. Architectural lighting concepts in above buildings.	10
IV	Design of lighting system for a stadium, theatre hall, indoor play hall, External and internal lighting of historical building, hospital lighting, air-port lighting, tunnel lighting, underwater lighting.	10

Text books:

1. "***Electric Illumination"*** by John O.Kraehenbueshl, John Wiley & Sons.
2. "***Lamps and lighting"*** by H.Howitt&A.S.Vause.
3. "***Load lighting"*** by Ir. W.J.M. Van Bommel

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EE 609: NEURAL NETWORKS AND FUZZY LOGIC

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

This course introduces the basics of neural network and its types and also about fuzzy set and fuzzy logic system component and its effectiveness in real world application.

COURSE CONTENT:

UNIT	CONTENT	NO. OF Hrs.
I	**ANN Model And Architecture:** Biological foundations, ANN models, types of activation function, introduction to network architecture, multilayer feed forward network (MLFFN), radial basis function network (RBFN), recurring neural network.	**10**
II	**Learning Processes:** Supervised and unsupervised learning, error-correction learning, Hebbian learning, Boltzmann learning, single layer and multilayer perception model, least mean square algorithm, back propagation algorithm, Application in forecasting and pattern recognition and other power engineering problems.	**10**
III	**Fuzzy Setss And Theory:** Fuzzy sets, fuzzy set operations, properties, membership functions, fuzzy to crisp conversion, measures of fuzziness, fuzzification and defuzzification methods.	**8**
IV	**Hybrid Intlligent System:** Genetic algorithm, neuro fuzzy system, adaptive neuro-fuzzy inference system, evolution of neural network, fuzzy evolutionary system.	**9**

Text Books :

1. M. T. Hagon, Howard B. Demuth and Mark Beale, ***" Neural Network Design, PWS Publishing Company"*** 1995.
2. Jacek M Zurada, "***Introduction to Artificial Neural Systems***", Jaico Publishing House, Bombay, 1994

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3. Wasserman, "***Neural Computing: Theory and Practice,*** Van Nastrand Reinhold, 1989".
4. Freeman, J. A. and D. M. "***Neural Networks _-Algorithms, application and programming techniques,*** Addison Weley, 1991".

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EE-611: SWITCHGEAR & PROTECTION LAB

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 6-7 experiments must be performed by a student during the semester.

LIST OF EXPERIMENTS:

1. To plot time-current characteristics of an IDMT relay.
2. To plot time current characteristics of Electromagnetic type over-current relay.
3. Study of the performance and operation of a three phase over-current andearth fault static relay.
4. Symmetrical fault level analysis on a d.c.network analyzer.
5. Unsymmetrical fault level analysis on a d.c. network for various type of faults.
6. To study transformer differential protection.
7. To study the magnetization characteristics of C.T
8. To study the problems associated with C.T. magnetization.
9. Performance and study of Merz-Price protection.

Note: At least six experiments to be done from above list.

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EE-612: MICROPROCESSORS & APPLICATIONS LAB

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 6-7 experiments must be performed by a student during the semester.

LIST OF EXPERIMENTS:

8085 Based

7. Addition and subtraction of two 8-bit numbers with programs based on different addressing modes of 8085A.

8. Addition and subtraction of two 16-bit numbers. (Using 2's complement method, also programs which access numbers from specified memory locations.).
9. Multiplication of two 8-bit numbers using the method of successive addition and Shift & add.
10. Division of two 8-bit numbers using the method of successive subtraction and shift & subtract.
11. Block transfer and block exchange of data bytes.
12. Finding the smallest and largest element in a block of data.
13. Generation of Fibonacci Series.

Application Based (Max 2)

6. Program controlled data transfer using 8255 PPI.
7. To INPUT data bytes from peripheral port and to store them in memory.
8. To OUTPUT data bytes from memory to peripheral port.
9. To Study of interrupts by enabling them in main line program and then executing different subroutines when TRAP, RST 7.5, RST 6.5 & RST 5.5 are activated.

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EE 613: SEMINAR

Evaluation Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Evaluation
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Evaluation/ Viva**	**Total**	
0	0	2	1	50	50	100	-

OBJECTIVE:

To measure as well as flourish the ability of the student to study a topic, in Electrical Engineering, of current relevance, from technical literature and present a seminar on that topic.

PROCEDURE:

Individual students should be asked to choose a topic in any field of Electrical Engineering, preferably from outside the B.Tech syllabus and give a seminar on that topic for about thirty minutes. It enables the students to gain knowledge in any of the technically relevant current topics and acquire the confidence in presenting the topic. The student will undertake a detailed study on the chosen topic under the supervision of a faculty member, by referring papers published in reputed journals and conferences. Each student has to submit a seminar report (in two copies), based on these papers; the report must not be reproduction of any original paper. A committee consisting of three/four faculty members (preferably specialized in various sub-fields of Electrical Engineering) will evaluate the seminar. One of the two copies submitted by the student should be returned to him/her after duly certifying it by the staff in charge of the seminar and Head of the department and the other copy shall be kept in the departmental library.

Internal Continuous Assessment
As per ordinance

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SEMESTER-VII
EE-701: ENERGY MANAGEMENT

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

This subject will give the student overall idea about energy scenario, security reliability,optimization method cost effective methods.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs
I	**Energy Scenario:** Energy needs of growing economy, Long term energy scenario, Energy pricing, Energy sector reforms, Energy and environment, Air pollution, Climate change, Energy security, Energy conservation and its importance, Energy strategy for the future.	8
II	**Energy Management:** Definition, Energy audit- need, types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies,optimizing the input energy requirements, Fuel and energy substitution.	10
III	**Financial Management :**Investment-need, Appraisal and criteria, Financial analysis techniques, Simple payback period, Return on investment, Net present value, Internal rate of return, Cash flows, Risk and sensitivity analysis, Financing options, Energy performance contracts and role of ESCOs.	9
IV	**Electrical System:** Electricity tariff, Load management and maximum demand control, Power factor improvement, Distribution and transformer losses. Losses in induction motors, Motor efficiency, Factors affecting motor performance, Rewinding and motor replacement.	9

Text books:

1) ***"Handbook on Energy Audit and Environment Management"*** by Abbi, Y.P. and Jain, S.Teri Press, 2006.
2) ***"Energy Conservation"*** by P.Diwan and P. Dwivedi, Pentagon Press, 2008.
3) ***"Handbook of Energy Audits",*** by A.Thumann, W.J.Younger, T.Niehus, CRC Press,8th Edition, 2008.

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EE-702: ELECTRICAL POWER QUALITY

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

This subject solely belongs to maintain power quality degradation causes and their reduction to a certain permissible limit such that it will benefit the manufacturer and customer of power usage. Hence students learn about basic fundamental techniques of maintaining such quality of power and crate awareness in the society.

COURSE CONTENT:

UNIT	CONTENT	No. of hrs
I	**Power Frequency Disturbance:**Introduction, common power frequency disturbances, cures for low frequency disturbances, voltage tolerance criteria.	10
II	**Power Factor:**Active Power and reactive power, displacement and true power factor, power factor improvement, power factor correction, power factor penalty, other advantages of power factor correction, voltage rise due to capacitance, application, svc.	10
III	**Measuring And Solving Power Quality Problems:**measuring devices and procedure for power quality, number of test locations and duration, instrument set up and guidelines.	9
IV	**Grounding And Bonding:**Shock and fire hazards, essentials of a grounded system, ground electrode, earth resistance test, earth ground grid system, power ground system, signal reference ground and methods, single point and point grounding, ground loops.	10

Text books:

1. ***"Power Quality"*** by C. Shankaran
2. ***"Power Quality in Electrical System"*** by Alexander Kusko McGraw-Hill Companies.
3. ***"Electrical Power System Quality"*** by Roger C. Dugan, Mark F. Mcgranaghan,SuryaSantosoH.WayneBeaty Tata McGraw-Hill Publishing company limited

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EE-703: NON CONVENTIONAL ELECTRICAL POWER GENERATION

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

It introduces solar energy, its radiation, collection, storage and application. It also introduces the wind energy, bio-mass energy, geothermal energy and ocean energy as energy sources.

COURSE CONTENT:

UNIT	CONTENT	NO.OF HRS
I	**Introduction**: energy sources, energy consumption as a measure of prosperity, future of world energy, energy sources and their availability (commercial and non-commercial energy sources).	8
II	**Wind Energy:** Introduction, Origin of wind, Basic principles of wind energy, site selection consideration, and Basic components of wind energy conversion system, Classification of WEC system, Advantages and Disadvantages of WEC system. **Solar Energy:** Introduction, solar constant, solar radiation, solar energy collector, applications of solar energy.	10
III	**Energy From Biomass:** Introduction, biomass definition, Biomass conversion technologies, Photosynthesis, factors effecting the Bio digestion or generation of gas. **Geo-Thermal Energy:** Introduction, Geothermal sources development of geothermal power in India. Advantages and disadvantages of geothermal energy over other energy form.	10
IV	**Energy From The Oceans, Tidal, Wave**: Introduction, Basic principle of tidal power, Wave energy, Ocean Thermal Energy Conversions System. **Small And Mini Hydro Power**: Introduction, site selection, classification of small hydro power stations, advantages and limitations of small scale hydroelectric power system	10

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Text book:

1. ***"Non-Conventional Energy Resources"*** by G.D Rai

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Reference books:

1. ***"An Introduction To Power Plant Technology",*** By G.D.Rai.
2. ***"Renewable Energy Sources",***MaheshwarDyal.

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EE-704: ELECTRICAL MACHINE DESIGN

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
2	2	0	3	40	60	100	3hrs

COURSE OBJECTIVES:

After studying this subject students should be able to understand the intention of special design features of different machine such that they are able to design them.

COURSE CONTENT:

Unit	Content	No. of Hrs
I	Classification of insulating material, classification of magnetic material, super conductivity, methods of cooling of transformer, types of enclosure, hydrogen cooling, direct water cooling. Types of ventilation. Temperature rise, calculation, heating curve, cooling curve,methods used for selection of motor rating for variable drives power rating.	10
II	Output equation, Choice of Specific magnetic loading, choice of specific electric loading, output equation, variation of output and losses with linear dimension. Specific slot presence for parallel sided slot, leakage reactance calculation of poly phase machines, leakage reactance of cylindrical coils and sandwiching coils of equal width.	9
III	**Transformer:** Single phase and three phase, core and shell, power and distribution of transformer, core construction of modern core type transformer, transformer winding, output equation, ratio of iron loss to copper loss, relation between core area, weight of iron and copper. Simplified steps for transformer design, no-load current, magnetising volt-ampere, regulation, efficiency.	9
IV	**Induction Motor:** Area of stator slot, length of air gap, rotor design of squirrel cage and wound rotor induction motor, area, shape and size of rotor bar, design of end ring, area of end ring, methods of improving	10

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	starting torque,losses,efficiency.	

