DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR COURSE STRUCTURE
B.TECH CIVIL ENGINEERING

I- semester

S.No	Course code	Course	Credit			
			L	T	P	Total
1.	GPT-301	Moral & Value Education	2	0	0	2
2.	LNG-302	Professional Communication –1	3	0	0	3
3.	ME- 304	Workshop Practice & Technology	2	0	4	4
4.	ME- 301	Engineering Graphics –I	0	0	4	2
5.	ME- 408	Engineering Thermodynamics	2	0	2	3
6.	CE-401	Engineering Mechanics	2	1	0	3
7.	PHY-312	Engineering Physics	3	1	2	5
8.	MAS-411	Engineering Mathematics –I	3	1	0	4
Total			**17**	**3**	**12**	**26**

II- semester

S.No	Course code	Course	Credit			
			L	T	P	Total
1.	LNG-303	Professional Communication –II	3	0	0	3
2.	CHEM-513	Engineering Chemistry	3	1	2	5
3.	COMP-410	Computer & Languages	2	1	2	4
4.	ME- 401	Engineering. Graphics –II	0	0	4	2
5.	MAS- 490	Engineering Mathematics – II	3	1	0	4
6.	ECE-301	Basic Electronics	2	1	2	4
7.	EEE-303	Electrical Engineering	3	0	2	4
Total			**16**	**4**	**12**	**26**

III- semester

S.No	Course code	Course	Credit			
			L	T	P	Total
1.	SES-415	Environmental studies – I	2	0	0	2
2.	MAS-590	Engineering Mathematics – III	3	1	0	4
3.	COMP-510	Foundation of Information Technology	2	1	4	5
4.	CE-405	Fluid Mechanics I	2	1	2	4
5.	CE - 402	Surveying and leveling	2	0	4	4
6.	CE-408	Strength of material	3	0	0	3
Total			**14**	**3**	**10**	**22**

IV- semester

S.No	Course code	Course	Credit			
			L	T	P	Total
1.	CE – 504	Advance surveying	2	1	2	4
2.	CE – 403	Building material & Construction	2	1	2	4
3.	CE – 413	Structural analysis – I	2	1	2	4
4.	CE -501	Fluid Mechanics II	3	0	0	3
5.	CE – 404	Civil Engineering Drawing	0	0	4	2
6.	MAS – 491	Computer Based Numerical & Statistical Techniques	3	1	2	5
7.	SES – 416	Environmental Studies - II	2	0	0	2
8.	SWLE-403	Engineering Hydrology	3	0	0	3
Total			**17**	**4**	**12**	**27**

V- semester

S.No	Course code	Course	Credit			
			L	T	P	Total
1.	CE - 505	Structural analysis – II	2	1	2	4
2.	CE - 414	Concrete structure – I	2	1	2	4
3.	CE-415	Transportation Engineering – I	2	1	2	4
4.	CE -416	Geotech Engineering - I	2	1	0	3
5.	CE - 511	Hydraulic Machines	2	1	2	4
6.	SWLE-508	Ground Water Engineering	3	0	0	3
7.	BAM - 315	Elements of economics & principals management science	3	1	0	4
Total			**16**	**6**	**8**	**26**

VI- semester

S.No	Course code	Course	Credit			
			L	T	P	Total
1.	CE – 506	Estimation and costing management	2	1	0	3
2.	CE – 507	Concrete structure – II	2	1	2	4
3.	CE-508	Transportation Engineering – II	2	1	0	3
4.	CE – 608	Engineering Geology	2	1	2	4
5.	CE – 509	Geotechnical Engineering – II	2	1	2	4
6.	CE – 510	Environmental Engineering - I	3	1	0	4
7.	CE – 503	Survey camp	0	0	4	2
8.	SWLE – 408	Water Resources Engg – I	2	1	0	3
Total			**15**	**7**	**10**	**27**

VII- semester

S.No	Course code	Course	Credit			
			L	T	P	Total
1.	CE – 601	CAD in Structures	2	0	4	4
2.	CE – 603	Environmental Engineering- II	2	1	2	4
3.	CE-605	Design of Steel Structure	3	1	0	4
4.	CE – 606	Project planning and construction management	3	1	0	4
5.	SWLE-502	Irrigation Engineering	3	0	2	4
6.	CE – 699A	Project (Project Formulation)	0	0	2	2
7.	CE – 580	Seminar - I	0	0	1	1
8.	CE – 500	Training	0	0	1	1*
Total			**12**	**3**	**12**	**24**

VIII- semester

S.No	Course code	Course	Credit			
			L	T	P	Total
1.	CE - 680	Seminar – II	0	0	1	1
2.	CE – 650-679	Elective – I	3	0	0	3
3.	CE – 650-679	Elective – II	3	0	0	3
4.	CE – 650-679	Elective – III	3	0	0	3
5.	SWLE – 516	Water Resource Engineering - II	2	1	0	3
6.	CE – 699 B	Project (Project Execution & Report)	0	0	6	6

Total	**11**	**1**	**7**	**19**

MORAL & VALUE EDUCATION

Course Code GPT- 301 **Credit-2[2-0-0]**

My country and my people – the Indians, being and becoming an Indian, Nationalism and Internationalism. Some life issues – Love, Sex and marriage;
Men and Money - value of time, meaning of work, human communication, human suffering, addiction, ecology, women's issues.
Understanding one's neighbor - neighbor hood groups, their structure and functions, patterns of social interaction of group dynamics.
Preparation for career-choice of vocation, motivation for study and research, the present education system, curriculum and syllabus, teaching method, examination and work experience.
Definition of value education, Moral and Ethics, Laws and Moral based on Ten Commandments and two great commandments.
Discovery of self, Self-awareness, Growth of intellect- Man's spiritual nature, emotions, will, respect the rights of life, liberty, property, truth, reputation.
Sin, Origin of sin, manifestation of sin, the results of sin, the remedy of sin, sin as an act, sin as a state, sin as a nature.
Consciences – as defined in Oxford dictionary and Winston Dictionary, types of consciousness (such as evil, convicted, purged, pure, weak, good, void of offence).

PROFESSIONAL COMMUNICATION –1

Course Code LNG-302 **Credit- 3[3-0-0]**

Study of selected Literacy Texts – Collection of short essays, Collection of short stories.
Testing Written Comprehension Ability - Comprehension Passages of 500 words, Multiple Choice Questions.
Composition & Grammar - Report Writing, Characteristics of Business Reports.
Structure of reports: Front Matter, Main Body, and Back Matter
Style of Reports: Definition, the Scientific Attitude, Readability of Reports, Choice of Words and Phrases, Construction and length of sentences, Construction and length of Paragraphs. The lineout or break up of a format report Blank Form Report, Frogen Report, Memoranda Form Report, Periodic Report, and Miscellaneous Report.
Speech Drills - Using the language laboratory to develop Speaking Communication Skills.
Word Accent: Production of correct accentual patterns involving two and three syllabi words.
Rhythm: Stress-tone rhythm in sentences.
Intonation: Rising Tone and Talking Tone Ear Training and Production Tests.

