SCHEME & SYLLABUS

B.Tech Civil Engineering

Department of Civil Engineering

University Institute of Engineering Technology

Sant Baba Bhag Singh University

2015

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SEMESTER I / II

Scheme for B. Tech. 1st Year (Common to all disciplines) (Physics Group)

I. Theory Subjects (including Non- Credit Courses)

S. No.	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	*PHY105	Engineering Physics	3:0:0	3:0:0	3	3
2	MAT103 / MAT104	Engineering Mathematics-I/ Engineering Mathematics-II	4:2:0	4:1:0	6	5
3	*EE101	Basic Electrical Engineering	2:0:0	2:0:0	2	2
4	*CSE101	Fundamentals of Computer Technology	3:0:0	3:0:0	3	3
5	*EVS101	Environmental Science	3:0:0	3:0:0	3	3

II. Practical Subjects

S. No	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	*PHY107	Engineering Physics Laboratory	0:0:2	0:0:1	2	1
2	*EE103	Basic Electrical Engineering Laboratory	0:0:2	0:0:1	2	1
3	*CSE103	Fundamentals of Computer Technology Laboratory	0:0:4	0:0:2	4	2
4	*ME107	Engineering Workshop	0:0:6	0:0:3	6	3
5	*PT101/PT103 /PT105	Physical Training-I (NSO/NCC/NSS)	0:0:2	NC	2	NC

- In the 2nd Semester the scheme for Physics and Chemistry group will interchange
- In the 2nd Semester Engineering Mathematics-1 will be replaced by Engineering Mathematics-2
- Training after the 2nd Semester will be focused on Engineering Computer Graphics Laboratory work
- *Indicates that the subject will be offered in both the Semesters

Total Contact Hours = 33
Total Credits = 23

SEMESTER I / II

Scheme for B. Tec h. 1st Year (Common to all disciplines) (Chemistry Group)

I. Theory Subjects (including Non- Credit Courses)

S. No	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	*CHM105	Engineering Chemistry	3:0:0	3:0:0	3	3
2	MAT103/ MAT104	Engineering Mathematics-I/ Engineering Mathematics-II	4:2:0	4:1:0	6	5
3	*ME101	Basics of Mechanical Engineering	3:1:0	3:0.5:0	4	3.5
4	*ECE101	Basic Electronics & Communication Engineering	2:0:0	2:0:0	2	2
5	*ENG121	Communication Skills-I	2:0:0	2:0:0	2	2
6	*ME103	Engineering Drawing	1:0:0	1:0:0	1	1

II. Practical Subjects

S. No	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	*CHM107	Engineering Chemistry Laboratory	0:0:2	0:0:1	2	1
2	*ECE103	Basic Electronics & Communication Engineering Laboratory	0:0:2	0:0:1	2	1
3	*ENG123	Communication Skills-I (Practical)	0:0:2	0:0:1	2	1
4	*ME103	Engineering Drawing Laboratory	0:0:6	0:0:3	6	3
5	*PT102/PT104 /PT106	Physical Training II (NSO/NCC/NSS)	0:0:2	NC	2	NC

- In the 2nd Semester the scheme for Physics and Chemistry group will interchange
- In the 2nd Semester Engineering Mathematics-1 will be replaced by Engineering Mathematics-2
- Training after the 2nd Semester will be focused on Engineering Computer Graphics Laboratory work
- *Indicates that the subject will be offered in both the Semesters

Total Contact Hours = 32
Total Credits = 22.5

SEMESTER III

Theory Subjects
Including Non-Credit Courses

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	MAT205	Engineering mathematics-III	4:1:0	4:0.5:0	5	4.5
2	CE201	Solid Mechanics	3:1:0	3:0.5:0	4	3.5
3	CE203	Fluid Mechanic-I	3:1:0	3:0.5:0	4	3.5
4	CE205	Surveying –I	3:0:0	3:0:0	3	3
5	CE207	Building Technology	3:0:0	3:0:0	3	3

II. Practical Subjects

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE211	Solid Mechanics Lab	0:0:2	0:0:1	2	1
2	CE213	Fluid Mechanic-I Lab	0:0:2	0:0:1	2	1
3	CE215	Surveying-I Lab	0:0:3	0:0:1.5	3	1.5
4	CE217	Institutional Training (Undertaken after 2nd semester)		3 Weeks		3
5	PT201/PT203 /PT205	Physical Training III (NSO/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours = 28
Total Credits = 24

SEMESTER IV

Theory Subjects
Including Non-Credit Courses

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE202	Structural Analysis-I	3:1:0	3:0.5:0	4	3.5
2	CE204	Design of Concrete Structure-I	3:1:0	3:0.5:0	4	3.5
3	CE206	Environmental Engineering-I	3:0:0	3:0:0	3	3
4	CE208	Surveying – II	3:0:0	3:0:0	3	3
5	CE210	Elements of Earthquake Engineering	3:0:0	3:0:0	3	3
6	CE212	Fluid Mechanic-II	3:1:0	3:0.5:0	4	3.5
7	CE214	Irrigation Engineering I	3:0:0	3:0:0	3	3
		*Educational tour				

*At least one educational tour must be carried out in the semester for the practical exposure of the students. The tour must augment existing or previous lesson plans and synchronize with classroom learning.

II. Practical Subjects

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE216	Structural Analysis-I Lab	0:0:2	0:0:1	2	1
2	CE218	Concrete Technology Lab	0:0:2	0:0:1	2	1
4	PT202/PT204 /PT206	Physical Training IV (NSO/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours = 30
Total Credits = 24.5

SEMESTER V

Theory Subjects
Including Non-Credit Courses

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE301	Design of Steel Structure-I	3:1:0	3:0.5:0	4	3.5
2	CE303	Structural Analysis-II	3:1:0	3:0.5:0	4	3.5
3	CE305	Transportation Engineering I	3:0:0	3:0:0	3	3
4	CE307	Environmental Engineering-II	3:0:0	3:0:0	3	3
5		Professional Elective-I	4:1:0	4:0.5:0	5	4.5
6	ENG307	Professional Communication skills	3:0:0	3:0:0	3	3
7	SSE303	Human Values & Professional Ethics	3:0:0	NC	3	NC

II. Practical Subjects

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE309	Computer Aided Steel Structural Design/Drawing	0:0:2	0:0:1	2	1
2	CE311	Environmental Engineering Lab	0:0:2	0:0:1	2	1
3	CE313	Transportation Engineering-I Lab	0:0:2	0:0:1	2	1
3	CE315	*Survey Camp of Two Weeks Duration After Fourth Semester		2 Weeks		3
4	CE317	**Seminar – I	0:0:2	0:0:1	2	1

Professional Elective-I

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE319	Structural Analysis III	4:1:0	4:0.5:0	5	4.5
2	CE321	Dynamics of Structures	4:1:0	4:0.5:0	5	4.5
3	CE323	Finite Element Methods in Engineering	4:1:0	4:0.5:0	5	4.5
4	CE325	Pre-stressed Concrete	4:1:0	4:0.5:0	5	4.5

***Survey Camp** of 3 weeks duration will be held immediately after 4th semester at a Hilly Terrain. The students are required to prepare the Topographical Map of the area by traditional method. Students should also be exposed to modern Survey Equipment and practices, like Total Station, Automatic Level, GPS etc.

****The seminar-I** will be studied and presented by the student on the topic of any latest technology in their relevant field. The complete knowledge of the latest technology is expected from the student. A Report and presentation will be submitted at the end of semester.

Total Contact Hours = 33
Total Credits = 27.5

SEMESTER VI

Theory Subjects

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	MAT304	Numerical & Statistical Methods	4:0:0	4:0:0	4	4
2	CE302	Design of Concrete Structure II	3:1:0	3:0.5:0	4	3.5
3	CE304	Transportation Engineering-II	3:0:0	3:0:0	3	3
4	CE306	Soil Mechanics	3:0:0	3:0:0	3	3
5	CE308	Professional Practice	3:0:0	3:0:0	3	3
6		Open Elective-I	4:0:0	4:0:0	4	4
7		Professional Elective-II	4:1:0	4:0.5:0	5	4.5

II. Practical Subjects

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE310	Computer Aided RCC Design/ Drawing	0:0:2	0:0:1	2	1
2	CE312	Soil Mechanics Lab	0:0:2	0:0:1	2	1
3	CE314	*Seminar-II	0:0:2	0:0:1	2	1

Professional Elective II

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE316	Traffic & Transportation Planning	4:1:0	4:0.5:0	5	4.5
2	CE318	Advanced Transportation Engineering	4:1:0	4:0.5:0	5	4.5
3	CE320	Pavement Design	4:1:0	4:0.5:0	5	4.5
4	CE322	Bridge Engineering	4:1:0	4:0.5:0	5	4.5

*In Seminar-II the literature survey, problem formulation, assessment for feasibility of the project, objectives and methodology for the project to be undertaken in next semester shall be presented in 6th semester. The same problem is to be extended in the Project work in 7th semester.

Total Contact Hours = 32

Total Credits = 28

SEMESTER VII

Theory Subjects

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE401	Design of Steel Structure II	3:1:0	3:0.5:0	4	3.5
2	CE403	Irrigation Engineering II	3:0:0	3:0:0	3	3
3	CE405	Foundation Engineering	3:0:0	3:0:0	3	3
4		Open Elective II	4:0:0	4:0:0	4	4
5		Professional Elective-III	4:1:0	4:0.5:0	5	4.5
6		Professional Elective-IV	4:1:0	4:0.5:0	5	4.5
7	ENG401	Technical Writing & Presentation Skills	3:0:0	NC	3	NC

II. Practical Subjects

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
2	CE411	Project Work	0:0:6	0:0:3	6	3

Professional Elective III

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE413	Soil Dynamics	4:1:0	4:0.5:0	5	4.5
2	CE415	Ground Improvement Techniques	4:1:0	4:0.5:0	5	4.5
3	CE417	Advanced Foundation Engineering	4:1:0	4:0.5:0	5	4.5
4	CE419	Rock Mechanics & Engineering Geology	4:1:0	4:0.5:0	5	4.5

Professional Elective IV

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE421	Advanced Environmental Engineering	4:1:0	4:0.5:0	5	4.5
2	CE423	Water Resource Management	4:1:0	4:0.5:0	5	4.5
3	CE425	Solid & Hazardous Waste Management	4:1:0	4:0.5:0	5	4.5
4	CE427	Environmental Impact Analysis of Civil Engineering Projects	4:1:0	4:0.5:0	5	4.5

*The problem of the project, formulated" during 6th Semester is to extended and executed In project work by the same group of students. The design/construction/fabrication/computer modeling/experimentation etc. is to be carried out. The results and analysis followed by discussion

regarding suitability /non suitability of the project or any positive gain in the project made with conclusions and recommendations for future extension of the project must be covered.

Total Contact Hours = 33
Total Credits = 25.5

SEMESTER VIII

Theory Subjects

S. No	Sub code	Subject Name	Contact hours (L.T.P)	Credits (L.T.P)	Total contact Hours	Total credit Hours
1	CE402	Industrial Training		6 Months		22

Total Credits = 22

*The 6 month industrial training must be undertaken in reputed industry for whole semester. The student must submit a mid-term report after three months. The student will submit Training Report along with training certification from industry. A presentation at the end of semester will be given by the student in front of Faculty of concerned department.

LIST OF OPEN ELECTIVES

OPEN ELECTIVE-I

S. No	Code	Course Title	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	AGE372	Advanced Engineering systems	4:0:0	4:0:0	4	4
2	AGE374	Engineering Economy and Project Planning	4:0:0	4:0:0	4	4
3	CE372	Rural Technology & Community Development	4:0:0	4:0:0	4	4
4	CE374	Disaster Management	4:0:0	4:0:0	4	4
5	CSE372	Operating System & Database Management System	4:0:0	4:0:0	4	4
6	CSE374	Elements of System Analysis & Design	4:0:0	4:0:0	4	4
7	ECE372	Mobile Communication	4:0:0	4:0:0	4	4
8	ECE374	Broadband Communication	4:0:0	4:0:0	4	4
9	EE372	Electrical measurement	4:0:0	4:0:0	4	4
10	EE374	Energy Auditing & Management	4:0:0	4:0:0	4	4
11	ME372	Total Quality Management	4:0:0	4:0:0	4	4
12	ME374	Maintenance and Reliability Engineering	4:0:0	4:0:0	4	4
13	MGT372	Basics of Human Resource Management	4:0:0	4:0:0	4	4
14	MGT374	Management Practices	4:0:0	4:0:0	4	4

OPEN ELECTIVE-II

S. No	Code	Course Title	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	AGE471	Reliability Engineering	4:0:0	4:0:0	4	4
2	AGE473	Remote Sensing and Geographical Information System	4:0:0	4:0:0	4	4
3	CE471	Infrastructure and Real Estate Management	4:0:0	4:0:0	4	4
4	CE473	Architecture & Town Planning	4:0:0	4:0:0	4	4
5	CSE471	Web Development	4:0:0	4:0:0	4	4
6	CSE473	Distributed System	4:0:0	4:0:0	4	4
7	ECE471	Computer Networks	4:0:0	4:0:0	4	4
8	ECE473	Speech & Image Processing	4:0:0	4:0:0	4	4
9	EE471	Fundamentals of Electrical Machines	4:0:0	4:0:0	4	4
10	EE473	Elements of power system	4:0:0	4:0:0	4	4
11	ME471	Renewable Energy Resources	4:0:0	4:0:0	4	4
12	ME473	Ergonomics	4:0:0	4:0:0	4	4
13	MGT471	Managing Innovation and Entrepreneurship	4:0:0	4:0:0	4	4
14	MGT473	Project Management	4:0:0	4:0:0	4	4

SUMMARY OF SCHEME

Sem	L	T	P	Contact hrs/week	Credit	HS	BS	ES	PC	PE	OE	Project/ Training/ Seminar	MC
1	15	2	16	33	23	2	9	11	-	-	-	-	-
2	16	3	14	32	22.5	4	9	10.5	-	-	-	-	-
3	16	3	9	28	24	-	4.5	9	7.5	-	-	3 Training	-
4	21	3	6	30	24.5	-	-	3.5	21	-	-	-	-
5	22	3	8	33	27.5	3	-	-	16	4.5	-	1seminar+3 Training=4	3 unit
6	24	2	6	32	28	3	4	-	14.5	4.5	4	1 seminar	-
7	24	3	6	33	25.5	-	-	-	9.5	9	4	3 Project	3unit
8	6 Months Industrial Training				22	-	-	-	-	-	-	22	-
Total	**138**	**19**	**67**	**221**	**197**	**12**	**26.5**	**34**	**68.5**	**18**	**8**	**33**	**6 Units**

Course Code	**PHY105**
Course Title	**Engineering Physics**
Type of course	**BS**
L T P	**3 0 0**
Credits	**3**
Course Prerequisite	**+2 Physics (Non Medical)**
Course Objective (CO)	**To provide high quality, comprehensive educational and training opportunities those are compatible to changing needs of the students. Engineering Physics is a field that provides broad training in physics and basic training in engineering and design. Our engineering physics program aims to educate students to become professionals with in-depth knowledge and skills in engineering to understand physical systems; to research, design, and solve problems; and to provide the foundation for graduate study and lifelong learning.**

SYLLABUS

UNIT-I.

Electromagnetics: Physical significance of Gradient, Divergence & Curl, Integral and Differential approach to Gauss Law, Ampere's law and Faraday's law, Stoke's theorm, Gauss divergence theorem, Equation of continuity, Maxwell's Equations, Equation of EM waves in free space, velocity of EM waves, Dielectric polarization, displacement Current, Types of polarization.

Physics of Materials: Basic Ideas of Dia, Para, Ferro & Ferri, Ferrites, Domain theory, Magnetic Anisotropy, Magnetostriction, B-H curve, Hard and Soft magnetic materials, Superconductivity, Superconductors as ideal diamagnetic materials, Signatures of Superconducting state, Meissner Effect, Type I & Type II superconductors, London Equations, Introduction to BCS theory.

UNIT-II.

Special Theory of Relativity: Concept of Ether, Michelson Morley experiment, Einstien's postulates, Lorentz transformation equations, lengh, time and simultaneity in relativity, Addition of velocity, Variation of mass with velocity, Mass Energy equivalence, Energy momentum relations.

UNIT-III

Lasers: Introduction, Spontaneous & Stimulated emissions, Einstein's Coefficients, Population Inversion, Pumping Mechanisms, Components of a laser System, Lasing action, properties of laser, Three & four level laser systems; Ruby, He-Ne, CO_2 and semiconductor Lasers, Characteristics of different types of lasers, Applications of lasers, Holography.

Fibre Optics: Introduction, Acceptance Angle, Numerical Aperture, Normalized Frequency, Modes of propagation, Losses in Optical Fibre, Fibre connectors, Splices and couplers, Applications of Optical Fibres.

UNIT-IV.

Physics of crystallography: Unit cell, Basis, Space lattice, Crystal Systems, Miller Indices of Planes & Directions in cubic system, Continuous & Characteristic X-Rays, X-Ray Diffraction & Bragg's law in

Crystals,

Nanophysics: Nano scale, Surface to volume ratio, Nano particles(1D 2D 3D), Nano materials and their properties, Synthesis Methods- Ball milling and sol- gel techniques, Carbon nanotubes (Synthesis and properties), Applications of nano materials.

Suggested textbooks			
S. No	**Name**	**Author(S)**	**Publisher**
1	Physics for Scientists & Engineers (Vol. I &II),	Serway & Jewett, 6thEdition	Cengage Learning.
2	Engineering Physics,	Malik; HK, Singh; AK,	Tata McGraw Hill
3	Materials Science & Engg.,	Raghvan V.	Prentice Hall of India
4	Concepts of Modern Physics	Beiser; A.,Mahajan S.Choudhary SR	Tata McGraw Hill
5	Solid State Physics	Dan Wei,	Cengage Learning
6	Introduction to Solids	Azaroff LV	Tata Mc Graw Hill
7	Introduction to Electrodynamics	Griffiths; DJ,	Prentice Hall
8	Lasers & Optical engineering	Dass; P,	Narosa Publishers
9	Optical Fibre system, Technology, Design & Applications	Kao; CK	McGraw Hill.

Course Code	**MAT103**
Course Title	**Engineering Mathematics-I**
Type of course	**BS.**
L T P	**4 2 0**
Credits	**5**
Course prerequisite	**+2 with non- medical**
Course Objective (CO)	**Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students : (1) To understand the theory knowledge as well as practical knowledge of different formulas.(2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a sound foundation that eventually will help them in their coming technical futures.**

SYLLABUS

UNIT-I

Matrices: Rank of Matrices, Inverse of Matrices, Gauss Jordan Method, reduction to normal form, Consistency and solution of linear algebraic system of equations, Gauss Elimination Method, Eigen values and Eigen vectors, Diagonalization of Matrix, Cayley Hamilton Theorem, Orthogonal

UNIT-II

Partial Derivatives: Function of two or more variables, Partial differentiation; Homogeneous functions and Euler's theorem ; Composite functions ; Total Derivative ; Derivative of an implicitfunction, Change of variable, jacobian

Applications of Partial Differentiation: Tangent and normal to a surface; Taylor's and Maclaurin's series for a function of two variables; Maxima and Minima of function of several variables; Lagrange's method of undetermined multipliers.

UNIT-III

Multiple Integrals:. Double and triple integral and their evaluation, change of order of integration, change of variable, Application of double and triple integration to find areas and volumes.

UNIT-IV

Vector Calculus: Scalar and vector fields, differentiation of vectors, velocity and acceleration. Vector differential operators: Del, Gradient, Divergence and Curl, Formulae involving Del applied to point functions and their products. Directional Derivatives and Work Done By Force, Line, surface and volume integrals.

Application of Vector Calculus: Solenoidal and irrotational vectors. Gauss Divergence Theorem. Green's Theorem in plane, Stoke's Theorem (without proof) and their applications.

Suggested textbooks			
S. No	**Name**	**Author(S)**	**Publisher**
1	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publishers
2	Fourier Series and Boundary Values Problems	Churchill	McGraw Hill.
3	Complex Variables & Applications	Churchill	McGraw Hill.
4	Engineering Mathematics	Bali & Lyingar	Laxmi Publication.
5	Advanced Engineering Mathematics	Wylie and Barren	Mcgrawhill,6thedition,1995
6	Advanced Engineering Mathematics	Kreyszig, John Wiley	

Course Code	**MAT104**
Course Title	**Engineering Mathematics -II**
Type of course	**BS**
L T P	**4 2 0**
Credits	**5**
Course Prerequisite	**Engineering Mathematics –I**
Course Objective (CO)	**Mathematics is really a great tool to understand the things correctly. The aim of the course is to enable students : (1) To understand the theory knowledge as well as practical knowledge of different formulas.(2) To inculcate the skills to use different methods to solve the applied problems. (3) To check the accuracy of every formula by using different strategies. (4) To give them a sound foundation that eventually will help them in their coming technical futures.**

SYLLABUS

UNIT I

Probability Distributions and Sampling Distributions: Random variables, Probability Distribution: Binomial, Poisson and Normal distributions. Fundamentals of Sampling, Large samples, Small samples; Sampling distribution of the means, t-Distribution, F-Distribution, Chi-square Distribution.

UNIT II

Ordinary Differential Equations of first order and Linear Ordinary Differential Equations of second & higher order: Exact Differential equations, Equations reducible to exact form by integrating factors; Equations of the first order and higher degree, Clairaut's equation.Leibniz's linear and Bernoulli's equation Solution of linear Ordinary Differential Equations of second and higher order; methods of finding complementary function and particular integrals. Method of variation of parameters, Cauchy's homogenous and Legendre's linear equation.

UNIT III

Complex Numbers and elementary functions of complex variable: De-Moivre's theorem and its applications. Real and Imaginary parts of exponential, logarithmic, circular, inverse circular, hyperbolic, functions of complex variables. Summation of trigonometric series.(C+iS method)

UNIT IV

Measures of Central tendency and Dispersion: Measures of central tendancy: Arithmatic Mean, Geometric Mean, Harmonic Mean, Quartiles, Deciles, Percentiles. Median, Mode, Skewness, Kurtosis. Measures of dispersion: Range, Interquartile range, Variance and Standard Deviation.

Suggested textbooks

S. No	Name	Author(S)	Publisher
1	Higher Engineering Mathematics	Grewal, B.S.	Khanna Publishers, Delhi

2	Advanced Engineering Mathematics	Jain, R.K and Iyengar, S.R.K.	Narosa Publishing Company
3	Statistical Methods	S P Gupta	Sultan Chand & sons Publisher

Course Code	**EE101**
Course Title	**BASICS OF ELECTRICAL ENGINEERING**
Type of course	**ES**
L T P	**2 0 0**
Credits	**2**
Course prerequisite	**Physics & Mathematics**
Course Objective (CO)	**To familiarize with AC, DC circuits & their fundamentals, Magnetic circuits & Transformer, Electrical Machines and Measuring Instruments**

SYLLABUS

UNIT-I
DC Circuits
Circuits : Identifying the Elements and the Connected Terminology, Ohm's Law- Statement, Illustration and limitation, Kirchhoff's Laws –Statement and Illustration ,Method of solving a Circuits by Kirchhoff's Laws, Computation of Resistance at Constant temperature, Temperature Dependence of resistance, Computation of Resistance at different temperatures, Units – Work, Power and Energy (Electrical, Thermal and Mechanical).

UNIT-II
AC Fundamentals
Generation of Alternating Emf, Concept of 3-phase EMF Generation, Root Mean Square or Effective Value, Average value of AC, Phasor Representation of Alternating quantities, Representation of Alternating Quantities in Rectangular and Polar forms, Introduction of Resistors, Inductors and Capacitors, R-L Series Circuits, R-C Series Circuits, R-L-C Series Circuits, Admittance and its components, Resonance in Series and Parallel, Analysis of simple 3 phase system, star-delta connections and conversion.

UNIT-III
Magnetic Circuits
Comparison between Magnetic and Electric circuits, Electromagnetic Induction, Magnetic Effects of Electric Current, Current carrying conductor in Magnetic field, Law of Electromagnetic Induction, Self Inductance, Mutual Inductance ,Coupling Coefficient between two magnetically coupled Circuits.

UNIT-IV
Electrical Machines Transformer: principle, construction, working, efficiency & applications. D.C. Generator: principle, construction, working & applications. D.C. Motor: principle, construction, working & applications. Three Phase Induction Motor: principle, construction, working & applications.

Measuring Instruments

Classification of Instruments, Basic Principles of indicating instruments, Moving Iron Instruments – Attraction and Repulsion Type, Moving Coil Instruments – Permanent Magnet - Dynamometer Type, Multimeters.

Suggested textbooks			
S. No	**Name**	**Author(S)**	**Publisher**
1	Basic Electrical, Electronics and Computer Engg.	R muthusubramanian,S Salivahanan,K A Muraleedharan	Tata McgrawHill
2	A Textbook of Electrical Tech	B.L Theraja.& A.K Theraja	S Chand
3	Fundamentals of Electrical Engg	Vincent Deltoro	Prentice Hall.
4	A Course in electrical and electronic Measurements & Instumentation	A.K Sawhney	Dhanpat Rai & co.
5	Basic Electrical Engineering	H.M Rai and S.Marwaha	Satya Prakashan, Delhi

Course Code	**CSE101**
Course Title	**Fundamentals of Computer Technology**
Type of course	**ES**
L T P	**3 0 0**
Credits	**3**
Course prerequisite	**Basics of computer and any high level language**
Course Objective (CO)	**To familiarize the students of all branches in engineering with computer organization, operating systems, problem solving and programming in C++.**

SYLLABUS

UNIT I

Introduction to Computers: Define a Computer System, Block diagram of a Computer System and its working, associated peripherals, memories, RAM, ROM, secondary storage devices, Computer Software and Hardware.

Working Knowledge of Computer System and Office automation: Introduction to the operating system, its functions and types, working knowledge of GUI based operating system, introduction to word processors and its features, creating, editing, printing and saving documents, spell check, mail merge, creating power point presentations, creating spreadsheets and simple graphs.

Problem Solving & Program Planning: Need for problem solving and planning a program; program design tools – algorithms, flow charts, and pseudo code; illustrative examples.

UNIT II

Overview of C++ Language: Introduction to C++ language, structure of a C++ program, concepts of compiling and linking, IDE and its features, Basic terminology - Character set, tokens, identifiers, keywords, fundamental data types, literal and symbolic constants, declaring variables, initializing variables, type modifiers.

Operators and expressions: Operators in C++, precedence and associativity of operators, expressions and their evaluation, type conversions.

Beginning with C++ program: Input/output using extraction (>>) and insertion (<<) operators, writing simple C++ programs, comments in C++**,** stages of program execution.

UNIT III

Control Structures and Functions: Decision making statements: if, nested if, if – else. Else if ladder, switch, Loops and iteration: while loop, for loop, do – while loop, nesting of loops, break statement, continue statement, go to statement, Advantages of using functions, structure of a function, declaring and defining functions, return statement, formal and actual arguments, const argument, default arguments,

Arrays and Strings: Declaration of arrays, initialization of array, accessing elements of array, I/O of arrays, passing arrays as arguments to a function, multidimensional arrays. String as array of characters, initializing string variables, I / O of strings, string manipulation functions (strlen, strcat, strcpy, strcmp), passing strings to a function. Use of arrays and strings through illustrative programming examples**.**

Classes and Objects: Concept of classes, Declaration of classes, Defining access specifier, Public, Private, Protected derivations, defining member functions in a class, use of scope resolution operator outside the class definition. Defining objects. Friend function.

UNIT IV

CAD/CAM: Introduction to the basics of CAD and CAM, Study 2-D sketching entities like lines, rectangle, parallelogram polygon, circle etc., under SKETCH ENTITY MENU.

Evolution of Internet and its applications and services.