Text books:

1. ***"A Course in Electrical Machine Design"*** by A K SawhneyDhanpatRai Publication.
2. ***"Principle of Electrical Machine Design"*** by Dr. H M Rai.

Recommended book:

1. ***"Electrical Machine Design"*** by L.K. Khera

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EE-705: HYDRO POWER STATION DESIGN

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

This course will empower the students to with the basic requirement, fundamental, principles, classification according to the specifications and to design a hydro power station.

COURSE CONTENT:

UNIT	CONTENT	NO.OF HRS
I	Introduction, hydrology, stream flow, Hydrographs, flow duration curve, mass curve, storage, investigation of site.	8
II	Types of dams, arrangement and location of hydro- electric station, types of hydroelectric plant and their field of use, principle of working of hydroelectric plant.	9
III	Developed power, size of plant and choice of units, types of turbine and their characteristics, design of main dimensions of turbine.	9
IV	Draft tubes, turbine setting and penstock dimensions, scroll case, preliminary design of penstock, characteristics of generators.	9

Text book:

1. "***Power station design***" by M.V. Deshpande PHI Publication.

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PROGRAMME ELECTIVE-II

EE-706: TESTING & COMMISSIONING OF ELECTRICAL EQUIPMENTS

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

This course will enable the students to understand the concepts, principles and acquired basic skills of installation, commissioning and maintenance of electrical equipments in power stations, substations, and industry.

COURSE CONTENT:

UNIT	CONTENT	NO.OF HRS
I	**Earthing:** Introduction to earthing, Station earthing, neutral grounding and equipment grounding, step potential, touch potential, pipe earthing and plate earthing, material used in earthing, General requirement of earthing as per Indian Electricity Rules for buildings and industrial premises.	9
II	**TestingAnd Commissioning Of Transformers:**Type, routine and commissioning tests on power and distribution transformers, Filtering and drying out of transformer oil, information required for ordering a transformer, recommended maintenance schedule of transformers, testing, commissioning of C.T/P.T	10
III	**Testing And Commissioning Of Rotating Machines:**Type, routine and commissioning tests, Selection, location and mounting of machines, Frame sizes, Degree of protection, standard IP and IC code, type of enclosures, Foundation and civil work, Checks before commissioning of machines of d.c., induction and synchronous machines, Recommended maintenance schedule of rotating machines (d.c., induction and synchronous), covering: - Mechanical and electrical maintenance. - Preventive maintenance, overhauling and safety precautions. - Permissible temperature rise limits. - Idea of MTBF and MTTR.	10

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IV	**Commissioning And Maintenance Of L.T. Panels:** Type and rating of bus-bars, A.C.B.s, MCCBs, ELCBs and MCBs etc, Location and rating of power factor improvement apparatus. **Safety Precautions:** Safety precautions for testing, commissioning and maintenance of electrical equipments (low and medium voltage apparatus).	**9**

Text book:

1. "***Testing, Commissioning, Operation and Maintenance of Electrical Equipment"*** by S.Rao, Khanna Publishers.

Reference book:

1. "***Handbook of Electrical Engineering"*** by S.L.Bhatia, Khanna Publishers.

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PROGRAMME ELECTIVE-II
EE-707: HIGH VOLTAGE DC TRANSMISSION SYSTEM

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

OBJECTIVES:

- To understand the concept, planning of DC power transmission and comparison with AC
- Power transmission.
- To analyse HVDC converters.
- To study about the HVDC system control.
- To analyse harmonics and design of filters.
- To model and analysis the DC system under study state.

COURSE CONTENT:

UNIT	CONTENT	NO.OF HRS
I	**Introduction:**Insulation system, types of insulation system. **Discharges In Gases:** General characteristics of gaseous insulation, basic processes of ionization in a gas, discharges in uniform and non-uniform fields, Paschen's law, commonly used gases for insulation and their properties. **Breakdown Of Solids And Liquids**: Different mechanisms of breakdown of solids, Intrinsic breakdown, theories of intrinsic breakdown, different theories of breakdown in liquids, commonly used solid and liquid insulating materials and their properties.	10
II	**Lightning Phenomenon:** Charge accumulation in clouds – formation and characteristics of lightning stroke, current and voltage magnitudes, protection of transmission lines and substations against lightning, lightning arrestors, switching surges, Insulation co-ordination	9
III	**Impulse Generator:** Definition of impulse wave, single stage and multistage impulse generators and their equivalent circuits, determination of front and tail resistance to produce a given wave shapes.	10
IV	**Measurement Of High Voltages**: Measurement of direct, alternating and impulse voltages by electrostatic voltmeters, sphere gap, uniform field gap, ammeter in series with high voltage resistors and voltage divider.	9

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Text book:

1. ***"An introduction to high voltage engineering"*** by Subir Ray.
2. ***"High Voltage Engineering"*** by M.S.Naidu&V.Kamaraju

Recommended books:

1. "***High Voltage Engineering"*** by C.L.Wadhwa
2. "***A course in Electrical power"*** by Soni, Gupta, Bhatnagar.

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EE -711: PROJECT WORK - I

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	4	2	50	50	100	-

COURSE OBJECTIVE:

To expose students to simulate real life situations related to electrical engineering and carry out a design project in one of the specializations of electrical engineering with substantial multidisciplinary component.

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EE - 712: INDUSTRIAL PRACTICAL TRAINING

(Training to be undergone after VI semester)

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
0	0	0	2	50	50	100	-

COURSE OBJECTIVE:

To expose students to simulate real life situations related to electrical engineering in different organizations.

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EE-713: ELECTRICAL SIMULATION LAB-III

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	2	1	30	20	50	3hrs

Practicals as per the topics in the syllabus for the course will be conducted in the laboratory. Following is the suggested list of practicals out of which a minimum of 6-7 experiments must be performed by a student during the semester. Experiments can be performed by means of mat lab software or E-Tap software (Mi-Power).

LIST OF THE EXPERIMENTS TO BE PERFORMED:

1. This Programme illustrates the use of different line model sending end voltage, sending end current calculation for short medium and long transmission line by taking examples.
2. Y-bus by Singular Transformation from a y-bus primitive matrix
3. Gauss-Siedelmethod of load flow analysis.
4. Newton-Raphson, optimum loading for generator.
5. Optimum unit commitment by Brute Force technique method.
6. Economic load dispatch by γ-iteration method.
7. Economic load dispatch by dynamic programing method.

Use Mi-Power software to perform the experiments given below:

8. Study of shunt faults of Single line diagram of power system
9. Study of load flow technique methods of power system network.

Text book:

1. ***"Matlab - Modelling, Programming and Simulations"***, Published by Sciyo, Croatia Edited by Emilson Pereira Leite.
2. ***"Modern power system analysis"*** by D.P. Kothari and I.J. Nagrath.

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SEMESTER-VIII
EE-803: POWER SYSTEM PLANNING

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

After the learning of course students should be able to design transmission line, to design primary and secondary distribution also the basic concepts of generation planning. Transmission planning and distribution planning.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Objectives Of Planning:** Long and short term planning. Load forecasting, characteristics of loads, methodology of forecasting energy forecasting, peak demand forecasting, totalforecasting annual and monthly peak demand forecasting.	9
II	**Load Forecasting Objectives Of Forecasting:** Load growth patterns and their importance in planning, load forecasting Based on discounted multiple regression technique, weather sensitive load forecasting, determination of annual forecasting, use of AI in load forecasting.	10
III	**Expansion Planning:** Basic concepts on expansion planning-procedure followed for integrate transmission system planning, current practice in India-Capacitor placer problem in transmission system and radial distributions system.	10
IV	**Distribution System Planning Overview:** Introduction, sub transmission lines and distribution substations-Design primary and secondary systems-distribution system protection and coordination of protective devices.	10

Text Books:

1. R.L. Sullivan, ***"Power System Planning",*** Tata McGraw Hill Publishing Company Ltd, 2012.

2. X. Wang & J.R. McDonald, "***Modern Power System Planning***", McGraw Hill Book Company,1994.

3. T. Gonen, ***"Electrical Power Distribution Engineering",*** McGraw Hill Book Company, 1986.

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EE-804: DIRECT ENERGY CONVERSATION

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

To analyse the working principle, pros and cons of conventional energy conversion techniques, direct energy conversion system,need of energy storage system and fuel cell.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	Introduction toConventional generation**,** alternative generation processes, criteria for central power generation. **Thermionic Generation:**The basic thermionic diode generator and its analysis, Cross held devices, Anode and cathode materials, Experimental thermionic generator.	**10**
II	**Mhd Generation:** Principles of MHD generation, electrical conditions, FaradayGenerator, Hall generator, comparison of generators. **Experimental Mhd Generation:** Open cycle working, closed cycleOperation, Liquid metal systems, and alternating current system.	**10**
III	**Fuel Cells:**Principles of fuel cells, Thermodynamics of the fuel cell, Choice of fuels and operating condition, Polarization and its effect, Practical Fuel cells – various types. **Further Conversion Process:** Miscellaneous techniques – radiation cell, ferromagnetic generation, ferroelectric generation, controlled thermo nuclear reactions, Practical devices.	**10**
IV	**Thermoelectric Generation:** See back effect, Peltier effect, Thomsoneffect, EMF relationship, Generator analysis, Material selection, ExperimentalThermoelectric generation.	**10**

Text Books:

1. "***Direct Energy Conversion",*** by R.A.Coombe.

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EC-804: DIGITAL IMAGE PROCESSING

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration
L	T	P/D	C	Sessional	End Semester Exam	Total	End Semester Examination
3	0	0	3	40	60	100	3 hrs

COURSE OBJECTIVE:

To learn and understand the fundamentals of digital image processing, and various image transforms, image enhancement techniques, image restoration techniques and methods, image compression and segmentation used in digital image processing.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals**: Introduction, origin, areas of image processing, steps in digital image processing, components of image processing system, basic concepts of sampling and quantization, representing digital images,spatial and gray level resolution, aliasing, zooming & shrinking digital images, neighboring of pixels, some basic relationships between pixels.	8
II	**Image Enhancement:** Histogram equalization,histogram specification,local enhancement, image subtraction, image averaging, basics of spatial filtering, smoothing spatial filters, sharpening of filters. **Image Restoration**: A model of the image degradation/ restoration process noise models.	9
III	**Wavelets**: Wavelet functions, wavelet transformations in one and two dimensions,wavelet series expansions,discrete wavelet transform,continuous wavelet transform,series expansion,scaling functions, wavelet functions, haar transform,sub band coding.	9

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IV	**Image Compression:**Need for data compression, image compression models, error free compression-variable length coding, LZW-coding,bit plane coding,lossless predictive coding, lossy compression-lossy predictive coding,transform coding,wavelet coding. **Image Segmentation:**Point detection,link detection**,**edge detection, ,local processing ,global processing via hough transform ,thresholding foundation ,the role of illumination,basic global thresholding,basic adaptive thresholding, region based segmentation.	**8**

Text Books:

1.Rafael C. Gonzalez, Richard E. Woods,***Digital Image Processing*,** Pearson.
2. Pratt, W. K. ***Digital Image Processing***, John Wiley.