References:

1. Close R.A.: A University Grammar of English Workbook.
2. Longman, London, 1998.
3. Jones, Daniel: English Pronouncing Dictionary, ELBS, and London, 1999.
4. Sharma S.D: A Textbook of Spoken and Written English, Vikas, 1994.
5. Alvarez, Joseph A.: The Elements of Technical Writing, New York: Harcourt, 1998.
6. 5.Bansal, R.K.: Spoken English For India, Orient Longman, 1993

WORKSHOP PRACTICE & TECHNOLOGY

Course Code ME-304 **Credit -4[2-0-4]**

1.Introduction
Classification of manufacturing processes, Primary shaping process, Machining processes, Joining processes, Surface finishing processes, Plant & Shop layout, Industrial Safety.

2. Properties of Metals
Strength, Elasticity, Stiffness, Plasticity, Malleability, Ductility, Brittleness, Toughness, Hardness, Impact strength, Fatigue, Creep.

3. Classification of Metals
Wrought iron, Cast iron, Grey cast iron, White cast iron, Nodular cast iron, Alloy cast iron, Steel, Mild steel, Medium Carbon steel, High carbon steel and its application. Effect of alloying elements on steel, Special alloy steels, e.g. stainless steel, high speed steel, cutting alloys.

4. Non-ferrous Metals

Aluminium, Copper, Zinc, Lead, Tin, Nickel, Non-ferrous alloys, Brass, Bronze.

5. Carpentry Shop

Introduction, Selection of timber, Seasoning of Timber, Common defects in timber, Preservation of timber, Auxiliary materials used in carpentry, Veerners and Veneering, Plywood, Wood working hand tools, Marking and measuring tools, Holding & Supporting tools, Cutting tools, Saws, chisel, Planers, Boring tools, Wood working processes, Joinery work classification of joints.

6. Bench Working & Fitting Shop

Introduction, Vices, Vice blocks, Surface plates, Trisquare, Bevel square, Combination set files, Chisel, Hacksaw, Surface gauge, Universal surface gauge, Punches, Calipers, Dividers, Pliers, Spanners, Drills taps. Die and die stock. Screw pitch gauge, Wire gauge, Dial indicator, Bench working processes.

7.Welding Shop

Concept of welding, Resistance welding, Spot welding resistance butt and flash welding, Resistance projection welding and seam welding, Electric arc welding, Gas welding (Oxy-Acetylene welding), Equipments and process, welding joints and positions of welding.

8. Sheet Metal Shop

Introduction, Metals used in sheet metal shop hand tools, Sheet metal operations.

List of practical:

1. To make a T-lap carpentry joint.
2. To make the wooden block of given size with the help of planning - to make a square slot, to make a semi circular arc.
3. To make an S-hook.
4. Metal practice- Filing, hack sawing, drilling, tapping.
5. To make a book stand.
6. To make a butt joint with the help of electric arc welding.
7. To make a lap joint with the help of electric arc welding.
8. To study and sketch the Lathe Machine.

ENGINEERING GRAPHICS –I

Course Code ME-301 **Credit -2[0-0-4]**

Introduction:

Graphics as a tool to communicate ideas, engineering drawing instruments and its uses. Lettering and dimensioning, scales, layouts of drawing sheets Construction of geometrical figures like pentagon and hexagon.

Orthographic Projection:

Principles of orthographic projections, Principal and auxiliary planes, First and Third angle projections. Projection of points. Pictorial view.

Projection of lines parallel to both the planes. Parallel to one and inclined to other, Inclined to both the planes. Application to practical problems.

Projection of solid in simple position, Axis or slant edge inclined to one and parallel to other Plane, Solids lying on a face or generator on a plane.

Sectioning of solids lying in various positions, True shape of the section.

Development of lateral surfaces, sheet metal drawing.

Isometric Projection:

Principles of isometric projection, Isometric projection using box and offset methods.

References:

Bhatt N.D.: Elementary Engineering Drawing, Charothar Publishing.

Laxmi Narayan V & Vaish W.: A Text Book of Practical Geometry on Geometrical Drawing.

ENGINEERING THERMODYNAMICS

Course Code ME-408 **Credit- 3[2-0-2]**

Thermodynamics:

Fundamental Concepts and Definitions:

Introduction to SI units, Definition of thermodynamics, System, Surrounding and universe, Phase, Concept continuum, Macroscopic and Microscopic point of view, Density, Sp. Volume, Pressure, Thermodynamic equilibrium, Property, State, Path, Process, Cyclic process, Quasi-static process, Reversible and irreversible process, Energy and its forms, Work and head, NTP and STP.

Ideal and Real Gases:
Concept of ideal gas, characteristic equation of gas. Universal and characteristic gas constant. Enthalpy and specific heat, Deviation of real gas from ideal gas, compressibility factor and the Van der Waall's equation of state for real gas.
Laws of Thermodynamics
Zeroth Law: Concept of temperature. Equality of Temperature, Zeroth law, Principle of thermometry and temperature scale.
First Law: First Law of thermodynamics. Concept processes, Flow processes and control volume, Flow work, Steady flow energy equation, Mechanical work in a steady flow process, Throttling process, Application of first law to open systems.
Second Law: Essence of second law. Thermal reservoir. Heat Engines and thermal efficiency, COP of heat pump and refrigerator. Definition of available and unavailable energy, Statement of second law, Carnot cycle, Carnot's theorem, Clausius inequality, Concept of Entropy, Entropy change for ideal gases.
Properties of steam:
Generation of steam at constant pressure. Various states of water, Properties of steam, Use of property diagram, Process of vapour in closed and open system, Determination of dryness fraction of steam by separating and throttling Calorimeter, Rankin cycle.
Thermodynamic Cycles:
Definitions of bore, Stroke clearance ratio, Compression ratio, Definition and calculation of mean effective pressure from the cycle work (proof not required), Indicated pressure, Air standard cycles (Otto and Diesel cycles), Principle of working and description of two and four stroke SI and CI engines.