Suggested textbooks			
S. No	**Name**	**Author(S)**	**Publisher**
1	Object-Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
2	Object-Oriented Programming with C++	Lafore R.	Waite Group
3	The C++ Programming Language	Bjarne Stroustrup	Addison Wesley
4	Fundamentals of Computers	R. S. Salaria	Salaria Publishing House

Course Code	**EVS101**
Course Title	**Environmental Science**
Type of course	**HS**
L T P	**3 0 0**
Credits	**3**
Course Prerequisite	**Basic Science**
Course Objective (CO)	**To make students aware about environment and need of maintaining it with best possible knowledge.**

SYLLABUS

UNIT-I

Introduction to Environment and Ecosystem: Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness, Concept of Ecosystem. Structure, interrelationship, producers, Consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spots of biodiversity.

UNIT II

Environmental Pollution & Natural Resources: Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management. Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster Management: Floods, earthquake, cyclone and landslides. Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

UNIT-III

Social Issues and the Environment :From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation

UNIT-IV

Human Population and the Environment & Field Work: Population growth, variation among nations. Population explosion –Family Welfare Programme. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health. Case studies

Visit to a local area to document environmental assets river/forest/grassland/hill/mountain; Visit to a local polluted site-Urban/Rural/Industrial/Agricultural; Study of common plants, insects, birds; Study of simple ecosystems-pond, river, hill slopes, etc.

Suggested textbooks

S. No	Name	Author(S)	Publisher
1	A Textbook for Environmental Studies	Erach Bharucha	Orient BlackSwan
2	Environmental Biology,	Agarwal, K.C. 2001	Nidi Publ. Ltd. Bikaner.
3	Environmental Science,	Miller T.G. Jr.	Wadsworth

Course Code	**PHY107**
Course Title	**Engineering Physics laboratory**
Type of course	**BS**
L T P	**0 0 2**
Credits	**1**
Course Objective (CO)	**To familiarize students with the functions of laser beam, optical fibre, AC mains and other instruments.**

SYLLABUS

List of practicals

1. To study the magnetic field of a circular coil carrying current.
2. To find out polarizability of a dielectric substance.
3. To study the laser beam characteristics like; divergence using diffraction grating aperture.
4. To study laser interference using Michelson‟s Interferometer.
5. Study of diffraction using laser beam and thus to determine the grating element.
6. To determine numerical aperture of an optical fibre.
7. To determine attenuation & propagation losses in optical fibres.
8. To find out the frequency of AC mains using electric-vibrator.
9. To find the refractive index of a material using spectrometer.
10. To find the refractive index of a liquid.
11. To study B-H curve using CRO.

Course Code	**EE103**
Course Title	**Basics Of Electrical Engineering Lab**
Type of course	**ES**
L T P	**0 0 2**
Credits	**1**
Course prerequisite	**Basics Of Electrical Engineering**
Course Objective (CO)	**To familiarize with various AC, DC circuits, Transformer , Electrical Machine and Measuring Instruments.**

SYLLABUS

List of practicals

1. To find voltage, current relationship and power factor of a given R-L circuit.
2. To perform open- circuit and short circuit test on a transformer and determine the following: (a)The transformation ratio (b) the transformer efficiency.
3. To find out the line voltage, phase voltage relationship, line current and phase current relationship in case of star and delta connected 3- phase balanced load.
4. To connect 3 identical single phase transformers for three phase power transformations through following connections (a) star-delta (b) star-star(c) delta-star (d) delta-delta and to find phase and line voltage ratio.
5. To connect, start and reverse the direction of rotation of a 3- phase induction motor.
6. To perform the Block Rotor test of 3-phase induction motor test.
7. To study various measuring instruments(Moving Iron Instruments – Attraction Type, Moving Iron Instruments – Repulsion Type, Moving Coil Instruments – Permanent Magnet Type, Moving Coil Instruments – Dynamometer Type).
8. To study the speed control of characteristic of D.C. Motor.
9. To verify the rating of compact fluorescent lamp (CFL).
10. To verify Ohm's Law and its limitations.
11. To verify Kirchhoff's Laws.
12. To measure the resistance and inductance of a coil by ammeter-voltmeter method.
13. To measure power and power factor in a single- phase AC circuit.
14. To verify series and parallel resonance in AC circuits

Suggested textbooks

S. No.	Name	Author	Publisher
1	Basic Electrical, Electronics and Computer Engg.	R muthusubramanian,S Salivahanan,K A Muraleedharan	Tata McgrawHill
2	A Textbook of Electrical Tech	B.L Theraja.& A.K Theraja	S Chand

Course Code	**CSE103**
Course Title	**Fundamental of Computer Technology Lab**
Type of course	**ES**
L T P	**0 0 4**
Credits	**2**
Course prerequisite	**Basics of computer and knowledge of any high level language**
Course Objective (CO)	**To familiarize the students of all branches in engineering with computer organization, operating systems, problem solving and programming in C++.**

SYLLABUS

Familiarization with the Computer System:

1) To explain the part of the computer system such as system unit, input devices, output devices connected to the computer.
2) To explore the outside view of the system unit that includes the panels on front and ports at the rear
3) To explore the inside view of the system unit that includes the motherboard, processor, expansion slots, various add-on cards, storage devices, power supply, fans.
4) To understand the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.
5) To introduce the graphical user interface (desktop) of Windows operating System to explain the various elements of the desktop such as taskbar, icons (My Computer, Recycle Bin, etc.), short cuts, notification area.
6) To configure the desktop that includes selecting the wallpaper, selecting the screen saver with or without password protection, selecting the screen resolution and color quality.

Explore Office automation

1) Creating, Formatting documents with Word, explore the various toolbar options, Mail Merge, Spell Check, Word –Art.
2) Creating PowerPoint presentations with Power Point. Explore various views of PPT, Charts, Graphs, animation, multimedia.
3) Creating Sheets in Excel using formulas, chart and graphs.

Programming using C++

1) Implement programs using various operators in C++
2) Implement various Branch statements: if, if-else, nested if, switch
3) Implement various loop statements: for, while, do-while
4) Implement other control statements: go-to, exit function, continue
5) Implement various programs using arrays and string
6) Implement various programs classes and objects

Computer Aided Tools and Internet

1) Exercise with CAD/CAM
2) Internet surfing and E-mail

Suggested Books			
S. No.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Object-Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill
2	Object-Oriented Programming with C++	Lafore R	Waite Group
3	The C++ Programming Language	Bjarne Stroustrup	Addison Wesley.
4	Fundamentals of Computers	R. S. Salaria	Salaria Publishing House

Course Code	**ME107**
Course Title	**Engineering Workshop**
Type of course	**ES**
L T P	**0 0 6**
Credits	**3**
Course Perquisites	**+2 Physics and Mathematics**
Course Objectives(CO)	**To become aware of different manufacturing process in industry.**

SYLLABUS

1. Carpentry and Pattern making: Various types of timber and practice boards, defects in timber, seasoning of wood, tools, wood operations and joints, exercises involving use of important carpentry tools to practice various operations and making joint.
2. Foundry Shop: Introduction to moulding material, mould, melting furnaces, foundry tools and equipment's used in foundry shops; firing of a cupola furnace, exercises involving preparation of small sand moulding and casting.
3. Forging practice: introduction to forging tools; equipment's and operations forge ability of metals; exercises on simple smithy; forging exercises.
4. Machine shop: Machines ; introduction to lathe and shaper machine and its operation performed on it.
5. Welding shop: introduction to different welding methods; welding equipment's; electrodes; welding joints; welding defects; exercises involving use of gas/electric arc welding.
6. Electrical and electronics shop: introduction to electrical wiring; preparation of PCBs involving soldering applied to electrical and electronic applications; exercises preparation of PCBs involving soldering applied to electrical and electronic applications.
7. Sheet metal shop: shop development of surfaces of various objects; sheet metal forming and joining operation, joints, soldering and brazing; exercises involving use of sheet metal forming operations for small joints.
8. Fitting shop: introduction of fitting practice and tool used in fitting shop; exercise involving marking cutting fitting practice (right angles) male female mating parts practice.

Suggested Text Books and References

Sr. No.	Name	Author(s)	Publisher
1	Workshop Technology	HS Bawa	McGraw-Hill Publishing Company Limited
2	Workshop Technology I,II,III	S K Hajra, Choudhary and A K Choudhary	Media Promoters and Publishers Pvt. Ltd., Bombay
3	Manual on Workshop Practice	K Venkata Reddy	MacMillan India Ltd. New Delhi

4	Basic Workshop Practice Manual	T Jeyapoovan	VikasPublishing House (P) Ltd., New Delhi

Course Code	**CHM105**
Course Title	**Engineering Chemistry**
Type of course	**BS**
L T P	**3 0 0**
Credits	**3**
Course Prerequisite	**+2 Chemistry in Non-Medical**
Course Objectives(CO)	**The objectives of the engineering chemistry are to relate the students with basic concepts of chemistry. Some new topics have been introduced to the syllabus for the development of the right attitudes by the engineering students to cope with new technology**

SYLLABUS

UNIT-1

Water and its Treatment: Boiler feed water Specification, Scales and sludge formation; Priming & foaming; Different methods of the water purifications and softening; Desalination of water; Water for domestic use; Specifications; Disinfection of water.

Corrosion and its Prevention: Introduction; Different types of corrosion ;Wet and Dry corrosion; Different types of surface films; Mechanisms of wet corrosion; Galvanic corrosion Galvanic Series; Concentration cell corrosion and differential aeration corrosion; Soil and microbial corrosions; waterline, stress corrosions; Prevention measure against corrosion.

UNIT-II

Spectroscopy and its Applications: An introduction 1). UV/Visible Spectroscopy: Selection rules; Line widths and intensities Chromophores & auxochromes; Factors affecting λMax& intensity of spectral lines; Principle and instrumentation; Electronic Transitions lines; Franck Condon principle; Applications of UV/Visible spectroscopy.

2).I.R. spectroscopy: Fundamental modes of vibrations and types; Factors affecting vibration frequency (calculation of force constant); Applications of I.R. spectroscopy.

3). NMR Spectroscopy: Principle & instrumentation; Chemical shift; Spin-Spin Splitting; High resolution NMR spectrum (PMR only); applications of N.M.R. spectroscopy.

Photochemistry: Introduction; Photophysical & photochemical processes; Light sources in photochemistry; Beer Lambert Law; Laws of Photochemistry; Quantum yield (primary and overall);Primary and secondary photochemical reactions; Jablonski diagram; Semiconductor photochemistry, Photovoltaic cells Introduction to optical sensors, Introduction to supra-molecular photochemistry.

UNIT-III

Green Chemistry and its Applications: Introductory overview Definition and concepts of Green chemistry; Twelve principles of Green Chemistry with emphasis on the use of alternative feedstock (biofuels);Use of innocuous reagents in natural processes; Design of the safer chemicals; Designing alternative reaction methodology. Microwave and ultrasonic radiation in Green synthesis minimizing energy consumption.

Polymers and Reinforced Composites: Introduction; Functionality; Types of polymerization; Specific features of polymers; Tactility of polymers; Average molecular weights and size; number average method; polymers; Introduction: polymer reinforced composite; Effect of molecular weight on the properties of polymers; Biodegradable polymers.

UNIT-IV

Nanochemistry: Introduction; Materials self-assembly; Molecular vs. materials self assembly; Self-assembling materials; Two dimensional assemblies; Mesoscale self assembly; Coercing colloids; Nanocrystals; Super molecular structures Nanoscale materials; Future perspectives.

Petrochemicals: Introduction; First, second & third generation petrochemicals; Primary Raw Materials for Petrochemicals Natural gas: Natural gas treatment processes; Natural gas liquids; Properties of natural gas; Crude oil: Composition of crude oil-Hydrocarbon compounds; Non-hydrocarbon compounds; Metallic Compounds, Crude oil classification Physical separation processes; Conversion processes; Production of ethylene and propylene; Renewable and non renewable source of energy.

Suggested Text Books and References			
Sr. No.	**Name**	**Author(s)**	**Publisher**
1	Engineering chemistry	J.C. Curiacose and J.Raja Ram.	Tata Mcgraw-Hill Co.New Delhi.
2	Chemical applications of infrared spectroscopy	CNR Rao.	Acad.Pres, New York.
3	Ultra violet and visible spectroscopy chemical applications	CNR.Rao	plenum press

Course Code	**ME101**
Course Title	**Basics of Mechanical Engineering**
Type of course	**ES**
L T P	**3 1 0**
Credits	**3.5**
Course Perquisites	**11th and 12th class knowledge of Physics**
Course Objectives(CO)	**To impart the knowledge of basic thermodynamics, material science, Moment of inertia of different sections, power cycles, thermodynamic laws and steady flow energy equation to students.**

SYLLABUS

UNIT-I

Basic Concepts of Thermodynamics: Definition of thermodynamic; Need to study thermodynamics; Application areas of thermodynamic; Difference between Mieroscopic (or, Statistical) thermodynamics and Macroscopic (or, Classical) thermodynamics; Brief concept of continuum; Thermodynamic System : definition, types (Open, Closed and Isolated) and their examples; Thermodynamic System Boundary : definition, types and their examples; Surroundings; Control(fixed) mass and Control Volume concept and their example ; Thermodynamic State; Thermodynamic Property: definition, types citing their examples; condition for any quantity to be a property; State postulate; Thermodynamic equilibrium (which includes Thermal, Mechanical and Chemical equilibrium etc.); Thermodynamic path; Thermodynamic process: definition, concept of reversible process, quasi-static (or, quasi-equilibrium) process, irreversible process, conditions for reversibility and how these are met with, non-flow processes and flow processes, method of representation of reversible and irreversible process on property diagrams; Cyclic process; Thermodynamic Cycle: definition and its concept; Energy and its forms (microscopic and macroscopic); Physical insight to internal energy; Energy transfer across system boundary i.e. transient energies (heat and work); Difference between heat and work; Sign conventions for heat and work interactions; heat and work as path functions; Equality of Temperature and Zeroth law of Thermodynamics.

UNIT-II

First Law of Thermodynamics and its applications : Definition, essence and corollaries or consequences of first law of Thermodynamics; Expressions for First law of Thermodynamics for a control mass undergoing a Cycle and for process (i.e., a change in state of a control mass) ; Concept of Enthalpy and total energy and differentiation between the two – a thermodynamic property; Compressible and incompressible substances; Specific Heats; Difference between Internal Energy and Enthalpy of compressible and incompressible substances; Representation of first law of thermodynamics as rate equation; Analysis of non-flow/ flow process for a control mass undergoing constant volume, constant pressure, constant temperature, adiabatic and polytropic processes; Free Expansion Process and its examples, its representation on Property diagram; Review of concepts of control volume; Expressions of first law of thermodynamics for a control volume (i.e. open system) ; Steady State Steady Flow process and its examples; First law analysis of Steady State Flow process e.g. isochoric, isobaric, isothermal, isentropic and polytropic process; Throttling process and its applications; Flow energy or inertial energy of flowing fluids or, Energy transport by mass; Application of Steady State Flow Energy Equation to various engineering devices.

UNIT-III

Second Law of Thermodynamics: Limitations of first law of thermodynamics; and how 2nd law is fully able to explain away and thus overcome those shortcomings of Ist law; Thermal Reservoirs, source and

sink (Low temperature and high temperatures); Heat Engine, Heat Pump and Refrigerator: definitions, working, efficiency/performance and their real life examples. Justification as to why the actual efficiency of Heat Pump and Refrigerator shall also be ≤ 100% though on the face of it seems to be more than 100%; Various statements of Second Law of Thermodynamics and their equivalence; Philosophy of Carnot cycle and its consequences viz. how each of the individual four processes constituting the cycle contribute in optimizing the output and efficiency of the cycle; Carnot Engine, Carnot Refrigerator and Carnot Heat Pump: definitions, working, efficiency/performance and Limitations of the cycle; Carnot theorem for heat engines, refrigerators and heat pumps; derivation of Carnot efficiency/COP (which seems to be more than 100%); Thermodynamic Temperature Scale; Clausius theorem and Inequality; Philosophy and concept of entropy; Entropy changes during various processes; Temperature - Entropy Chart and representation of various processes on it; Principle of Increase of Entropy; Applications of Entropy Principle; Quality of Energy viz. high and low grade energies; Degradation of Energy; Third Law of Thermodynamics.

Gas Power Cycles : Introduction; Concept and philosophy of Air Standard Cycle along with associated assumptions and advantages; Air Standard Efficiency; Nomenclature of reciprocating piston-cylinder arrangement with basic definitions such as swept volume, clearance volume, compression ratio, mean effective pressure etc; Otto Cycle (or constant volume heat addition cycle), Diesel cycle (or constant pressure heat addition cycle) and Dual cycle (Mixed or Composite or Limited Pressure cycle) with their representation on P-V and T-S charts, their Air-standard (thermal) Efficiencies; Brayton Cycle, Comparison of Otto, Diesel and Dual cycle under some defined similar parametric conditions; Introduction to heat engines; Merits of I.C. Engines and their important applications, Classification and constructional features of I.C. Engines; working of two stroke and four stroke Petrol and Diesel engines and their comparison.

UNIT IV

Engineering Materials: Materials and Civilization, Materials and Engineering, Classification of Engineering Materials, Mechanical Properties of Materials: elasticity, plasticity, strength, ductility, brittleness, melleability, toughness, resilience, hardness, machinability, formability, weldability. Properties, Composition, and Industrial Applications of materials: metals (ferrous- cast iron, toolsteels, stainless steels and non ferrous- Aluminum, brass, bronze), polymers (natural and synthetic , thermoplastic and thermosetting), ceramics (glass, optical fibre glass, cements), composites (fibre reinforced, metal matrix), smart materials (piezoelectric, shape memory, thermochromic, photochromic, magnetorheological), Conductors, Semiconductors and insulators, Organic and Inorganic materials. Selection of materials for engineering applications.

Centroid, Centre of Gravity and Moment of Inertia: Difference between centre of gravity and centroid. Determination of position of centroid of plane geometric figures of I, U, H, L, T, C, Circular and Triangular Sections. Centroid of Composite Areas. Determination of position of Centre of Gravity (CG) of regular solids viz. Right Circular Cone, Solid Hemisphere, thin Hollow Hemisphere. Area moment of inertia & mass moment of inertia, Polar moment of inertia, Parallel axes Theorem (or transfer formula), Perpendicular axes Theorem, Radius of gyration, determination of area Moment of Inertia of I, U, H, L, T, C, Circular and Triangular Sections along various axes. Mass moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their axis of symmetry and other axes.

Suggested Text Books and References

Sr. No.	Name	Author(s)	Publisher
1	Elements of mechanical engineering	Kumar D.S	Kataria publications,New delhi
2	Engineering Thermodynamics	Nag P.K	Tata McGraw Hill
3	Thermodynamics and Heat Engines	Yadav R	Central Publishing House, Allahabad
4	Engineering Thermodynamics	Rogers G. and Mayhew Y	Pearson Education
5	Thermodynamics – An Engineering Approach	Cengel Y.A. and Boles M.A	Tata McGraw Hill.

Course Code	**ECE101**
Course Title	**Basic Electronics & Communication Engineering**
Type of course	**ES**
L T P	**2 0 0**
Credits	**2**
Course Prerequisite	**Knowledge of Physics**
Course Objectives(CO)	**To introduce basic postulates of Electronics, Boolean algebra and basic gates, and Boolean expressions, To outline the formal procedures for the analysis and design of electronics and digital circuits. Introduction to basic fundamentals of communication engineering.**

SYLLABUS

UNIT 1: Semiconductor Diodes& Applications: Introduction, Semiconductor materials, Extrinsic materials: n type and p type, Semiconductor diodes, Biasing of diodes, Breakdown mechanisms, Ideal diode, Transition and diffusion capacitance, Reverse recovery time, Diode testing, Zener diode, Light emitting diodes (LEDs).Load line analysis, Half wave rectifications, full wave rectification, Clippers, Clampers, Zener diode as a voltage regulator, Voltage multiplier.

UNIT 2: Digital Electronics Fundamentals: Digital and Analog Quantities, Binary digits, Logic levels, Basic logic operations, Overview of basic logic functions, Number system: Decimal numbers, Binary numbers & its arithmetic operations, octal & Hexadecimal numbers, number system conversions, Logic gates: The inverter, The AND gate, The OR gate, The NAND gate, The NOR gate, The Exclusive OR and Exclusive NOR gates.

UNIT 3: Basic Signals & Systems: Introduction, Signals and classification of signals, Basic continuous time signals, Basic discrete time signals, System and classification of systems, Transducers

UNIT 4: Communication Systems: Introduction, Elements of a communication system, Classification of communication systems, Modulation and coding, Need of modulation, Multiplexing, Analog and Digital communication, Advantages of digital communication over analog communication, Microwave communication, Satellite communication, Optical communication, Cellular Mobile communication:1G, 2G, 3G, GSM. (Basic introduction to all communication systems).

Suggested Text Books and References

Sr. No.	Name	Author(s)	Publisher
1	Electronics Devices & Circuits	Robert Boylested and Louise Nashelsky	Prentice Hall of India
2	Fundamental of Analog Circuits	Thomos L. Floyd and David buchla	Prentice Hall
3	Electronic Devices and Circuits	J.B Gupta	S K Kataria& Sons
	Wireless Communications	T. L. Singal	Tata McGraw-Hill

Course Code	**ENG121**
Course Title	**Communication Skills-I**
Type of course	**HS**
L T P	**2 0 0**
Credits	**2**
Course Perquisites	**General English**
Course Objectives(CO)	**The objective of this course is to :** **1. Assist the students to acquire proficiency, both in spoken and written language** **2. To develop comprehension, improve writing skills, and enhance skills in spoken English.**

SYLLABUS

UNIT-I

Basics of Communication Skills:

Communication, Process of Communication, Types of Communication-Verbal and Non verbal communication, Channels of Communication, Upward, Downward, Horizontal, Barriers to Communication, Role of Communication in society.

UNIT-II

Listening Skills:

Listening Process, Hearing and Listening, Types of Listening, Effective Listening, Barriers of Effective Listening, Note Taking.

Reading Skills:

Purpose of reading, Process of reading, reading skills Models and strategies, scanning, skimming, SQ3R, Approaches of Reading, Comprehension passages for practice.

UNIT III

Writing Skills:

Purpose of writing, Effective writing, Types of writing, Business Correspondence, Precise writing, Memo writing, minutes of meeting.

UNIT-IV

Speaking Skills:

Speech process, Skills of effective speaking, Role of audience, Feedback Skill, Oral Presentation.

Suggested Text Books and References

Sr. No.	Name	Author(s)	Publisher
1	Bhupender Kour	Effectual Communication Skills	S.K. Kataria and Sons
2	R. Datta Roy and K.K. Dheer	Communications Skills	Vishal Publishing Company
3	The Essence of Effective Communication	Ludlow and Panthon	Prentice Hall of India
4	Essentials of Business Comunication	Pal and Rorualling	S. Chand and Sons. New Delhi

Course Code	**ME103**
Course Title	**Engineering Drawing**
Type of course	**ES**
L T P	**1 0 6**
Credits	**4**
Course Perquisites	**Basic Mathematics**
Course Objectives(CO)	**Main objective of the Engineering Drawing is to introduce the students to visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, intersection and development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts.**

SYLLABUS

UNIT I

Introduction: Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use. BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning. Basic Definition of geometrical objects: Points, lines, planes and solids.

Scales: Representative Fraction, Types of Scale, Plain and Diagonal Scale, Scale of chords.

Projection: Introduction, Principle of Projection, Method of projection, Planes of projection, Four quadrant, First and Third angle projection, Reference line, symbols for methods of projection, Orthographic projection

UNIT II

Projection of Point: Introduction, Projection of Point situated in first, second, third & fourth quadrant.

Projection of lines: Introduction , Line parallel to One or both the planes, Line contained by one or both the planes, Line perpendicular to one of the planes, Line inclined to one plane and parallel to other . Line inclined to both the planes, True length

Projection of Planes: Introduction, Types of planes, Difference between plane and lamina, Projection of planes, Projection of planes perpendicular to both the reference planes, Perpendicular to one plane and parallel to other plane, Perpendicular to one plane and inclined to the other plane, Inclined to both planes.

UNIT III

Projection of solids: Introduction, Type of solid, Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

Section of Solids: Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

Development of Surfaces: Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

UNIT IV

Isometric Projection: Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism,

pyramid and cylinder, and assignments on isometric projection of simple machine parts.

Orthographic Projection: Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Intersection of Surfaces/Solids: Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., use of cutting plane and line method.

Suggested Text Books and References			
Sr. No.	**Name**	**Author(s)**	**Publisher**
1	Engineering Graphics	Narayana K L and Kanaiah P	Tata McGraw Hill Publishing Company Limited, New Delhi
2	Engineering Graphics and Drafting	P S Gill	Katria and Sons, Delhi.
3	Elementary Engineering Drawing-Plane and solid Geometry	ND Bhat	Chartotar Publishing House, Anand
4	A Text Book of Engg Drawing	R. K. Dhawan	S. Chand and Co. Ltd
5	"Engineering Graphics"	K.L. Narayana and P.Kannaiah	Scitech Publications (India)

Course Code	**CHM107**
Course Title	**Applied Chemistry Laboratory**
Type of course	**BS**
L T P	**0 0 2**
Credits	**1**
Course Objectives(CO)	**The objectives of the engineering chemistry are to relate the students with basic concepts of chemistry. Some new topics have been introduced to the syllabus for the development of the right attitudes by the engineering students to cope with new technology**

SYLLABUS

1.Analysis of Effluents

- Determination of hardness of water by EDTA method.
- Determination of C.O.D and B.O.D in water.
- Determination of Residual Chlorine.

2. Analysis of Fuels and Lubricants

- Determination of Moisture, Volatile and ash content by proximate analysis.
- Determination of acid value of oil
- Determination of the viscosity

3. Instrumental Analysis

- Determination of surface –tension of given liquid
- Determination of the concentration of a solution conductometerically.
- Determination of the strength of a solution pH meterically.

4.Chromatography

- Determination of Rf value of amino acid by TLC and identification of the amino acid present.
- Separation of metallic ions by paper chromatography.
- Separation of Ions by using complexing agents

.

5. Synthesis & Green Chemistry experiments

- Preparation of a polymer phenol/urea formaldehyde resin or
- Preparation of aspirin.
- Base catalyzed aldol condensation by Green Methodology
- Acetylation of primary amines using ecofriendly method.

Suggested Text Books and References			
Sr. No.	**Name**	**Author(s)**	**Publisher**
1	Engineering chemistry	J.C. Curiacose and J.Raja Ram,	Tata Mcgraw-Hill Co.New Delhi.
2	Chemical applications of infrared spectroscopy	CNR.Rao.	Acad.Pres, New York.
3	Ultra violet and visible spectroscopy chemical applications	CNR,Rao	plenum press
4	Inorganic quantitative analysis	A.I. Vogal	
5	Engineering practical	Shashi chawla	Dhanpat Rai and co.

Course Code	**ECE103**
Course Title	**Basic Electronics & Communication Engineering Lab**
Type of course	**ES**
L T P	**0 0 2**
Credits	**1**
Course Perquisites	**Basic knowledge of Electronics components**
Course Objectives(CO)	**To introduce basic postulates of Electronics, Boolean algebra and basic gates, and Boolean expressions, To outline the formal procedures for the analysis and design of electronics and digital circuits. Introduction to basic fundamentals of communication engineering.**

SYLLABUS

List of Experiments

1. Identification of Basic components of Electronics.
2. Introduction to Multimeter.
3. Introduction to working of CRO & Function Generator.
4. Component Testing: Resistance, Capacitor and Inductance.
5. Component Testing: Diode, BJTs.
6. LED testing.
7. Calculate and verify the Resistance and capacitance in series and parallel combination.
8. Verification of Basic Logic gates (AND, OR, NOT).
9. Verification of Universal Logic gates (NAND, NOR).
10. Basics practice on soldering and general purpose PCB component installation.