Reference Books:

1. Jain, A.K. Englewood Cliffs**, *fundamentals of Digital Image Processing***, Prentice Hall.
2. Rosenfield, A and Kak, A.C., ***Picture Processing***, Academic Press N. Y.

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EE-806: POWER SYSTEM STABILITY

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Tota l	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

This course deals with the development detailed models of power system components and their application in the analysis of the dynamic behaviour of inter-connected power system in response to small and large disturbance.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Load Flow Studies:** Network model formulation, Formation of Y-Bus by singular transformation, load flow problem, gauss-siedel method, Newton-Raphson method, decoupled load flow method**.**	**10**
II	**Fault Analysis:** symmetrical component phase shift in star delta transformer, sequence impedance of transmission lines, sequence impedance of power system, symmetrical component analysis of unsymmetrical component.L-Gfault, L-Lfault, L-L-Gfault, L-L-L fault.	**9**
III	**Stability:**Dynamicsof synchronous machine, power angle equation, nodal elimination technique, steady state stability, transient stability, equal area criteria, numerical solution of swing equation, factors affecting transient stability.	**10**
IV	**Voltage Stabilty:** Comparison of angle and voltage stability, reactive power flow and voltage collapse, voltage stability problem and its prevention.	**10**

Text Books :

1. ***"Power Generation, Operation and Control*"**by A. J. Wood and B. F. Woolenberg, Willey & son's publication.
2. ***"Power System Engineering"*** by D. P. Kothari and I. J. Nagrath TMH publication.
3. ***"Electrical Power System"*** by C.L.Wadhwa.

Reference Books:

1. ***"Power System Analysis Design"*** By B. R. Gupta.

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EE-807: OPTIMIZATION TECHNIQUES

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

Students should be educated the importance of optimal use of resources using mathematical programming methods considering all constraints and fulfilling objective of the customer.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Introduction:** Engineering Application, Statement of the Optimal Problem, Classification, Optimization Techniques. **Classical Method:** Single Variable Optimization; Multivariable Optimization without any constraints with equality and inequality constraints.	10
II	**One-Dimensional Minimization Methods:** Uni-modal Function; Elimination Method, Dichotomous Search, Fibonacci and Golden Method, Interpolation Method, Quadratic and Cubic Interpolation Method. **Unconstrained Minimization Method**: Uni-variate, Conjugate Directions, Gradient and Variable Matrix Method.	10
III	**Constrained Minimization Method:** Characteristics of a constrained problem, Direct Method of feasible directions, Indirect Method of interior and exterior penalty functions. **Geometric Programming:** Formulation and Solutions of Unconstrained and Constrained geometric programming problem.	10

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IV	**Dynamic Programming**: Concept of Sub-optimization and the principal of optimality: Calculus, Tabular and Computational Method in Dynamic Programming: An Introduction to Continuous Dynamic Programming. **Integer Programming:** Gomory's Cutting Plane Method for Integer Linear Programming; Formulation & Solution of Integer Polynomial and Non- Linear problems.	**9**

Text Books:

1. "***Optimization (Theory & Application)-*** S.S. Rao, Wiley Eastern Ltd, New Delhi.
2. "***Optimization Concepts and Applications in Engineering"*** – Ashok D.Belegundu and Tirupathi R Chandrupatla – Pearson Education 1999, First India Reprint 2002

Reference Books:

1. ***Optimization: Theory andPractice***, C.S.G. Beveridge and R.S. Schechter, McGraw Hill, New York.
2. Kalyanamoy Deb, "***Optimization for Engineering design algorithms and Examples***", Prentice Hall of India Pvt. Ltd. 2006.
3. Rao, Singaresu, S., "***Engineering Optimization – Theory & Practice***", New Age International (P) Limited, New Delhi, 2000.

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EE-808: ADVANCED POWER ELECTRONICS

Teaching and Examination Scheme:

Teaching Scheme			Credit	Marks			Duration of End Semester Examination
L	**T**	**P/D**	**C**	**Sessional**	**End Semester Exam**	**Total**	
3	0	0	3	40	60	100	3hrs

COURSE OBJECTIVE:

This subject introduces about inverter application and different types of dc and ac single phase and three phase drive operation by power electronics devices.

COURSE CONTENT:

UNIT	CONTENT	NO. OF HOURS
I	**Inverters:** voltage control of single phase inverter, reduction of harmonics output voltage, Switched mode power supply.	**10**
II	**DC Drive:** Single phase & three phase half wave, semi convertor, full wave dual convertor three phase. **Chopper Drives:** Power control or motoring control, regenerative braking control, two quadrant chopper drives, four quadrants chopper drives.	**10**
III	**Speed Control Of Three-Phase Induction Motors:** Stator voltage control, Stator frequency control, stator voltage and frequency control, stator current control, stator rotor resistance control, slip power recovery schemes.	**9**
IV	**Synchronous Motor Drives:** Cylindrical rotor motors, salient pole motors, reluctance motors.	**9**

Text Books:

1. ***"Power Electronics: Circuits, Devices & Applications"*** by M.H. Rashid, Prentice Hall of India Ltd,2004.
2. ***"Power Electronics***", by P.S. Bimbhra,Khanna Publishers,2006.
3. ***"Power Electronics",*** by M.D. Singhand K.B. Khanchandani, TataMC-GrawHillPub,2005.

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EE-801: PROJECT WORK - II

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	16	8	50	50	100	3 hrs

COURSE OBJECTIVE:

To simulate real life situations related to electrical engineering and impart adequate training so that confidence to face and tackle any problem in the field is developed in the college itself.

PROCEDURE:

1. The project work started in the seventh semester will continue in this semester. The students should complete the project work in this semester and present it to the assessing committee (as constituted in the seventh semester). The performance of the students in the project work shall be assessed on a continuous basis by the project evaluation committee through progress seminars and demonstrations conducted during the semester.
2. Each project group should maintain a log book of activities of the project. It should have entries related to the work done, problems faced, solution evolved etc. There shall be at least an Interim Evaluation and a final evaluation of the project in the 8^{th}semester.
3. Each project group has to submit an interim report in the prescribed format for the interim evaluation. Each student is expected to prepare a report in the prescribed format, for final evaluations based on the project work. Members of the project group will present the relevance, design, implementation, and results of the project to the project evaluation committee. Each group will submit the copies of the completed project report signed by the guide to the department.
4. The head of the department will certify the copies and return them to the students. One copy will be kept in the departmental library and one by the respective guide. The assessment committee and project guides will award the marks for the individual students in a project as follows:

50% of the marks is to be awarded by the guide and
50% by the evaluation committee.

Internal Continuous Assessment:

40% - Data collection, Planning/ Design and detailing/Simulation and analysis
30% - Presentation & demonstration of results
20% - Report
10% - Regularity in the class

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EE-802: INDUSTRIAL PROJECT

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
0	0	16	8	50	50	100	3 hrs.

Note: Industrial Project of Four months duration is to be carried out by the student in industry under the joint supervision of faculty advisers from institution as well as from the industry

Suggested List of projects:

1. Any productive project involving application of engineering fundamentals to solve problems encountered by human kind, in collaboration with industry, R&D institutes, institutes of international/national/state importance as deemed fit by the faculty members/concerned supervisor.

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HIMACHAL PRADESH TECHNICAL UNIVERSITY
HAMIRPUR

Syllabus

for

B.Tech. First Year

(Common to all Branches)

As per National Education Policy (NEP-2020)

(w.e.f. the Academic Year 2023-2024)

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S. No.	Group	Branches
1	**Group-A**	**Civil Engineering** **Computer Science and Engineering** **Computer Science and Engineering (AI-ML)** **Computer Science and Engineering (AI-DS)** **Information and Technology** **Electronics and Communication Engineering.**
2	**Group-B**	**Electrical Engineering** **Electrical and Electronics Engineering** **Mechanical Engineering** **Textile Engineering**

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Group A: Semester I

Sr. No.	Category	Subject Code	Subject	L	T	P/D	Credits	Evaluation Scheme (Marks)		
								IA	ESE	Subject Total
Theory:										
1	FC	PHY-111	Applied Physics	3	1	0	4	40	60	100
2	FC	HS-111	Communication Skills	3	0	0	3	40	60	100
3	FC	EE-111	Basic Electrical Engineering	3	1	0	4	40	60	100
4	FC	MA-111	Applied Mathematics-1	3	1	0	4	40	60	100
5	MC	EVS-111	Energy and Environment	2	1	0	3	40	60	100
	Labs:							**IA**	**ESVE**	**Sub. Total**
1	FC	PHY-111P	Applied Physics Lab	0	0	2	1	30	20	50
2	FC	HS-111P	Communication Skills Lab	0	0	2	1	30	20	50
3	FC	EE-111P	Basic Electrical Engineering Lab	0	0	2	1	30	20	50
4	FC	*WXX-111P	Workshop	0	0	4	2	30	20	50
			Total	**14**	**04**	**10**	**23**			**700**

Group A: Semester II

Sr. No.	Category	Subject Code	Subject	L	T	P/D	Credits	Evaluation Scheme (Marks)		
								IA	ESE	Subject Total
Theory:										
1	FC	CHM-111	Applied Chemistry	3	1	0	4	40	60	100
2	FC	CS-111	Computer Programming	3	0	0	3	40	60	100
3	FC	EC-111	Basic Electronics Engineering	3	1	0	4	40	60	100
4	FC	MA-121	Applied Mathematics-II	3	1	0	4	40	60	100
5	MC	UHV-111	Universal Human Values and Awareness About Himachal Pradesh	3	0	0	3	40	60	100
	Labs:							**IA**	**ESVE**	**Sub. Total**
1	FC	CHM-111P	Applied Chemistry Lab	0	0	2	1	30	20	50
2	FC	CS-111P	Computer Programming Lab	0	0	2	1	30	20	50
3	FC	EC-111P	Basic Electronics Engineering Lab	0	0	2	1	30	20	50
4	FC	ME-111P	Engineering Graphics and Design	0	0	4	2	30	20	50
5	MC	HS-122P	Holistic Health and Yoga	0	0	2	1	30	20	50
			Total	15	03	12	**24**			750

Legends:

- **L -** Lecture
- **T -** Tutorial
- **P -** Practical
- **CT -** Class Test
- **IA -** Internal Assessment
- **FC-** Foundation Course
- **ESE -** End Semester Examination
- **FW -** Documentation/ File work and presentation
- **LP** - Lab performance
- **ESVE -** End Semester Exam. / Viva-voce Exam.
- **MC**-Mandatory Course

*WXX where XX is branch code- CE (Civil Engineering), CS (Computer Science & Engineering), IT (Information & Technology), EC (Elect. Comm. & Engineering)

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Group B: Semester I

Sr. No.	Category	Subject Code	Subject	L	T	P/D	Credits	Evaluation Scheme (Marks)		
								IA	ESE	Subject Total
Theory:										
1	FC	CHM-111	Applied Chemistry	3	1	0	4	40	60	100
2	FC	CS-111	Computer Programming	3	0	0	3	40	60	100
3	FC	EC-111	Basic Electronics Engineering	3	1	0	4	40	60	100
4	FC	MA-111	Applied Mathematics-1	3	1	0	4	40	60	100
5	MC	UHV-111	Universal Human Values and Awareness about Himachal Pradesh	3	0	0	3	40	60	100
	Labs:							**IA**	**ESVE**	**Sub. Total**
1	FC	CHM-111P	Applied Chemistry Lab	0	0	2	1	30	20	50
2	FC	CS-111P	Computer Programming Lab	0	0	2	1	30	20	50
3	FC	EC-111P	Basic Electronics Engineering Lab	0	0	2	1	30	20	50
4	FC	ME-111P	Engineering Graphics and Design	0	0	4	2	30	20	50
			Total	15	03	10	**23**			700

Group B: Semester II

Sr. No.	Category	Subject Code	Subject	L	T	P/D	Credits	Evaluation Scheme (Marks)		
								IA	ESE	Subject Total
Theory:										
1	FC	PHY-111	Applied Physics	3	1	0	4	40	60	100
2	FC	HS-111	Communication Skills	3	0	0	3	40	60	100
3	FC	EE-111	Basic Electrical Engineering	3	1	0	4	40	60	100
4	FC	MA-121	Applied Mathematics-II	3	1	0	4	40	60	100
5	MC	EVS-111	Energy and Environmental	2	1	0	3	40	60	100
Labs:										
1	FC	PHY-111P	Applied Physics Lab	0	0	2	1	30	20	50
2	FC	HS-111P	Communication Skills Lab	0	0	2	1	30	20	50
3	FC	EE-111P	Basic Electrical Engineering Lab	0	0	2	1	30	20	50
4	MC	HS-122P	Holistic Health and Yoga	0	0	2	1	30	20	50
5	FC	*WXX-111P	Workshop	0	0	4	2	30	20	50
			Total	14	04	12	**24**			750

Legends:
- **L -** Lecture
- **T -** Tutorial
- **P -** Practical
- **CT -** Class Test
- **IA -** Internal Assessment
- **FC-** Foundation Course
- **ESE -** End Semester Examination
- **FW -** Documentation/ File work and presentation
- **LP** - Lab performance
- **ESVE -** End Semester Exam. / Viva-voce Exam.
- **MC**-Mandatory Course

* WXX where XX is branch code- EE (Electrical Engineering.), EEE (Electrical & Electronics Engineering.), ME (Mechanical Engineering). TE (Textile Engineering.)

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Template for-Internal Assessment (IA Theory)

HIMACHAL PRADESH TECHNICAL UNIVERSITY

Award Sheet Theory Internal Assessment (IA)

<table>
<tr><td colspan="3">Name of the Institution:</td><td colspan="4">Distribution of Marks</td><td rowspan="5">Total Marks</td></tr>
<tr><td colspan="3">Programme:</td><td colspan="2" rowspan="2">Periodical Examinations</td><td rowspan="4">Teacher Assessment (Assignment discussion/ presentation/Quizzes/ Overall behavior)</td><td rowspan="4">Attendance</td></tr>
<tr><td colspan="2">Subject:</td><td>Sub. Code:</td></tr>
<tr><td colspan="2">Branch:</td><td>Semester:</td><td rowspan="2">1st Periodical Examination</td><td rowspan="2">2nd Periodical Examination</td></tr>
<tr><td colspan="2">Max. Marks:</td><td>Min. Marks:</td></tr>
<tr><td>Sr. No.</td><td>University Roll No.</td><td>Name of Student</td><td>10</td><td>10</td><td>15</td><td>05</td><td>40</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="3">Name of Internal Examiner
Signature……………………..………
Date……………………..………..…..</td><td colspan="5">Head of Dept.
Signature………………......
Date………………………..</td></tr>
</table>

Note: The marks of the attendance (theory and practical) in Internal Assessment(IA) should be awarded on the basis of percentage of lectures attended as per the following details:

Sr. No	Percentage of Lecture Attended	Marks Awarded
1	From 75% to 79.9%	01
2	From 80% to 84.9%	02
3	From 85% to 89.9%	03
4	From 90% to 94.9%	04
5	Above 95%	05

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Template for-Internal Assessment (Practical/Project/Seminar/Viva-Voce)

HIMACHAL PRADESH TECHNICAL UNIVERSITY
Award Sheet Practical Internal Assessment (IA)
(Practical/Project/Seminar/Workshop)

Name of the Institution:			Distribution of Marks				Total Marks
Programme:			Written/ Presentation/ Demonstration	Viva-voce	Teacher Assessment: Lab Work performance/ Report/ File Work	Attendance	
Subject:	Sub. Code:						
Branch:	Semester:						
Max. Marks:	Min. Marks:						
Sr. No.	**University Roll No.**	**Name of Student**	**05**	**05**	**15**	**05**	**30**

Name of Internal Examiner
Signature…………………….…..………
Date……………………...……..…...

Head of Dept.
Signature……………….......
Date………………………..

Template for-External Assessment (Practical/Project/Seminar/Viva-Voce)

HIMACHAL PRADESH TECHNICAL UNIVERSITY
AWARD SHEET PRACTICAL (EXTERNAL ASSESSMENT)
(Practical/Project/Seminar/Workshop)

Name of the Institute: ……………………………………………………………………………….

Programme: ……………………………………………………………………………………….

Subject Name: ………………... …………… **Subject Code:** ………………………………………..

Branch: ……………………………….. ……. **Semester** ……………………………………………

Max Marks ……………………………….. **Min. Marks:** ……………………………………….

Sr. No.	University Roll No.	Name of Student	Marks in Figure	Marks in Words

Name of Internal Examiner: ………………
Signature……………………..………………………
Date……………………...…………………………

Name of External Examiner……………………….
Signature……………….................................
Date……………………….…………………

Note: The distribution of marks would be on the basis of Task performance/written (10 marks) and viva-voce (10 marks), total=20 marks.

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Syllabus

for

Semester-I (Group A&B)

and

Semester-II (Group-A&B)

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<table>
<tr><th colspan="9">PHY-111 Applied Physics</th></tr>
<tr><th colspan="3">Teaching Scheme</th><th rowspan="2">Credit</th><th colspan="3">Marks Distribution</th><th rowspan="2">Duration of End Semester Examination</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Internal Assessment</th><th>End Semester</th><th>Total</th></tr>
<tr><td rowspan="2">3</td><td rowspan="2">1</td><td rowspan="2">0</td><td rowspan="2">4</td><td>Maximum Marks: 40</td><td>Maximum Marks: 60</td><td>100</td><td rowspan="2">3 Hours</td></tr>
<tr><td>Minimum Marks: 16</td><td>Minimum Marks: 24</td><td>40</td></tr>
</table>

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-I:
Theory of Relativity: Inertial and non- inertial frames of reference, earth as an inertial frame of reference, Michelson and Morley experiment, Postulates of special theory of relativity, Galilean and Lorentz transformations, Time dilation and length contraction, Relativistic kinematics and mass-energy equivalence. **Laser:** Introduction, Characteristics of lasers, Spontaneous and stimulated emission of radiation Einstein's coefficients, Population inversion, Ruby laser, Helium -Neon lasers & Semiconductor Lasers Applications of laser in industry, Scientific and medical fields.
Unit–II:
Oscillations: Simple harmonic motion (SHM), Differential equation of SHM, Energy of SHM, Damped and Forced Oscillations, Relaxation Time, Quality Factor, Resonance, Sharpness of Resonance. **Fiber Optics:** Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and acceptance cone, Numerical aperture, Propagation Mechanism and communication in fiber, Single and Multi-Mode Fibers, Step index and Graded index fiber, Attenuation and losses, Applications of optical fibers.
Unit–III
Quantum Mechanics: De Broglie waves, Phase and Group velocity concept, Uncertainty principle and its applications, Wave function, Postulates of quantum mechanics, Derivation of Schrodinger equation for time independent and time dependent cases and its applications viz. Particle in one dimensional box. **X-rays:** X-rays production, hard and soft x-rays, Continuous and characteristics x-rays, Bremsstrahlung effect
Unit-IV:
Electrodynamics: Equation of continuity, displacement current, Maxwell‘s equations, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting vector & Poynting theorem. **Superconductivity:** Introduction and discovery of superconductivity, Meissner effect, Type-I and type-IIP superconductors, Isotope effect, BCS theory (qualitative), High temperature superconductors, Applications of superconductivity.

Textbooks:

- Engineering Physics, H.K Malik & A.K Singh, Tata McGraw-Hill.
- Ajoy Ghatak, Quantum Mechanics: Theory and Applications‖, Tata McGraw-Hill.
- Satya Prakash and Vibhav saluja, Engineering Physics‖, Pragti Prakashan Meerut.
- Applied Solid State Physics‖, Wiley India Pvt Ltd.