ENGINEERING MECHANICS

Course Code CE-401 **Credit 3[2-1-0]**
Force and Equilibrium: Basic concepts, Force, Moment and couple, Principle of Transmissibility, Verigonon's theorem, Resultant of Force Systems concurrent and Non- concurrent coplanar Forces, Funicular polygon. Free body diagram.
Trusses: Plane structures, Various methods of analysis of Trusses, Method of joints, Method of sections and Graphical method.
Moment of Inertia: Center of gravity, centroids of Line, Area, volume and Composite Bodies, Area Moment of Inertia and Mass Moment Moment of Inertia for plane figures and bodies including composite bodies, Product Moment of inertia, Parallel axis theorem, Principal moment of inertia.
Friction: Introduction, Dry friction, Co-efficient of static friction. Friction cone, screw jack and Belt friction.
Beams:Bending moment and shear force diagrams for statically determinate beams.
Kinematics of Rigid Bodies: Plane motion, Absolute motion, Relative motion, Translating axes and Rotating axes.
Kinetics of Rigid Bodies: Plane motion, Force Mass and Acceleration, Work and energy, Impulse and momentum, Principles of energy conservation, Principle of virtual work, D'Alembert's principle and Dynamic equilibrium.
References:
Beer F.P and Johnston F.R: Mechanics for Engineers, McGraw Hill.
Meriam, J.L: Statistics, John Wiley.
Meriam, J.L: Dynamics, John Wiley.
Shames I.H: Engineering Mechanics, Prentice Hall of India.
Dayaratnam, P.: Statistics, Tata Mc Graw Hill.
Timeshenko, S. and Ypung D.: Engineering Mechanics, Mc Graw Hill.

ENGINEERING PHYSICS

Course Code PHY-312 **Credit- 5[3-1-2]**
Special Theory of Relativity:
Michelson Morley experiment, Inertial frames of reference, Postulates of special theory of relativity, Lorentz transformation equation of space and time, length contraction, time dilaton, addition of velocities, variation of mass with velocity, mass-energy equivalence.

Optics :
Interference: Coherent sources, Conditions of interference, Fresnel's bi-prism experiment, displacement of fringes, interference in thin films, wedge shaped film, Newton's rings.

Diffraction: Single slit and double slit diffraction, diffraction grating, Reyleigh's criterion of limit of resolution, resolving power of telescope, microscope and grating.

Polarization: Polarization of light, Pictorial representation of polarized light, Brewster's law, Malus law, Phenomena of double refraction, Geometry of calcite crystal, Optical activity, Specific rotation, Polarimeter.

Fields:

Scalar and vector fields, Gradient of a scalar field, divergence and curl of a vector field, line integral, conservative vector field, Gauss' Divergence theorem, Stoke's theorem.

Electrostatics:

Gauss' law and its applications, Poisson and Laplace equations. Maxwell's equations, Basic Concepts of Electromagnetic waves and its solution in free space.

Magnetic Properties of Materials:

Para, dia, ferro, antiferro and ferro-magnetic materials, hysteresis, Methods of plotting hysteresis curve of a ferro-magnetic material and their uses, magnetic circuits.

X-Rays:

Origin of X-rays, Continuous and characteristic X-Ray spectra, Moseley's law, Absorption of X-rays, Diffraction of X-rays, Bragg's law, Bragg's spectrometer, Practical application of X-rays, Compton effect.

Quantum Theory:

Wave particle duality, De Broglie concept of matter waves, Davisson and Germer experiment, Heissenberg's uncertainty principle, Schrodinger wave equation and its applications.

Laser:

Spontaneous and stimulated emission of radiation, Einstein's coefficients, Main components of a laser, types of lasers and their applications.

References:

1. Arthur Beiser: Concepts Of Modern Physics, TMH.
2. Subramanyam & Brij Lal: A Text Book of Optics, S. Chand & Co.
3. K.K. Tiwari: Electricity & Magnetism, S. Chand & Co.
4. Brij Lal & Subramanyam: Electricity & Magnetism.
5. Wehr, Richardo & Adair: Physics of the Atom.

ENGINEERING M A T H E M A T I C S – I

Course Code (MAS-411) **Credit 4(3-1-0)**

1. **Matrices :**Elementary row and column transformations, Linear dependence, Rank of matrix, Consistency of system of linear equations and solution of linear equations, Characteristic equation, and Caley-Hamilton theorem, Eigen values and eigen vectors, Diagonalisation, Complex and unitary matrices.
2. **Differential Calculus-I:** Leibnitz theorem, Partial differentiation, Euler's theorem, Asymptotes, Curve tracing, Change of Variables, expansion of functions of one and several variables. Cylindrical and spherical coordinate systems
3. **Differential Calculus-II:** Jacobian, Approximation of errors, Extrema of function of several variables, Lagrange's method of multipliers (simple applications).
4. **Multiple integrals:** Double and triple integrals, change of order, change of variables, Gamma & Beta functions,application to area, volume, Disrichlet's integral and its applications.
5. **Vector Calculus:** Point functions, Gradient, divergence and curl of a vector and their physical interpretations, line, surface & volume integrals, Gauss divergence theorem and Greens & Stokes theorem.

References:

1. Shanti Narayan: A Text Book of matrices, S.Chand & Co.
2. Thomas/Finney: Calculus and Analytic Geometry, Narosa Pub. House.
3. J. N. Kapur: Mathematical Statistis, S. Chand &Co.
4. C. Prasad: Mathematics for Engineers, Prasad Mudranalaya.
5. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers.
6. Jaggi & Mathur : Advanced Engineering Mathematics, Khanna Publishers.
7. Piskunov, N.: Differential & Integral Calculus, Moscow Peace Pub.
8. H.K. Das, Engineering Mathematics.
9. Vijai Shankar Verma & Sanjeev Kumar, Engineering Mathematics.
10. Rakesh Dubey, Engineering Mathematics

PROFESSIONAL COMMUNICATION –II

Course Code LNG-303 **Credit 3[3-0-0]**

Technical Written Communication: Nature, origin and development of technical written communication, Salient Features, Difference between technical writing and general writing.

Pre-requisites of Scientific and Technical Communication: Fragment sentences, Parallel comparisons, Elements of a series, Squinting construction and split infinitive, Modifiers, connectives, antecedents and clause subordination, Dangling participles and gerunds.

Ellipsis, Coherence, Unity, Chronological method, spatial method, inductive method, linear method, deductive method, interrupted method.

Business Correspondence: General principles of business correspondence.

Ramifications of business letters. Letters giving instructions, inquiries and answers to enquiries, complaints and adjustments, letters urging action, employment letters, application and resumes.

Proposal Writing: Proposal: Definitions and kinds, Division of format proposals (front matter, title page, summary/ abstract, Table of contents etc.)

Statement of request, body- statement of problem, background, scope, methodology, Advantages and disadvantages.