Course Code	**ENG123**
Course Title	**Communication Skills-I (Practical)**
Type of course	**HS**
L T P	**0 0 2**
Credits	**1**
Course Perquisites	**NA**
Course Objectives(CO)	**The objective of this course is to provide the students sufficient practice for speaking and writing English efficiently.**

SYLLABUS

UNIT-I

Speaking and Discussion Skills:

Oral Presentation, Planning and organizing content for presentation, Use of audio /Visual Aids, Making Slides for presentation , Group Discussion , Debate , Extempore speaking, Interview Skills, Mock interview, Mock Dialogues (Pair Speaking), Cue Card Speaking, Meeting/ Conferences.

UNIT-II

Listening Skills:

Listening to any recoded material and asking oral/written questions for listening comprehension.

Reading Skills:

Active Reading of passages for Reading comprehensions, paraphrase, Summary writing.

UNIT III

Writing Skills:

Guidelines of effective writing, Paragraph Writing, Email Writing.

UNIT-IV

Grammar and Vocabulary:

Parts Of Speech, Tenses, GRE words (List of 50 Words)

Course Code	**ME103**
Course Title	**Engineering Drawing**
Type of course	**ES**
L T P	**1 0 6**
Credits	**4**
Course Perquisites	**Basic Mathematics**
Course Objectives(CO)	**Main objective of the Engineering Drawing is to introduce the students to visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, intersection and development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts.**

SYLLABUS

UNIT I

Introduction: Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning. Basic Definition of geometrical objects: Points, lines, planes and solids.

Scales: Representative Fraction, Types of Scale, Plain and Diagonal Scale, Scale of chords

Projection: Introduction, Principle of Projection, Method of projection, Planes of projection, Four quadrant, First and Third angle projection, Reference line, symbols for methods of projection, Orthographic projection

UNIT II

Projection of Point: Introduction, Projection of Point situated in first, second, third & fourth quadrant.

Projection of lines: Introduction , Line parallel to One or both the planes, Line contained by one or both the planes, Line perpendicular to one of the planes, Line inclined to one plane and parallel to other . Line inclined to both the planes, True length.

Projection of Planes: Introduction, Types of planes, Difference between plane and lamina, Projection of planes, Projection of planes perpendicular to both the reference planes, Perpendicular to one plane and parallel to other plane, Perpendicular to one plane and inclined to the other plane, Inclined to both planes.

UNIT III

Projection of solids: Introduction, Type of solid, Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

Section of Solids: Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

Development of Surfaces: Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

UNIT IV

Isometric Projection: Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism,

pyramid and cylinder, and assignments on isometric projection of simple machine parts.

Orthographic Projection: Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Intersection of Surfaces/Solids: Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., use of cutting plane and line method.

Suggested Text Books and References			
Sr. No.	**Name**	**Author(s)**	**Publisher**
1	Engineering Graphics	Narayana K L and Kanaiah P	Tata McGraw Hill Publishing Company Limited, New Delhi
2	Engineering Graphics and Drafting	P S Gill	Katria and Sons, Delhi.
3	Elementary Engineering Drawing-Plane and Solid Geometry	ND Bhat	Chartotar Publishing House, Anand
4	A Text Book of Engg Drawing	R. K. Dhawan	S. Chand and Co. Ltd
5	"Engineering Graphics"	K.L. Narayana and P Kannaiah	Scitech Publications (India)

Course Code	**MAT205**
Course Title	**Engineering Mathematics –III**
Type of course	**BS**
L T P	**4 1 0**
Credits	**4.5**
Course prerequisite	**Engineering Mathematics I,II**
Course Objective (CO)	**This course is an introduction to a broad range of mathematical techniques for solving problems that arise in Science and Engineering. The goal is to provide a basic understanding of the derivation, analysis and use of these techniques along with a detailed understanding of Transforms in engineering applications**.

Syllabus

UNIT-I

Fourier Series Periodic functions, Euler's formula, Even and odd functions, Point of Discontinuous Function, Change of interval half range expansions, Fourier series of different wave forms.

Fourier Transforms: Fourier Integral Theorem (statement only), Fourier Transform of a function, Fourier Sine and Cosine Integral Theorem (statement only), Fourier Cosine & Sine Transforms. Fourier, Fourier Cosine & Sine Transforms of elementary functions. Properties of Fourier Transform: Linearity, Shifting, Change of scale, Modulation, Examples, Fourier Transform of Derivatives, Examples. Convolution Theorem (statement only), Inverse of Fourier Transform, Examples.

UNIT-II

Laplace Transforms: Laplace transforms of various standard functions, properties of Laplace transforms, inverse Laplace transforms, transform of derivatives and integrals, Laplace transform of unit step function, impulse function, periodic functions, applications to solution of ordinary linear differential equations with constant coefficients, and simultaneous differential equations.

UNIT-III

Partial Differential Equations Formation of partial differential equations, Linear partial differential equations, homogeneous partial differential equations with constant coefficients Applications: Wave equation and Heat conduction equation in one dimension. Two dimensional Laplace equation, solution by the method of separation of variables. Laplacian in polar coordinates.

UNIT-IV

Functions of Complex Variable Limits, continuity, derivative of complex functions, analytic function, Cauchy-Riemann equation, conjugate functions, harmonic functions; Conformal Mapping: Mapping of a complex function, conformal mapping, standard transforms, mapping of standard elementary transformations, complex potential, applications to fluid flow problems; Complex Integration : Line integrals in the complex plane, Cauchy's theorem, Cauchy's integral formula and derivatives of analytic function. Taylor's and Laurent's expansions, singular points, poles, residue, complex integration using the method of residues, evaluation of real integrals by
contour integration

Recommended books:-

S. No	**Name**	**Author(S)**	**Publisher**
1	Higher Engineering Mathematics (Third Edition) Vol-II	By Dr. K.R. Kachot	Mahajan Pub. House, Ahmedabad

2	Advanced Engineering Mathematics (Fifth Edition)	Erwin Kreyszig	John Wiley
3	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna, New Delhi.
4	Elementry Differential Equations	W.E.Boyce and R.Diprima	John Wiley
5	Fourier Series& Boundary Value Problems	R.V. Churchill & J.W. Brown	McGraw-Hill

Course Code	**CE201**
Course Title	**Solid Mechanics**
Type of course	**PC**
L T P	**3 1 0**
Credits	**3.5**
Course prerequisite	**Basics of Civil Engineering**
Course Objective (CO)	**Apprise the student about basic concepts of equilibrium, stress, deformation, bending stress and other structural members.**

Syllabus

UNIT I

Concept of Equilibrium:

General equilibrium equations; Equilibrium of a point in space; Equilibrium of a member; Concept of free body diagrams; Displacements; Concept of displacement-constraints/ supports; Statically-determinacy of a structure.

Simple Stress and Strains:

Concept of stress and strain, Hooke's law, young modulus, poisons ratio stress and strain at a point, stresses and strains in bars subjected to axial loading, modulus of rigidity, bulk modulus, temperature, stress and strain calculations due to application of axial loads and variation of temperature in single and compound wall, statically determinate and indeterminate problems, Stress and strains in thin cylinders, spherical shells; Thin vessels subjected to internal pressures.

UNIT II

Compound stress and strains:

Two dimensional system, stress at a point on a plane principal stresses and principal planes, mohr's circle of stress, ellipse of stress and their applications, two dimensional stress strain system, principal strain and principal axis of strain, circle of strain and ellipse of strain, relationship between elastic constant.

Bending moment and Shear force diagrams:

shear force and bending moment diagram BM and SF diagrams for cantilever, simply supported and fixed beams with or without overhangs and calculations of maximum BM and SF and point of contra flexure under: concentrated load, uniformly distributed load over the whole span or a part of span, combination of concentrated loads(two or three) and uniformly distributed load, uniformly varying load, applications of moments.

Theory of Bending Stresses: Assumptions in simple bending theory, derivation of formula: its application to beams of rectangular section, circular section and channel section, composite/fletched beams, bending and shear stresses in composite beams

UNIT III

Torsion:

Derivation of Torsion equation and its assumptions, application of the equation of the hollow and solid circular shaft torsional rigidity , combined torsion and bending of circular shaft, principal stress and maximum shear stress under combined oading of bending and torsion, analysis of close coiled helical springs.

Slope and deflection:

Relationship between moment, slope and deflection, moment area method, macaulay's methods

Use of these method to calculate slope and deflection for determinant beams.

Columns and Struts: columns under uni axial load Buckling of columns, slenderness ratio and conditions. Derivation of euler's formula for elastic buckling load, equivalent length, rankine gordon's empirical

formula.

UNIT IV

Strain Energy

Energy of dilation and distortion, resilience stress due to suddenly applied loads, castigiliano's theorem and Maxwell theorem of reciprocal deflection.

Failure theories: Maximum principal stress theory, Maximum shear stress theory, maximum Strain Energy theory, maximum shear strain energy theory, graphical representation and derivation of equation for each and their application to problems relating to two dimensional stress system only.

Recommended books:-			
S. No	**Name**	**Author(S)**	**Publisher**
1	Strength of material	S.Ramamrutham	
2	Mechanics of material	E.Popov	
3	Strength of material	Rajput	
4	Strength of material	Sadhu singh	

Course Code	**CE203**
Course Title	**Fluid Mechanics-I**
Type of course	**ES**
L T P	**3 1 0**
Credits	**3.5**
Course prerequisite	**Basics of Civil Engineering**
Course Objective (CO)	**This course aims at developing and understanding of the behavior of fluids in motion or at rest and the subsequent effects of the fluid on the boundaries. The study of this subject will develop analytical abilities related to fluid flow. This is a core subject, basic knowledge of which is required by all engineers.**

Syllabus

UNIT I

Fluid and their properties :

Concept of fluid, Continuum concept of fluid: classification of fluids density, specific weight and relative density; viscosity and its dependence on temperature; surface tension and capillarity, vapor pressure and cavitation, compressibility band bulk modulus; Newtonian and non-Newtonian fluids.

Measurement of pressure:

Pressure variation in a static fluid, pascal's law, unit and scales of pressure measurement-atmospheric pressure, absolute pressure, gauge pressure and vacuum pressure, hydrostatic paradox, manometer.

UNIT II

Buoyancy and floatation

Buoyant force, buoyancy and center of buoyancy, Archimedes principle, principle of floatation. Metacenter and metacentric height , equilibrium of floating bodies and submerged bodies evaluation of metacentric height-theoretical method and experimental method, oscillation of floating body.

Fluid in relative equilibrium

Static fluid subjected to uniform linear acceleration. Liquid container subjected to constant horizontal acceleration and constant vertical acceleration, liquid container subjected to constant rotation.

Hydrostatic force on plane and curved surface-

Total Pressure and centre of pressure, Pressure Diagram, Total Pressure on plane surfaces and Depth of centre of pressure, Total Pressure on curved surfaces, Practical applications of Total Pressure and Centre of Pressure.

UNIT III

Fluid Kinematics- Fluid flow of methods of analysis of fluid motion, Streamlines, Path lines, Streak lines and Stream tubes. Types of fluid flow- Steady and Unsteady Flow, Uniform and Non-uniform flow, Laminar, Transitional and Turbulent Flow, Reynolds number, Reynolds Experiment, Rotational and Irrotational flow, Sub critical, Critical and supercritical flow, Compressible and incompressible flow, One, Two and Three Dimensional Circulation and Vorticity, Velocity potential and Stream function, Flow net.

Fluid Dynamics-

Euler's equation, Bernoulli's equation and steady flow energy equation; representation of energy changes in fluid system, Momentum and Energy correction factors. Applications of Bernoulli's equation- Pitot tubes, venturimeter and orifice meters, orifices, mouth pieces, notches and weirs.

UNIT IV

Flow Past immersed bodies-

Drag and lift, Types of drag, Drag on a sphere, cylinder, flat plate and effect of free surface and compressibility on drag. Development of lift on immerses bodies, Lift, Magnus Effect and Circulation, lift characteristics of airfoils, polar diagram.

Dimensional analysis and similitude:

Dimensional homogeneity, Non dimensional parameter, IT Theorem, dimensional analysis choice of variables, Raleigh methods, examples Rise in capillary tube, head characteristics of a pump, drag on a ship, fall velocity of a sphere, Velocity in an open channel, pipe orifice, discharge over a sharp edge weir, celerity of a gravity wave. Model Analysis Similitude, types of similarities, force ratios, similarity laws, model classification, scale effects.

Recommended books:-

S. No	Name	Author(S)	Publisher
1	Hydraulics and Fluid Mechanics including Hydraulic Machines	Modi P.N and Seth	Standard Book House, New Delhi, 2003
2	Fluid Mechanics and Hydraulics and Fluid Machines	Ramamrutham, S	Dhanpat Rai and Sons, Delhi, 2001.
3	Fluid Mechanics and Hydraulics and Fluid Machines	Bansal, R.K	5th edition, Laxmi Publications Pvt. Ltd. New Delhi, 2008.

Course Code	**CE205**
Course Title	**Surveying I**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Mathematics and Measurements**
Course Objectives (CO)	**The objective of the subject is to study the maps and plans and also to learn the techniques for drawing maps in plane areas and in hilly areas using different instruments.**

SYLLABUS

UNIT I

Introduction:

Definition, principles of surveying, Various types of surveying- based on methods and instruments, topographical map, scale of map.

Chain and Compass Surveying:

Chain Surveying, instruments required for linear measurement, Measurement of distances with chain and tape, direct & indirect ranging, offsets, Compass: Bearings- different types, compass- prismatic, surveyor, whole circle, reduced bearings, local Attraction, calculation of angles from bearings.

UNIT II

Plane Table Surveying:

surveying- Definitions, uses and advantages, temporary adjustments, different methods of plane table surveying, two-point problem and three-point problem, errors in plane table survey.

Levelling & Contouring:

Definitions: technical terms, different types of levels, different types of levelling, reduction of levels, problems, difficulties in levelling work, corrections and precautions to be taken in levelling work, correction due to curvature and refraction. Contour- definitions, contour interval, equivalent, uses and characteristics of contour lines, direct and indirect methods of contouring, methods of interpolation, uses of contour maps.

UNIT III

Theodolite Traversing:

Theodolite: - Various parts and axis of transit, technical terms, temporary and permanent adjustments of a transit, horizontal and vertical angles, methods of repetition and reiteration. Different methods of running a theodolite traverse, Gale's travers table, balancing of traverse by Bow-Ditch's transit and modified transit rules.

UNIT IV

Tachometry:

Definition, determination of tachometer constants and reduced level from tachometric observations

Curves:

Elements of a simple curve, different methods of setting out of simple circular curve.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Surveying Vol I & II	Duggal, S.K	Tata McGraw Hill (2006)
2	Surveying Vol I & II	Punmia, B.C, Jain, Ashok Kumar and Jain, Arun Kumar	Laxmi Publications (2005)
3	Surveying	Agor, R	Khanna Publishers (1982)

Course Code	**CE207**
Course Title	**Building Technology**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Nil**
Course Objectives (CO)	**To develop knowledge of conventional and new materials of construction.**

SYLLABUS

UNIT I

Building Stones-

General, Qualities of a good building stone, Deterioration of stones, Preservation of stones, Common building stones of India & their Uses, Artificial stones.

Bricks-

General, Composition of good brick earth, qualities of good bricks, tests for bricks, classification of bricks, Foundations – functions- classifications- bearing capacity. Varieties of fire bricks, sand lime bricks, building tiles- roofing, flooring and wall tiles.

UNIT II

Lime-

Cementing material, Characteristics of good quality lime, classification & testing of Lime, Hydraulic Test, acid test, setting & slaking of lime.

Timber-

Advantages of Timber construction, timber trees- exogenous and endogenous trees; soft and hard woods, structure of tree, felling of trees, defects in timber, characteristics of good timber, uses and testing of timber.

UNIT III

Concrete-

Constituents of Concrete, different types of cements used in concrete, brief introduction to ingredients and manufacture of cements. Hydration and compounds of hydration. Properties and testing of cement, Design of concrete mixes by ISI method and ACI method, Design of High strength concrete mixes. Design of concrete mix for flexural strength.

Properties of Fresh and Hardened Concrete-

Introduction, workability, factors affecting workability, methods of determination of workability, strength of concrete, factors affecting strength of concrete, durability and permeability of concrete, factors affecting permeability of concrete, creep and shrinkage of concrete.

UNIT IV

Production of Concrete –

Introduction, batching of materials, mixing of concrete materials, transportation and placing of concrete, compaction of concrete, curing of concrete.

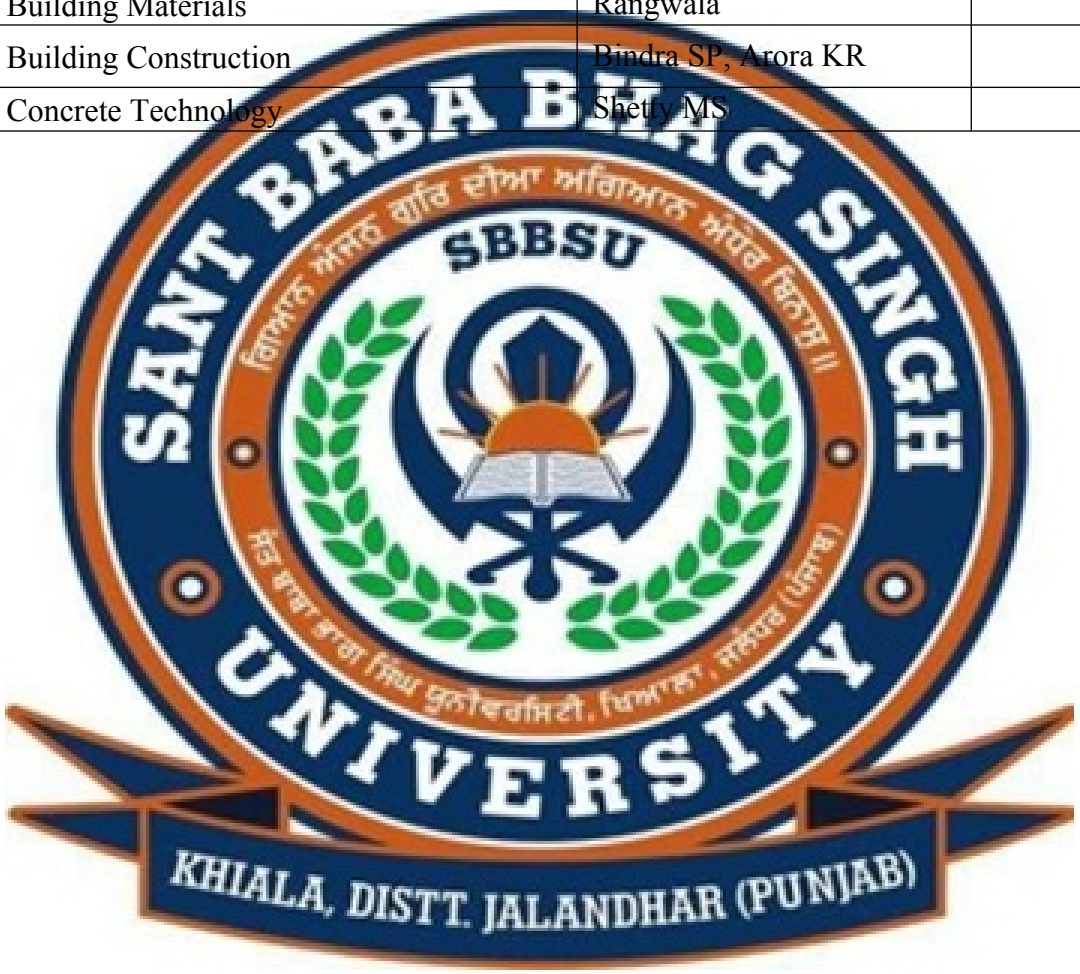
Non Load Bearing Materials-

Paints: Functions- constituents- characteristics- selection- types of paints- defects. Varnishes: Elements- properties- types. Distempers- composition- properties. Asbestos: properties- uses- asbestos cements products. Glass: Constituents- composition- classification- properties- market form- uses. Plastic: constituents, classification- properties- uses.

Fire-

Fire Hazards, fire-fighting system means of escape alarm system. Fire prevention measures.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Building Materials	Rangwala	
2	Building Construction	Bindra SP, Arora KR	
3	Concrete Technology	Shetty MS	



Course Code	**CE211**

Course Title	Solid Mechanics Lab
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Basic Civil Engineering
Course Objectives (CO)	Apprise the student about basic concepts of equilibrium, stress, deformation, bending stress and other structural members.

SYLLABUS

List of experiments

1. Draw stress strain curve for ductile and brittle material in tension.
2. Draw stress strain curve for ductile and brittle material in compression.
3. Draw shear stress, shear strain curve for ductile and brittle material in torsion strength testing.
4. Draw load deflection curve for spring in loading and unloading conditions.
5. To determine the hardness of the given material by Rockwell and brinell hardness testing machine.
6. To determine the fatigue strength of the material.
7. To determine the impact strength by izod and charpy test.
8. To determine the load carrying capacity of the leaf spring.
9. To test a mild steel and cast iron specimen in double shear.

Course Code	CE213

Course Title	Fluid Mechanics-I Lab
Type of Course	ES
L T P	0 0 2
Credits	1
Course Prerequisites	Basics of Civil Engineering
Course Objectives (CO)	The study of this subject will develop analytical abilities related to fluid flow. This is a core subject, basic knowledge of which is required by all engineers.

SYLLABUS

List of experiments

1. To determine the meta-centric height of a ship model
2. Verification of Bernoulii's theorem
3. To calibrate a venturimeter and to determine its coefficient of discharge.
4. To calibrate an orifice meter and study the variation of the coefficient of discharge with the Reynolds number.
5. To study the flow over v notch(weir) and to find the coefficient of discharge.
6. To determine the hydraulic coefficients of discharge of a mouth piece
7. To verify momentum equation experimentally
8. To determine the coefficient of friction of pipes of different diameter.
9. To determine the head loss in a pipe line
10. To obtain a surface profile on the total heads distribution of a forced vortex
11. Viscous flow analogy (hele-shaw apparatus) for flow net.

Course Code	**CE215**
Course Title	**Surveying Lab**
Type of Course	**PC**
L T P	**0 0 3**
Credits	**1.5**
Course Prerequisites	**Mathematics and Measurements**
Course Objectives (CO)	**The objective of the subject is to study the maps and plans and also to learn the techniques for drawing maps in plane areas and in hilly areas using different instruments.**

SYLLABUS

List of experiments

1. Measurement of distance, ranging a line.
2. Measurement of bearing and angles with compass, adjustment of traverse by graphical
3. Method.
4. Different methods of leveling, height of instrument, rise & fall methods.
5. Measurement of horizontal and vertical angle by theodolite.
6. Determination of tachometric constants and determination of reduced levels by tachometric.
7. Plane table survey, different methods of plotting, two point & three point problem.
8. Determination of height of an inaccessible object.
9. Setting out a transition curve. Setting out of circular curves in the field using different.

Course Code	**CE202**

Course Title	**Structural Analysis I**
Type of Course	**PC**
L T P	**3 1 0**
Credits	**3.5**
Course Prerequisites	**Knowledge of Solid Mechanics**
Course Objectives (CO)	**The objective of this course is to introduce the students with various types of structures and the concept of stability, determinacy and analysis of their structures.**

SYLLABUS

UNIT I

Introduction

Classification of structures, equation of equilibrium, stability, free body diagram, static and kinematics indeterminacies, principle of superposition, principle of consistent deformation.

Analysis slope and deflection in determinate and indeterminate beams and frames-

Double Integration, Macaulay's moment area and conjugate beam methods, deflection from strain energy, Castigliono's theorem and its applications, unit load method, principle of virtual work, deflection of pin-jointed frames, Maxwell's Reciprocal theorem, Consistent deformation method, method of virtual work for beams and frames.

UNIT II

Analysis Deflection in plane truss

Introduction, stability, and determinacy, bridge trusses, analysis of trusses, equation of condition, determination of forces in number of trusses by method of section, method of joint, unit load method and method of virtual work.

Analysis of Dams, chimneys and Retaining Walls

Introduction, limit of eccentricity for no tension in the section, core of the section, middle third rule, maximum and minimum, wind pressure on chimneys.

UNIT III

Analysis of Arches

Introduction, Analysis of three hinged, two hinged and fixed arches, and spandrel braced arches. Horizontal thrust, shear force and bending movement, radial shear and normal thrust for three hinged and two hinged arches. Influence line diagram for three hinged arches.

Analysis of cables and suspension bridges

Introduction, shape of a loaded cable, cable carrying point loads and UDL, cables with ends at different level, cable subjected to temperature stresses, suspension bridge with two hinged and three hinged stiffening girders, influence liners.

UNIT IV

Moving Loads and Influence Line Diagrams-

Bending Moment and Shear force diagrams due to Single Point load, two point load, multiple concentrated

rolling loads and uniformly distributes moving loads, Equivalent UDL, Muller Breslau principle: Influence lines for beams, Girders with floor beams and frames circulations of the maximum and absolute maximum, shear force and bending moment envelopes.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Basic structural Analysis	C.S. Reddy	
2	Analysis of Structures Vol- I and Vol- II	Vazirani & Ratwani	
3	Intermediate Structural Analysis	C.K. Wang	
4	Theory of Structures	R.S. Khurmi	
5	Theory of Structures	S. Ramamurthum	

Course Code	**CE204**
Course Title	**Design of Concrete Structure-I**
Type of Course	**PC**
L T P	**3 1 0**
Credits	**3.5**
Course Prerequisites	**Knowledge of Solid Mechanics and Building Technology**
Course Objectives (CO)	**To make the students well acquainted with the basics of RCC & RCC structures and design of various RCC structural components using appropriate codes.**

SYLLABUS

UNIT I

Introduction-

Reinforced Concrete, definition, properties of materials, grades of concrete and reinforcing steel, stress-strain curves for concrete & steel, permissible stresses, design philosophies working stress design, ultimate strength and limit state design method.

UNIT II

Limit State Method-

Assumptions in Analysis, Analysis of singly and doubly reinforced rectangular sections, Analysis of singly reinforced flanged sections. Characteristic values, characteristic strength, characteristic loads, design values for materials and loads, factored loads.

Unit III-

Design of Beams for flexure-

Codal provisions for design as per IS 456:2000 according to working stress and limit state method, design of singly and doubly reinforced sections, Design of flanged sections.

Design for Shear, Bond & Torsion-

Shear stresses in homogenous rectangular beams, critical sections, Design Shear strength of plain concrete, Design of shear reinforcement, Bond stress, Anchorage development length, bond failure & bond strength. General behaviour in torsion, Design of sections subjected to torsion, shear and flexure

Unit IV

Design of Slabs-

One-Way and two- way slabs. Design of slab sections using IS method. Introduction to flat slab

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Reinforced Concrete Design	Pillai U. and Menon D	Tata McGraw Hill, New Delhi (2003).
2	Limit State Design of R.C.C. Structures	Jain A.K	Nem Chand & Sons, Roorkee(2002).
3	Limit State Design of Reinforced Concrete	Varghese	Prentice Hall of India, New Delhi
4	Advanced Design of Structures	N. Krishna Raju	

Course Code	**CE206**

Course Title	**Environmental Engineering I**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Nil**
Course Objectives (CO)	**The sustainable provision of safe and drinking water remains as the major challenges facing both the developing and industrialized regions in the world.**

SYLLABUS

UNIT I

Introduction

Importance of environmental sanitation. Quality of water: wholesomeness and palatability; physical, chemical, bacteriological standards.

Public Water Supply:

Beneficial uses of water, water demand, per capita demand, variation in demand, causes detection and prevention of wastage of water, population forecasting.

UNIT II

Sources of Water Supply:

Surface and underground sources, relation and development of source in r/o quality and quantity of water, development of wells. Storage reservoir balancing and service storage, capacity determination by mass curves method. Intake and transmission system: distribution systems: network design. Hydrology principles, zones of under-ground water.