Reference Books:

- Ajoy Ghatak, ―Optics‖, Tata McGraw-Hill.
- N. Subrahmanyam, Brij Lal, M.N. Avadhanulu, ―Optics‖, S. Chand & Co. Ltd.
- Anuradha De, ―Fiber optics and laser Principles and Applications‖, New Age International.
- Arthur Beiser, ―Concepts of Modern Physics‖, Tata McGraw-Hill.
- David J Griffiths, ―Introduction to electrodynamics‖, Prentice Hall of India, New Delhi

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HS-111 Communication Skills

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester	Total	
3	0	0	3	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-I:
Essentials of communication: The meaning, types &process of communication, Barriers to communication and removal of these barriers, Shannon & weaver model of communication, Berlos' model of communication, The Seven Cs of Effective Communication - Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness, Types of information- order, advise, suggestion, motivation, persuasion, warning and education. Mass Communication –function of mass communication – Media of mass communication, Advantages and disadvantages ofsocial media.
Unit–II:
Essentials of Grammar: Types of sentences: Declarative Sentence, Imperative Sentence, Interrogative Sentence, Exclamatory Sentence, simple, compound & complex sentences, conversion of one type of sentence into other, Parts of speech, Tenses, articles and prepositions, Model Auxiliaries Types of diction, ways to improve diction, Paragraph writing.
Unit–III
Technical Communication: Report writing: Characteristics of a good report, parts & types of reports, drafting of reports. Business letters: planning a business letter, parts of a letter, classification of business letters – inviting and sending quotations, letter placing orders, letter of complaint, letter of adjustment, and letter of Job, letter negotiating a job offer and Resume writing, Drafting memorandum, notices, agenda and minutes of meeting, preparing effective e- mail messages and power-point presentations
Unit-IV:
Soft skills & personality development: Soft skills: Classification of soft skills, Delivering effective presentations,Capturing audience, Impromptu speech, speech initiators, telephone etiquette - Good practice when making and receiving a call; Becoming a good leader and team-player, Personal SWOT analysis., body language, Types of interviews, preparing for a job interview, Strategies for managing emotions & controlling Stress.

Textbooks:

- Communication Skills, Sanjay Kumar and Pushp Lata, Oxford University Press.
- Effective Communication and soft Skills, Nitin Bhatnagar and Mamta Bhatnagar, Pearson Publication.
- Communicative English for Engineers and professionals, Nitin Bhatnagar and Mamta Bhatnagar, Pearson Publication.
- Personality and Soft Skills by B. K. Mitra Oxford press.
- An Introduction to Professional English and Soft Skills: by Bikram K. Das, Kalyani Samantray, Cambridge Press.
- Business correspondence and Report Writing: by R. C. Sharma & Krishna Mohan

Reference Books:

- Business Communication: Theory and Application by R.W. Lesikar and John.D. Pettit , All India Traveller Bookseller.
- Speaking and Writing for Effective Business Communication by Francis Soundaraj Macmillan.
- Understanding Human Communication by Ronald B. Adler and George Rodman Oxford University

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Press: New York.

- Communication Skills and soft skills- An integrated approach, Kumar, Pearson Publication
- K.K.Sinha, Business Communication, Galgotia Publishing Company, New Delhi, 1999.
- R.K.Bansal& J.B. Harrison, spoken English for India, Orient Longman.
- An Introduction to Linguistics: Language, Grammar and Semantics by Pushpinder Syal and D. V. Jindal (Author) Paperback
- Mastering Interviews and Group Discussions by Dinesh Mathur CBS
- English Conversation Practice by Grant Taylor
- Handbook of Practical Communication Skill by Chrissie Wright (Ed.) JAICO Books.
- English Conversation Practice by Grant Taylor
- Business correspondence and Report Writing: by R. C. Sharma & Krishna Mohan

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EE-111 Basic Electrical Engineering

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	1	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-I:
DC Circuits: Kirchhoff‘s voltage and current laws; power dissipation; Voltage source and current source; Mesh and Nodal analysis; Star-delta transformation; Superposition theorem. Thevenin‘s theorem; Norton‘s theorem; Maximum power transfer theorem; Millman‘s theorem and Reciprocity theorem; Transient response of series RL and RC circuits.
Unit–II:
Steady state analysis of DC Circuits: The ideal capacitor, permittivity; the multi- plate capacitor, variable capacitor; capacitor charging and discharging, current-voltage relationship, time-constant, rise-time, fall-time,inductor energization and de- energization, inductance current-voltage relationship, time-constant; Transient responseof RL, RC and RLC Circuits.
Unit–III
AC Circuits: Sinusoidal sources, RC, RL and RLC circuits, Concept of Phasors, Phasor representation of circuit elements, Complex notation representation, Single phase AC Series and parallel circuits, power dissipation in AC circuits, power factor correction, Resonance in series and parallel circuits, Balanced and unbalanced 3-phase circuit - voltage, current and power relations, 3-phase power measurement, Comparison of single phase and three phase supply systems. **Electromagnetism:** Electromagnetic induction, Dot convention, Equivalent inductance, Analysis of Magnetic circuits, AC excitation of magnetic circuit, Iron Losses, Fringing and stacking, applications: solenoids and relays.
Unit-IV:
Single Phase Transformers: Constructional features of transformer, operating principle and applications, equivalent circuit, phasor analysis and calculation of performance indices. **Motors and Generators:** DC motor operating principle, construction, energy transfer, speed torque relationship, conversion efficiency, applications, DC generator operating principle, reversal of energy transfer, EMF and speedrelationship, applications.

Textbooks:

- Ashfaq Husain and Harroon Ashfaq Fundamental of Electrical Engineering Dhanpat Rai & Co. (P) Limited; Fourth edition, 1 January 2016
- Nagrath I.J. and D. P. Kothari (2001), Basic Electrical Engineering, Tata McGraw Hill.
- Hayt and Kimberly, Engineering Circuit Analysis, Tata McGraw Hill.
- Ritu Sahdev (2019), Basic Electrical Engineering, Khanna Book Publishing Company
- Kulshreshtha D.C. (2009), Basic Electrical Engineering, Tata McGraw Hill.
- Rajendra Prasad (2009), Fundamentals of Electrical Engineering, Prentice Hall, India

Reference Books:

- Ajoy Ghatak, ―Optics‖, Tata McGraw-Hill.
- N. Subrahmanyam, Brij Lal, M.N. Avadhanulu, ―Optics‖, S. Chand & Co. Ltd.
- Anuradha De, ―Fiber optics and laser Principles and Applications‖, New Age International.
- Arthur Beiser, ―Concepts of Modern Physics‖, Tata McGraw-Hill.
- David J Griffiths, ―Introduction to electrodynamics‖, Prentice Hall of India, New Delhi

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<table>
<tr><th colspan="9">MA-111 Applied Mathematics-I</th></tr>
<tr><th colspan="3">Teaching Scheme</th><th rowspan="2">Credit</th><th colspan="3">Marks Distribution</th><th rowspan="2">Duration of End Semester Examination</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Internal Assessment</th><th>End Semester Examination</th><th>Total</th></tr>
<tr><td rowspan="2">3</td><td rowspan="2">1</td><td rowspan="2">0</td><td rowspan="2">4</td><td>Maximum Marks: 40</td><td>Maximum Marks: 60</td><td>100</td><td rowspan="2">3 Hours</td></tr>
<tr><td>Minimum Marks: 16</td><td>Minimum Marks: 24</td><td>40</td></tr>
</table>

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-I:
Sequences and Series: Introduction to sequences and Infinite series, Tests for convergence/divergence, Limit comparison test, Ratio test, Root test, Cauchy integral test, Alternating series, Absolute convergence and conditional convergence. **Series Expansions:** Power series, Taylor & Maclaurin‘s series, Convergence of Taylor series, Taylor & Maclaurin‘s Theorem, Error estimates (one variable)
Unit–II:
Calculus: Rolle‘s theorem, Lagrange‘s and Cauchy mean value theorem, Application of definite integral to evaluate areas of bounded region, Arc length of a plane curve, volume of solids, surface areas of a solid revolution (Cartesian coordinates), Improper integrals, Beta and Gamma functions
Unit–III
Partial Differentiation and applications: Functions of several variables, Limits and continuity ($\delta - \epsilon$ approach), Partial derivatives, Euler‘s theorem (Homogeneous functions), Chain rule, change of variables, Jacobian, Maxima and minima by using second order derivatives, Lagrange‘s method of multipliers, Taylor‘s & Maclaurin‘s Theorem, Error estimation.
Unit-IV:
Multiple Integrals and applications: Double integral, change of order of integration in double integral, Polar coordinates, graphing of polar curves, Change of variables (Cartesian to polar), Applications of double integrals to areas and volumes, evaluation of triple integral.

Textbooks:

- B. S. Grewal, Higher Engineering Mathematics by B. S. Grewal 43rd Edition (2015)
- N. P. Bali and Manish Goyal A Textbook Of Engineering Mathematics (2016)
- Thomas, G.B. and Finney, R.L., Calculus and Analytic Geometry, Pearson Education (2007),9thed.
- Stewart James, Essential Calculus; Thomson Publishers (2007), 6th ed.
- R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics (2003), 2nd ed.

Reference Books:

- Wider David V, Advanced Calculus: Early Transcendentals, Cengage Learning (2007).
- Apostol Tom M, Calculus, Vol I and II, John Wiley (2003).
- Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons (2011) 9th Edition

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EVS-111 Energy and Environment							
Teaching Scheme			**Credit**	**Marks Distribution**			**Duration of End Semester Examination**
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
2	**1**	**0**	**3**	**Maximum Marks: 40**	**Maximum Marks: 60**	**100**	**3 Hours**
				Minimum Marks: 16	**Minimum Marks: 24**	**40**	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-I:
Ecosystems: Structure and function of an ecosystem–ecological succession–primary and secondary succession - ecological pyramids – pyramid of number, pyramid of energy and pyramid of biomass. **Conventions on Climate Change:** Origin of Conference of Parties (COPs), United Nations Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC); Kyoto Protocol, Montreal Action Plan; Paris Agreement and post-Paris scenario. **Environmental issues:** Global Environmental crisis, Current global environment issues, Global Warming, Greenhouse Effect, role of Carbon Dioxide and Methane, Ozone Problem, CFC_s and Alternatives, Causes of Climate change, Carbon footprint.
Unit–II:
Air Pollution: Origin, sources, adverse effects and preventive measures related to air pollution. Case study for air pollution (London smog, Photochemical smog, Bhopal gas tragedy). **Water Pollution:** Origin, sources, adverse effects and preventive measures related to water pollution. Case study forair pollution (Minamata tragedy, Arsenic pollution at Punjab/UP, The Ganga River pollution). **Noise Pollution:** Origin, sources, adverse effects and preventive measures related to noise pollution. **Nuclear pollution:** Origin, sources, adverse effects and preventive measures related to radioactive pollution, Case study. **Environmental protection acts:** Important environmental protection acts in India – water, air (prevention and controlof pollution) act, wild life conservation and forest act.
Unit–III
Renewable and non-renewable resources: Coal, Petroleum, Solar energy, wind energy, hydrothermal energy, nuclear energy, Tidal energy, Bioenergy etc. Role of individual in conservation of natural resources for sustainable life styles. Use and over exploitation of Forest resources, Deforestation, Timber extraction, Mining, Dams and their effects on forest and tribal people. Use and over exploitation of surface and ground water resources, Floods, Drought, Conflicts over water, Dams- benefits and problems. National green hydrogen mission. FAME India Scheme.
Unit-IV:
Environment and Disaster: Introduction: Principles of Disaster Management. Natural Disasters such as Earthquake, Floods, Fire, Landslides, Tornado, Cyclones, Tsunamis, Nuclear and Chemical Terrorism. Hazards, Risks and Vulnerabilities, Vulnerability of a location and vulnerable groups, National policy on disaster Management.