Writing Scientific and Semi-technical Articles: Source material, topic sentence, literature review. Tables, figures, footnotes, bibliography.

Study of Scientific and General Texts: Prescribed text books for detailed study

Arora, V.N (et. al.), Improve your writing (Delhi: Oxford University Press, 1981.

Lesson No. 1.2, 1.6, 2.4, 3.5, 4.1, 4.3, 5.1, 5.4, 6.2.

For extended Reading (any one of the following)

Orwell George, Nineteen Eighty Four (New York: Penguin, 1984)

Hemingway, Ernest, The old man and the Sea, (Oxford: 1990)

ListeningComprehension:

(a)Ear-training.

(b) Uses of latest scientific techniques (AVR Comprehension trainer,

SRA Comprehension trainer, SRA Comprehension Accelerator, AVR Comprehension Reteometer.)

ReadingComprehension:

(a) Scanning method.

(b) Skimming method.

Phonetic Transcription:

Stresses and Intonation:

References

1. Sherman, Theodore A. (et al) Modern Technical Writing, New Jersey, Prentice Hall, 1991.
2. Legget, Glenn (et al) Essentials of grammar and composition, Macmillan, Delhi 1994.
3. Strunk, Jr. William (et al), The elements of style, Macmillan, 1987.
4. Sharma, S.D A Text Book of Scientific and Technical Writing, Vikas, Delhi, 1990.

ENGINEERING CHEMISTRY

Course Code CHEM-513 **Credit-5[3-1-2]**

General Chemistry:

Advanced Theory of Chemical Bonding: Valence bond and molecular orbital theory. Structure of NH3, H2O, SO3, PCl5, XeO2 molecules. Theories of bonding in metals and semiconductors, n-type and p-type semi-conductors, Imperfections in materials. Born-Haber cycle, Bragg's conditions.

Physical Chemistry:

Equilibrium on Reactivity: Bronsted and Lewis Acids, pH, pka, pkb Scale, Buffer solution. Stereochemistry of organic compounds, Co-ordination chemistry, Nomenclature, Valence Bond and crystal field theory.

Chemical Kinetics & Catalysis: Rate law, Order of reactions, Parallel and reversible reactions, Catalysis, Homogeneous and heterogeneous catalysis, Characteristics of catalytic reaction, Catalytic promoters and poi-sons, Auto catalysis and negative catalysis, Intermediate compound formation theory and absorption theory.

Environment Chemistry:

Atmospheric Chemistry & Air Pollution: Environment and Ecology, Environmental segments, Structure and composition of atmosphere, Radiation Balance of Earth and Green House Effect, Formation and depletion of Ozone layer, Chemical and photochemical reactions of various species in atmosphere, Air pollution – sources, reactions and sinks for pollutants, Acid rains and Smog formation. Pollution control methods.

Corrosion and Lubrication: Introduction, causes of corrosion, Theories of corrosion, Factors influencing Corrosion, Corrosion inhibitors, passivity, Types of corrosion, Protection from corrosion and protective coatings. Theory, Classification and mechanism of Lubrication.

Applied Chemistry:

Water and Waste Water Chemistry: Introduction, Hardness of water, characteristics imparted by impurities, Analysis of contaminants, Treatment of Water by Zeolite, L-S process, Boiler feed water, Waste water treatment.

Chemistry of Engineering Materials:

Fuels & Combustion: Classification of fuels, Non conventional Energy, Biogas, Biomass and solar energy. Calorific value- gross and net, characteristics of good fuel, Determination of calorific value, Solid fuels, Analysis of coal, Liquid fuels.

Instrumentation: IR, UV, NMR, MASS AND ASS.

Industrial Chemistry:

Polymer Chemistry: Classification of Polymers, Including Biopolymers condensation and addition polymers and their applications. Industrial

Application and mechanism of chemical reaction, Beckman, Hoffman, Reimer Tiemann, Cunnizzaro, Diels Alder and Skraup synthesis

References:

1. Puri and Sharma/Principles of Physical Chemistry.
2. Manas Chandra/Atomic Structure and Chemical Bond.
3. Bahl and Tuli /Engineering Chemistry.
4. Jain and Jain/A Text-Book of Engineering Chemistry
5. S.S Dara/Environmental Chemistry and Pollution Control.
6. S.S Dara /Environmental Chemistry.
7. A.K De/Environmental Chemistry.

List of Experiments: (Any Ten):

1. To determine the percentage of available chlorine in the supplied sample of Bleaching powder.
2. To determine the Ferrous content in the supplied sample of iron ore by titrimetric analysis against standard K∧Cr∧ solution using K, Fe(CN)g as external indicator.
3. To determine the chloride content in supplied water sample using Mohr's method.
4. To determine the constituents and amount of alkalinity of the supplied water sample.
5. To determine the Temporary and Permanent hardness of water sample by Coplexometry.
6. To find the Chemical Oxygen Demand of a waste water sample using Potassium dichromate.
7. To determine iron concentration in the sample of water by spectrophotometric method.
8. To find out the Velocity constant for the inversion of cane sugar in acidic medium and to show that inversion follows the first order kinetics.
9. To determine the Molecular weight of a polystyrene sample by using Viscometer method.
10. To determine pH of a solution using a pH-meter and titration of such a solution pH-metrically.
11. To determine the calorific value of a fuel sample by using a Bomb Calorimeter.
12. Analysis of a coal sample by proximate analysis method.
13. References:
14. Vogel's Qualitative Chemical Analysis: Ed. By Jaffery Bassette et. al. (ELBS).
15. Applied Chemistry- Theory and Practice, 2nd Ed. By Virmani and Narula (New Age International Pub.).
16. Experiments in Engineering Chemistry, Ed. By Masood Alam (Maktaba Jamia Limited).

COMPUTER & LANGUAGES

Course Code COMP-410 **Credit- 4[2-1-2]**

Computer hardware components and their functions. Basic operating system concepts,MS-DOS and getting to know DOS commands, Familiarizing with WINDOWS environment, Getting started with UNIX, Files and Directories and their use in different Operating System Environments, Getting to know different editors like edit & vi Introduction to Internet. Getting familiar with Web Browsers like Netscape Navigator & Internet Explorer Sending & receiving mail over Internet, Introduction to PINE and /or ELM, Need of programming languages. Language translators. Introduction to "C" language, Data types operators and expressions. Conditional & looping statements. Function & Arrays. Introduction to Pointers & Structures.

References:

1. DOS the complete reference by Kris Jamsa, Tata- McGraw Hill Publication.
2. UNIX POWER TOOLS by J.Peek Tim O'reilly & M. Locekides, BPB Publication.
3. The 'C' Programming Language by B.W Kernighan & D.M Ritchie, Prentice Hall of India.
4. Using LINUX- Latest Edition by Jade Tackett & David Ganter, Prentice Hall of India.