Quality and Examination of Water:

Necessity for examination of water impurities in water. Sampling of water, physical, chemical & bacteriological quality for domestic water supply. Drinking water quality standards and criteria.

UNIT III

Water Supply and Drainage of Buildings:

System of water supply house connections, metering, internal distribution, sanitary fittings, pipe joints, different types of pipes and pipes materials.

Water Treatment:

Unit operations in water treatment, screening, plain sedimentation tank and its theory, sedimentation, aided with coagulation, design of sedimentation tank, flocculation sand filtration, rapid gravity filter, pressure filters, disinfections; Necessary requirements of a disinfectant, methods of disinfecting, different practices of chlorination.

UNIT IV

Miscellaneous Methods of Water Treatment:

Aerial colour, odors & Taster from water, control, removal of iron & manganese from water softening processes, base exchange process, swimming pool water treatment.

RECOMMENDED BOOKS

S. no.	Name	AUTHOR(S)	PUBLISHER
1	Water Supply Engineering" Vol. I	Garg S K,	Khanna Publishers, New Delhi,
2	Waste and Wastewater	Raju B S N,	Tata McGraw Hill, New Delhi,
3	Environmental Engineering	Peavy H S and Rove D R,	McGraw Hill, New Delhi,
4	Water Supply Engineering	Punmia B C,	Laxmi Publication, New Delhi,

Course Code	**CE208**
Course Title	**Surveying II**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Knowledge of Surveying-I**
Course Objectives (CO)	**Developing technical competency to have professional practice in the fields of surveying technique, land management, photogrammetry, remote sensing and geographical information systems**

SYLLABUS

UNIT I

Photogrammetry

Introduction, Basic Principles, Photo-Theodolite, Elevation of a Point by Photographic Measurement, Aerial Camera, Vertical Photograph, Tilted Photograph, Scale, Crab and Drift, Flight Planning for Aerial Photography, Ground Control for Photogrammetry, Photomaps and Mosaics, Stereoscopic Vision, Stereoscopic parallax, Stereoscopic Plotting Instruments, Applications.

UNIT II

Modern surveying instruments

Electromagnetic Distance Measurement (EDM) Electromagnetic Waves, Carrier Waves, Black body radiation, Laws of radiation, Modulation, Types of EDM Instruments, Electro-optical, Infrared, and Microwave EDM Instruments, Effect of Atmospheric Conditions, The Geodimeter, The Tellurometer, Wild Distomats, Electronic Total Station.

UNIT III

Remote Sensing

Introduction, Basic Principles, Electromagnetic (EM) Energy Spectrum, EM Radiations and the Atmosphere, Interaction of EM radiations with Earth's Surface, Types of remote sensing systems, Remote Sensing Observation Platforms, Satellites and their characteristics – Geostationary and sun-synchronous, Earth Resources Satellites, Meteorological satellites, Sensors, Types and their characteristics, Across track and Along track scanning, Applications of Remote Sensing.

Geographical Information System (GIS)

Definition, GIS Objectives, Hardware and software requirements for GIS, Components of GIS, Coordinate System and Projections in GIS, Data structure and formats, Spatial data models – Raster and Vector, Data inputting in GIS, Data base design - editing and topology creation in GIS, Linkage between spatial and non spatial data, Spatial data analysis – significance and type, Attribute Query, Spatial Query, Vector based spatial data analysis, Raster based spatial data analysis, Errors in GIS, Integration of RS and GIS data, Digital Elevation Model, Network Analysis in GIS, GIS Software Packages.

UNIT IV

Global Positioning System (GPS)

Introduction, Fundamental concepts, GPS system elements and signals, GPS measurements and accuracy of GPS, Satellite Movement, GPS Satellites, Co-ordinate systems - Geoids, Ellipsoid and Datum, Spheroid, Customized Local Reference Ellipsoids, National Reference Systems, Worldwide Reference Ellipsoid, WGS 84, Differential-GPS, Classification of GPS receivers, GPS Applications.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Surveying Vol-III	Arora, K.R.,	Standard Book House
2	Introduction to Remote Sensing	Campbell, J.B.	Taylor Publications
3	Geographic Information Systems	Chang.T.K.	Tata McGrawHill.
4	Higher Surveying	Punmia, B.C., Jain A.K.,	Laxmi Publication, New Delhi,

Course Code	**CE210**
Course Title	**Elements of Earthquake Engineering**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Nil**
Course Objectives (CO)	**To foresee the potential consequences of strong earthquakes on urban areas and civil infrastructure and Design, construct and maintain structures to perform at earthquake exposure up to the expectations and in compliance with IS codes**

SYLLABUS

UNIT I

Introduction:

Causes of Earthquakes, plate tectonics, Earthquake mechanism, seismic zoning map of India, epicenter, focus, magnitude, intensity, characteristics of ground motion and attenuation, Earthquake recording instruments- seismograph, accelerograph, Seismoscopy or multi SAR. Past Earthquakes and lessons learnt, Various Types of damages to Buildings.

UNIT II

Theory of Vibration:

Introduction to theory of vibrations, Source of vibrations, Types of vibrations, Degree of freedom, Spring action and damping, Equation of motion of S.D.O.F. systems, Undamped, Damped system subjected to transient forces, general solution, green's function.

UNIT III

Site response to Earthquakes:

Local geology and soil conditions, soil investigations and tests dynamic design criteria for a given site, Lateral Force analysis, Floor Diaphragm action, moment resisting frames, shear walls.

UNIT IV

A Seismic design of structures:

Design data and philosophy, seismic coefficients, permissible stresses and load factors multi-storeyed buildings, base-shear, fundamental period of building, distribution of forces along the height, dynamic analysis.

- Introduction to provisions of IS 1893-2002 Part-I for buildings. Estimation of lateral forces due to earthquake.
- Introduction to provisions of IS 4326.
- Introduction to provisions of IS 13920.

Seismic Strengthening, repair of restoration concepts: Existing buildings, Aging, weathering, development of cracks, repair of masonry and concrete structure.

RECOMMENDED BOOKS			
S. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Earthquake resistant Design of Structures	Pankaj Agrawal, Manish Shrikhande	PHI Learning
2	Dynamics of Structures: Theory and	AK Chopra,	Prentice Hall

	Applications to Earthquake Engineering		
3	Earthquake Resistant Design	David J. Dowrick	Wiley India Pvt. Ltd
4	Elements of Earthquake Engg	Jai Krishna, A.R. Chandrasekaran,Brijesh Chandra	South Asian Publishers
5	Dynamics of Structures	R.W. Clough and Joseph Penzein	McGraw-Hill Education

Course Code	**CE212**
Course Title	**Fluid Mechanics II**
Type of Course	**ES**
L T P	**3 1 0**
Credits	**3.5**
Course Prerequisites	**Fluid Mechanics-I**
Course Objectives (CO)	**The objective of the course is to give information about the application of different types of flows studied in F.M-I and also to study how the hydraulic energy can be used in hydraulic machines.**

SYLLABUS

UNIT I

Laminar Flow:

Navier-stokes equations in Cartesian coordinates (no derivation),meaning of terms ,Flow through circular section pipe, flow between parallel plates, stokes law. Flow through porous media, Transition from laminar to turbulent, Critical velocity and critical Reynolds Number

Turbulent Flow:

Turbulent flows and flow losses in pipes, Darcy equation minor head losses in pipe fittings, hydraulic and energy gradient lines. Definition of turbulence, scale and intensity, Effects of turbulent flow in pipes. Equation for velocity distribution in smooth and rough pipes (no derivation), Resistance diagram.

UNIT II

Boundary Layer Analysis:

Assumption and concept of boundary layer theory, Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate, Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.

UNIT III

Uniform flow in open Channels:

Flow classifications, basic resistance Equation for open channel flow, Chezy, Manning, Bazin and Kutter formulae. Variation of roughness coefficient, conveyance and normal depth, Velocity Distribution. Most efficient flow sections; rectangular, trapezoidal and circular.

Energy and Momentum principles and critical flow:

Energy and specific, Energy in an open channel; critical depth for rectangular and trapezoidal channels. Alternate depths, applications of specific energy to transitions and Broads crested weirs. Momentum and specific force in open channel flow, sequent depths.

UNIT IV

Gradually varied Flow:

Different Equation of water surface profile; limitation, properties and classification of water and surface profiles with examples, computation of water surface profile by graphical, numerical and analytical approaches.

Hydraulic Jump and Surges:

Theory of Jump, Elements of jump in a rectangular Channel, length and height of jump, location of jump, Energy dissipation and other uses, Positive and negative surges

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Hydraulics & Fluid Mechanics	P.N.Modi and S.M.Seth	Standard Publication
2	Flow in Open Channels	S.Subraminayam	Tata MacGraw Hill
3	Fluid Mechanics	Dr. R.K. Bansal	Laxmi Publications
4	Fluid Mechanics	Dr. Jagdish Lal	Metropolitan Book Co. Ltd.
5	Fluid Mechanics	Robert N.Fox & Alan T.Macnold	Tata MacGraw Hill

Course Code	**CE214**
Course Title	**Irrigation Engineering I**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Nil**
Course Objectives (CO)	**The objective of this course is to introduce the students with various methods of irrigation, regarding canal losses, tube wells, irrigation projects and important concept of River training works.**

SYLLABUS

UNIT I

Introduction:

Agriculture and Irrigation Definitions, Necessity of irrigation in India, Aim of Irrigation, Economics of Irrigation, Benefits of Irrigation, Ill-effects of Irrigation, Scope of Irrigation Science in its Engineering and Agricultural aspects or phases, importance of irrigation Engineering, scope of irrigation development in India, Multipurpose River Valley Project, Planned development in India, Action plan to meet future challenges.

Methods of Irrigation:

Types of irrigation, Modes or methods of applying water to crops, quality of irrigation water, Advantages of various techniques of irrigation- Furrow irrigation, Boarder strip irrigation, Basin Irrigation, sprinkler irrigation, drip irrigation, Water requirements of crops, Factors affecting water requirement, Certain important definitions, Consumptive use of water, Duty of water, Duty at various places, Importance of duty, Relation between delta, duty and base period, Soil-moisture-Irrigation relationship, Soil fertility.

UNIT II

Canal Irrigation: Classification of canals, Canal alignment, Inundation canals, advantages and disadvantages, Bandhara irrigation advantages and disadvantages, Silt theories, Kennedy's theory and its drawbacks and Design capacity of an irrigation canal, Maintenance of unlined canals, Silt removal, strengthening of channel banks.

Lined Canals- Lining, Advantages of lining, Types of lining, Requirements of lining, Factors responsible for selection of a particular type of lining, Lining of canals in expansive soils, Financial justification and Economics of lining, Justification for canal lining on new canal projects, Maintenance of lined canals. Silt removal. Measurement of discharge in channels, Design of lined canals, Necessity and methods of providing drainage behind lining.

UNIT III

Losses in Canals Water Logging and Drainage: Losses in canals- Evaporation and seepage, Empirical formulas for channel losses, Water Logging, Causes, Ill-effects, and remedial measures of water logging, Reclamation of saline and Alkaline lands, Drainage of land, Classification of drains, surface and sub-surface drains, Design and maintenance of open surface drains, Advantages and maintenance of Tile Drains.

Investigation and Preparation of Irrigation Projects: Classification of project, Project Preparation-Investigations, Topographical surveys, Geological investigations, Construction material surveys, Design of works and Drawings, Concept of multi purpose projects, Major, Medium and Minor Projects, Planning of an irrigation Project, Economics and Financing of Irrigation Works, Documentation of Project Report.

UNIT IV

Tube-well Irrigation: Types of Tube-wells, Strainer type, Cavity Type, Slotted type, Type of strainers, Design of a strainer tube well, Aquifer, Porosity, Uniformity coefficient, Specific yield & specific retention, Coefficient of Permeability, Coefficient of Transmissibility, Coefficient of Storage, Yield or discharge of a tube-well, Assumptions, Theim's formula and Dupuit's Formula, Interference of Tube-wells, well Shrouding and well development. Life of a tube well and reasons for its failure. Advantages and Disadvantages over canal irrigation

River training works

River training, importance of river training, control and graining of river, classification of river training works, types of river training works, objective of river training works, design of guide banks, groynes or spurs their design and classification ISI recommendations of approach embankments and afflux embankment, pitched island, natural cutoff and design consideration, artificial cutoff object and design consideration

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Principles & practice of Irrigation Engg.	S.K. Sharma;	S. Chand, Limited.
2	Irrigation & Water Power Engg.	B.C. Punmia, Pande B.B Lal	Laxmi Publications Ltd
3	Fundamentals of Irrigation Engg	Dr. Bharat Singh	Nem Chand & Bros
4	Irrigation Engg. & Hydraulic Structure	Santosh Kumar Garg	Khanna Publishers

Course Code	**CE216**
Course Title	**Structural Analysis-I Lab**
Type of Course	**PC**
L T P	**0 0 2**
Credits	**1**
Course Prerequisites	**Knowledge of structures**
Course Objectives (CO)	**The objective of this course is to introduce the students with various types of structures and the concept of stability, determinacy and analysis of their structures.**

SYLLABUS

List of experiments

1. Deflection of a simply supported beam and verification of Clark-Maxwell's theorem.
2. To determine the Flexural Rigidity of a given beam.
3. To verify the Moment- area theorem for slope and deflection of a given beam.
4. Deflection of a fixed beam and influence line for reactions.
5. Deflection studies for a continuous beam and influence line for reactions.
6. Study of behavior of columns and struts with different end conditions.
7. Experiment on three-hinged arch.
8. Experiment on two-hinged arch.
9. Deflection of a statically determinate pin jointed truss.
10. Forces in members of redundant frames.
11. Experiment on curved beams.
12. Unsymmetrical bending of a cantilever beam.

Course Code	**CE218**
Course Title	**Concrete Technology Lab**
Type of Course	**PC**
L T P	**0 0 2**
Credits	**1**
Course Prerequisites	**Nil**
Course Objectives (CO)	**To make the students well acquainted with the basics of RCC & RCC structures and design of various RCC structural components using appropriate codes.**

SYLLABUS

List of experiments

1. To Determine the Specific Gravity of and Soundness of cement
2. To Determine the Standard Consistency, Initial and Final Setting Times of Cement and Compressive Strength of Cement.
3. To Determine the Fineness Modulus, Bulk Density, Water Absorption and Specific gravity of Fine and Coarse Aggregates.
4. To Determine the Slump, Compaction Factor and Vee-Bee Time of Concrete.
5. Mix Design of Concrete by IS methods
6. To Determine the Compressive Strength of Concrete by Cube and Cylinder.
7. To carry out the Split Tensile and Flexural strength of Concrete.
8. Compressive strength of Brick and Tile as IS standard

Course Code	**CE301**
Course Title	**Design Of Steel Structure I**
Type of Course	**PC**
L T P	**3 1 0**
Credits	**3.5**
Course Prerequisites	**Knowledge of Structures**
Course Objectives (CO)	**To make the students well acquainted with the basis and design of various components used in fabrication of steel structures.**

SYLLABUS

UNIT I

Riveted & Welded Joints:

Rivets and riveting, stresses in rivets, strength and failure of riveted joints, Riveted joints in framed structures, Types of welds and welded joints, stresses in welds, design of welds, eccentrically loaded welded joints.

UNIT II

Tension Members:

Types of tension members, net and gross areas, permissible stresses, Design of members subjected to axial loads, combined bending moments and axial loads, lug angles, Tension Splice

Compression Members:

Failure modes of columns, end conditions and effective length of columns, various empirical formulae. IS code formula, General codal provisions for design of compression members, Built up compression members, lacing and battening of compression members, splicing of compression members.

UNIT III

Flexural Members:

Design of laterally restrained and unstrained rolled and built up sections, encased.

Column Bases and Foundations:

Types of column bases, design of slab base, Gussetted base and grillage foundations.

UNIT IV

Roof Trusses:

Design loads, combination of loads , design of members (including purlins) and joints, detailed working drawings.

Design of plate Girders: Components of a plate girder, basic design assumptions, stiffeners in plate girders, design of various components of a welded and riveted plate girder.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Design of steel structure by limit state method	SS Bhavikatti	IK International as per IS 800-2007
2	Design of steel structure	S.K Duggal	Tata McGraw Hill
3	Design of steel structures:	N Subramanian	Oxford Higher Education
4	Design of Steel Structures	Chandra R,	Standard Publishing House,

Course Code	**CE303**
Course Title	**Structural Analysis-II**
Type of Course	**PC**
L T P	**3 1 0**
Credits	**3.5**
Course Prerequisites	**Solid Mechanics and Structural Analysis-I**
Course Objectives (CO)	**To develop a technical competence in the fundamental concepts and application of displacement methods and force methods of statically indeterminate structures.**

SYLLABUS

UNIT I

Statically Indeterminate Beams and Frames:
Introduction, types of supports-reaction Components, Compatibility Equations, external redundancy, statically indeterminate beams and frames, degree of Redundancy, rigid frames and trusses due to yielding of supports.

Fixed and Continuous Beams:
Introduction, Bending moment diagrams for fixed beams with different loadings, effect of sinking of supports, degree of fixity at supports, advantages and disadvantages of fixed beams, continuous beams, Three moment theorem(Clayperons theorem) for different types of loading, effect of sinking of supports and geometry of continuous beams.

UNIT II

Slope Deflection Method:
Introduction, slope deflection equations, Applications to fixed beams, simply supported beams, continuous beams and portal frames, portal frames with or without side sway.

Unit III-

Moment Distribution Method:
Basic propositions, stiffness of a member, distribution theorem, carry-over theorem, relative stiffness, distribution factors, analysis of statically indeterminate beams and rigid frames (with and without side sway) due to applied loading and uneven support settlement.

Rotation Contribution method:
Basic concepts, rotation factor, and application to continuous beams, symmetrical and unsymmetrical portal frames and multi-storeyed frames due to applied loading and yielding of supports, story shear.

Unit IV

Approximate methods of Structural Analysis: Portal method, Cantilever Method, Substitute Frame Method.

Column analogy method: application Stiffness and carry over factors for non-prismatic members.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Theory of Structures	B.C.Punmia, Ashok Jain, Arun Jain	Luxmi Publications
2	Theory of structures	S Ramamurthum	
3	Structural Analysis (I&II)	S.S. Bhavikatti	Vikas Publishing House
4	Theory of structures	Vazirani and Rathwani Vol. II and Vol. III.	

Course Code	**CE305**
Course Title	**Transportation Engineering I**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Nil**
Course Objectives (CO)	**The objective of the subject is to study highway project planning and to design various elements of roads.**

SYLLABUS

Highway Engineering

UNIT I

Highway Development & Planning-

Classification of roads, brief history of road development in India, present status of roads in India, road patterns, saturation systems, highway alignment: basic requirements for an ideal alignment, factors governing highway alignment, highway location surveys and studies, highway alignment in hilly areas, drawings and reports, highway project preparation.

Highway Geometric Design-

Terrain classification, design speed, vehicular characteristics, highway cross-section elements Sight distance: introduction to sight distance, reaction time, analysis of safe sight distance, analysis of overtaking sight distance, intersection sight distance. Design of horizontal alignment: horizontal curves, design of super elevation and its provision, radius at horizontal curves, widening of pavements at horizontal curves, analysis of transition curves. Design of vertical alignment: different types of gradients, grade compensation on curves, analysis of vertical curves.

UNIT II

Traffic engineering & control-

Traffic engineering definitions: functions, organization and importance, necessity of understanding the behaviour of road user and vehicle characteristics, human factors governing the road user behaviour- power performance and other vehicular characteristics. Traffic studies and surveys: Speed studies: presentation of data, journey time and delay studies, uses and various methods, relative merits and demerits Vehicular volume counts: types, various available methods, relative merits and demerits, planning of traffic counts, vehicle occupancy surveys. Origin destination surveys, need and uses, various available methods, checks for accuracy, presentation of data. Parking surveys: needs and types. Traffic signs and marking: types, location, height etc., miscellaneous traffic control aids like roadway delinators, hazard markers, object marker, speed breakers, rumble strips etc.,

Pavement materials-

Stone aggregates: desirable properties, tests, requirements of aggregates for different types of pavements. Bituminous materials: types, tests on bitumen, desirable properties, selection of grade of bitumen. Bituminous mix design: principle, methods, modified binders.

Design of pavements-

Types of pavements, comparison of different types of pavements, functions of pavement components, pavement design factors, design wheel load, equivalent single wheel load, repetition of loads, equivalent wheel load factors, strength characteristics of pavement materials, climatic variation; design of flexible highway pavement as per IRC approach, design of flexible airport pavements, Stresses in rigid highway pavements, critical load positions, stresses due to loads, stresses due to temperature change, combined loading and temperature stresses, Joints in rigid pavements: transverse joints, longitudinal joints, fillers and sealers.

UNIT III

Highway construction-

Equipment used for construction, embankment design and construction, construction of different Types of roads: water bound macadam, different types of bituminous pavements, cement concrete pavements, Construction of soil stabilized roads: different soil stabilization methods, use of geo-textiles and geo-grids.

Highway drainage and maintenance –

Necessity, surface draining, highway sub drainage, draining of city streets, Highway maintenance- Pavement failures: flexible pavement failures, rigid pavement failures, maintenance of different types of pavements: assessment and need for maintenance, pavement management system, evaluation of pavements: structural evaluation of pavements, functional evaluation of pavements, strengthening of existing pavements: object of strengthening, types of overlays, design of different types of overlays.

Water Transportation

UNIT IV

Water Transportation-

Harbors: Selection of site, entrance and channel requirement, ship characteristics and their influence on ports management and operations, harbor maintenance. Harbor layout: types and construction, dolphins. Navigational aids: buoys & lighthouses. Port facilities: docks, transit sheds and warehouses, general layout, containers and container yard, layout and handling equipment.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Highway Engineering	Khanna S.K., and Justo	Nem Chand and Brothers, Roorkee
2	Principles and Practice of Highway Engineering	Kadiyali, L.R	Khanna Publishers
3	Highway Engineering Volume 2	Flaherty, C.A.O	Edward Arnold, London
4	Principles, Practice & Design of Highway Engineering	Sharma, S.K	S. Chand & Company Ltd., New Delhi,

Course Code	**CE307**
Course Title	**Environmental Engineering II**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Environmental Engineering-I**
Course Objectives (CO)	**It is the branch of environmental engineering in which the basic principles of science and engineering are applied to the problems of water pollution control. So, as an overview, this wastewater engineering includes wastewater treatment, sludge disposal and reuse, wastewater reclamation and reuse, effluent disposal and the role of engineer.**

SYLLABUS

UNIT I

Introduction:

Terms & definitions, systems of sanitation and their merits and demerits, system of sewerage, choice of sewerage system and suitability to Indian conditions.

Design Of Sewers:

Quantity of sanitary and storm sewage flow, forms of sewers. Conditions of flow in sewers, sewers of equivalent section, self cleansing and limiting velocity, hydraulic formulae for flow of sewerage in sewers and their design.

UNIT II

Construction & Maintenance Of Sewers:

Sewer appurtenances, materials for sewers, Laying of sewers, joints in sewers, testing of sewers pipes. Maintenance, operation and precaution before entering a sewer.

House Drainage:

Principles of house drainage, traps, inspection chamber Indian and European type W.C. flushing cisterns, soil-waste and anti-syphonage pipes, plumbing system.

UNIT III

Characteristics & Testing Of Sewage:

Composition of sewage, sampling, physical & chemical analysis of sewerage, biological decomposition of sewage, kinetics of organic waste stabilization.

Treatment Of Sewage:

Unit processes of waste water treatment, importance of environmental sanitation, treatment of water; impurities in water-processes for their removal – typical flow-sheets. Sedimentation: factors affecting efficiency, design values of various parameters, tube settlers. Coagulation and flocculation: mechanisms, common coagulants, rapid mixing and flocculating devices screens, grit chambers, detritus tank, skimming tank, grease traps, sedimentation, chemical treatment, aerobic biological treatment, trickling filter (lrtf & hrtf), activated sludge processes, anaerobic treatment, units-sludge digesters and biogas plant.

UNIT IV

Low Cost Waste Water Treatment Units:

Theory, design, advantages & disadvantages of oxidation's ponds, lagoons, ditches, septic tanks and imhoff tanks.

Introduction To Advanced Treatment Process:

Reverse osmosis, electro – dialysis, floatation, micro filtration, ultra filtration, nan filtration.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	"Water Supply Engineering" Vol. II	Garg S K	Khanna Publishers, New Delhi, 2003
2	Environmental Engg. - A design Approach	Arcadio P. Sincero and Gregoria P. Sincero	Prentice Hall of India, New Delhi
3	Waste Water Engineering - Treatment and Reuse	Metcalf & Eddy	McGraw Hill, New Delhi, 2003
4	Waste Water Engg. (Environmental Engg.-II)	Punmia B C	Laxmi Publication, New Delhi, 2002

Course Code	ENG307

Course Title	**Professional Communication Skills**
Type of course	**HS**
L T P	**3 0 0**
Credits	**3**
Course Objectives(CO)	**The course is career oriented which aims to develop and improve the English language and proficiency. In order to gain confidence in public and professional life and strengthen the abilities and skills pertinent to success.**

SYLLABUS

UNIT-I

Language Skills: Parts of Speech, Vocabulary, Phrase, Clause, Sentence and its types, Punctuation.

UNIT-II

Business Correspondence: Meaning of Business correspondence – Importance of Business Correspondence, Essential qualities of a business letters, types of business letters – cover letter, thank you letters, message through email and Fax. Acceptance letters, rejection letters, and withdrawal letters.

UNIT- III

Principles of communication: LSRW in communication. What is meant by LSRW Skills – Why it is important – How it is useful – How to develop the skills? Non-verbal communication: Body language-Kinesics, Proxemics, Para linguistic, Chronemics Signs and symbols, Territory/Zone Oral: Speaking words, articulation and pronunciation.

UNIT- IV

Enhancing self-esteem and Personality development: Self theory and the Johari window: Characteristics of fully functioning individuals, manifestations of low and high self-esteem, techniques for enhancing self-esteem, nurturance techniques.

Comprehension Skills: Collection of Short Stories: Khushwant Singh's *The Mark of Vishnu*

Suggested Text Books and References

Sr. No.	Name	Author	Publisher
1	Communication Skills	Loveleen Kaur	Satya Prakashan
2	A course in Communication Skills and English Grammatr	Tanu Gupta Iritiksha Mittal	Ajay Publications Yamuna Nagar
3	Business Communication	Varinder Kumar Bodh Raj	Kalyani Publishers

Course Code	**SSE303**

Course Title	**Human Values and Professional Ethics**
Type of course	**MC**
L T P	**3 0 0**
Credits	**NC**
Course Objectives(CO)	**1. To help the students to discriminate between valuable and superficial in the life.** **2. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief.** **3. This Course will encourage the students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life.** **4. This course is an effort to fulfil our responsibility to provide our students significant input about understanding**

SYLLABUS

UNIT-I

Course Introduction- 1. Need, Basic Guidelines, Content and Process for Value Education : Understanding the need, basic guidelines, content and process for Value Education, Understanding Happiness and Prosperity correctly.

Understanding Harmony in the Human Being : Understanding the harmony with self and the Body: Sanyam and Swasthya.

UNIT II

Harmony in Human Relationship: Understanding harmony in the Family- the basic unit of human interaction, visualizing a universal harmonious order in society

Understanding Harmony in the Nature and Existence: Understanding the harmony in the Nature, Holistic perception of harmony at all levels of existence

UNIT III

Understanding of Harmony on Professional Ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.

UNIT IV

Strategy for transition from the present state to Universal Human Order: At the level of individual, at the level of society.