Textbooks:

- Moaveni, S., Energy, Environment and Sustainability, Cengage(2018)
- Down to Earth, Environment Reader for Universities, CSE Publication(2018)
- Chapman, J.L. and Reiss, M.J., Ecology Principles and Application, Cambridge University Press (LPE) (1999).
- Eastop, T.P. and Croft, D.R., Energy Efficiency for Engineers and Technologists, Longman and Harow (2006).
- O'Callagan, P.W., Energy Management, Mc Graw Hill Book Co. Ltd.(1993).
- Peavy H.S. and Rowe D.R. Environmental Engineering, McGraw Hill(2013)

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WME-111P Workshop

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	4	2	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

1.	**Introduction:**
	Introduction to Need and importance of workshop, different materials to be utilized Applications of Ferrous and Non-Ferrous metals alloys.
2.	**Carpentry Shop:**
	To prepare half-lap corner joint, mortise & tennon joints
3.	**Fitting Shop:**
	To make a job involving fitting work -drilling, tapping or dieing
4.	**Smithy Shop:**
	To make a job by using smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.
5.	**Welding Shop:**
	To prepare a simple butt and Lap welded joints.
6.	**Sheet-metal Shop:**
	Fabrication of Funnel, tool-box, tray etc.
7.	**Machine Shop:**
	To make a job on lathe involving plane turning, step turning, taper turning and threading operations
8.	**Foundry Shop:**
	To prepare a Mould with the use of a core and cast it.

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WCS:111P/WIT:111P Workshop							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	4	2	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

1.	Identification and study of peripherals of a PC and Laptop
2.	Assembling and disassembling the PC
3.	Identification and study the purpose of Networking concepts
4.	Study / Prepare a network cable: Straight Through Cables vs Crossover Cables
5.	Prepare a document/report using Microsoft Word, Power Point, Microsoft Excel
6.	Prepare professional pdf documents using LaTeX
7.	Develop the home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list
8.	Operating System installation
9.	Virtual Machine setup
10.	Linux Operating System commands
11.	Enabling firewall and setting router as wireless access point in the system
12.	Study of AI based tools.

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WEE-111P/WEEE-111P/ WEC-111P Workshop							
Teaching Scheme			**Credit**	**Marks Distribution**			**Duration of End Semester Examination**
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
0	**0**	**4**	**2**	**Maximum Marks: 30**	**Maximum Marks: 20**	**50**	**2 Hours**
				Minimum Marks: 12	**Minimum Marks: 8**	**20**	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

Electrical Workshop	
1.	a) Demonstrate the precautionary steps adopted in case of Electrical shocks.
	b) Identify different types of cables, wires, switches, fuses, fuse carriers, MCB, ELCB and MCCB with ratings.
2.	Wiring of simple light circuit for controlling light/ fan point (PVC conduit wiring)
3.	Wiring of light/fan circuit using Two-way switches. (Staircase wiring)
4.	Wiring of Fluorescent lamps and light sockets (6A) with a power circuit for controlling power device. (16A socket)
5.	Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and Energy meter.
6.	a) Identify different types of batteries with their specifications.
	b) Demonstrate the Pipe and Plate Earthing Schemes using Charts/Site Visit.
7.	Activity: Assemble the wooden/plastic boards, switches and sockets in form of extension boards with proper wiring and pin top.
Electronics Workshop	
8.	Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. [Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)
9.	Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools (such as Orcad, MultiSim or XCircuit), Interpret data sheets of discrete components and IC's, Estimation and costing.
10.	Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, DSO etc.] [Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station etc.]
11.	Testing of electronic components [Resistor, Capacitor, Diode, Transistor and JFET using multimeter.]
12.	Overview of Arduino: Hardware and Software IDE: Installation and live projects burning such as LED Blinking, Running LEDs, Sand Glass Filling of LEDs, Decoration LEDs/LED Patterns etc.
13.	Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit]
14.	Activity: Assembling of components of a basic mobile phone system and develop an ability to repair and formulate a basic Transmission and Receiving system.

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<table>
<tr><th colspan="9">WTE-111P Workshop for Textile Engineering</th></tr>
<tr><th colspan="3">Teaching Scheme</th><th rowspan="2">Credit</th><th colspan="3">Marks Distribution</th><th rowspan="2" colspan="2">Duration of End Semester Examination</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Internal Assessment</th><th>End Semester Examination</th><th>Total</th></tr>
<tr><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">4</td><td rowspan="2">2</td><td>Maximum Marks: 30</td><td>Maximum Marks: 20</td><td>50</td><td rowspan="2" colspan="2">2 Hours</td></tr>
<tr><td>Minimum Marks: 12</td><td>Minimum Marks: 8</td><td>20</td></tr>
</table>

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

1	Identification of different natural fibers.
2	Identification of different synthetic fibers.
3	Determination of linear density of yarn.
4	Analysis of various yarns structure and their basic properties.
5	Structural analysis of woven fabrics.
6	Structural analysis of knitted fabrics.
7	Dyeing of cotton fabric with natural dyes.
8	Dyeing of cotton fabric with synthetic dyes.
9	To prepare fabric sample for printing.
10	Characterization of various technical textiles and study of their application fields.

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WCE-111P Workshop for Civil Engineering								
Teaching Scheme			**Credit**	**Marks Distribution**			**Duration of End Semester Examination**
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
0	**0**	**4**	**2**	**Maximum Marks: 30**	**Maximum Marks: 20**	**50**	**2 Hours**
				Minimum Marks: 12	**Minimum Marks: 8**	**20**	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

1	Preparation of Technical report/document, Presentation, Data analysis by using MS office
2	Preparation of simple butt and lap welded joint (metal or other)
3	Preparation of half lap corner joint, Mortise joint and tenon joint (metal or other)
4	Fabricate a furniture using any carpentry joints (Chair/Table/any furniture)
5	Fabricate any one bar bending models for any structural element
6	Fabricate Plumbing line model from source to distribution end
7	Construct a Masonry brick wall using any masonry Bond
8	Construct an arch using brick masonry
9	Sampling of latest/ advanced construction materials
10	Generating simple 3D models in CAD and 3D printing

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PHY-111P Applied Physics Lab

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

Laboratory Work:

1. To determine the wavelength of monochromatic light by Newton‘s Ring.
2. To find the wavelength of light from a given source using Michelson‘s interferometer.
3. To determine the wavelength of spectral lines using plane transmission grating.
4. To find the value of Planck‘s constant.
5. To verify Stefan‘s law by electrical method.
6. To determine the numerical aperture of an optical fibre.
7. To determine the attenuation & propagation losses in optical fibre.
8. To determine the height of a tower with a Sextant.
9. To determine the refractive index of a liquid by Newton‘s ring.
10. To determine the hall co-efficient.
11. To determine the band gap of an intrinsic semiconductor by four prove method.
12. To study the LASER beam characteristics like wavelength using diffraction grating aperture & divergence.
13. To calculate the hysteresis loss by tracing a B-H curve for a given sample.
14. To compare the capacitances of two capacitors by De‘sauty Bridge.
15. To study the variation of magnetic field with distance by Stewart and Gee‘s apparatus.
16. To find the value of e/m for electron by helical method.

HS-111P Communication Lab							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

I	**Learning correct pronunciation**: Organs of speech, IPA symbols (consonant & vowel sounds), classification of consonants as per place & manner of articulation. finding out the correct pronunciation of words with the help of a dictionary, phonetic transcription of words presented orally, conversion of words presented through IPA symbols into normal orthography, syllable division and stress marking (in words presented in IPA form). Intonation (rising & falling tone).
II	**Listening Skills:** Listening with a focus on pronunciation (ear-training), stress and intonation; the students will be exposed, to the following varieties of English during listening practice: Standard Indian, British and American. Learning the differences between British & American pronunciation, Listening practice of the dialogues and speeches in British & American English.
III	**Speaking Skills:** Delivering impromptu speeches, reading aloud of dialogues, poems, excerpts from plays, Situational conversations: Introducing oneself, describing a person, place, situation and event, giving instructions, making inquiries – at a bank, post-office, air-port, hospital, reservation counter etc. Mock interviews and group discussions.
IV	**Writing Skills:** Identifying common mistakes made by students in written communication and improving them, writing emails: sending and responding to emails, preparing and delivering power -point presentations, answering comprehension, translation practice (Hindi to English & vice-versa).

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<table>
<tr><th colspan="9">EE-111P Basic Electrical Engineering Lab</th></tr>
<tr><th colspan="3">Teaching Scheme</th><th rowspan="2">Credit</th><th colspan="3">Marks Distribution</th><th rowspan="2">Duration of End Semester Examination</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Internal Assessment</th><th>End Semester Examination</th><th>Total</th></tr>
<tr><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">2</td><td rowspan="2">1</td><td>Maximum Marks: 30</td><td>Maximum Marks: 20</td><td>50</td><td rowspan="2">2 Hours</td></tr>
<tr><td>Minimum Marks: 12</td><td>Minimum Marks: 8</td><td>20</td></tr>
</table>

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

List of Experiments:

1. To verify Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL)
2. To study the V-I characteristics of an incandescent lamp.
3. Verification of Thevenin's theorem
4. Verification of Norton theorem
5. Verification of superposition and Maximum power theorem
6. To study series LCR circuit
7. To study parallel LCR circuit
8. Power consumption of a fluorescent lamp
9. Measurement of power and power factor by two wattmeter method.
10. To perform short circuit test on a single-phase transformer to calculate copper loss of the transformer.
11. To measure the single-phase power in a single phase a.c. circuit by using three ammeters.
12. To measure the single-phase power in a single phase a.c. circuit by using three voltmeters.

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CHM-111 Applied Chemistry

<table>
<tr><th colspan="3">Teaching Scheme</th><th rowspan="2">Credit</th><th colspan="3">Marks Distribution</th><th rowspan="2">Duration of End Semester Examination</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Internal Assessment</th><th>End Semester Examination</th><th>Total</th></tr>
<tr><td rowspan="2">3</td><td rowspan="2">1</td><td rowspan="2">0</td><td rowspan="2">4</td><td>Maximum Marks: 40</td><td>Maximum Marks: 60</td><td>100</td><td rowspan="2">3 Hours</td></tr>
<tr><td>Minimum Marks: 16</td><td>Minimum Marks: 24</td><td>40</td></tr>
</table>

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-I:

Water Technology: Introduction, Sources, common impurities, Hardness, Degree of hardness and units, water quality parameters and their analysis-Turbidity, TDS, Hardness, Chlorine, Arsenic Test, BOD and COD, Water Softening-Zeolite and Ion-exchange process, Drinking water purification and domestic water purifiers.