List of Experiments:

1. Basic Internal and External DOS Commands.
2. Write a simple batch program.
3. Giving exposure to Windows environment.
4. File and program management in windows.
5. Practice of basic UNIX commands.
6. Write simple shell script.
7. Introduction to word processing.
8. Exposure to advance feature supported by some editors.
9. Net Surfing.
10. Creation and checking of E-mail account.
11. Write C program to demonstrate each of the following:
12. Conditional statements.
13. Looping statements.
14. User defined functions.
15. Arrays.
16. Pointers and structures.
17. Familiarizing mail account using PINE, deleting, creating folder/mail-messages, adding signature, creating director of addresses.

Note: List may be modified according to new software available.

ENGINEERING GRAPHICS –II

Course Code ME-405 **Credit-2[0-0-4]**

Introduction: Graphic language, Classification of drawings, Principles of drawing: IS codes for Machine drawing, Lines, Sections, Dimensioning, Standard abbreviation.

Orthographic Projections: Principles of first and third angle projections, drawing and sketching of machine elements in orthographic projections, spacing of views.

Screwed (Threaded) Fasteners:Introduction, Screw thread nomenclature, Forms of threads, Thread series, Thread designation. Representation of threads, Bolted joints, Locking arrangements for nuts, Foundation bolts.

Keys and Cotters: Keys, Cotter joints.

Shaft Couplings: Introduction, Rigid and flexible coupling.

Riveted Joints:Introduction, Rivets and riveting, Rivet heads, Classification of riveted joints.

Assembly Drawing: Introduction, Engine parts, Stuffing box etc.

Free Hand Sketching:Need for free hand sketching, Free hand sketching of some threaded fasteners and simple machine components.

References:

N. Siddeshwar, P. Kannaiah, V.V.S Shastri: Machine Drawing, TMH, New Delhi.

K.L Narayana, P. Kannaiah, K. VenkatReddy: Machine Drawing, New Age International Publications, 2nd edition.

Engineering drawing practice for schools and colleges, SP 46-1998(BIS).

ENGINEERING MATHEMATICS – II

Course Code MAS-490 **Credit-4[3-1-0]**

Integral Transforms: Fourier integral, Fourier complex transform, Fourier sine and cosine transforms and application to simple heat transfer equations.

Z transform and its application to solve difference equations.

Functions of a Complex Variable-I:Analytic functions, Cauchy-Riemann equations and Harmonic functions, Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula derivatives of analytic functions, Liouvilles Theorem, Fundamental theorem of algebra.

Functions of a Complex Variable-II:Representation of a function by power series, Taylor's series and Laurent's Series, Poles, Singularities and zeroes. Residue theorem, evaluation of real integrals of type $\int f(\cos\theta,\sin\theta)d\theta$ AND $\int$,Conformal mapping and bilinear transformations.

Probability and Statistics:Moments, Moment generating functions, skewness, kurtosis, Binomial distribution, normal distribution and poission distribution, correlation and regression.

Solution Of Equations And Curve Fitting:Solution of cubic and bi-quadratic equations. Method of least squares and curve fitting.

References:

Kreyzig, E. (1993): Advanced Engg. Mathematics 7th Edition, John Willey & Sons inc.

Paopoulis: Signal Analysis 3rd Edition (1998) McGraw Hill

Engineering Mathematics Volume II

By H.K.Das.
Publication: S.CHAND
H.K. Das, Engineering Mathematics.
Vijai Shankar Verma & Sanjeev Kumar, Engineering Mathematics.

BASIC ELECTRONICS

Course Code ECE-301 **Credit - 4[2-1-2]**

Energy Bands in Solids: Energy band theory of solids, Concept of forbidden gap, Insulators, Metals and Semiconductors.

Transport Phenomenon in Semiconductors: Mobility and conductivity, electrons and holes in an intrinsic semiconductor, Donor and acceptor impurities, Fermi level, carrier densities in semiconductor, electrical properties of semiconductor, Hall effect, Diffusion.

Junction Diode: P-N junction, depletion layer, V-I characteristics, diode resistance, capacitance, switching time, diode application as a rectifier (half wave and full wave), diode circuits (clipper, clamper, voltage multipliers) Breakdown mechanism, Zener & Avalanche, breakdown characteristics, Zener diode and its applications.

Bi-junction Transistor: Bipolar junction Transistor, CE, CB and CC configuration, characteristic curves (cut off, active and saturation region), Requirement of biasing, biasing types and biasing analysis, stability.

Transistor as an Amplifier: Graphical analysis of CE amplifier, concept of voltage gain, current gain and power gain, h-parameter (low frequency), computation of Av, RI, Ro and approximate formulae.

Operational Amplifiers: Concepts of ideal op-amp, inverting, non-inverting and unity gain amplifiers, adders, difference amplifiers. , Integrators.

Switching Theory & Logic Gates: Number systems, conversion of bases, Boolean algebra, Logic Gates, concept of universal gate, canonical forms, and minimization using K-map.

Electronic Instruments: Multimeter, CRO and its Applications.

References:

1. Boylestad & Nashelsky/Electronic Devices & Circuits/ PHI.
2. Morris Mano/Digital Computer Design/ PHI.
3. Milliman, J. Halkias/Integrated Electronics/TMH.
4. Malvino & Leach/Digital Principles & Application/

List of Experiments:

1. Study of Diode characteristics.
2. Study of Common Base Transistor characteristics.
3. Study of Common Emitter Transistor characteristics.
4. Study of Half Wave Rectifier with effect of Capacitor and also calculate the ripple factor.
5. Study of Full- Wave Rectifier with effect of Capacitor and also calculate the ripple factor.
6. Study of Various Logic Gates.
7. Study of Clipping and clamping Circuits.
8. Study of C.R.O., Function generator, Multimeter.

ELECTRICAL ENGINEERING

Course Code EEE-303 **Credit-4[3-0-2]**

Sinusoidal Steady State Circuit Analysis: Voltage, Current, Sinusoidal & Phasor representation.1-Phase A.C. Circuit-behavior of resistance, Inductance and Capacitance and their combinations, impedance, concept of power, power factor, series & parallel resonance-bandwidth and quality factor.

Network Theory: Introduction to basic physical laws, Network theory: Superposition, Thevenin, Norton, Maximum Power transfer theorems, Star-delta transformation, Circuit theory Concepts: Mesh and Nodal analysis.

Three Phase Supply: Star/delta connections, line and phase voltage/current relations, Three-phase power and its measurement.