Case studies: typical holistic technologies, management models and production systems

Suggested Text Books and References			
Sr. No.	**Name**	**Author**	**Publisher**
1	A Foundation Course in Value Education	R R Gaur, R Sangal, G P Bagaria	Excel Books Publishers
2	Energy & Equity	Ivan Illich	The Trinity Press, Worcester, and HarperCollins, USA
3	Human Values and Professional Ethics	Rishabh Anand	Satya Prakashan, New Delhi
4	Jeevan Vidya ek Parichay.	A Nagraj	Divya Path Sansthan,Amarkantak.

Course Code	**CE309**
Course Title	**Computer Aided Steel Structural Design/Drawing**
Type of Course	**PC**
L T P	**0 0 2**
Credits	**1**
Course Prerequisites	
Course Objectives (CO)	**Practical will provide better understanding of the various commands used in auto cadd and of structures to be made using commands.**

SYLLABUS

List of experiments

1. Structural design of steel elements such as connections, tension members.
2. Detailed working drawing for Elements of industrial buildings and steel roof truss.
3. Detailed working drawings for steel foot bridge, deck type and through type and railway bridge.

Course Code	**CE311**

Course Title	Environmental Engineering II
Type of Course	PC
L T P	0 0 2
Credits	1
Course Prerequisites	Environmental Engineering I
Course Objectives (CO)	It is the branch of environmental engineering in which the basic principles of science and engineering are applied to the problems of water pollution control. So, as an overview, this wastewater engineering includes wastewater treatment, sludge disposal and reuse, wastewater reclamation and reuse, effluent disposal and the role of engineer.

SYLLABUS

List of Experiments

1. Measurement of PH
2. Measurement of Total Dissolved salts
3. Measurement of Conductivity
4. Estimation of Alkalinity
5. Estimation of Hardness by EDTA method
6. Estimation of Residual Chlorine.
7. Estimation of Optimum Coagulant Dose by Jar Test
8. Estimation of Sulphate
9. Estimation of Chlorides
10. Estimation of D.O. by Winkler's methods.
11. Estimation of Suspended, Settle able, Volatile and fixed solids.
12. BOD test for water and waste water.
13. COD test for water and waste water.
14. Determination of Turbidity by using Nephlometer.
15 Water Microorganism Analyses

Course Code	**CE313**
Course Title	**Transportation Engineering Lab I**
Type of Course	**PC**
L T P	**0 0 2**
Credits	**1**
Course Prerequisites	**Nil**
Course Objectives (CO)	**The experiments will provide better understanding of the materials and their behavior under various loading conditions.**

SYLLABUS

List Of Experiments

Tests on Sub-grade Soil

1.California Bearing Ratio Test

Tests on Road Aggregates

2. Crushing Value Test
3. Los Angles Abrasion Value Test
4. Impact Value Test
5. Shape Test (Flakiness and Elongation Index)

Tests on Bituminous Materials and Mixes

6. Penetration Test
7. Ductility Test
8. Softening Point Test
9. Flash & Fire Point Test
10. Bitumen Extraction Test

Field Tests

11. Roughness Measurements Test by Roughometer
12. Benkelman Beam Pavement Deflection Test

PROFESSIONAL ELECTIVES-I

Course Code	**CE319**
Course Title	**Structural Analysis III**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Knowledge of Structural Analysis I, Structural Analysis II**
Course Objectives (CO)	**To learn advanced methods like matrix methods of structural analysis plastic theory.**

SYLLABUS

UNIT-I

Basic concepts of structural analysis

Force and displacements, equilibrium, compatibility, degree of redundancy, rigid-jointed plane and space frames, pin jointed plane and space frames and hybrid structures.

UNIT II

Flexibility Matrix (Physical approach)

Basic definitions and types of matrices, matrix operations, matrix inversion, solution of linear simultaneous equations, matrix, portioning, development of flexibility matrices for statically determinate and indeterminate beams, rigid-jointed plane frames and pin jointed plane frames using physical approach.

Stiffness Matrix (Physical approach)

Development of stiffness matrices for statically determinate and indeterminate beams, rigid jointed plane frames and pin jointed plane frames using physical approach, reduced stiffness matrix, total stiffness matrix, translational or lateral stiffness matrix.

UNIT III

Stiffness Matrix (Element Approach):

Transformation of system displacements to element displacements through displacement transformation matrix, transformation of element stiffness matrices to system stiffness matrix, development of stiffness matrices for statically determinate and indeterminate beams, rigid-jointed plane frames and pin-jointed plane frames using element approach, relation between flexibility and stiffness matrices.

Stiffness Method Of Analysis

Analysis of continuous beams, rigid-jointed plane frames and pin-jointed plane frames using the physical and element approaches, effect of support settlements, temperature stresses and lack of fit, comparison of flexibility and stiffness methods of analysis.

UNIT IV

Plastic Analysis

Introduction , plastic hinge concept, plastic modulus, shape factor, upper and lower bound theorems, collapse mechanics, combined mechanics, plastics analysis of beams and portal frames by equilibrium and mechanism methods, plastic moment distribution

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Theory of structures	B.C.punmia, Ashok Jain, Arun Jain	
2	Basic structural analysis	C.S Reddy	Tata McGraw Hill
3	Indeterminate structure analysis	C.K Wang	
4	Structural analysis-A matrix approach	G.S Pandit & Gupta	

Course Code	**CE321**
Course Title	**Dynamics of Structures**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Knowledge of Structures**
Course Objectives (CO)	**The objective is to provide the fundamental understanding of the structural dynamics and the problems solving ability for dynamic response in civil engineering design and analysis**

SYLLABUS

UNIT-I

Overview of structural dynamics:
Fundamental objective of structural dynamic analysis – types of prescribed loadings - essential characteristics of a dynamic problem - method of discretization: lumped mass procedure - generalized displacements - the finite-element concept.

Single degree of freedom systems:
Components of the basic dynamic system formulation of the equations of motion - direct equilibration using Alembert's principle - principle of virtual displacements - *generalized SDOF systems* - rigid body assemblage.

Free vibration response:
Solution of the equation of motion - Undamped free vibrations - damped free vibrations - critical damping – under damped systems - over damped systems - negative damping.

UNIT II

Response to harmonic loading: Undamped system complementary solution - particular solution - general solution - response ratio - damped system - resonant response

Response to periodic loading: Fourier series expression of the loading - response to the fourier series loading - exponential form of fourier series solution

Response to impulsive loads: General nature of impulsive loads - sine-wave impulse – rectangular impulse - triangular impulse - shock load.

UNIT III

Response to general dynamic loading: Duhamel integral for an undamped system – numerical evaluation of the duhamel integral for an undamped system - response of damped systems response analysis through the frequency domain

Multi degree of freedom systems: Formulation of the MDOF equations of motion - selection of the degrees of freedom - orthogonally conditions - normal co-ordinates - uncoupled equations of motion - undamped & damped - mode superposition procedure

UNIT IV

Continuous parameter systems: Vibration analysis by Rayleigh's method - basis of the method - approximate analysis of a general system - selection of the vibration shape - improved Rayleigh method

Practical vibration analysis: Preliminary comments - stodola method - fundamental mode analysis – proof of convergence - analysis of second mode - analysis of third and higher modes – analysis of highest mode - Rayleigh's method in discrete co-ordinate systems.

RECOMMENDED BOOKS			
Sr.	**Name**	**AUTHOR(S)**	**PUBLISHER**

no.			
1	Dynamics of Structures	Clouch R.W. & Penzien J	Tata McGraw Hill
2	Vibration Problem in Engineering	Weaver W., Jr. Timoshenko S.P., Young D.H,	John Wiley
3	Mechanical Vibration Analysis	Srinivasan P.,	Tata McGraw Hill
4	Elements of Vibration Analysis	Meivovitch L.,	Tata McGraw Hill
5	Dymanics of Structures	A K Chopra;	Prentice-Hall
6	Mechanical Vibrations, Schaum's Outline Series,	Seto W.W.,	McGraw Hill

Course Code	**CE323**
Course Title	**Finite Element Methods In Engineering**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Knowledge of Structures**
Course Objectives (CO)	**Be able to use the commercial finite element package ANSYS to build finite element models and solve a selected range of engineering problems**

SYLLABUS

UNIT-I

Introduction

background and applications, general description of the method, summary of the analysis procedure, matrix theory, differential equations.

UNIT II

Review of Solid mechanics:

Equations of equilibrium, stresses and strains, strain displacement relations, linear constitutive relations, two – dimensional elasticity, non-linear material behavior, material characterization.

One – dimensional finite elements:

The concept of an element, various element shapes, displacement models, finite element modelling, coordinates and shape functions, stiffness matrix, the finite element equations and treatment of boundary conditions.

UNIT III

Two-dimensional finite elements:

Introduction, two-dimensional boundary value problems, various element shapes, constant strain triangular elements, quadrilateral elements, natural coordinates, connectivity and nodal coordinates, problem modelling and boundary conditions.

Two-dimensional Isoparametric Elements:

Introduction, the four-nodded quadrilateral element, numerical integration, interpolation formulas and shape function formulas, computations of element stiffness matrix.

UNIT IV

Beams and Frames:

Introduction, finite element formulation, load vector, boundary conditions, displacement method for beam analysis, beam finite elements, shear force and bending moment, plane frames.

Solution Techniques

Gauss elimination – matrix decomposition-based and frontal solver, Requirements of pre and post processor in GUI based FE packages.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Introduction to the finite element method	Desai C S and Abel J F,	CBS Publishers and Distributions, Delhi, 2004.

2	Theory and Problems of Finite Element Analysis Schaum's Outline Series,	Buchanan G R,	Tata McGraw Hill
3	Introduction to Finite Elements in Engineering	Chandrupta T R and Belegundu A D	PHI, New Delhi,1997
4	Finite Element Analysis – Theory and Programming"	Krishnamoorthy C S,	TMH Publishing Co. Ltd. New Delhi, 2002.
5	Finite Element Procedures	Bathe K J,	Prentice Hall of India, New Delhi, 1997

Course Code	**CE325**
Course Title	**Pre-Stressed Concrete**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Design of Concrete Structures**
Course Objectives (CO)	**To provide an exposure to design of pre stressed concrete structures and structural elements.**

SYLLABUS

UNIT-I

Introduction And Analysis For Stress

Basic concepts-terminology-system of pre-stressing- pre-tensioning-post tensioning- principle of pressurizing-types of pre-stressing. Assumptions-analysis of pre-stress-concentric & eccentric tendon-resultant stresses- rectangle I Section(symmetrical only)-concept of pressurizing-stress concept, strength concept and load balancing concept.

UNIT II

Losses of pre-stress and anchorage zone stresses

Losses of pre-stress-types-losses due to elastic deformation of concrete- shrinkage of concrete-creep of concrete-friction-anchorage slip. Anchorage zone stresses-stress distribution in end block-investigations on anchorage zone stresses-Indian code provision only.

Shear strength

Behavior of pre stressed concrete members under shear- shear strength-principle stresses-ultimate shear resistance- Indian standard code provision.

UNIT III

Design Of Pre-stressed Concrete Beams

Design of sections for flexure-stress conditions-minimum section modulus-stresses at transfer-service load-pre stressing force-eccentricity-check for stresses-initial and final conditions-limit state of collapse in flexure-shear,(rectangular section only).

UNIT IV

Design Of Pre Stressed Concrete Slab

Types of pre-stressed concrete slabs-design of one way slab, two way slab- design of simple flat slab.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Pre-stressed concrete,	R. Krishna Raju,	Tata McGraw Hill
2	Pre-stressed Concrete	R. Rajagopalan,	Alpha science international
3	Pre-stressed Concrete	Pandit G.S.Gupta S.P	CBS Publishers
4	IS Code of practice for Pre-stressed Concrete	IS 1343-1980	BIS New Delhi 1980

Course Code	**MAT304**
Course Title	**Numerical And Statistical Methods**
Type of course	**BS**
L T P	**4 0 0**
Credits	**4**
Course prerequisite	**Engineering Mathematics**
Course Objective (CO)	**This course is an introduction to a broad range of mathematical techniques for solving problems that arise in Science and Engineering. The goal is to provide a basic understanding of the derivation, analysis and use of these techniques along with a detailed understanding of Transforms in engineering applications.**

SYLLABUS

UNIT-I

Computer Arithmetic and Errors: Representation of integers and real numbers in computers. Fixed point arithmetic, Floating point arithmetic, normalized floating point numbers, Round off and truncation errors, Relative and absolute errors

Solution of Non-linear equations: Bisection method for solution of a single non-linear equation and its rate of convergence. Ragula falsi method for solution of a single non-linear equation and its rate of convergence. Newton-Raphson method for solution of a single non-linear equation. Rate of convergence.

UNIT-II

Finite differences and Interpolation: Finite difference:-First and Higher order differences, Forward differences and backward differences, Properties of operators, Shifting operator E, Relations between the operators. **Interpolation**:- Newton Forward and Backward Interpolation formulae, Divided differences, Newton's Divided difference formula, Lagrange's Interpolation formula, Inverse interpolation.

UNIT-III

Numerical differentiation and integration: Newton's forward and backward differences formulae to compute first and higher order derivatives, The Trapezoidal rule, Simpson's one third rule and three eighth rule.

Numerical solution of ordinary differential equations: Solution by Taylor's series, Euler's method, modified Euler method, Runge-Kutta methods up to fourth order (No proof), Milne's Method, Adam's Bashforth method.

UNIT-IV

Solution of system of linear equation: Gauss elimination method with concept of partial and complete pivoting. Gauss Jordan method for solving linear equations. Jacobi's method and Gauss Siedel method for solving system of linear equations.

Numerical solution of partial differential equations: Classification of Partial differential equations of the second order, Laplace's equation and its solution by Liebmann's process. Solution of Poisson's equation, Solutions of Parabolic and Hyperbolic equations.

Recommended books:-

S. No	Name	Author(s)	Publisher
1	Numerical Methods,	Dr. B.S. Grewal	Khanna Publishers
2	Introductory Methos of Numerical Analysis	S.S. Shastri	PHI

3	Numerical Methods	M.K. Jain, SRK Iyengar, R. K.Jain	New Age Intl. Publishers
4	Numerical Solution of Differential Equations	M.K.Jain,	

Course Code	**CE302**
Course Title	**Design Of Concrete Structure II**
Type of Course	**PC**
L T P	**3 1 0**
Credits	**3.5**
Course Prerequisites	**Design of Concrete Structure-I**
Course Objectives (CO)	**To make the students well acquainted with the basics of RCC & RCC structures and design of various RCC structural components using appropriate Codes.**

SYLLABUS

Unit I

Design Of Footing-

Isolated footings subjected to eccentric loading, combined footings: Different types, Design of Rectangular, Trapezoidal, Strap and Raft footings.

Beams curved in plan-

Design of semicircular beams supported on three supports. Design of circular beam supported on symmetrically placed columns.

Unit II

Domes

Introduction to different types of domes and, Design of spherical and conical domes.

Staircases-

Types of staircases loads on stair, Design of different types of staircases.

Unit III

Retaining Walls-

Design of cantilever and counter fort retaining walls.

UNIT IV

Water Tanks

Design of circular and rectangular water tanks resting on ground.

Beam-

Design of Continuous beams and curved beam.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Reinforced Cement Concrete	Mallick and Rangasamy	Oxford-IBH
2	Reinforced Concrete Design	Pillai U. and Menon D	Tata McGraw Hill
3	Limit State Design of Reinforced Concrete	Varghese	Prentice Hall of India
4	Advanced RCC Design	Pillai & Mennon	Tata MacGraw Hill

Course Code	**CE304**
Course Title	**Transportation Engineering II**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Transportation Engineering II**
Course Objectives (CO)	**To provide knowledge about basics and design aspects of railway tracks and airports**

SYLLABUS

Railway Engineering

Unit I

Introduction to Railway Engineering:
History of Railways, Development of Indian Railway, Organization of Indian Railway, Important Statistics of Indian Railways. Railway Gauges: Definition, Gauges on World Railways, Choice of Gauge, Uniformity of Gauge, Loading Gauge, Construction Gauge.

Geometric Design of Railway Track:
Requirements of a Good Track, Track Specifications on Indian Railways, Detailed Cross-Section of Single/Double Track on Indian Railways. Components of Railway Track: Rails, Sleepers, Ballast, Subgrade and Formation. Track Fixtures & Fastenings, Coning of Wheels, Tilting of Rails, Adzing of Sleepers, Rail Joints, Creep of Rails, Alignment, Gradients, Horizontal Curve, Super-elevation, Equilibrium Cant, Cant Deficiency, Transition Curves.

Points and Crossings:
Functions, Working of Turnout, Various types of Track Junctions and their layouts, Level-crossing.

UNIT II

Railway Stations & Yards:
Site Selection, Classification & Layout of Stations, Marshalling Yard, Locomotive Yard, Equipment at Railway Stations & Yards.

Signalling and Interlocking:
Objectives, Classification of Signals, Types of Signals in Stations and Yards, Automatic Signalling, Principal of Interlocking.

Modernization of Railway Tracks:
High Speed Tracks, Improvement in existing track for high speed, Ballastless Track, MAGLEV, TACV Track.

Airport Engineering

UNIT III

Introduction to Airport Engineering and Airport Planning:
Air Transport Scenario in India and Stages of Development, National and International Organizations, Aircraft Characteristics, Factors for Site Selection, Airport Classification, General Layout of an Airport, Obstructions and Zoning Laws, Imaginary Surfaces, Approach Zones and Turning Zones.

Runway Orientation and Design:
Head Wind, Cross Wind, Wind Rose Diagram, Basic Runway Length, Corrections, Geometric Design Elements, Runway Configuration.

UNIT IV

Taxiway and Aircraft Parking:
Aircraft Parking System. Main Taxiway, Exit Taxiway, Separation Clearance, Holding Aprons.
Visual Aids:
Marking and Lighting of Runway and Taxiway, Landing Direction Indicator, and Wind Direction Indicator, IFR/VFR.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Railway Engineering	Chandra S., and Aggarwal	M.M. Oxford University Press, New Delhi,
2	Railway Track Engineering	J. S. Mundrey	McGraw Hill Publishing Co., 2009
3	Airport Planning and Design	Khanna, S.K., Arora, M.G., and Jain, S.S	Nem Chand & Bros. Roorkee, 1999.
4	Planning and Design of Airports	Horenjeff, R. and McKelvey, F.	McGraw Hill Company, New York, 1994.

Course Code	**CE306**
Course Title	**Soil Mechanics**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Nil**
Course Objectives (CO)	**This course is aimed to develop analytical skills in dealing with soil as a medium of water flow, a medium for structural supports and a primary building material.**

SYLLABUS

Unit I

Basic Concepts

Definition of soil and soil mechanics, common soil mechanics problems in Civil Engineering. Principal types of soils. Comparison between soil and rock. Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio and porosity. Definitions: moisture content, unit weights, degree of saturation, void ratio, porosity, specific gravity, mass specific gravity etc. Relationship between volume weight, void ratio- moisture content, unit weight- percent air voids, saturation- moisture content, moisture content- specific gravity etc .important properties of very fine soil. Characteristics of main Clay mineral groups. Weight volume relationship and determination of specific gravity from pycnometer test. Field density from sand replacement method and other methods. Moisture content by oven dry method and other methods.

Plasticity Characteristics of Soil

Introduction to definitions of: plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, definitions of activity and sensitivity. Determination of liquid limit, plastic limit and shrinkage limit. Use of consistency limits. Classification of Soils-Introduction of soil classification: particle size classification, Indian standard soil classification system, general characteristics of soil in different groups.

Unit II

Permeability of Soil-

Introduction to hydraulic head, Darcy"s law, validity of Darcy"s law. Determination of coefficient of permeability: Laboratory method: constant head method, falling head method, Permeability of stratified soils, factors affecting permeability of soil. Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets, graphical method to plot flow nets.

Effective Stress-

Concept of effective stress principal, seepage pressure, effect of water table, critical hydraulic gradient and quick sand condition.

Compaction-

Definition and object of compaction and concept of O.M.C. and zero Air Void Line. Modified proctor Test. Factors affecting compaction Effect of compaction on soil properties and their discussion. Field compaction methods- their comparison of performance and relative suitability. Field compactive effort, Field control of compaction by proctor.

Unit III

Consolidation of Soil-

Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, consolidation test results, basic definitions, Terzaghi"s theory of consolidation, final settlement of soil deposits, consolidation settlement: one- dimensional method, secondary consolidation. Effect of disturbance on e-Logσ curves of normally consolidated clays, importance of consolidation settlement in the design of structures.

Unit IV

Shear Strength- Principle planes parallel to the coordinate axes, Mohr's circle, important characteristics of Mohr's circle, Mohr-Coloumb theory, types of shear test: direct shear test, merits of direct shear test, triaxial compression tests, test behaviour of UU, CU and CD tests, relation between major and minor principal stresses, unconfined compression test, vane shear test. Derivation of Skempton's pore pressure parameters. Stress strain and volume change characteristics of sands.

Stability of Slopes-

Introduction, different factors of safety, types of slope failures, analysis of finite and infinite slopes, wedge failure Swedish circle method, friction circle method, stability numbers and charts

RECOMMENDED BOOKS			
S. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Soil Mechanics & Foundation Engineering	B.C Punmia	Laxmi Publications
2	Soil Mech. & Foundation Engineering	K.R.Arora	Standard Publishers Distributors
3	Geotechnical Engineering	P. Purshotama Raj	Tata Mcgraw
4	Problems in Soil mechanics and Foundation Engineering	B.P.Verma	Khanna Publishers.

Course Code	**CE308**
Course Title	**Professional Practice**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Nil**
Course Objectives (CO)	**To estimate the quantity of materials in a building and its probable cost.**

SYLLABUS

UNIT I

Estimates-

Method of building estimates, types, site plan index plan, layout plan, plinth area, floor area, Technical sanction, administrative approval, estimate of buildings, roads, earthwork, R.C.C. works, sloped roof, roof truss, masonry platform, complete set of estimate, mass haul diagram, earthwork calculations.

Analysis of rates-

For earthwork, concrete work, D.P.C., stone masonry, plastering, pointing, roadwork

UNIT II

Specifications- For different classes of building and Civil engineering works. Rules and measurements for different types of Civil engineering works.

UNIT III

Types of contracts- Tenders, tender form, submission and opening of tenders, measurement book, muster roll , piecework agreement and work order, termination of contract, extra work and items, penalty and liquidated charges, settlement of dispute, RA Bill & Final Bill, payment of advance, insurance claims, price variation etc

Accounts-Division of accounts, cash, receipt of money, cash book, temporary advance, imprest, accounting procedure.

UNIT IV

Arbitration: Arbitration, Arbitrator and arbitration acts power of arbitrator and arbitration awards.

Building byelaws-. Building byelaws, definitions, procedures for submission of building application and execution of works, siting planning and architectural control.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Estimating and Costing	B.N. Datta,	UBSPD, New Delhi
2	Estimating and Costing	G.S. Birdie	Dhanpat Rai Publication
3	Estimating and Costing	V.N. Chakravorty	Calcutta

Course Code	**CE310**
Course Title	**Computer Aided RCC Design/ Drawing Lab**
Type of Course	**PC**
L T P	**0 0 2**
Credits	**1**
Course Prerequisites	**Auto Cadd**
Course Objectives (CO)	

SYLLABUS

LIST OF EXPERIMENTS

1. RCC footing , isolated footing(square and rectangular), combined footing(rectangular, trapezoidal, strap), raft footing.
2. Beams curved in plan
3. Domes
4. Staircase
5. Retaining wall cantilever type retaining wall, counterfort type retaining wall
6. Water tanks, circular and rectangular water tanks resting on the ground
7. Axially loaded compression members, short compression members under axial load with uniaxial and biaxial bending, slender columns

Course Code	**CE312**
Course Title	**Soil Mechanics Lab**
Type of Course	**PC**
L T P	**0 0 2**
Credits	**1**
Course Prerequisites	**Nil**
Course Objectives (CO)	**This course is aimed to develop analytical skills in dealing with soil as a medium of water flow, a medium for structural supports and a primary building material.**

SYLLABUS

LIST OF EXPERIMENTS

1. Determination of in-situ density by core cutter method and Sand replacement method.
2. Determination of Liquid Limit & Plastic Limit.
3. Determination of specific gravity of soil solids by pyconometer method.
4. Grain size analysis of sand and determination of uniformity coefficient (Cu) and coefficient of curvature (Cc).
5. Determination of moisture density relationship by (standard proctor method)
6. Determination of Relative Density of soil.
7. Determination of permeability by Constant Head Method.
8. Determination of permeability by Variable Head method.
9. Unconfined Compression Test for fine grained soil.
10. Direct Shear Test
11. Triaxial Test
12. Swell Pressure Test
13. 13.California bearing ratio test(CBR)

PROFESSIONAL ELECTIVES-II

Course Code	**CE316**
Course Title	**Traffic & Transportation Planning**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Basic knowledge of Transportation Engineering**
Course Objectives (CO)	**The use of simple methods in averting traffic congestion in urban area and provide students with opportunities to develop basic skills with respect to traffic count for planning urban transport.**

SYLLABUS

UNIT-I

Traffic Engineering And Control

Review of various surveys and traffic studies statistical methods for traffic engineering and their applications-distribution sampling theory and significance testing, intersection design-principles, various available alternatives, rotary design, mini roundabout, traffic signals:-types of traffic signals advantages, determination of optimal cycle time and signal setting for an intersection with fixed time signals, area traffic control, delay at signalized intersection, accident and road safety: accident causes, recording system, analysis and preventive measures, accident cost, alternative methodologies for calculation. Traffic management-various measures and their scope, relative merits and de merits, highway capacity: passengers car unit, level of service, factor affecting capacity and level of service, influence of mixed traffic.

UNIT II

Transportation Planning And Management

Introduction to the process of urban transport planning. Travel demand forecasting, trip generation analysis, trip classification, multiple regression analysis, category analysis, modal split analysis: introduction, earlier split models, modal split models with behavioral basis. Trip distribution analysis: introduction, methods of trip distribution, uniform and average factor method, fratar method, furness method, the gravity model, intervening and competing, linear programming approach to trip distribution, traffic assignment: purpose of traffic assignment, traffic flow characteristics, assignment techniques= all or nothing assignments, multiple route assignments, capacity restraints assignments, diversion curves, route building alogrithms.

UNIT III

Theory Of Traffic Flow

Scope, definition and basic relationship, review of flow, density speed studies, hydrodynamic analogies, application of hydrodynamic analogy, car following theory and its application to traffic engineering, probabilistic description of traffic flow, an introduction to queuing theory as applied to traffic flow problems for study state conditions, simulation studies.

UNIT IV

Transport Economics

Economic evaluation of highway scheme, need for economic evaluation, cost and benefits of transportation projects, basic principles of economics evaluation, net present value method, benefits/cost ratio method, internal rate of return method, vehicle operating cost, value of travel time saving, accident studies.

Public Transportation

Mass transit systems: bus and rail transit, characteristics capacities, introduction to intelligent transportation

system, introduction to advanced computational techniques for transportation planning

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Traffic Engineering & Transport Planning	Kadiyali, L.R.,	Khanna Publishers, New Delhi
2	Principles of traffic engineering	G.J Pingnataro	Tata Mcgraw Hill
3	Traffic system analysis for engineering and planner	Wohl and Martin	Tata Mcgraw Hill
4	Introduction to urban transport system	B.G Hutchinson	Tata Mcgraw Hill

Course Code	**CE318**
Course Title	**Advanced Transportation Engineering**

Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Transportation Engineering-I,II**
Course Objectives (CO)	**The objective of the course is to give knowledge about the design of flexible and rigid pavements and basic knowledge of docks, harbor & tunnels.**

SYLLABUS

UNIT-I

Introduction:

Types of pavement structure. Importance and functions of various components of pavement structures, design factors, Factors affecting pavement design, Design wheel load, equivalent single wheel load, repetition of loads climate variation.

UNIT II

Design of Flexible Pavements:

Flexible pavement design methods: CBR method, group index method, IRC method of design of flexible pavement.