Electrochemistry: Specific, equivalent and molar conductivity of electrolytic solutions, Reference Electrodes-Calomel electrode and Ag-AgCl electrode, Ion-selective electrode-Glass electrode, determination of pH of solution using glass electrode, Construction and working of Batteries-Lead acid storage battery, Ni-Cd storage cell, Lithium batteries, fuel cell and Solar cell.

Unit–II:

Corrosion Science: Introduction, Chemical and Electrochemical Corrosion, Theory of electrochemical corrosion, Types of Electrochemical Corrosion-Differential aeration corrosion, Pitting Corrosion. Stress Corrosion e.g., Caustic embrittlement. Factors affecting rate of corrosion-Related to metal & related to environment. Control of corrosion.

Spectroscopy Techniques:

UV-Visible Spectroscopy-principle, Lambert-Beer‘s Law, instrumentation, Electronic Transitions, Auxochromes, Chromophores, Effect of conjugation and solvents on transition of organic molecules, applications.

IR: - Principle, Instrumentation, Fundamental vibrations, Hooke‘s Law, effect of masses of atoms, bond strength, nature of substituent and hydrogen bonding on Vibrational frequency, applications.

Unit–III

Fuels: Classification of fuels, Calorific value - Definition, HCV, LCV, determination of calorific value of solid and liquid fuels using Bomb calorimeter, Ultimate analysis of coal and numerical problems, Petroleum cracking -fluidized bed catalytic cracking. Reformation of petrol, Quality of liquid fuels- Cetane and Octane number, power alcohol-manufacture, advantages and disadvantages, Concept of hydrogen as fuel- types, synthesis by water electrolysis and natural gas reforming.

Chemistry in ICT: Introduction and applications of metal and metal oxides like Si, Ge, Al,, Ti, Ni, Cu, SiO_2, La_2O_3 and ZrO_2 in communication and Display devices (liquid crystals based, LED, CRT, alumina-silicate glass based, touch screen). Disposal of harmful chemicals used in ICT; Hg, Pb, Cd and flame retardant materials.

Unit-IV:

Engineering Materials

Polymers: Introduction, Classification, Glass transition temperature, factors affecting Tg and its significances, Synthesis, properties and applications of PP, PVC, PMMA, polyurethanes, Epoxy resins, Silicon Rubber, PET, Lexan, Kevlar.

Conducting Polymers: Introduction-Definition, applications, Mechanism of conduction in polyacetylene.

Nano- Materials: Introduction, Properties of nanomaterials, Graphene, Fullerenes, Carbon nanotubes, nano wires, nano cones, Application of nano-materials.

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Textbooks:

- Ramesh, S. and Vairam S. Engineering Chemistry, Wiley India.
- Puri, B.R., Sharma, L.R. and Pathania, M.S. Principles of Physical Chemistry, Vishal Publishing Co. (2008).
- Aggarwal, S. Engineering Chemistry: Fundamentals and Applications, Cambridge University Press(2015).

Reference Books:

- Brown, H., Chemistry for Engineering Students, Thompson.
- Sivasankar, B., Engineering Chemistry, Tata Mc Graw-Hill Pub. Co. Ltd, New Delhi(2008).
- Shulz, M. J. Engineering Chemistry, Cengage Learnings (2007).

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CS-111 Computer Programming

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	0	0	3	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-I:

Introduction to C++: C++ character set, C++ Tokens (Identifiers, Keywords, Constants, Operators,), Structure of a C++ Program (include files, main function), use of I/O operators (<>), Cascading of I/O operators, compilation, linking and execution. Concept of Data types: Built-in Data types: char, int, float and double; Constants: Integer Constants, Character constants - \n, \t, \b), Floating Point Constants, String Constants; Access modifier: const; Variables of built-in-data types, Declaration/Initialization of variables, Assignment statement, Type modifier: signed, unsigned, long Operator and Expressions: Operators: Arithmetic operators (-,+,*,/,%), Unary operator (-), Increment (++) and Decrement (--) Operators, Relation operator (>,>=,<=,=,!=), Logical operators (!,&&,||), Conditional operator: ?; Precedence of Operators; Automatic type conversion in expressions, Type casting; C++ shorthands (+=,-=,*=,/=,%=) . Conditional statements: if else, Nested if, switch case default, use of conditional operator, Nested switch case, break statement; Loops: while, do - while, for and Nested loops. Defining a function; function prototype, Invoking/calling a function: call by value, call by reference, returning values from a function, scope rules of functions and variables local and global variables

Unit–II:

Array, Structure and Class: One Dimensional Array: Declaration/initialization of One-dimensional array, inputting array elements, accessing array elements, Two dimensional Array: Declaration/initialization of a two-dimensional array, inputting array elements accessing array elements, Defining a Structure, declaring structure variables, accessing members of structure, Defining a class, declaring object and accessing class members

Unit–III

Constructor and Destructor: Constructors, Parameterized Constructors, Constructors with default arguments, Friend function, and Friend classes

Inheritance: Derived Class declaration, Public, Private and Protected Inheritance, friend function and Inheritance, Forms of inheritance, virtual base class, Abstract class, Advantage and disadvantage of Inheritance.

Unit-IV:

Polymorphism: Classification of Polymorphism, Compile time and Run time Polymorphism, Virtual function, Pure virtual functions

File Handling: Defining and Opening a File, closing a File, reading from a File, Writing into a File. Templates: Need of template, Function templates

Exception Handling: Exception handling mechanism, Catch Blocks, Catch Throw an exception,

Textbooks:

- The C++ Programming Language (4th Edition) By Bjarne Stroustrup
- Lippman, S.B. and Lajoie, J., C++Primer, Pearson Education (2005) 4th ed..
- Stroustrup, Bjarne, The C++ Programming Language, Pearson Education (2000)3rd ed.
- Kanetkar Y., Let Us C++, BPB Publications, 2nded.
- Balaguruswamy E., Object Oriented Programming with C++, McGraw Hill, 2013.

Reference Books:

- Ajoy Eills, Margaret A. and Stroustrup, Bjarne, The Annonated C++ Reference Manual, Pearson Education (2002).

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- Rumbaugh, J.R., Premerlani, W. and Blaha, M., Object Oriented Modeling and Design with UML, Pearson Education (2005) 2nd ed.
- Kanetkar, Yashvant, Let us C++, Jones and Bartlett Publications (2008) 8th ed.
- Brian W. Kernighan, Dennis M. Ritchie, The C++ Programming Language, Prentice Hall)
- Schildt H., C++: The Complete Reference, Tata Mc Graw Hill, 2

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EC-111 Basic Electronics Engineering							
Teaching Scheme			**Credit**	**Marks Distribution**			**Duration of End Semester Examination**
L	**T**	**P**		**Internal Assessment**	**End Semester Examination**	**Total**	
3	1	0	4	**Maximum Marks: 40**	**Maximum Marks: 60**	**100**	**3 Hours**
				Minimum Marks: 16	**Minimum Marks: 24**	**40**	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-I:
Semiconductors: Energy band concept of materials, difference between metal, Insulator and semiconductor, Intrinsic and extrinsic semiconductors (n- type & p- type), current conduction in semiconductor, Photo diode, photo-transistor, LED and seven- segment display. **Semiconductor Diodes**: p- n junction diode, Depletion layer, Energy diagrams of p-n junction and depletion region, Biasing of diode and V-I Characteristics; Rectifiers - half- wave, full- wave and bridge rectifiers; Filters - L, C, LC and π filters; Zener diode, V-I Characteristics and Zener diode as voltage regulator.
Unit–II:
Bipolar Junction Transistors (BJT): Transistor operation and current components in p- n- p and n- p- n transistors, input/output characteristics of CB and CE configurations, Transistor as an Amplifier, transistor cutoff, saturation and active regions, Transistor biasing and bias stabilization: Operating point, Stability factor, Analysis of fixed bias, collector to base bias, Emitter resistance bias circuit and self bias circuit **Field Effect Transistors (FET):** Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, MOSFET: Depletion and enhancement type MOSFET- Construction, operation and characteristics.
Unit–III
Oscillators: Introduction, Criteria for oscillation, types of oscillators Hartley, Colpitt, RC Phase shift and Wein bridge oscillators. **Operational Amplifiers:** Concept of ideal operational amplifiers, ideal operational amplifier parameters, inverting, non-inverting and unity gain amplifiers, adders and subtractor, Differentiator, integrator and Comparator operational Amplifiers
Unit-IV:
Number System and Logic Design: Number systems, Conversions and code, conversion of bases(decimal, binary, octal and hexadecimal numbers), addition and subtraction, Boolean algebra, logic gates (AND, OR, NAND, NOR, XOR, XNOR), concept of universal gate. **Electronic Instruments:** Operation of CRO and its applications, Signal Generator, measurement of voltage, phase and frequency using CRO.

Textbooks:

- Boylestad, R. L. and Nashelsky, L., Electronic Devices & Circuit Theory, Pearson (2009).
- M. M. Mano and M. D. Ciletti, Digital Design, Pearson, Prentice Hall, 2013.

Reference Books:

- Milliman, J. and Halkias, C. C., Electronic Devices and Circuits, Tata McGraw Hill, 2007.
- Donald D Givone, Digital Principles and Design, McGraw-Hill, 2003.
- John F Wakerly, Digital Design: Principles and Practices, Pearson, (2000).
- N Storey, Electronics: A Systems Approach, Pearson, Prentice Hall, (2009).

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MA-121 Applied Mathematics-II

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	1	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

Guidelines for setting Question Paper: Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-I:
Linear Algebra: Review of matrices, Row reduced echelon form, Inverse using Gauss Jordan method and rank of a matrix, Solution of system of linear equations, Linear spaces, Subspaces, Basis and dimension, rank-nullity theorem, Linear transformation and its matrix representation, Eigen values, Eigen vectors and Diagonalization, Cayley-Hamilton Theorem (without proof), and Quadratic form and Orthogonal transformation.
Unit–II:
Ordinary Differential Equations: Review of first order differential equations, Exact differential equations, Second and higher order linear differential equations with constant coefficients, Cauchy‘s & Legendre‘s homogeneous differential equations, Variation of parameters method, Cauchy - Euler equation, Method of undetermined coefficients, Engineering applications of differential equations.
Unit–III
Laplace Transform: Definition and existence of Laplace transforms and its properties, Inverse Laplace transforms using partial fraction, properties and convolution theorem (without proof), Laplace and inverse Laplace transforms of Unit step function and Impulse function, Applications to solve initial and boundary value problems.
Unit-IV:
Fourier Series: Introduction, Fourier series on arbitrary intervals, Even Odd functions, Half range expansions, Parseval‘s theorem, Complex Fourier series, Harmonic analysis. **Vector calculus:** Introduction to vectors, Vector addition and multiplication, Directional derivatives, gradient, divergence & curl with properties, Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Green, Stokes and Gauss divergence theorem (without proof)

Textbooks:

- R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics (2003), 2nd ed.
- B.S. Grewal, ―Higher Engineering Mathematics‖, Khanna Publishers.
- H.K. Dass and Rama Verma, ―Engineering Mathematics‖, S. Chand Publications.