Basic Instruments: Instruments for measurement of voltage, Current, power and energy: Construction, principle and application.

Magnetic Circuit and Transformer: Magnetic circuit concept, theory and working principle of single-phase transformer.

Rotating Machines: Principles of energy conversion, Basic concepts of rotating machines, DC machines, Different types and their characteristics & applications. Elementary idea of operation of synchronous and induction machines. Single-phase induction & stepper motors, Applications.

Power Systems: Introduction, Elements, Line diagram, Supply systems, Power factor improvement.

Reference:

1. V. Del Toro/ Principles of Electrical Engineering/ PHI.

2. W.H Hayt & J.E Kennedy/ Engineering Circuit Analysis/ McGraw Hill.
3. I.J Nagrath/ Basic Electrical Engineering/ Tata McGraw Hill.
4. A.E Fitzgerald/ Electronic Instruments & Measurement Techniques/ PHI.
5. Higginbotham L.Grabel/Basic Electrical Engineering/ McGraw Hill.

List of Practical's:

1. Verification of Thevenin's Theorem.
2. Verification of Superposition Theorem.
3. Verification of Norton's Theorem
4. Verification of Kirchoff's Law.
5. To measure the value of impedance and power factor in RLC series A.C. circuit.
6. To measure the value of impedance and power factor in RLC parallel A.C.
7. To study resonance by frequency variation in series RLC circuit.
8. To calibrate the given energy meter with the help of a standard wattmeter.
9. To find the relation between line current and phase current and line voltage and phase voltage in Star – Delta connections.
10. To perform open circuit and short circuit test and draw the equivalent circuit of a single-phase transformer.
11. To measure three phase power by two-wattmeter method.
12. To draw the magnetizing characteristic of a single-phase transformer.

ENVIRONMENTAL STUDIES – I

Course Code SES-415 **Credit -2[2-0-0]**

The Multidisciplinary Nature of Environmental Studies. Definition,Scope and Importance.

(i) Ecosystems.

Concept of an Ecosystem.
Structure and function of an Ecosystem.
Producers,consumers and decomposers.
Energy flow in he ecosystem.
Ecological successsion.
Food chains,food webs and ecological pyramids.

Introduction,types,Characteristics features,structures and function of the following ecosystem:

(a) Forest Ecosystem.
(b) Grassland Ecosystem.
(c) Desert Ecosystem.
(d) Aquatic Ecosystem (Ponds,streams,lakes,rivers,oceans,estuaries).

(ii) Social Issues and the Environment

From unsustainable to sustainable development.
Urban problems related to energy.
Water conservation, rain water harvesting, water shed 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
Visit to local polluted site-Urban/Rural/industrial/Agricultural.
Study of Common plants, insects, birds.

Study of simple ecosystems-ponds, river. Hillslopes etc(Field work equal to 5 lecture hours).

Issues involved in enforcement of environmental legislation; public awareness.

List Of Experiments:

(1)Visit to different polluted sites to assess their effect on pollution, monitoring of pollutant in ecosystem.
(2)Study of simple ecosystem-ponds, rivers, Hill slopes.
(3)Study of common plant, insects,(Herbarium file/insect box)
(4)Visit of local polluted site-Urban/Rural/Agricultural/Industrial
(5)To study the different purification of industrial effluents and wastes.

MATHEMATICS – III *

Course Code MAS 590 **Credit -4[3-1-0]**

Integral Transforms

Fourier integral, Fourier complex transform, Fourier sine and cosine transforms and application to simple heat transfer equations.
Z transform and its application to solve difference equations.

Functions of a Complex Variable-I

Analytic functions, Cauchy-Riemann quations and Harmonic functions, Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula derivatives of analytic functions, Liouvilles Theorem, Fundamental theorem of algebra.

Functions of a Complex Variable-II

Representation of a function by power series, Taylor's series and Laurent's Series, Poles, Singularities and zeroes. Residue theorem, evaluation of real integrals of type $\int f(\cos\theta,\sin\theta)d\theta$ AND $\int$,Conformal mapping and bilinear transformations.

Probability and Statistics

Moments, Moment generating functions, skewness, kurtosis, Binomial distribution, normal distribution and poission distribution, correlation and regression.

Solution Of Equations And Curve Fitting

Solution of cubic and bi-quadratic equations. Method of least squares and curve fitting.

References:

Kreyzig, E. (1993): Advanced Engg. Mathematics 7th Edition, John Willey & Sons inc.
Paopoulis: Signal Analysis 3rd Edition (1998) McGraw Hill
Engineering Mathematics Volume II
By H.K.Das.
Publication: S.CHAND
H.K. Das, Engineering Mathematics.
Vijai Shankar Verma & Sanjeev Kumar, Engineering Mathematics.
Rakesh Dubey, Engineering Mathematics

FOUNDATION OF INFORMATION TECHNOLOGY

Course Code COMP 510 **Credit -5[2-1-4]**

Fundamental Concept of Information, Concept and Processing : Definition of Information, Need of Information, Quality of Information, Value of Information, concept of Information, Entropy Category and Level of Information in Business Organization, Data Concepts and Data Processing, Data Representation.

Information Representation: Information Contents, Introduction to Information Representation in Digital Media, Elementary Concepts in Information Perseverance, Data Compression, LZW Coding, Text, Image Compression, Introduction to JPEG, MPEG, MHEG.

Computer and Programming, Computer Appreciation: Definition of Digital Computer, History, Generations, Characteristics and Application of Computers, Computer Hardware, RAM and ROM, CPU, Various I/O Devices, Storage Media, Software Definition.

Programming Language Classification & Program Methodology: Computer Language, Generations of Languages, Software Development Methodology, Life Cycles, Software Coding, Testing, Maintenance, Industry Standards, Introduction to ISO, SEI-CMM Standards for IT Industry.

Digital Devices and Basic Network Concepts, Digital Fundamentals: Various Codes, Decimal, Binary, Hexa Decimal Conversion, Floating Numbers, Gates, Flip Flops, Adder, Multiplexers.

Computer Networks and Communication: Need for Data Transmission over Distances, Types of Data Transmission, Media for Data Transmission, Introduction to Computer Networks, Network Classification and Network Topologies.

Internet and Web Technologies, Internet & World Wide Web: Hypertext Markup Language, DHJML, WWW, Gopher, FTP, Telnet, Web Browsers, Net Surfing Search Engines, Email, Basic Concepts in E-Commerce, EDI, Electronic Payments, Digital Signatures, Network, Security, Firewall.

Web Technologies: HTML, DHTML, XML, Java Script, WAP, WML, JSP, ASP.