Design of Rigid Pavements:

General design considerations, Wheel load stresses, Westergard's stress equation for wheel load, evaluation of wheel load stress, temperature stresses, design of joints, design of dowel and tie bars, IRC method of design of rigid pavements, CRCP(Continuously Reinforced concrete pavements) FRC (Fibre reinforced concrete pavements), pre stressed concrete pavements

UNIT III

Design of Bituminous Mixes:

Requirements of bituminous mixes, Marshall Method of Bituminous Mix Design

Harbor and Docks

Harbours and ports, water transportation, natural phenomenon: tides, wind & waves, classification, facilities at major port, protection facilities: wall type & special break waters, planning & layout of ports, classification of docks, docking facilities, repairing facilities fixed form & movable form , approach facilities, loading and unloading facilities, guiding facilities- light house & signal, storing facilities.

UNIT IV

Tunnels

General, basic definition, merits & demerits of tunnels & open cuts, selection of alignment of tunnel, classification of tunnels, tunnel approaches.

Problems in Tunneling

Introduction to various stages in tunnel construction, methods of tunneling in soft soil & rock, tunnel lining necessity & material used, drainage in tunnels, health protection in tunnels.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Docks and harbor engineering	Bindra S.P	Dhanpat rai
2	Principles, practices and design highway engineering	Sharma S.K	S chand & company ltd 1995
3	Highway engineering	Khanna S.K & Justo CEG	Nem chand and brother roorkee

Course Code	CE320

Course Title	**Pavement Design**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Transportation Engineering**
Course Objectives (CO)	**The objective in the design of the road pavement is to select appropriate pavement and surfacing materials, types, layer thickness and configuration to ensure that the pavement performs adequately and requires minimal maintenance.**

SYLLABUS

Note: Use of IRC:37-2012 and IRC:58-2011 shall be allowed in the examination.

UNIT-I

Introduction:

Types of pavement structure. Functions of pavement components, Factors affecting pavement design, Design wheel load, Strength characteristics of pavement materials. Comparison of flexible and rigid pavements.

UNIT II

Design of Flexible Pavements:

General design considerations, Methods for design of flexible pavements – Group Index Method, Triaxial Test Method, Hveem Stabilometer Method, McLeod's Method, Indian Roads Congress Method.

Design of Bituminous Mixes:

Mix Design Approaches, Marshall Method of Bituminous Mix Design, Superpave

UNIT III

Design of Rigid Pavements:

General design considerations, Westergard's Analysis, Methods for design of rigid pavements - PCA method, AASHTO Method, Indian Roads Congress Method, Types and design of Joints in cement concrete pavements.

UNIT IV

Modern Design Concepts:

Reinforced Concrete Pavement, Airport Pavement Design, Bituminous Pavement with Cemented Base, Interlocking Concrete Block Pavement, Full Depth Bituminous Pavement, Ultrathin White Topping, Perpetual Pavement, Pavement Overlays.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Principals of Pavement Design	Yoder, E. J., and M. W. Witczak	Wiley Publication.
2	Highway engineering	Khanna, S. K., and C. E. G. Justo,	Nem Chand & Bros., Roorkee
3	Principles of Transportation Engineering	Chakraborty,P. and A.Das,	Prentice Hall India.
4	Pavement Analysis and Design	Yang H. Huang	Prentice Hall.

Course Code	**CE322**

Course Title	**Bridge Engineering**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Concrete Structures**
Course Objectives (CO)	**The objective of the course is to teach students about bridge engg design.**

SYLLABUS

UNIT-I

Introduction and investigation of bridges:

Definition and components of a bridge, classifications of bridges, choice of a bridge type, Need for investigations, selection of bridge site, determination of design discharge for river bridge, linear waterway, economical span, vertical clearance, scour depth, traffic projection

UNIT II

Standard Specifications for road bridges:

IRC Bridges codes, width of carriage way, clearances, dead load IRC standard live loads, impact effects, wind load, longitudinal forces, centrifugal forces, horizontal forces due to water current, buoyancy effects, earth pressure, deformation stresses, erection stresses, temperature effects and seismic forces.

Reinforced Concrete Bridges:

Types of RCC bridges, culverts-box culvert, pipe culvert, solid slab bridge, T-beam girder bridge, hollow girder bridge, balanced cantilever bridge, continuous girder bridges, rigid frame bridges, arch bridges, pre stressed concrete bridges.

UNIT III

Steel bridges:

Types of steel bridges, beam bridges, plate girder bridges, box girder bridges, truss bridges, arch bridges, cantilever bridges, cable stayed bridges, suspension bridges.

Sub structure and foundation

Pier and abutment, material for pier and abutment, types of foundations, shallow, pile and well foundation, relative merits of piles and well foundation, pneumatic caissons, box caissons

UNIT IV

Bearing Joints and appurtenances:

Importance of bearings, different types of bearings-Expansion bearings, fixed bearings, elastomeric bearing, expansion joints, wearing course, approach slab, footpath handrails.

Construction and maintenance of bridges

Methods of construction of concrete and steel bridges, formwork and falsework for concrete bridges, causes of bridge failures, inspection and maintenance

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Essentials of Bridge Engineering	Johnson, Victor,	Oxford University Press..
2	A Text book of Bridge Construction",	Khadilkar, C. H.,	Allied Publishers.
3	Bridge Engineering",	Rangwala, S. C.,	Charotar Publishing House Pvt. Ltd.

4	Concrete Bridges Handbook	Raina, V. K.,	Shroff Publishers and Distributors
5	Bridge Engineering",	Ponnuswamy, S.	McGraw Hill Education

Course Code	**CE401**
Course Title	**Design Of Steel Structure II**
Type of Course	**PC**
L T P	**3 1 0**
Credits	**3.5**
Course Prerequisites	**Design Of Steel Structure I**
Course Objectives (CO)	**To make the students acquainted with the basics and design of various components used in fabrication of steel.**

SYLLABUS

UNIT I

Design of steel foot bridge-

Introduction, design of flooring cross girders, analysis of N type truss, design of various members of truss, design of joints, design of bearings.

UNIT II

Design of complete industrial building with design Gantry girder Column bracket mill bent with constant moment of inertia lateral and longitudinal bracing for column bents etc.

UNIT III

Design of single track railway bridge with lattice girders having parallel chords (for B.G.)

a. Design of stringer and stringer bracing,
b. Design of Cross girder,
c. Design connection between stringer and cross girder
d. Design of Main girders with various members and joints
e. Design of bottom lateral bracing and top lateral bracing
f. Design of portal bracing and sway bracing
g. Design of bearings – rocker and roller.

UNIT IV

Elements of a plate girder, design of a plate girder, curtailment of flanges, various type of stiffeners.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Design of steel structures:	L S Negi	
2	Design of steel structures:	Arya AS nad Ajmani	Nem chand & bros Roorkee
3	Design of steel structures: Vol-I and Vol II	Chandra R	Standard book house
4	Limit state design of steel structures	S.K Duggal	

Course Code	**CE403**
Course Title	**Irrigation Engineering II**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Irrigation Engineering I**
Course Objectives (CO)	**The objective of this course is to introduce the students with various theories of seepage and design of various important irrigation based structures**

SYLLABUS

UNIT I

Head Works:

Definition of head work Types of head works, Functions and investigations, location of head works and selection of site of a diversion head work , component parts of a diversion head work and their design considerations, silt control devices, weir and barrage, gravity and non-gravity weirs, components of weir and barrage.

Theories of Seepage:

Failure of hydraulic structures founded on pervious foundations, Bligh's Creep theory for seepage flow its assumptions, salient features, safety against piping, safety against uplift pressure and limitations, Lane's weighted Creep theory and Khosla's theory and concept of flow nets, stream lines, equipotential lines, critical exit gradient, khosla method of independent variables for determination of pressures, exit gradient(Ge) and floor thickness for seepage below a weir or a barrage, salient features of lane weigh theory and khosla theory, Comparison of Bligh's Creep theory and Khosla's theory.

UNIT II

Design of Weirs:

Weirs versus barrage, types of weirs, main components of weir, causes of failure of weir and design considerations with respect to surface flow, hydraulic jump and seepage flow, ydraulic design of vertical drop weir on bligh's theory, and design of modern weir and barrages founded on permeable foundations on the basis of khosla theory. Effect produced by weir on river regime and retrogression of downstream levels. Factors governing the design of weir and barrage..

Energy Dissipation Devices:

Use of hydraulic jump in energy dissipation, Factors affecting design, Types of energy dissipater and their hydraulic design, methods of energy dissipation below falls, design of standing wave flume.

UNIT III

Canal Regulators:

Canal regulation, canal regulation works, Off take alignment, cross-regulators – their functions and design, Distributary head regulators, their design, canal escape definition and object of flume, classification of flumes, design of meter flumes, design of standing wave flume

Canal Falls:

Definition Necessity and location, development of fall, classification of fall, types of falls and their description, component of a fall structure selection of type of falls, Principles of design, Design of Sarda type, straight glacis and Inglis or baffle wall falls.

UNIT IV

Cross-Drainage works :
Introduction Definitions, choice of type, Hydraulic design consideration, Aqueducts their types and design, siphon aqueducts – their types and design considerations, super passages, canal siphons and level crossing.

Canal Out-lets :
Essential requirements of a good irrigation module, classifications of outlet, criteria for outlet behaviours, flexibility, proportionality, sensitivity, sensitiveness, etc. selection of type of outlet, tail cluster Details and design of non-modular, semi-modular and modular outlets.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Irrigation Engg. & Hydraulic Structure	Santosh Kumar Garg	Khanna Publishers
2	Design of Irrigation Structures	R.K. Sharma	Oxford IBH Pub
3	Irrigation Engg. and Hydraulics Structures	S.R. Sahasrabudhe	Katson Publishing
4	Limit state design of steel structures	S.K Duggal	

Course Code	**CE405**
Course Title	**Foundation Engineering**
Type of Course	**PC**
L T P	**3 0 0**
Credits	**3**
Course Prerequisites	**Soil Mechanics and Structures**
Course Objectives (CO)	**To develop an understanding of the behaviour of foundations for engineering structures and to gain knowledge of the design methods that can be applied to practical problems**

SYLLABUS

UNIT I

Soil exploration:

Introduction Object of soil investigation for new and existing structures. Depth of exploration for different structures. Spacing of bore Holes. Methods of soil exploration and relative merits and demerits. Types of soil sample. Design features of sampler affecting sample disturbance. Methods of boring, soil sampler and sampling , number and deposition of trail pits and boring, penetrometer test, borehole logs for standard penetration test, geophysical methods

Earth Pressure

Terms and symbols used for a retaining wall. Movement of all and the lateral earth pressure. Earth pressure at rest. Rankine states of plastic equilibrium, Ka and Kp for horizontal backfills. Rankine's theory both for active and passive earth pressure for Cohesionless backfill with surcharge and fully submerged case. Cohesive backfill condition. Coulomb's method for cohesion less backfill. Merits and demerits of Ranking and Coulomb's theories, Culmann 's graphical construction (without surcharge load).

UNIT II

Shallow Foundation and bearing capacity:

Introduction- bearing capacity definition, types of shear failure, bearing capacity of shallow foundation on homogeneous deposits- methods terzaghi's, skempton's and BIS methods-effects of water table on bearing capacity- plate load test- bearing capacity from in-situ test- SPT,SCPT and plate load test-method of improving bearing capacity of soil. Type of foundations-contact pressure distribution below isolated footing-types and proportioning of combined footing-types and application of mat foundation- floating foundation-settlement: total and differential settlement- causes and methods of minimizing settlement.

UNIT III

Pile Foundations:

Necessity and uses of piles, Classification of piles, Merits and demerits of different types based on composition. Types of pile driving hammers & their comparison. Effect of pile driving on adjacent ground. Use of Engineering News Formula and Hiley's Formula for determination of allowable load. Limitations of pile driving formulae. Cyclic Pile Load Test, Separation of skin friction and point resistance using cyclic pile load test. Determination of point resistance and frictional resistance of a single pile by Static formulas. Piles in Clay, Safe load on a Friction and point Bearing pile. Pile in sand, Spacing of piles in a group, Factors affecting capacity of a pile group, Efficiency of pile group by converse – Labare formula and feeds formulas. Bearing capacity of a pile group in clay by block failure and individual action approach. Calculation of settlement of friction pile group in clay. Related Numerical problems. Settlement of pile groups in sand, Negative skin friction.

UNIT IV

Under ground conduits

Classes of underground conduits, load on a ditch conduit, settlement ratio, ditch condition and projection condition, imperfect ditch conduit.

Caissons and Wells:

Major areas of use of caissons, advantages and disadvantages of open box and pneumatic caissons. Essential part of a pneumatic caisson. Components of a well foundation. Calculation of allowable bearing pressure. Conditions for stability of a well, Forces acting on a well foundation. Computation of scour depth.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Soil mechanics and foundation engineering	WNS Murthy	
2	Soil mechanics and foundation engineering	B.C Punmia	Luxmi publication
3	Soil mechanics and foundation engineering	K.R Arora	

Course Code	**ENG401**
Course Title	**Technical Writing and Presentation Skills**
Type of course	**MC**
L T P	**3 0 0**
Credits	**NC**
Course Objectives(CO)	**Aims to teach oral and written skills in English with illustrations and examples drawn from project reports, paper presentations and published papers in scientific journals. The grammar exercises are not taught in a rule-based manner but through observation and use in specific contexts. Newspaper and popular scientific reports are also included as course material. Presentation skills will be taught through practice sessions. During the course, all participants make presentations and also critique the presentations by others. Emphasis is placed on teaching how to present the same findings orally and in writing.**

SYLLABUS

UNIT- I

Reinforcement of Language Skills: Correcting common errors- Verbosity – How to avoid unnecessary jargon – Words and Usage – List of "aura" words, Synonyms and Antonyms – Phrasing, Tense, Voice, Prepositions, Punctuation.
Type of technical reports – creating specs, lab manuals, worksheets.

Unit II

Organization of Ideas

1. Preparing a Basic plan – Structuring the ideas, collecting the relevant materials
2. Creating Outlines – Headings of Sections, Topic Sentences.
3. Reviewing Sentences and Rewriting Paragraphs
4. Revising Drafts

Unit III

Format: Margins, Headings, Indentation, Pagination, Type face and fonts, Abbreviations, Symbols, Layouts, Proof reading Symbols
Contents of a Report: Cover and title page, Table of Contents, List of Tables and Figures, Preface, Foreword, Acknowledgement, Abstract, Introduction, Body (in Sections and Subsections), Results, Conclusions and Recommendations, Appendices, References

Unit IV

Presentation of the Report

Difference between Oral Presentations and Written Reports; How to give a good presentation, Proper use of technological aids; Discussion skill

Suggested Text Books and References

Sr. No.	Name	Author(s)	Publisher
1	Technical Communication Principles and Practice	Meenakshi Raman Sangeeta Sharma	Oxford University Press
2	Basic Technical Communication	Gupta, Ruby and Anugrah Rohini Lall	Cambridge University Press

3	Basic Technical Communication	Kirkman, John	Pitman Publishing Ltd.,

PROFESSIONAL ELECTIVES-III

Course Code	**CE413**
Course Title	**Soil Dynamics**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Soil Mechanics and Foundation Engineering**
Course Objectives (CO)	**This course is designed to provide an introduction to dynamics with soil dynamics and geotechnical earthquake engineering. The fundamental theoretical and computational aspects of dynamics are developed for important geotechnical problems.**

SYLLABUS

UNIT-I

Introduction and fundamentals of vibrations:

Soil mechanics and soil dynamics, nature of dynamic loads, stress conditions on soil elements under earthquake loading, problems of dynamic loading of soil and soil structures. Earthquake causes, origin, classification and effects

Theory of vibrations:

Undamped and damped vibrations, forced vibrations with harmonic excitation, system under transient vibrations, Rayleigh method, logarithm decrement, determination of viscous damping, transmissibility, principles of vibration measuring instrument, system with two degree of freedom(vibration absorber), system with multi degree of freedom, spectral response.

UNIT II

Wave Propagation In An Elastic Medium:

Wave Propagation in an elastic rod, Wave Propagation in an elastic infinite medium, Wave Propagation in a semi infinite elastic half space, waves generated by surface footing.

Stress Strain Characteristics Of Soil Under Dynamic Loads

Introduction to dynamic test, pendulum loading apparatus, behavior of saturated sands under transit loading, effect of static stress level and number of pulses on strength of cohesive solids, oscillatory simple shear, resonant column apparatus, wave propagation methods, block resonance test, cyclic plate load test.

UNIT III

Dynamic Earth Pressure:

Behavior of retaining walls during earthquakes, modification on coloumb's theory modified culmann's construction, analytical solution of c- Φ soils, displacement analysis and indian standard code of practice.

Dynamic Bearing Capacity

Earthquake load on footing, effect of horizontal load and moment, provision of relevant standards, dynamic analysis for vertical and horizontal loads.

UNIT IV

Liquefaction Of Soil

Theory and criterion of liquefaction, factors affecting liquefaction characteristics, liquefaction studies in triaxial shear and oscillatory simple shear, evaluation of liquefaction potential, liquefaction analysis from

standard penetration test data, introduction to shake table and field test.

Machine foundations:
Degrees of freedom of a machine foundation, vertical sliding, rocking, yawing vibration of a block, simultaneous rocking sliding and vertical vibration of a block, Indian standards for design of foundations for reciprocating machines and impact type of machines.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Soil dynamics	Shamsher parkash	
2	Dynamics Of Bases And Foundations	D.D Barken	
3	Soil dynamics and machine foundations	Swami saran	

Course Code	**CE415**
Course Title	**Ground Improvement Techniques**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Soil Mechanics**
Course Objectives (CO)	**To develop an understanding of the ground improvement techniques and use of new materials and its behavior for ground improvement techniques.**

SYLLABUS

UNIT-I

Problematic Soil and Ground Improvement Techniques:

Ground improvement-role of ground improvement in foundation engineering-methods of ground improvement- geotechnical problems in alluvial, lateritic and black cotton soils-selection of suitable ground improvement techniques based on soil conditions.

Dewatering:

Dewatering techniques - well points- vacuum electro-osmotic methods- seepage analysis for two dimensional flows-fully and partially penetrated slots in homogeneous deposits(simple cases only)

UNIT II

Ground improvement for cohesionless and cohesive soils

In-situ densification of cohesionless soil and consolidation of cohesive soil: dynamic compaction vibroflotation, sand compaction piles. Consolidation: preloading with sand drains, and fabric drains, stone columns- lime piles installation techniques only- relative merits and limitations-deep soil mixing.

UNIT III

Grouting Techniques

Grouting- types of grout-suspension grouts-solution grouts-grouting equipment and methods- grouting with soil, bentonite-cement mixes and asphalt grout monitoring techniques.

UNIT IV

Geo-synthetics Applications:

Geo-synthetics-types-functions of geotextiles-separation-filtration-drainage-reinforcement geo-membranes-containments and barriers-application to ground anchors.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Ground improvement techniques	Purushothama raj P	Laxmi publisher
2	Construction and geotechnical methods in foundation engineering	Koerner R.M	Mcgraw hill New York 1984
3	Ground Improvement	Moseley M.P	Chapman And Hall Glassgow
4	Selection of ground improvement techniques for foundation in weak soil	IS 13094:1992	

Course Code	**CE417**
Course Title	**Advanced Foundation Engineering**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Foundation Engineering**
Course Objectives (CO)	**Cultivate higher level Insights in theories for foundations engineering and to promote critical thinking in designing and analyzing foundations**

SYLLABUS

UNIT-I

Soil exploration

Introduction, standard penetration test, dynamic cone penetration test, static cone penetration test, field vane shear test, large shear box test, field permeability test, Geophysical Tests, Dynamics properties of soil planning of soil exploration programme.

Foundation Design-General Principles:

Types of foundations, selection of type of foundation, basic requirements of a foundation, computation of loads, Design steps.

UNIT II

Consolidation:

Terzaghi's theory of one d consolidation- derivation of equation(solution in detail need to be covered), estimation of Cc and Cv from laboratory test, estimation of Pc by various methods, field consolidation curves, Quasi pre-consolidation and secondary consolidation, practical applications

Pile Foundations:

Introduction, bearing capacity of piles, vertical piles subjected to lateral loads, proportioning and design of pile foundations, lateral load capacity of single pile, batter piles under lateral load, uplift capacity of piles ultimate lateral load resistance of a pile group.

UNIT III

Drilled Piers:

Introduction, current construction methods, use of Drilled Piers, analysis and design of drilled piers, settlements of drilled piers, structural design of drilled piers, laterally loaded drilled pier analysis.

Bridge Sub Structures:

Definitions, elements of substructures, maximum depth of scour, depth of foundation allowable bearing pressure, loads to be considered, lateral stability, design of pier cap & pier, sinking stresses in wells, design of well cap, well staining, well curb, cutting edge, bottom plug.

UNIT IV

Sheet Piles and Coffer Dams:

Types of sheet piles structures, design of cantilever sheet pile wall, design of anchored bulkheads, anchorage methods design of braced sheeting in cuts, Design of cellular coffer dams.

Estimation Of Stresses

Boussinesq's theory, Westergard's theory, Newmarks charts.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**

1	Soil mechanics and foundation engineering volume I and II	V.N.S Murthy	Saitech publication
2	Foundation design	Teng W.C	Prentice hall India ltd
3	Soil mechanics and foundation engg	K.R Arora	Standard Publishers Distributors
4	Basics And Applied Soil Mechanics	Ranjan G and Rao ASR	New age international pvt.ltd

Course Code	**CE419**
Course Title	**Rock Mechanics & Engineering Geology**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Basics of Soil**
Course Objectives (CO)	**The objective of the course for the students to develop an under standing of the engineering properties of rocks, geological and engineering rock classification, rock failure theories and principles of rock mechanics.**

SYLLABUS

UNIT-I

General Geology :

Importance of Engg. Geology applied to Civil Engg. Practices. Weathering, definition, types and effect. Geological works of rivers, wind, glaciers as agents of erosion, transportation and deposition.

Rocks & Minerals

Minerals, their identification, igneous, sedimentary & metamorphic rocks. Classification of rocks for engineering purposes. Rock quality designation (RQD).

UNIT II

Structural Geology:

Brief idea about stratification, apparent dip, true dip, strike and in conformities. Folds, faults & joints : definition, classification relation to engineering operations.

Engineering Geology:

Geological considerations in the Engg. Projects like tunnels, highways, foundation, dams, reservoirs. Earthquake : Definition, terminology, earthquake waves, intensity, recording of earthquake.

UNIT III

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. Strength of intact and fissured rocks, effect of anisotropy, effect of saturation and temperature

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

UNIT IV

Improvement in properties of Rock masses :

Pressure grouting for dams and tunnels, rock reinforcement rock bolting.

Geology of dam and reservoir site:

Required geological consideration for selecting dam and reservoir site. Failure of reservoir, favorable & unfavorable conditions in different types of rocks in presence of various structural features, precautions to be taken to counteract unsuitable conditions, significance of discontinuities on the dam site and treatment giving to such structures.

RECOMMENDED BOOKS

S.No.	Name	AUTHOR(S)	PUBLISHER
1	Introduction to Rock Mechanics	Richard E. Goodman	

2	Engg. Behaviour of rocks	Farmar, I.W.	
3	Rock Mechanics and Engg.	Jaager C.	
4	Fundamentals of Rock Mechanics	Jaager and Cook	
5	Engineering Geology	Parbin Singh	
6	Rock Mechanics for Engineering	B.P. Verma	

PROFESSIONAL ELECTIVES-IV

Course Code	**CE421**
Course Title	**Advanced Environmental Engineering**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Environmental Engineering**
Course Objectives (CO)	**To make students updated about the recent environmental trends and global environmental issues that comes across in domestic and industrial life.**

SYLLABUS

UNIT-I

Environmental issues in India :

Forest and agricultural degradation of land, resources depletion(water, mineral, forest, sand, rocks etc), environmental degradation, public health, loss of biodiversity, loss of resilience in ecosystem, land pollution, greenhouse emissions, environmental issues and Indian laws, conservation, specific issues.

Biological environment :

Community, health-significance, disease transmission, health education, occupational health, hazards, plan prevention and control, water born disease.

Soil and agriculture pollution :

Top soil, pollution, parameter of soil analysis, remedial measures, related disease.

UNIT II

Air Pollution

Air pollution, Physical & chemical fundamentals, Air pollution standards, Effects of air pollution; climate change, Air pollution meteorology, Atmospheric dispersion of pollutants, Indoor air quality models, Air pollution control of stationary & mobile sources.

Noise Pollution & Control:

Introduction, Rating Systems, Sources & Criteria, Noise prediction and Control.

Global issues

Green construction & eco renovation, CO2 Pollution and global warming, compact fluorescent lights(CFLS), radiation/nuclear/radioactive pollution.

UNIT III

EIA & Environmental Audit

Environmental impact assessment, social and economic aspects, brief study of environmental audit, audit items, audit procedure, safety audit.

Industrial pollution

Paper and pulp, cane sugar and distilleries, diary plant, petrochemical and refineries and other industrial units.

Waste Water From Industries

Waste characteristic, harmful effects, pretreatment of industrial waste, reduction of waste strength and volume equalization and neutralization.

UNIT IV

Legal characteristics

Municipal solid waste rules, hazardous waste rules, biomedical waste rules, rules related to recycled plastics,

used batteries, flyash etc function of pollution control board and legal aspects.

Hazardous waste management

The hazard risk , definition & classification RCRA & HSWA,CERCLA & SARA, hazardous waste management, treatment technologies, land disposal, ground water contamination and remediation.

RECOMMENDED BOOKS			
S.No.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Elements of public health Engg	K.N Duggal, S chand	
2	Environmental Engineering	Peavey HS and Rowe	Mcgraw hill
3	Environmental Engineering II	S.K Garg	Khanna publishers

Course Code	**CE423**
Course Title	**Water Resource Management**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Environmental Engineering, Irrigation Engineering**
Course Objectives (CO)	**To study hydrologic cycle, precipitation and its estimation, and the occurrence movement and augmentation of ground water through Darcy law, to know the importance features and uses of dams.**

SYLLABUS

UNIT-I

Surface water hydrology

Hydrologic cycle, runoff computation-infiltration-infiltration capacity curve-infiltrometers-rain simulators-precipitation-rain gauge- types-average depth of precipitation- estimation of missing precipitation records-PMP- rain gauge network-optimum rain gauge network-design.

UNIT II

Ground water hydrology

Occurrence and movement of ground water-permeability and transmissibility, Darcy's law – ground water yield-acquifers and their types-infiltration wells and infiltration galleries- measurements of yield recuperation test-pumping test-steady flow and analysis only-artificial recharge-methods.

UNIT III

Dams

Dams- types- factor affecting location and type of dam-problems in dam construction-gravity dam forces on a dam-modes of failure and criteria for structural stability- foundation treatment-spillway-location and types-galleries-function and types.

Rivers and reservoirs

Rivers-types of characteristics-control and training of rivers- reservoir- types-storage capacity of reservoir-storage zone-designing reservoir capacity-flow duration curves- mass curve of inflow and out flow- reservoir losses-reservoir sedimentation- silt control.

UNIT IV

Irrigation

Definition-crop period/base period- duty and delta- crop season- consumptive use-estimation-blaney criddle method-pan evaporation method soil moisture irrigation relationship-canal-alignment-distribution system-design of channel-regime channel-kennedy's theory-lacy's theory.

RECOMMENDED BOOKS		
Name	**AUTHOR(S)**	**PUBLISHER**
Hydrology	Raghunath.H.M	New age international publisher
Irrigation engineering and hydraulic structures	Santosh kumar garg	Khanna publisher

Course Code	**CE425**
Course Title	**Solid & Hazardous Waste Management**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Environmental Engineering-II**
Course Objectives (CO)	**To know the sources and types of solid waste and to learn the importance of methods of collection and selection of location for solid waste.**

SYLLABUS

UNIT-I

Solid Waste

Sources-types, composition, physical, chemical and biological properties of solid waste/ sources and types of hazardous and infectious wastes in municipal solid wastes. Solid waste generation and collection, handling, storage, processing, transportation.