Reference Books:

- N.P. Bali and Manish Goel, ―Engineering Mathematics‖, Laxmi Publications
- B.V. Ramana, ―Higher Engineering Mathematics‖, Tata McGraw Hill Education Pvt. Ltd., New Delhi

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<table>
<tr><th colspan="9">UHV-111 Universal Human Values and Awareness about Himachal Pradesh</th></tr>
<tr><th colspan="3">Teaching Scheme</th><th rowspan="2">Credit</th><th colspan="3">Marks Distribution</th><th rowspan="2">Duration of End Semester Examination</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Internal Assessment</th><th>End Semester Examination</th><th>Total</th></tr>
<tr><td rowspan="2">3</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">3</td><td>Maximum Marks: 40</td><td>Maximum Marks: 60</td><td>100</td><td rowspan="2">3 Hours</td></tr>
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Course Contents:

Unit-I:
Introduction to Value Education: Difference between moral and human values. Five core human values: Truth, Righteous conduct, Peace, Love and Non-violence. Classification of moral values, Value crisis in contemporary Indian society at different levels: Individual, family, Society and culture. Values in Indian constitution: Justice, liberty, equality and fraternity, Fundamental Rights under Indian constitution: Fundamental duties of Indian citizens.
Unit–II:
Harmony with the self, family & society: Understanding Human being as the Co-existence of the Self and the Body, Program to ensure the health of the body Distinguishing between the Needs of the Self and the Body, living in harmony with the self, family & society, steps to achieve self-discipline. Noble Eightfold Path: Right Understanding, Thought, Speech, Action, Livelihood, Effort, Mindfulness, and Concentration.
Unit–III
Understanding Mental health & emotional well-being: Characteristics of a mentally healthy person, causes of mental-health issues in contemporary society, possible solutions to improve mental health. Emotional intelligence: elements of emotional intelligence, Advantages of higher emotional intelligence & improving emotional intelligence, Maslow‘s hierarchy of needs & self-actualization.
Unit-IV:
Awareness about Himachal Pradesh: General knowledge including the knowledge of different places of historic, national and cultural importance & tourist attraction, hydro power projects, industries, highways, educational and other institutions of the state, knowledge about the famous personalities from the state, currents affairs of Himachal Pradesh, history of Himachal- from medieval to present time, Geography-including the weather, borders, rivers, mountain-ranges , passes, peaks , knowledge of customs and culture of HP : including the costumes, customs, fairs and festivals etc.

Textbooks:

- The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- The Wonderland Himachal Pradesh An Encyclopedia, Jag Mohan Balokhra, H. G. Publications New Delhi

Reference Books:

- Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- The Story of Stuff (Book).
- The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
- Slow is Beautiful - Cecile Andrews
- Economy of Permanence - J C Kumarappa
- Bharat Mein Angreji Raj – Pandit Sunderlal
- Rediscovering India - by Dharampal
- Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
- India Wins Freedom - Maulana Abdul Kalam Azad
- Vivekananda - Romain Rolland (English)

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ME-111P Engineering Graphics and Design

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	4	2	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

List of experiments:

Practical numbers 1-6 shall be perform in the drawing hall with the help of different drawing instruments/tools and practical numbers 7-10 shall be performed in the Auto CAD laboratory.

1. Introduction to different types of lines, lettering, dimensioning and scales.
2. To draw the projection of points and lines.
3. To draw the projection of planes.
4. To draw the projection of solids and section of solids.
5. To draw the projection of development of surfaces.
6. To draw the isometric projections.
7. Introduction to Auto CAD (History, exploring GUI, Workspace, Coordinate System, Snap, Grid and Ortho modes) and basic commands for 2D drawings.
8. Introduction to file management, drawing & drafting settings.
9. Perform dimensioning and annotations in drawing arc, lines, angle etc.
10. Use of drawing & modify tools to make simple shapes of different 2D- drawings of projection of points, line, plane, solids, section of solid, development of surfaces and isometric projections.

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CHM-111P Applied Chemistry Lab

<table>
<tr><th colspan="3">Teaching Scheme</th><th rowspan="2">Credit</th><th colspan="3">Marks Distribution</th><th rowspan="2">Duration of End Semester Examination</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Internal Assessment</th><th>End Semester Examination</th><th>Total</th></tr>
<tr><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">2</td><td rowspan="2">1</td><td>Maximum Marks: 30</td><td>Maximum Marks: 20</td><td>50</td><td rowspan="2">2 Hours</td></tr>
<tr><td>Minimum Marks: 12</td><td>Minimum Marks: 8</td><td>20</td></tr>
</table>

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

Laboratory Work:

1. To determine the pH and conductivity of five different water samples.
2. To determine total alkalinity in a given sample of water using standard acid.
3. To determine total hardness of water using complexometric titration method.
4. To determine the amount of Chlorine (residual) in given sample of water using N/20 Sodium thiosulphatesolution.
5. To determine the percentage of Chlorine in sample of bleaching powder, 10 g of which are dissolved in 500ml of water.
6. To determine the amount of Chromium in given sample of water.
7. To determine dissolved oxygen in given sample of water.
8. To determine the coefficient of viscosity of the given unknown liquids by using Ostwald‘s Viscometer
9. To determine the coefficient of viscosity of the given lubricating oil using Red Wood Viscometer.
10. To determine surface tension of given liquid by drop number method using Stalagmometer.
11. To determine % age of moisture, volatile matter, ash and fixed carbon in given sample of coal by proximateanalysis method.
12. To verify Beer's Law and apply it to find the concentration of given unknown solution by using UV-visiblespectra-photometer.
13. Estimation of Copper/Iron.
14. Preparation of any of the following polymers: Phenol formaldehyde resins/Urea formaldehyde resins /Biodegradable /conducting polymer.
15. To synthesize a polymer using synthetic monomer via free radical polymerization and characterize thepolymer using FTIR spectra-photometer.
16. To synthesize a semisynthetic polymer via grafting of monomer on polymeric backbone and characterize thepolymer using FTIR spectra-photometer.
17. Synthesis of nano-particles of Au/Ag/NiO/ZnO/Iron Oxide

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<table>
<tr><th colspan="9">CS-111P Computer Programming Lab</th></tr>
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<tr><td>Minimum Marks: 12</td><td>Minimum Marks: 8</td><td>20</td></tr>
</table>

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

Laboratory work:

1. WAP for basic input/output statement and various control statements.
2. WAP to create for function and function calling methods
3. WAP to take input and display elements of 1D and 2D array.
4. WAP for structures and display the values of structure members using structure variable.
5. WAP for creating class, defining member in class and accessing member.
6. WAP using various string functions in C++.
7. WAP for constructor and Destructor.
8. WAP for inheritance.
9. WAP for friend function and friend class.
10. WAP for polymorphism.
11. WAP for exception handling in C++.
12. WAP using template concept.
13. WAP to create function and use function calling methods.

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EC-111P Basic Electronics Engineering Lab

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks: 20	50	2 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

Laboratory Work:

1. Familiarization with electronics equipment (multimeters, CROs, power supply and function generators)
2. Study of the characteristics of P- N junction diode.
3. Study of the characteristics of Zener diode
4. Study of truth tables of different logic gates (AND, OR, NAND, NOR, XOR, XNOR).
5. Familiarization with CRO.
6. DSO and Electronic Components.
7. Diodes characteristics - Input- Output and Switching.
8. BJT and MOSFET Characteristics.
9. Zener diode as voltage regulator, Rectifiers.
10. Construction of an un regulated DC power supply (using a transformer, a full wave rectifier and a capacitor filter) and study of its output waveform by CRO.
11. Study of inverting and non-inverting amplifiers using op-amp
12. Study of the frequency response of any one oscillator.

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HS-122P Holistic Health & Yoga

Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	**T**	**P**		**Internal Assessment**	**End SemesterExamination**	**Total**	
0	**0**	**2**	**1**	**Maximum Marks: 30**	**Maximum Marks: 20**	**50**	**3 Hours**
				Minimum Marks: 12	**Minimum Marks: 8**	**20**	

Following is the list of experiments/ jobs. Minimum 08 number of practicals are to be performed from following list. The additional experiments may be performed by the respective institution depending on the infrastructure available.

List of Experiments:

1. Introduction of Yoga, Different Definitions of Yoga. General Guidelines for Yogic Practices
2. Traditional Schools of Yoga: Bhakti yoga, karma yoga, Gyana yoga, Hatha yoga, Mantra yoga, Laya yoga, Raja yoga) Ashtanga Yoga of Sage Patanjali.
3. Concept of Shatkriyas: Dhauti, Basti, Neti, Nauli, Trataka and Kapalbhati. Shatkriyas (Cleansing Process): Jala neti, Sutra neti. Kunjala, Vastra Dhauti, Danda Dhauti, kapalbhati, Surya namaskar.
4. Concept of Surya namaskar: Introduction, Technique, benefit, precaution.
5. Concept of Asanas Introduction, Types, Technique, benefit, precaution, Asanas: Standing Poses: Tadasana, Kati chakrasana, tiryak tadasana, vrikshasana, veer bhadrasana, garudasana, trikonsana, Sitting Poses: Padmasana, Swastikasana, Vajrasana, Bhadrasana, Gomukhasana, Mandukasana, Singhasana.
6. Concept of Pranayama: Introduction, Types, Technique, benefit, precaution.
7. Meditation: Concept, technique, benefit, and precaution. Dhyana: Sthoola Dhyana, Jyoti Dhyana, Sukshama Dhyana, (According to Gheranda Samhita). Mantra Chanting- Omkar (Pranav Jaap), Gayatri Mantra, Maha Mrityunjaya Mantra, Shanti Mantr
8. Lying Down Poses: Spine Position: uttanpadasana, Pawan muktasana, Naukasana, markatasana, halasana, sarvangasana, matsyasana, setubandhasana, chakarasana and shavasana. Prone Position: Bhujangasana, Shalabhasana, Dhanurasana, Vipreet naukasana

Textbooks:

- BKS Iyengar (2012), Light on Yoga
- Basvaraddi & S.P.Pathak (2016), Yogic Suksham Vyayam Evem Sthula
- Vyayam Swami Satyananda Saraswati (2012), Asana Pranayama Mudra
- Modern Trends and Physical Education by Prof. Ajmer Singh.

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