Advanced Concepts In Information Technology, IT Industry Trends, Careers and Applications in India: Scientific, Business, Educational and Entertainment applications, Industry Automation, Weather forecasting awareness of ongoing IT projects in India, NICNET ERNET, Application to E- Commerce, Electronic Governance, Multimedia, and Entertainment.

References:

Curtin, "Information Technology: Breaking News", TMH.
RajaRaman, V. "Introduction To Computers".
Bajpai, Kushwaha & Yadav, "Introduction To Computer & C Programming:, New Age.
Nelson, "Data Compression", BPB.
Bharohoke, "Fundamentals of Information Technology", Excel.
Peter Nortans "Introduction To Computers", TMH.

Leon & Leon “Fundamental of Information Technology”, Vikas.
Kanter, “Managing Information System”.
Lehngart, “Internet 101”, Addision Welsley.
Cistems “Internet, An Introduction”, Tata McGraw Hill.

FLUID MECHANICS – I

Course Code CE 405 **Credit -5[3-1-2]**

Introduction: Fluids and continuum; Physical properties of fluids: Viscosity, Compressibility, Surface Tension, Capillarity, Vapor Pressure; Cavitation; Classification of fluids including rheological classification.

Fluid Statics: Pressure at a point, Pascal’s law; Pressure-density-height relationship; Measurement of pressure by Manometers and mechanical gauges; Pressure on plane and curved surfaces; Total
Pressure and Centre of pressure; Buoyancy; Stability of immersed and floating bodies; Fluid masses subjected to linear accelerations and fluid mass subjected to rotation about the vertical axis.
Dimensional Analysis: Units and Dimensions, Dimensional analysis, Rayleigh’s method, Buckingham’s ∏ theorem, important dimensionless numbers used in fluid mechanics and their significance. Hydraulic Similitude and Model Studies: Model and prototype; Similitude; Geometric, Kinematic and Dynamic similarity.

Fluid Kinematics: Types of fluid Flows; Stream lines, Path lines and Streak lines; Stream tube; Acceleration of a fluid particle along a straight and curved path; Differential continuity equation for 3 D flows; Integral form of Continuity equation for one dimensional flow; Stream function and Velocity potential; Flow net characteristics and uses; kinetic energy and momentum correction factor; circulation.

Fluid Dynamics: Concept of control volume and control surface, Reynolds Transport Theorem, Introduction to Navier-Stokes Equations, Euler’s equation of motion along a streamline and its integration, Bernoulli’s equation and its applications – Pitot tube, Flow through orifices, Mouthpieces, Weirs; Flow measurement in pipes, momentum equation, forces on pipe bend; Angular momentum equation and its applications.

Laminar Flow: Reynolds Experiment; Equation of motion for laminar flow through pipes; Flow between parallel plates.

Boundary Layer Analysis: Boundary layer thicknesses i.e. displacement, momentum and energy thickness; Boundary layer over a flat plate; Laminar boundary layer; Application of Von-Karman Integral Momentum Equation; Turbulent boundary layer; Laminar sub-layer; Boundary layer separation and its control; Forces on immersed bodies like 2d cylinder and sphere.

Flow Through Pipes: Nature of turbulent flow in pipes; Mixing length theory; Equation for velocity distribution over smooth and rough surfaces; Major and Minor energy losses; Resistance coefficient and its variation; Hydraulic gradient and total energy lines; siphons; Concept of equivalent length; Branched pipes; Pipes in series and parallel; Simple pipe networks, water hammer.

REFERENCES:

Hunter Rouse: Elementary Mechanics of Fluids, John Wiley and sons, Omc/ 1946.
L H Shames: Mechanics of Fluids, McGraw Hill, International student edition.
K L Kumar: Engineering Fluid Mechanics
V. C. Agarwal: Fluid Mechanics, TPI Allahabad, 2006ed.

SURVEYING AND LEVELING

Course Code CE -402 **Credit-4[2-0-4]**

Introduction: Importance of surveying to Engineers –Examples from different fields; Plane and Geodetic Surveying, Control Points, Classification of surveys, Methods of locating a point, Sources and Types of errors, Principle of working from whole to part.

Measurement of Distances: Principle of different methods and their accuracy, Measurement by chain and tape. Sources of errors and precautions, Corrections to tape measurements, Field problems, Use and adjustment of auxiliary instruments, Introduction of modern trends: EDM and Total Stations.

Measurements of Angles and Directions : Compass Surveying: Reference meridians, Bearing and azimuths, Magnetic declination and its variations, Use and adjustment of compass.Theodolite Surveying: Vernier theodolite, micro-optic and electronic theodolites, Temporary and permanent adjustments, Measurement of horizontal and vertical angles.

Traversing: Principles of traversing by compass and theodolite, Field work and checks, Computation of coordinates, Sources of errors, Precision of traversing, Checking and adjusting of traverse, omitted measurements.

Tachometry : Definitions, Principles of stadia systems, Instrument constants, Subtense and tangential systems, Construction and use of Reduction Tacheometers, Errors and Precision.

Measurements of Elevation and Contouring: Different methods of determining elevation; Spirit levelling: Definition of terms, Principle, Construction, Temporary and permanent adjustments of levels. Automatic levels, Levelling staves, Methods of spirit levelling, Booking and reduction of fields notes, Curvature and refraction, Reciprocal leveling, Construction and field use of altimeter, Trigonometric levelling-simple and reciprocal

observations, Sources of errors and precision of levelling procedures. Methods of relief representations, Definition and characteristics of contours, Use of contour maps, Direct and Indirect methods of contouring, Digital Elevation Model.

Plane Table Surveying: Principle, Advantages and disadvantages, Plane Table equipment, Use of telescopic alidade and self reducing alidades, Different methods of Plane Table Surveying, Resection-Two and three point problems, Advantages and disadvantages of Plane Table surveying.

Sheet Numbering System :CIM and I &A C series, scales and numbering of Indian topographic maps.