UNIT II

Disposal Of Solid Waste

Material separation and processing, thermal conversion, biological and chemical conversion, recycling of material in municipal solid wastes, land filling, composting, gas generation, closure of land-fills.

UNIT III

Hazardous Wastes

Fundamentals, fate and transport of contaminants, toxicology origin, quantity and quality parameters. Biomedical/infectious waste: composition, collection, handling and disposal.

Legal Aspects Of Hazardous Waste Management

Collection , conveyance, treatment and disposal

UNIT IV

Hazardous waste management practices

Environmental audits, pollution prevention. Treatment and disposal methods; physiochemical processes, biological methods, stabilization & solidification, thermal methods, land disposal.

RECOMMENDED BOOKS		
Name	**AUTHOR(S)**	**PUBLISHER**
Integrated solid waste management	Thiesen & vigil	Mcgraw hill
Hazardous waste management	Lagrega Buckingham and evans	Mcgraw hill
Solid waste management in developing countries	AD bhide	Nagpur publications

Course Code	**CE427**
Course Title	**Environmental Impact Assessment of Civil Engineering Projects**
Type of Course	**PE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**Environmental Engineering-I,II**
Course Objectives (CO)	**To learn the fundamentals concepts of environmental impact assessment in the field of environmental engineering**

SYLLABUS

UNIT-I
Introduction
Impact of development projects under civil engineering on environment-environmental impact assessment(EIA)-environmental impact statement(EIS)- EIA Capabilities and limitations- legal provision on EIA.

UNIT II
Methodologies
Methods of EIA- check lists-Matrices-networks-cost benefit analysis- analysis of alternatives.

UNIT III
Prediction and Assessment
Assessment of impact on land, water and air, noise, social, cultural flora and fauna; mathematical model; public participation-rapid EIA.
Environmental Management
Plan for mitigation of adverse impact on environment-options for mitigation of impact on water, air and land, flora and fauna; addressing the issues related to project affected people ISO 14000.

UNIT IV
Case Studies
EIA For Infrastructure Projects- Bridges- Stadium-Highways-Dams-Multi-storey Building-Water Supply And Drainage Projects-Waste Water Treatment Plants

RECOMMENDED BOOKS		
Name	**AUTHOR(S)**	**PUBLISHER**
Environmental impact assessment	Canter R.L	Mcgraw hill
Concept in Environmental impact assessment.	Shukla S.K	Mcgraw hill

Course Code	**AGE372**
Course Title	**Advanced Engineering systems**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Objectives (CO)	**The students will be able to understand the concept of mechanical, electrical systems and also be able to analyse the equations.**

SYLLABUS

UNIT – I

Equation of motion for simple physical systems. Mechanical, Electrical, and Electromechanical systems.

UNIT – II

Equations of motion for simple heat, conduction and fluid systems. Analogies. Equations of motion for mechanical system in two and three dimensions.

UNIT – III

Dynamic response of first order and second order systems. Forced Oscillations of elementary systems. Dynamic stability of compound systems.

UNIT – IV

Total response of compound systems. Fundamentals of control system analysis.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Dynamics of Physical systems	Cannon, Robert H	McGraw Hill Kngakusha

Course Code	**AGE374**
Course Title	**Engineering Economy and Project Planning**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Nil**
Course Objectives (CO)	**To provide Knowledge regarding economics structure and about economic growth.**

SYLLABUS

UNIT I

Introduction

Economics, definition; Engineering economics; Industrial economics; Utility; Law substitution; Value and pricing goods and wealth ; Wants; Demands and Supply; The law of demand and supply; Elasticity of demand; Factors effecting and elasticity of demand.

Money; Value of money; Velocity of circulation; Inflation; Hyper inflation; Deflation; Trade cycle; Banks, types of banks; Commercial banks; Central Banks; Industrial Banks; Agricultural Banks; Exchange banks; IMF; World Bank.

UNIT II

Terminology and Cash Flow Diagram

Time value of money; Engineering economy factors and their use; Economic analysis, present worth; Equivalent uniform annual worth; Capitalized cost; Internal rate of return;

Economic analysis of operating plans; Profit versus Loss cost comparison; Break even analysis; Compound interest calculations; The uniform annual cost method; Equal service period requirement.

Replacement Studies

Determination of replacement; Salvage value; Book value; replacement theories; Cost benefit and pay back analysis; Capital budgeting.

UNIT III

Depreciation

Purpose of depreciation; Type; Economic life; Depreciation methods; Straight line method: Declining balance method; Sum of years digits methods; Sinking fund formula; Service output method; Selection of depreciation method; Depletion; Valuation; Determination of property life from limitations in the use of mortality data.

Forecasting

Forecasting in operations; Forecasting and operations; Sub systems; Characteristics of demand overtime; Dependent versus independent demand; Forecast error; lntutive or formal approaches; Useful forecasting models; Quantitative models; Time series quantitative models; Exponential smoothing; Double exponential smoothing; Regression analysis; Selection of the forecasting model; Behavioral dimensions of forecasting.

UNIT IV

Network Analysis

PERT and CPM; The terminology of networks; Shortest path problem; Minimum spanning free problem; Maximum flow problem; Minimum cost flow problem; Network simplex method; Project planning and control with PERT CPM.

Inventory Control

Demand and control systems; Characteristics inventory concepts costs; Inventory modelling; Deterministic inventory models; Stochastic inventory models; Applications in behavioral pit falls in inventory control.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Engineering Economy	Dagavino, E.P.	Seventh Edition
2	Productions and Operations Management	Chaby, S.N.	Tata McGraw Hill, 1980
3	Engineering Economics	Riggs, J.L.	McGraw Hill
4	Managerial and Engineering Economy	Taylor, G.A.	East West Press
5	Financial Management and Policy	Vanhorne, J.C.	Prentice Hall of India

Course Code	**CE372**
Course Title	**Rural Technology & Community Development**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Nil**
Course Objectives (CO)	**The objective of this course is to make students aware of the various elements of rural technology and community development.**

SYLLABUS

UNIT-I

Data analysis and measures of central tendency

Meaning nature scope and limitations of statistics, collection of statistical data, classification, tabulation and diagrammatic representation of data, measures of central tendency : statistical averages means, media and mode.

UNIT II

Data Information and Knowledge

Concept of information, need of information(professional education, research), qualities of information, value of information, difference between data and information, properties of the needed information, information and management, planning organizing, Coordinating and controlling

UNIT III

Concept of Marketing

Difference between marketing selling and retailing, marketing mix, market segmentation, marketing planning, strategy and approaches, modern concept of marketing

Community Development

Concept ,definition, meaning , need, history, principles objectives and scope. Community building: coming age, regenerating community, community model

UNIT IV

Consensus Organizing model

What's behind building healthy communities, participatory democracy. The role of various NGOs in community development. The role of business and government in community development initiatives, how to form a non profit corporation fund raising and grant writing

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Encouraging community development	Biddle William wishart	Mcgraw hill
2	Sustainable rural technology	M.S Virdi	Daya publishing house
3	Rural technology	Punia RD Roy	Satyaparkashan
4	Rural education and technology	S.B Verma, S.K Jiloka	Deep and deep publication

Course Code	**CE374**
Course Title	**Disaster Management**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Environmental Impact assessment**
Course Objectives (CO)	**The objective of this course is to make students aware of the various elements of rural technology and community development.**

SYLLABUS

UNIT I

Introduction to Disaster Management:

Define and describe disaster, hazard, emergency, vulnerability, risk and disaster management; Identify and describe the types of natural and non-natural disasters. Important phases of Disaster Management Cycle.

Disaster Mitigation and Preparedness:

Natural Hazards: causes, distribution pattern, consequences and mitigation measures for earth quake, tsunami, cyclone, flood, landslide drought etc. *Man-made hazards*: causes, consequences mitigation measures for various industrial hazards/disasters. Preparedness for natural disasters in urban areas.

UNIT II

Hazard and Risk Assessment:

Assessment of capacity, vulnerability and risk, vulnerability and risk mapping, stages in disaster recovery and associated problems.

Emergency Management Systems (EMS):

Emergency medical and essential public health services, response and recovery operations, reconstruction and rehabilitation.

UNIT III

Capacity Building:

Gender sensitive disaster management approach and inculcate new skills and sharpen existing skills of government officials, voluntary activists, development of professional and elected representative for effective disaster management, role of media in effective disaster management, overview of disaster management in India, role of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines..

Application of Geoinformatics and Advanced Techniques:

Use of Remote Sensing Systems (RSS) and GIS in disaster Management, role of knowledge based expert systems in hazard scenario, using risks-time charts to plan for the future, early warning systems.

UNIT IV

Integration of public policy:

Planning and design of infrastructure for disaster management, Community based approach in disaster management, methods for effective dissemination of information, ecological and sustainable development models for disaster management.

Case Studies:

Lessons and experiences from various important disasters with specific reference to Civil Engineering.

RECOMMENDED BOOKS

S. no.	Name	AUTHOR(S)	PUBLISHER
1	Natural Hazards in the Urban Habitat	Iyengar, C.B.R.I.	Tata McGraw Hill.Pub

2	Disaster Management,	R.B. Singh	Rawat Publications
3	Disaster Management –Future Challenges & Opportunities	Jagbir Singh,	I.K. International Publishing House.

Course Code	**CSE372**
Course Title	**Operating System & Database Management System**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Elementary knowledge about the Hardware/Software Interface**
Course Objectives (CO)	**This course should provide the students with good understanding of database systems concepts and Operating System including its architecture and all its components.**

SYLLABUS

UNIT I

Introduction to Operating system: Role of Operating system as resource manager, function of kernel and shell, operating system structures, views of an operating system.

Process management: CPU scheduling, Scheduling Algorithms, PCB, Process synchronization, Deadlocks, Prevention, Detection and Recovery.

UNIT II

Memory Management: Overlays, Memory management policies, Fragmentation and its types, Partitioned memory management, Concept of Thrashing, Paging, Segmentation, Need of Virtual memories, Page replacement Algorithms.

File Management: File System Architecture, Layered Architecture, Physical and Logical File Systems, Protection and Security.

UNIT III

Introduction to Database Systems: File Systems Versus DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data independence. Purpose of Database System , Views of data , Data Models ,Database Languages ,Database System Architecture, Database users and Administrator, Entity–Relationship model (E-R model) ,E-R Diagrams.

RELATIONAL MODEL: The relational Model, Types, Keys, Relational Algebra, Domain Relational Calculus, Tuple Relational Calculus, Fundamental operations, Additional Operations, SQL fundamentals, Security.

UNIT IV

DATABASE DESIGN: Functional Dependencies, Non-loss Decomposition, Functional Dependencies, First, Second, Third Normal Forms, Dependency Preservation, Boyce/Codd Normal Form- Multi-valued Dependencies and Fourth Normal Form ,Join Dependencies and Fifth Normal Form

TRANSACTIONS: Transaction Concepts ,Transaction Recovery ,ACID Properties ,System Recovery, Media Recovery ,Two Phase Commit - Save Points, SQL Facilities for recovery, Concurrency , Need for Concurrency, Locking Protocols, Two Phase Locking, Intent Locking, Deadlock, Serializability, Recovery Isolation Levels , SQL Facilities for Concurrency.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Operating System Concepts	A. Silberschatz and Peter B. Galvin	Addison Wesley Publishing Company
2	Systems Programming & Operating	Dhamdhere	Tata McGraw Hill

	Systems		
3	Database System Concepts	Abraham Silberschatz, Henry F. Korth, S. Sudharshan	Tata McGraw Hill
4	An Introduction to Database Systems	C.J.Date, A.Kannan, S.Swamynathan	Pearson Education
5	Database Systems Concepts, Design and Applications	S.K.Singh	Pearson Education

Course Code	**CSE374**
Course Title	**Elements of System Analysis & Design**
Type of Course	**OE**
L T P	**4 1 0**
Credits	**4.5**
Course Prerequisites	**NIL**
Course Objectives (CO)	**The course has been designed to provide a solid foundation of systems principles and an understanding of how business functions, while heightening students to the issues analysts face daily.**

SYLLABUS

UNIT I

Introduction: System definition and concepts: Characteristics and types of system, Manual and automated systems Real-life Business sub-systems: Production, Marketing, Personal, Material, Finance Systems models types of models: Systems environment and boundaries, Real-time and distributed systems, Basic principles of successful systems, Systems analyst :Role and need of systems analyst ,Qualifications and responsibilities ,Systems Analyst as agent of change

UNIT II

System Development cycle: Introduction to systems development life cycle (SDLC), Various phases of development: Analysis, Design, Development, and Implementation, Maintenance Systems documentation considerations: Principles of systems documentation, Types of documentation and their importance, Enforcing documentation discipline in an organization.

System Planning: Data and fact gathering techniques: Interviews, Group communication, Presentations, Site visits. Feasibility study and its importance Types of feasibility reports System Selection plan and proposal Prototyping , Cost-Benefit and analysis: Tools and techniques

UNIT III

Systems Design and modelling: Process modeling, Logical and physical design, Design representation, Systems flowcharts and structured charts, Data flow diagrams, Common diagramming conventions and guidelines using DFD and ERD diagrams, Data Modeling and systems analysis , Designing the internals: Program and Process design, Designing Distributed Systems ,Input and Output :Classification of forms: Input/output forms design, User-interface design, Graphical interfaces, Modular and structured design :Module specifications, Module coupling and cohesion , Top-down and bottom-up design .System Implementation and Maintenance :Planning considerations, Conversion methods, producers and controls, System acceptance Criteria, System evaluation and performance, Testing and validation, Systems qualify Control and assurance, Maintenance activities and issues.

UNIT IV

System Audit and Security :Computer system as an expensive resource: Data and Strong media Procedures and norms for utilization of computer equipment, Audit of computer system usage, Audit trails, Types of threats to computer system and control measures: Threat to computer system and control measures, Disaster recovery and contingency planning

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	System analysis and design	Elias M.Awad.	Galgotia Publications Pvt. Ltd
2	System analysis and design	Perry Edwards	Mitchell McGraw-Hill
3	Analysis and design of information systems	James A.Senn	McGraw-Hill

Course Code	**ECE372**
Course Title	**Mobile Communication**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Digital Communication**
Course Objectives (CO)	**To build an understanding of the fundamental concepts and basic taxonomy of computer mobile communication area, to study architecture of GSM and CDMA technology, to explain the need and significance of different types of networks, topologies and protocols, to study and understand how mobile and rest of the world do actually communicates with each other.**

SYLLABUS

UNIT I

Introduction to Cellular systems: Basic Cellular systems, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, concept of frequency reuse, cochannel interference reduction factor, desired C/I from a normal case in an omnidirectional antenna system, handoff mechanism, cell splitting, consideration of the components of cellular systems, different cellular systems and B3G systems.

UNIT II

Co-channel and Code channel interference reductions: Co-channel interference, exploring co-channel interference areas in a system, real time co-channel interference measurement at mobile radio transceivers, design of an omni-directional antenna system in worst case. Design of directional antenna system, lowering antenna height, reduction of co-channel interference by means of a notch in the tilted antenna pattern, umbrella pattern effect, use of parasitic elements, power control.

UNIT III

Handoff and Dropped Calls: Value of implementing handoffs, initiation of a hard handoff, delaying a handoff, forced handoffs, queuing of handoffs, power difference handoffs: MAHO and soft handoff, cell site handoff only, intersystem handoff, introduction to dropped call rate. GSM core network, GSM, BSS, NSS, OSS core and architecture overview, MSC (Mobile Switching Center), HLR (Home Location register), VLR (Visitor Location Register)

UNIT IV

Connectivity and interfaces, GSM subscriber services, Huawei GSM core network product, product introduction, Structure, logical structure etc. General call flows in Core network, Overview of GPRS/UMTS network, SGSN, GGSN, GPRS/UMTS network components. General call flows in Core network, Overview of GPRS/UMTS network, SGSN, GGSN, GPRS/UMTS network components. 3G Systems: WCDMA-UMTS (UTRA-FDD) physical layer, WCDMA-ARIB physical layer, WCDMA-TDD physical layer, UMTS network architecture, Evolution of UMTS-3GPP release 4 and beyond (release 5,6,7)

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Principle of Mobile Communication	Gordan L. Stuber	Springer
2	Wireless communications	Theodore S. Rappaport	TMH
3	Wireless communication networking	Vijay Garg	Elesvier

Course Code	**ECE374**
Course Title	**Broadband Communication.**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	
Course Objectives (CO)	**Study the principles and features of various possible alternatives for realizing high speed communication systems. Analyze and identify the suitability of a specific broadband system from the available alternatives depending on the geographical location, subscriber density.**

SYLLABUS

UNIT I

Mobile and Satellite Communication.- Mobile Communication Principles, Architecture of GSM, Introduction to 2G to 4G Systems such as GSM, HSCSD, GPRS, EDGE etc, Principles of CDMA. Satellite technology evolution, LEO, MEO, GEO satellites and their special services, orbital equations, link budget for C- band satellite, impact of satellite in Indian scenario.

UNIT II

Fixed Wireless System and Wireless System-Microwave Links, Private Unlicensed links(Spread Spectrum), MMDS(Multi channel Multi- point distribution service), LMDS (Local multipoint Distribution Service), Introduction to Wi- Fi and Wi- MAX , Principles and Parameters for Wireless Lan(IEEE 802.11 Standards), Operating Principles for Wi- MAX(IEEE 802.16 standard), Comparison of Wi- Fi and Wi-MAX.

UNIT III

Optical Fiber Communication.-Principles of optical fiber communication, significant features and advantages of optical fiber communications. Recent trend- FTTH(Fiber – to – the – Home) System.

UNIT IV

Quality of Service (Qos) in Broadband. Qos issues in broadband communication.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Mobile Communication Design Fundamentals	William C.Y. Lee	Wiley
2	Satellite Communications	Timothy Pratt	John Wiley & Sons
3	Wireless Communications	T.L Singhal	Tata McGraw-Hill Education
4	Optical Fibre Communications	Senior.John.M	Prentice Hall

Course Code	**EE372**
Course Title	**Electrical Measurement**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Basic electrical**
Course Objectives (CO)	**To understand various electrical quantities, their measurements and to familiarize with the construction, working principle and applications of various electrical instruments.**

SYLLABUS

UNIT-I

Units, Dimensions And Standards: Introduction to MKS **(Meter-Kilogram-Second)** and Rationalized MKSA **(Meter-Kilogram-Second-Ampere)** System, SI Units (International System of Units), Standards of electromotive force (EMF), Resistance, Capacitance and Inductance, Systematic errors

General Theory Of Analog Measuring Instruments: Operating torque, damping and controlling torque, Torque-weight ratio, Pointers and Scales. Principles of operation of various types of electro mechanical indicating / registering instruments viz. Permanent Magnet Moving Coil (PMMC), dynamometer, induction, thermal, etc. for direct current and alternating current measurement of voltage, current, power, frequency, phase and power factor etc., energy meter: their sources of error and compensation, shunts and multipliers, multi-meter.

UNIT-II

Potentiometers: Basic direct current (DC) potentiometer circuit, Modern form of DC potentiometer, measurement of voltage, current, Resistance and calibration of voltmeter and ammeter using DC potentiometer, volt ratio box, Self-balancing potentiometer, Alternating current (AC) potentiometers and their applications.

UNIT-III

Magnetic Measurements: Flux meter, B-H Curve, Hysteresis loop, Permeameters, AC Testing of Magnetic materials, Separation of iron losses, iron loss measurement by Wattmeter and Bridge methods.

UNIT-IV

Instrument Transformers: Theory and construction of current and potential transformers, ratio and phase angle errors and their minimization, Characteristics of current transformers (CT) and potential transformers (PT) and their Testing.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	A Course in Electrical and Electronics Measurement and Instrumentation.	Sawhney A. K	Dhanpat Rai and Sons.
2	Electrical Measurements and Measuring instruments	Golding Edward William and Widdis Frederick Charles	Wheelers India .
3	Modern Electronic Instrumentation. and Measurement Techniques	Helfrick A.D. and Cooper W.D.	Prentice Hall

Course Code	**EE374**
Course Title	**Energy Auditing & Management.**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Basic electrical.**
Course Objectives (CO)	**To understand how energy is used within the plant and to find opportunities for improvement, energy saving, energy audits concepts to evaluate the effectiveness of an energy efficiency project or program.**

SYLLABUS

UNIT-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, Energy conservation Act- 2001 and its features.

UNIT-II

Energy Management and Audit: 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, Energy audit instruments

UNIT-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 energy savings companies (ESCOs).

UNIT-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 issues, energy efficient motors. Light source, Choice of lighting, Luminance requirements, and Energy conservation avenues.

Compressed air system: Types of air compressors, Compressor efficiency, efficient compressor operation, Compressed air system components, Capacity assessment, Leakage test Factors affecting the performance and efficiency.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Solar Energy and Energy Conservation.	Sawhney and Maheshwari	Prentice Hall (India)
2	Energy Technology	Rao S. and B. B. Parulkar	Khanna Publishers
3	Solar Energy	Sukhatme S. P	Tata McGraw Hill

Course Code	**ME372**
Course Title	**Total Quality Management**
type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	
Course Objectives (CO)	**This subject provides students with the knowledge to understand the philosophy and core values of Total Quality Management (TQM), determining the voice of the customer and the impact of quality on economic performance and long-term business success of an organization; apply and evaluate best practices for the attainment of total quality.**

SYLLABUS

UNIT-I

Quality and Total Quality Management: Excellence in manufacturing/service, factors of excellence, relevance of TQM.

Concept and definition of quality: Total quality control (TQC) and Total Quality Management (TQM), salient features of TQC and TQM. Total Quality Management Models, benefits of TQM.

Just-in-time (JIT): Definition: Elements, benefits, equipment layout for JIT system, Kanban system MRP (Material Requirement planning) vs JIT system, Waste elimination, workers involvement through JIT: JIT cause and effect chain, JIT implementation.

UNIT-II

Customer: Satisfaction, data collection and complaint, redressal mechanism.

Planning Process: Policy development and implementation; plan formulation and implementation.

Process Management: Factors affecting process management, Quality function development (QFD), and quality assurance system.

UNIT-III

Total Employees Involvement (TEI): Empowering employees: team building; quality circles; reward and Recognition; education and training, Suggestion schemes.

Problems solving: Defining problem, Problem identification and solving process, QC tools.

Benchmarking: Definition, concept, process and types of benchmarking.

UNIT-IV

Quality Systems: Concept of quality system standards: relevance and origin of ISO 9000; Benefits; Elements of ISO 9001, ISO 9002, ISO 9003.

Advanced techniques of TQM: Design of experiments: failure mode effect analysis: Taguchi methods.

Recommended Books

S.No.	Name	Author(s)	Publisher
1	Total Quality Management	Sunder Raju	Tata McGraw Hill.
2	TQM for engineers	M.Zairi	Aditya Books.
3	Total Quality Management Handbook	J.L. Hradeskym	McGraw Hill.
4	Total Quality Key terms and concepts	William L.Duncan	Amacom
5	Total Quality Management and Operational	John S. Oakland	Routledge

	Excellence Text with Cases		

Course Code	**ME374**
Course Title	**Maintenance and Reliability Engineering**
type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course	
Prerequisites **Course Objectives (CO)**	**The course covers principles of reliability, failure rate and its relation to reliability, probability distribution of the time to failure, exponential distributions, reliability of systems, series and parallel systems, stand by redundancy, systems mean time to failure, mean residual life, reliability in design. It also includes failure mode effect analysis, failure tree analysis, reliability testing and analysis, and warranty problems.**

SYLLABUS

UNIT-I

Introduction: Objective and characteristics of maintenance function, Organization of the maintenance system, Operating practices in maintenance, Maintenance record keeping.

Cost Aspect of Maintenance: Costs of machine breakdown, estimation of life cycle costs, Application of work measurement in maintenance, Manpower planning and training, Incentive payments for maintenance.

UNIT-II

Planning of Maintenance Activities: Evaluation of alternative maintenance policies breakdown, preventive and predictive maintenance, fault diagnosis and condition monitoring techniques, simulation of alternative practices, Development of preventive maintenance schedule, House keeping practices, total productive maintenance.

Maintenance Engineering: Maintenance requirements of mechanical, electrical, process and service equipment, Safety aspect in maintenance, Aspect of lubrication: chemical control of corrosion, Computerized maintenance information systems.

UNIT-III

Reliability: Concept and definition, configuration of failure data, various terms used in failure data analysis in mathematical forms, component and system failures, uses of reliability concepts in design and maintenance of different system.

Reliability and Availability of Engineering systems: Quantitative estimation of reliability of parts, Reliability of parallel and series elements, Accuracy and confidence of reliability estimation, Statistical estimation of reliability indices, Machine failure pattern, Breakdown time distribution.

UNIT-IV

Reliability improvement: Reliability in design, reliability in engineering, systems, systems with spares, reliability simulation, redundant and stand by systems, confidence levels, component improvement element, unit and standby redundancy optimization and reliability-cost trade off.

Fault Tree Analysis: Introduction and importance, fault tree construction, reliability calculations from fault tree, tie set and cut set methods, event tree and numerical problems.

Recommended Books

S.No.	Name	Author(s)	Publisher
1	Maintenance Engineering Handbook	Lindley R. Higgins	McGraw Hill.
2	Principles of Planned Maintenance	R.H. Clifton	Edward Arnold.

3	Maintenance Planning control,	A Kelly	McGraw Hill.
4	Reliability Engineering	L.S Srinath	East West Press.
5	Reliability Engineering	S.K. Sinha	John Wiley.

Course Code	**MGT372**
Course Title	**Basics of Human Resource Management**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	
Course Objectives (CO)	**To familiarize students with the concepts of Human resources in the organization and their roles in the Business Concerns.**

SYLLABUS

Unit I

Introduction to Human Resource Management: Definition and Concept, Features , Objectives, Functions, Scope and Development of Human Resource Management, Importance of Human Resource Management, Human Resource Practices. **HRM and Personnel Management:** Introduction, Concept of Personnel Management, Personnel Management in India, Functions of the Labour Welfare Officer, Difference Between Personnel Management and HRM

Unit II

Human Resource Planning: Concept of Human Resource Planning (HRP), Factors in HRP, Process of HRP .**Job Analysis and Design:** Job Analysis, Job Description, Writing a Job Description, Job Specification, Job Design **Recruitment**: Introduction, Concept of Recruitment, Factors Affecting Recruitment, Types of Recruitment

Unit III

Selection: Introduction, Concept of Selection, Process of Selection, Selection Tests, Barriers in Selection **Induction:** Introduction, Meaning and Definition of Induction, Need for Induction , Problems Faced during Induction , Induction Programme Planning . **Training:** Concept and Significance of Training, Training Needs, Training Methods, Types of Training **Performance Appraisal:** Introduction, Concept of Performance Appraisal, Purpose of performance appraisal, Process, Methods of Performance Appraisal, Major Issues in Performance Appraisal.

Unit IV

Wages and Salary: Introduction, Nature and Significance of Wage and Salary Administration, Theories of Wages, Methods of Wage Fixation **Incentives:** Introduction, Concept of Incentives, Effective Incentive System, Types of Incentive Scheme **Employee Relations:** Introduction, Concept of Employee Relations, Managing Discipline, Managing Grievance , Employee Counseling **Employee Empowerment:** Introduction, Concept of Employee Empowerment, Process of Empowerment, Empowerment in Indian Scenario, Empowerment in Global Scenario.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Human Resource Management	Aswathappa, K ✓	Tata McGraw-Hill.
2	Human Resource Management	Bratton, J. and Gold, J.	Theory and Practice,
3	Human Resource Management	Flippo, E.,	McGraw Hill.
4	Managing Human Resources	Gomez-Mejia, L.,	Pearson Education

Course Code	**MGT374**
Course Title	**Management Practices**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	
Course Objectives (CO)	**This course introduces the fundamental management concepts and techniques.**

SYLLABUS

UNIT I

Management- concept, nature, process, importance & Functions. An overview of functional areas of management, managerial roles. Management as Art, Science & Profession Evolution of Management Theory (contributions) – Work of Fredrick .W. Taylor, Fayol's contribution, Discovery of Elton Mayo.

UNIT II

Management Functions – Planning, Organizing, Staffing, Directing and controlling.

Planning: meaning-importance-elements- process – limitations Decision Making- concept, importance and steps in decision making, techniques of decision making. Motivation – concept; theories – Maslow, Herzberg, Mc Gregor.

UNIT III

Organizing - Concept, nature and significance; organizing structures: Line structure, Functional structure, Line and Staff structure, Project structure, Matrix structure, Authority and responsibility relationships, centralization and decentralization, departmentation. Staffing - importance, functions of staffing .Recruitment- sources & methods of recruitment, selection-meaning and process. Directing – meaning and steps of direction.

UNIT IV

Leadership- concept, styles and traits .Control: concept, process, Effective control system. Recent Trends in Management: Social Responsibility of Management – environment friendly management, Total Quality management, Stress Management, International Management

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Essentials of Management	Koontz H & W	McGraw Hill, New York
2	Management and organization	Rudani	Tata McGraw Hill
3	Basic Managerial Skills for All	McGrath, E.H.	Prentice Hall of India
4	Essentials of Management	Massie Joseph	Prentice Hall of India
5	Management-Text & Cases	VSP Rao	Excel Books, Delhi

Course Code	**AGE471**
Course Title	**Reliability Engineering**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	
Course Objectives (CO)	

SYLLABUS

UNIT – I

Introduction:

Definitions and COl1l'lpb. Reliability. Probability, Impossible and certain events. Failure-Data and its analysis, Hazard rate and Failure density, Reliability in terms of hazard rate, Failure density in other situations.

UNIT II

Hazard Models:

Types of distribution and standard deviation and variance, Expectations Conditional probabilities.

UNIT – III

System Reliability:

Series, parallel and mixed configurations. Methods of solving complex systems.

UNIT IV

Reliability Improvement:

Types of redundancies, Reliability allocation for a series system, Optimization Reliability - cost Trade-off.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Reliability Engineering	Srinath, L.S.	Affiliated East-West Press Limited, New Delhi
2	Reliability Evaluation of Engineering systems, Concepts and Techniques	Roy Billington and Ronald N.Allan	Pitman Advanced Publishing Co
3	Reliability Engineering	Govil, A.K	Tata McGraw Hill, New Delhi
4	Reliability Engineering	Balagurusamy, E.	Tata McGraw Hill, New Delhi

Course Code	**AGE473**
Course Title	**Remote Sensing And Geographical Information System**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Geomatics Engineering**
Course Objectives (CO)	**To introduce the principles and basic concepts of Remote Sensing and GIS. To introduce the remote sensing systems, data products and analysis. To introduce the spatial data models, analysis and presentation techniques. To study the applications of Remote Sensing and GIS in agriculture, soil and water resources**

SYLLABUS

UNIT – I

Introduction

Basic principles of remote sensing; Conventional aerial photography; Non-conventional photography; Non-photographic sensors; Rocket and earth orbital imagery; Energy sources and radiation principles; Energy interaction in the atmosphere and with earth surface; Nature of electromagnetic radiation; Active and passive remote sensing systems; Earth resource satellite.

Photographic Systems for Remote Sensing

Fundamental consideration; Aerial photographic film, cameras and filters.

UNIT – II

Imaging and Nonimaging Sensors

Sensor fundamentals; Nonimaging sensors; Optical mechanical scanners; Radiometric calibration.

Remote Sensing Data Systems Processing and Management

Information system; Image data storage and retrieval; Image data input and output; Image processing principles; Image processing implementation; Pattern recognition.

UNIT –III

Ground Investigations in Support of Remote Sensing

Test sites; Common measurements; Geologic investigations; Agriculture and Forestry investigations; Atmospheric investigation.

Image Interpretation

Activities of image interpretation; Elements of image interpretation; Techniques of Image interpretation; Visual requirements for image interpretation; Image interpretation equipment.

UNIT – IV

Digital Image Processing and Geographic Information System

Image rectification and restoration; Image enhancement; Contrast manipulation; Multi image manipulation; Image classification; Post classification smoothing; Classification accuracy assessment; Basic concepts of GIS; Data imagery and GIS application for land and water resources.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Introduction to Environmental Remote Sensing	Barret, E.C. and Curits, L.F.	John Wiley and Sons Inc. New York
2	Space Remote Sensing System Introduction	Chern, H.S.	Academic Press Inc. New York
3	Remote Sensing and Image Interpretation	Lillesand, T.M. and Kiefer, R.W.	John Wiley and Sons Inc. New York
4	Remote Sensing: Methods and Applications	Hard, R.M.	John Wiley and Sons Inc. New York
5	Mannual of Remote Sensing	Reeves, R.G., Ansom, A. and David Landen	

Course Code	**CE471**
Course Title	**Infrastructure And Real Estate Management**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Engineering Economics**
Course Objectives (CO)	**The objective of this course is to make students aware of the various elements of infra structure and real estate management.**

SYLLABUS

UNIT I

Introduction:

Impact of Infrastructure development on economic development, standard of living and environment. Reasons for rise of public sector and government in infrastructural activities. Changed socio-economic scenario and current problems and related issues.

Infrastructure Management:

Importance, scope and role in different sectors of construction.

- **Highway Sector:**
  Repayment of Funds, Toll Collection Strategy, Shadow tolling, and directtolls, Maintenance strategy, Review of toll rates & structuring to suit the traffic demand
- **Irrigation Projects:**
  Large / Small Dams - Instrumentation, monitoring of water levels, catchments area, rainfall data management, prediction, land irrigation planning & policies, processes Barrages, Canals.
- **Power Projects:**
  Power scenario in India, Estimated requirement, Generation of Power distribution strategies, national grid, load calculation & factors, Hydropower - day to day operations, management structures, maintenance, Thermal Power, Nuclear Power.
- **Airports:**
  Requisites of domestic & International airports & cargo & military airports, facilities available, Terminal management, ATC.
- **Railways:** Mass Rapid Transport System MRTS, LRT, Multi-modal Transport System.

UNIT II

Real estate management

Introduction, functions of real estate project management.

Project management –I

Project management processes and organizational pattern, work breakdown structure, time scheduling techniques, CPM/PERT network analysis, resource management and scheduling techniques, material management, time cost analysis, project organization, project peculiarities, good practices and managerial responsibilities, project cost control.

Project management II

The application of management processes such as scope management, cost management, risk management, communication management and time management during the different construction phases. Some of the major techniques to be discussed are value engineering, quality function deployment, cost benefit analysis, risk identification and its quantification.

UNIT III

Operation management

Introduction , nature & scope of operation/production management, relationship with other functional areas, recent trends in operation management, manufacturing & theory of constraints, types of production system, just in time(JIT) and lean system

Product design and process selection

Stages in product design processes, value analysis, facility location and layout: types characteristics, merits and demerits, work measurement, job design

UNIT IV

Forecasting and capacity planning

Method of forecasting, overview of operation planning, aggregate production planning, production strategies, capacity requirement planning, MRP, scheduling supply chain management, purchase management, inventory management

Quality management

Definition, dimension, cost of quality, continuous improvement(kaizen), ISO (9000&14000 series), quality awards, statistical quality control, variable and attribute, process control, control chart(X,R,P,np and C Charts) acceptance sampling operating characteristic curve(AQL, LTPD, a & b risk) total quality management(TQM)

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Project planning analysis, selection, financing, implementation and review	Chandra, prassanna	Tata McGraw Hill.Pub
2	Infrastructure development & financing towards a public private partnership	Raghuram.G& Jain R	Macmillan India ltd
3	Production and operation management, concepts methods & strategy	Charry S.N(2005)	John willy &sons asiapvt ltd

Course Code	**CE473**
Course Title	**Architecture & Town Planning**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	
Course Objectives (CO)	**To enable the students to relate the architectural projects in context of planning in rural, urban and regional context.**

SYLLABUS

UNIT – I

Elements of Design:

Line direction. Shape, size, texture, value and colour, balance, scale and proportion.

Principles of Design:

Repetition, gradation, harmony, contrast and unity, creation of 2 D and 3 D compositions.

UNIT – II

The Industrial Revolution:

The age of revivals, the emergence of engineer, new materials and techniques and the evolution of balloon frame and steel frame.

Origin of Modern Architecture:

Definition and concept of modern architecture, various pioneers of modern architecture.

UNIT – III

Town Planning:

Definition and meaning, age of planning, scope and motives of planning, brief history of town planning – its origin and growth, historically development of town planning in ancient valley civilizations. Indus Nile Tigris and Euphrates, Greek Roman, Medieval and Renaissance town planning.

New Concepts:

Garden city movement, Linear city and concentric city concepts, Neighbourhood and Radburm, La-cite industrial, Radiant city to present day planning.

UNIT – IV

Planning Principles:

Types of town and their functions, types of town planning – Grid Iron, Radial, Spider webs, Irregular and Mixed, their advantages and disadvantages.

Planning Practice and Techniques:

Zoning – its definition, procedure and districts, height and bulk zoning, F. A. R., Master Plan – Meaning, preparation and realization, the scope of city planning – city rehabilitation and slum clearance.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Urban Planning Problems	Cherry, Gordon	Board Hill, London
2	Urban and Regional Planning in India	Sundaram,K V	Vikas Publishing house(P) Ltd.,New Delhi
3	The Urban Pattern	Gallion A B,Eisner S	Van Nostrandreinhold,New York

Course Code	**CSE471**
Course Title	**Web Development**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Basic knowledge of Computer and its functions, Internet and Browser**
Course Objectives (CO)	**Allows the students to understand the various design and website development technologies, enhances the design skills of students.**

SYLLABUS

UNIT I

INTERNET AND WORLD WIDE WEB: Introduction, Internet Addressing, ISP, types of Internet Connections, Introduction to WWW, WEB Browsers, WEB Servers, URLS, http, WEB applications, Tools for WEB site creation.

HTML: Introduction to HTML: HTML tags, Frames and forms, Lists, adding graphics to HTML page, creating tables, linking documents, frames, DHTML: Object model and Collections, Event model, Filters and Transitions, Data binding with tabular data controland Style sheets.

UNIT II

Java Script: Introduction, programming constructs: variables, operators and expressions, conditional checking, functions and dialog boxes, JavaScript DOM, creating forms, introduction to Cookies.

JAVA: Introduction to java objects and classes, control statements, arrays, inheritance, polymorphism, Exception handling.

Server side scripting Languages-JSP: Introduction to JSP, JSP Architecture, Scripting components, Standard actions, JSP with JDBC.

Case study of a simple online application.

UNIT III

XML: Why XML, XML syntax rules, XML elements, XML atributes, XML DTD displaying XML with CSS, Extensible Style sheet Language(XSL).

UNIT IV

AJAX: Introduction, HTTP request, XMLHttpRequest, AJAX Server Script, AJAX Database.

PHP: Introduction, syntax, statements, operators, sessions, E-mail, PHP and MySQL, PHP and AJAX.

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1.	Web Enabled Commercial Application	Ivan Bayross	Perl CGI
2.	HTML,CSS, JavaScript,Perl, Python and PHP	Steven M. Schafer	Wiley India Textbooks
3.	XML How to Program	Deitel,Deitel, Nieto, and Sandhu	Pearson Education

Course Code	**CSE473**
Course Title	**Distributed System**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Basic knowledge of object oriented programming, data structures, threads, operating system concepts.**
Course Objectives (CO)	**This Course work provides the complete understanding of distributed system and its various applications in the field of computer Science.**

SYLLABUS

UNIT I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Issues in Distributes Operating Systems, Resource sharing and the Web Challenges.

System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, and termination detection.

UNIT II

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

UNIT III

Agreement Protocols: Introduction, System models, classification of Agreement Problem- Interactive consistency Problem, Applications of Agreement algorithms.

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control

UNIT IV

Distributed Transactions: Introduction, Flat and nested distributed transactions,

Atomic commit protocols, concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Distributed shared memory – Design and Implementation issues, consistency models, CORBA Case Study: CORBA RMI, CORBA services.

File System: File service components, design issues, interfaces, implementation techniques, Sun Network File System – architecture and implementation, other distributed file systems – AFS, CODA. Name services – SNS name service model.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Advanced Concepts in Operating	MukeshSinghal&Niranjan G	Tata McGraw Hill

	Systems	Shivaratri	
2	Distributed System: Concepts and Design	*Coulouris, Dollimore, Kindberg*	Pearson Education
3	Distributed Operating Systems	Tanenbaum S	Pearson Education
4	Distributed System: Concepts and Design	P K Sinha	PHI

Course Code	**ECE471**
Course Title	**Computer Networks**
Type of Course	**OE**
L T P	**3 1 0**
Credits	**3.5**
Course Prerequisites	**Communication Engineering**
Course Objectives (CO)	**To build an understanding of the fundamental concepts and basic taxonomy of computer networking area, to explain the need and significance of different types of networks, topologies and protocols, to study and understand how computer and rest of the world do actually communicates with each other.**

SYLLABUS

UNIT I

Data Communications : Describe the purpose and functions of various network devices, Components, protocols and standards, Network and Protocol Architecture, Reference Model ISO-OSI, TCP/IP-Overview, Encapsulation and De-capsulation Process, Describe the purpose and basic operation of the protocols in the OSI and TCP models, topology, transmission mode, digital signals, digital to digital encoding, digital data transmission, DTE-DCE interface, interface standards, modems, cable modem, transmission media guided and unguided, transmission impairment, Performance, wavelength and Shannon capacity.

UNIT II

Basic Switching Concepts: Circuit switching (space-division, time division and space-time division), packet switching (virtual circuit and Datagram approach), message switching. Overview and difference between Circuit switching and packet switching. Data Link Layer: Design issues, Data Link Control and Protocols: Flow and Error Control, Stop-and-wait ARQ, Sliding window protocol, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Point-to – Point Access: PPP Point – to- Point Protocol, PPP Stack. Ethernet, Ethernet cabling, Types of Ethernet, Ethernet frames, Ethernet devices (Repeater, Hub, Switch), CSMA/CD, Ethernet Addressing (MAC Address), ARP.

UNIT III

Medium Access Sub layer: Channel allocation problem, Controlled Access, Channelization, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLAN, high-speed LANs, Token ring, Token Bus, FDDI based LAN, Network Devices-repeaters, hubs, switches bridges. Network Layer: Design issues, Routing algorithms, Congestion control algorithms, Host to Host Delivery: Internetworking, addressing and routing, IP addressing (class full & Classless), Subnet, Network Layer Protocols: IPV4, IPV6. Transport Layer: Process to Process Delivery: UDP; TCP, congestion control and Quality of service.

UNIT IV

Calculate addressing scheme including VLSM IP addressing design to a network. Describe the basic routing concepts, perform and verify routing configuration tasks for a static or default mode, configure and verify RIP, OSPF, Configure and verify STP, Describe the principle of VLAN, configure and verify the VLANs and trucking on Huawei switches, describe the architecture of the optical access network, Describe GPON concepts, Analyze main GPON protocols, Datacom product introduction.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Computer Networks	A. S. Tanenbaum	4th Edition, PHI
2	Data Communications and Networking	B. A. Forouzan	TMH, 1st ed.
3	Data & Computer Communication	William Stallings	PHI, 6ed.
4	An Engineering approach to Computer Networking	S. Keshav	Addison Wesley

Course Code	**ECE473**
Course Title	**Speech Signal & Image Processing**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Nil**
Course Objectives (CO)	**To provide the student with an appreciation to understand the concepts of Speech Signals and their processing** **To analyze the different types of images and how can we apply different methods on images in order to enhance the different types of images.**

SYLLABUS

UNIT I

Introduction to Image Processing Historical background, visual perception, image formation, Elements of Storage, sampling & Quantization, Relationships between pixels-neighbors of pixel, connectivity labeling of connected components, Relations, equivalence and Transitive closure, Distance measures, Arithmetic/ Logic operation, Imaging Geometry Basic and perspective transformation stereo imaging, application of image Processing.

UNIT II

Image Enhancement Spatial and frequency domain methods point processing, intensity transformation, Histogram processing image substation and Averaging spatial filtering, LP, HP and homo-morphic felling, generation of spatial marks, Color image processing.

UNIT III

The Fundamentals of Digital Speech Processing. A Review of Discrete-Time Signal &Systems , Fourier transfer, DFT, FFT Fundamental of Digital Filters, FIR system, IIR Systems. 2. Time –Domain Methods for Speech Processing. Time Dependent Processing of speech, short-time energy and Average Magnitude, Short time Average Zero-Crossing Rate. 3. Digital Representation of speech Waveform Sampling speech signals, statistical model, Instantaneous quantization, Instantaneous companding, quantization for optimum SNR, Adaptive quantization, Feed-forward Feedback adaptions.

UNIT IV

Speech Processing Review of human speech and Acoustic theory, nature of sound, harmonics, resonance measurement, virtual display. Music theory, pitch, duration, intervals, rhythm. Human speech production, the vocal tract, the Larynx, the source filter. Speech signal processing-the phasor mode. Software, Elements of speech Synthesis speech Recognition-speech in the computer-human interface

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Digital Image Processing	Rafact Gonzalez and Richard E. Woods	Pearson Education Society
2	Digital Image Processing	Keenneth R Castleman,.	Pearson Education Society
3	Speech and Audio Processing for multimedia PC's	Iain Murray	Pearson Education.

Course Code	**EE471**
Course Title	**Fundamentals of Electrical Machines**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Basic electrical.**
Course Objectives (CO)	**To became familiar with single phase and three phase transformer, DC and AC machines, parallel operation of machines& to calculate the efficiency of machines.**

SYLLABUS

UNIT-I

Introduction: Basic Principle, Types and constructional features of electrical machines, torque, and torque angle, basic electromagnetic laws, Induced EMF.

UNIT-II

Transformers: Basic principle, turns ratio, types and parts of a transformer, ideal transformer, transformer on no-load and on-load, phasor diagram, transformer reactance and equivalent circuit, losses, efficiency, all day efficiency, regulation, basic concept of three-phase transformer and auto transformer (excluding analysis).

UNIT-III

Direct Current (DC) Machines: Principle, Constructional features, Types of direct current (DC) machines, Electromotive force (EMF) and torque equations, circuit model, armature reaction, commutation, Types of armature winding(no detailed diagram), characteristics of dc motors, characteristics of dc generators, starting (three point and four point starters), speed control methods, efficiency and applications.

UNIT-IV

A.C MOTORS

Three-phase Induction Machines: Concept of rotating magnetic field in three phase, Construction and principle of operation, slip frequency, rotor currents, rotor Magneto motive force (MMF) and torque production, equivalent circuit, torque slip characteristics, power output, starting.

Single-phase Induction Motors: Principle of single phase induction motors, double field revolving theory, types of single phase induction motors.

Synchronous Machines: Construction and types, Electromotive force (EMF) equation, synchronous reactance.

Principle of Special Motors: Alternating current (AC) series motor, universal motor, reluctance motor, hysteresis motor, stepper motor, Brushless Motors, Switched reluctance motor and their

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Electrical Machines, VOL II	Thareja B.L	S.Chand
2	Bimbhra P.S.	Electrical Machinery,	Khanna Publishers
3	Electrical Machines	Nagrath I.J. and Kothari D.P	Tata McGraw Hill

Course Code	**EE473**
Course Title	**Elements of Power System**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	**Basic electrical.**
Course Objectives (CO)	**To familiarize with concept of power system transmission and distribution.**

SYLLABUS

UNIT-I

Power System Components: Single line Diagram of Power system, Brief description of power system Elements: Synchronous machine, transformer, transmission line, bus bar, circuit breaker and isolator Supply System Different kinds of supply system and their comparison, choice of transmission voltage

Transmission Lines: Configurations, types of conductors, resistance of line, skin effect, Kelvin's law. Proximity effect.

UNIT-II

Over Head Transmission Lines:-Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines, Representation and performance of short, medium and long transmission lines, Ferranti effect. Surge impedance loading **Overhead line Insulators:** Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency

UNIT-III

Mechanical Design of transmission line: Catenary curve, calculation of sag & tension, effects of wind and ice loading, sag template, vibration dampers Insulated cables: Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables.

UNIT-IV

Neutral grounding: Necessity of neutral grounding, various methods of neutral grounding, earthing transformer, grounding practices

EHV AC and HVDC transmission: Introduction to EHV AC and HVDC transmission and their comparison, use of bundle conductors, kinds of DC links, and incorporation of HVDC into AC system

Recommended Books			
S.No.	**Name**	**Author(s)**	**Publisher**
1	Electrical Power Systems.	WadhwaC. L.	New age international Ltd.
2	Power System Analysis and Design.	GuptaB. R.	S. Chand & Co
3	Electric Power	Uppal S. L.	Khanna Publishers

Course Code	**ME471**
Course Title	**Renewable Energy Resources**
type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	
Course Objectives (CO)	**The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro.**

SYLLABUS

UNIT-I

Principles of solar radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT II:

Solar energy collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar energy storage and applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT III:

Wind energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C Engine operation and economic aspects.

UNIT IV:

Geothermal energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

Direct energy conversion: Need for DEC, Carnot cycle, limitations, principles of DEC

Recommended Books			
S.No.	**Name**	**Author(s)**	**Publisher**
1	Non-Conventional Energy Sources	G.D. Rai	Khanna Publishers
2	Renewable Energy Resources	Twidell&Wier	CRC Press(Taylor & Francis)
3	Renewable energy resources	Tiwari and Ghosal	Narosa.
4	Renewable Energy Technologies	K Mittal	Wheeler

Course Code	**ME473**
Course Title	**Ergonomics**
type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	
Course Objectives (CO)	**Human Factors and Systems Design gives students an overview of the underlying philosophy, aims and approaches of human centered systems design. Students are introduced to the human sensory and physiological systems and cognitive processes. They are exposed to basic principles of designing and evaluating workplaces and interfaces. Issues on accidents, human error and designing for safety are also covered in this course.**

SYLLABUS

UNIT-I

Introducing Ergonomics and Discipline approach; Ergonomics/ Human factors: Design today- Human aid to lifestyle, Journey, Fitting task to man their contractual structure, Domain, Philosophy and Objective, Mutual task comfort: two way dialogue, communication model, Ergonomics/ human Factors fundamentals, Physiology (work physiology) and stress

UNIT-II

Human physical dimension concern: Human body- structure and function, anthropometrics, Anthropometry: body growth and somatotypes, Static and dynamic anthropometry, Stand Posture- erect, Anthropometry landmark: Sitting postures, Anthropometry: squatting and cross-legged postures, Anthropometric measuring techniques, Statistical treatment of data and percentile calculations

Posture and movement: Human body- structure and function, Posture and job relation, Posture and body supportive devices, Chair characteristics, Vertical work surface, Horizontal work surface, Movement, Work Counter

UNIT-III

Behavior and perception: Communication and cognitive issues, Psycho-social behavior aspects, behavior and stereotype, Information processing and perception, Cognitive aspects and mental workload, Human error and risk perception

Visual Issues: Visual performance, Visual displays

Environments Factors: Environmental factors influencing human performance

UNIT-IV

Ergonomic design process: Ergonomics design methodology, Ergonomics criteria/check while designing, Design process involving ergonomics check, Some checklists for task easiness.

Performance support and design intervention: Occupational safety and stress at workplace in view to reduce the potential fatigue, errors, discomforts and unsafe acts, Workstation design, Furniture support, Vertical arm reach and design application possibility, Humanising design: Design and human compatibility, comfort and adaptability aspects, Concluding session: Design Ergonomics in India: scope for exploration.

Recommended Books

S.No.	Name	Author(s)	Publisher
1	Introduction to Ergonomics	Bridger, RS	Taylor &Francis

2	Ergonomics for beginners, a quick reference guide	Dul, J. and Weerdmeester, B.	Taylor & Francis
3	Human Factors in Product Design	Green, W.S. and Jordan, P .W	Taylor & Francis
4	Handbook of Human Factors and ergonomics	G. Salvendy	John Wiley & Sons
5	Ergonomics Interventions for Health and Productivity	Singh, S	Himanshu Publications

Course Code	**MGT471**
Course Title	**Managing Innovation and Entrepreneurship**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	
Course Objectives (CO)	**Foundations of Entrepreneurship Concept ,innovation management-definition and process of innovation management methods of man agent innovation Women entrepreneurs& Entrepreneurship Development**

SYLLABUS

UNIT I

Foundations of Entrepreneurship Concept , Need, Definition& role of Entrepreneurship, Definition, characteristics& scope of Entrepreneur, Innovation, Invention, Creativity, Opportunities . Concepts of Entrepreneur, Manager, Intrapreneur / Corporate Entrepreneur comparative study, Roles& Responsibilities. Role of entrepreneur in Indian economy.

UNIT II

Women entrepreneurs& Entrepreneurship Development Meaning, role, problems& reasons for less women entrepreneurs. Various institutes & Govt. schemes to help &uplift women entrepreneurs. Case studies for successful women entrepreneurs. Concept, need & role of Entrepreneurship Development

UNIT III

Small& Medium Enterprises: Small & Medium Industry: Meaning and importance Definition of SME –role & importance in India Economy, Steps for Starting Small Industry: Decisions to become entrepreneur -Steps to be taken-Search for a business idea, source of ideas, idea processing, selection idea, input requirements

UNIT IV

Innovation management- definition and process of innovation management methods of management innovation. Entrepreneurship as a career, Sustaining Competitiveness Maintaining competitive advantage

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Fundamentals of Entrepreneurship	Renu arora, S K sood	Kalyani Publishers
2	Entrepreneurship and Business	Richard Branson	Pearson

Course Code	**MGT473**
Course Title	**Project Management**
Type of Course	**OE**
L T P	**4 0 0**
Credits	**4**
Course Prerequisites	
Course Objectives (CO)	**Projects are non-recurring activities requiring a different set of skill for planning as compared to regular and operative activities. The course is aimed at developing the understanding of project activities and relevant skills.**

SYLLABUS

UNIT I

Project: Meaning, Objectives of a Project, Project Identification Analysis: Socio-economic Consideration in Project Formulation; Social Infrastructure Projects for Sustainable Development; Investment Opportunities; Project Screening and Presentation of Projects of Decision Making; Expansion of Capacity; Diversification, , Project Life cycle. Project planning- process.

UNIT II

Market and Technical Analysis: Market and Demand Analysis –Market Survey, Demand Forecasting, Uncertainties in Demand Forecasting; Technical Analysis. Project Costing and Finance: Cost of project; Cost of production; Break even Analysis; Means of Financing Project; Role of Financial Institution in Project Finance.

UNIT III

Project Appraisal: Time Value of Money; Project Appraisal Techniques – Playback Period, Accounting Rate of Return, Net Present Value, Internal Rate of Return, Benefit Cost Ratio; Social Cost Benefit Analysis; Effective Rate of Protection, Local Cost Benefit Analysis. Risk Analysis: Measures of Risk; Sensitivity Analysis; Stimulation Analysis; Decision Tree Analysis.

UNIT IV

Project Scheduling/Network Techniques in Project Management: CPM and PERT Analysis and LOB. Project Audit; Project Audit Life Cycle, responsibilities of Evaluator/ Auditor. Project Selection.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Project Management: Strategic financial Planning Evaluation and Control	Bhavesh, M. Patel	Vikas Publisher
2	Project management	Chandra, P.	Tata McGraw hill
3	Modern project finance-A case book	Robert Bick, Robert K, David B,Crane	John Wiley and Sons