References :

1. Agor, R. "Surveying", Vol. I & II Khanna Publications, Delhi,.
2. Arora, K.R., "Surveying" , Vol. I & II Standard Book House, Delhi,
3. Bannister, A. and Baker, R., "Solving Problems in Surveying", Longman Scientific Technical, U.K., 1994.
4. Kennie, T.J.M. and Petrie, G., "Engineering Surveying Technology", Blackie & Sons Ltd., London, 1990.
5. Punmia, B.C., "Surveying", Vol. I & II, Laxmi Publications New Delhi,
6. Duggal, S.K., Surveying Vol. I & II TMH
7. Basak, Surveying TMH.
8. Kanetkar, Surveying Vol. I, II
9. Chandra, A.M. "Plane Surveying", New Age International Publishers, Delhi
10. Chandra, A.M. "Higher Surveying", New Age International Publishers, Delhi

Practical:

Handling of chain and chain accessories, offsetting, acquaintance with field book; Ranging out surveying line and plotting chain survey; Triangulation by chain and offsetting for details for preparation of map of a small area; Plotting of the field book reading for preparation of map acquaintance with symbols of different objects used in maps and scale of map; Setting up of prismatic compass and measurements of angles; Traversing of a small area with chains and prismatic compass and offsetting for details; Plotting of the above map; Setting up off a 20'' sccuracy transit Theodolite and measurement of horizontal angles and verticals angle; Setting up off a plain table and off setting by intersection method; Plain table traversing (5 sides); Setting up off a dumpy level and exercise in fly levelling and reciprocal levelling;

STRENGTH OF MATERIALS

Course Code CE-408 **Credit- 3[3-0-0]**

Simple Stresses and Strains: Stress- tensile and compressive, strain, strain energy, stress-strain diagram, ductile and brittle material, elastic constants, impact loading, varying cross-section and load, temperature stresses, shear stress, complimentary shear stress, shear strain, strain energy.

Compound Stress and Strains: State of stress at a point, Oblique stress, simple tension, pure shear, general two-dimensional stress system, principle planes, principle stresses and strains, Mohr's stress circle, Poisson's ratio, Maximum shear stress.

Bending Stress: Pure bending, Moment of inertia, Section modulus, Bending stresses, combined bending and direct stress, beam of uniform strength, middle third and Middle quarter rules for rectangular and circular sections.

Torsion: Circular shafts, Torsional shear stress, Strain energy in torsion, Shafts under varying torque, Compound shafts, Combined bending and twisting.

References:

Van Wylen G.J & Sonnlog R.E: Fundamentals of classical thermodynamics, John Wiley & Sons, Inc. NY.

Wark Wenneth: Thermodynamics (2nd edition), McGraw Hill book Co. NY)

Yadav R.: Thermodynamics and Heat Engines, Vol. I & II (SI Edition) Central Publishing House, Allahabad.

Yadav R.: Steam and Gas Turbines.

Kshitish Chandra Pal: Heat Power, Orient Longman Limited, 17, Chittranjan Avenue, Calcutta.

S. Rao, B.B. Parulekar: 'Energy Technology', Khanna Pub, New Delhi.

G.H. Ryder:" Strength of Materials".

List of Experiments:

1. Study of boiler models- Babcock Wilcox, Lancashire and Locomotive.
2. Study of Steam engine and steam turbine models.
3. Study of 2-stroke and 4-stroke I.C.E models.
4. Study of Fiat engine and/or Diesel engine prototype.
5. Study of vapour compression Refrigeration unit tutor/refrigerator.
6. Study of a window type air conditioner.
7. To conduct the tensile test on a UTM and determine ultimate Tensile strength, percentage elongation for a steel specimen.
8. To conduct the compression test and determine the ultimate compressive strength for a specimen

ADVANCE SURVEYING

Course Code CE 504 **Credit-4[2-1-2]**

Triangulation and Trilateration : Necessity of Control Surveying, Principle of Triangulation and Trilateration classification of Triangulation Systems Station Marks, Towers and Signals, Satellite station, Intersected and Resected points, Reconnaissance, Intervisibility of stations, Angular Measurement, Base line measurement and its extension

Adjustment Computations: Treatment of random errors, Normal law of errors, Most Probable Value, Weight of observations, Propagation of errors and variances, Principle of Least Squares, Observations and correlative Normal Equations, Adjustment of triangulation figures and level nets.

Curves: Classification of curves, Elements of Simple Circular, Transition and Vertical curves, Theory and methods of setting out circular, transition and vertical curves, special field problems.

Project Surveys: General requirements and specifications for Engineering project surveys, Reconaissance, Preliminary and Location surveys for highways, railways and canals, Correlation of surface and underground surveys in case of culverts, Bridges and Tunnels; Principles and practice of hydrographic surveys, Layout of culverts, canals, bridges and buildings.

Field Astronomy: Astronomical terms, co-ordinate systems, Spherical trigonometry, Astronomical triangle, Relationship between coordinates.

Photogrammetry and Remote Sensing: Photogrammetry-Introduction, Scale of photograph, Tilt and height displacement, Stereoscopic vision and stereoscopes, Techniques of photo-interpretation, Principles of remote sensing, Electro Magnetic Radiation (EMR), energy interaction with atmosphere and earth features, spectral signatures, Remote sensing satellites and their data products, methods of interpretation of remotely sensed data.

GPS and GIS: Global Positioning System (GPS)-Introduction, principle, and applications of GPS in different fields of Surveying, Geographic Information System (GIS) – Introduction, Geographical concepts and terminology, Applications of GIS

References

Agor, R., "Surveying", Vol. II & III, Khanna Publications, Delhi, 1995.
Arora, K.R., "Surveying", Vol. II & III, Standard Book House, Delhi.
Bannister, A. And Baker, R., "Solving Problems in Surveying, "Longman Scintific Technical, U.K., 1994.
Kennie, T.J.M. and Petrie, G., "Engineering Surveying Technology", Blackie & Sons Ltd. London, 1990.
Punmia, B.C., "Surveying", Vol.II & III Laxmi Publications,New Delhi.
Duggal S.K., Surveying Vol. I & II TMH
Basak, Surveying TMH.
Kanetkar, Surveying
Chandra, A.M. "Plane Surveying", New Age International Publisher, Delh
Chandra, A.M. "Higher Surveying", New Age International Publisher, Delhi
Lillesand, T.M. and Kiefer, R.W., "Remote Sensing and Image Interpretation".

BUILDING MATERIAL & CONSTRUCTION

Course Code CE-403 **Credit-4[2-1-2]**

Building Materials : Classification, Properties and selection criteria of Bricks Burning of Bricks , tests for bricks, stone Classification, characteristics of good building stone, common building stones in India, lime , IS specifications , Field tests of Building limes, timber,Characterstics of good timber, defects in timber, seasoning of timber, tests on timber, plywood, glass, plastics, P.V.C. Mortar : Types, classification and strength, I.S. specifications.

Cement,: Manufacture of cement ,Different types of cement such as slag Cement, Portland Pozzolona Cement and high Alumina cement, their characteristics, composition, use and properties, Tests on Cements , Admixtures, Aggregates and Testing of Aggregates: Classification, source, physical and mechanical properties. Testing of Aggregates for physical and mechanical properties.

Building Construction: Classification of buildings, Recommendations of NBC, Building byelaws, modular co-ordination; orientation of buildings, desirable conditions of comforts, components of building area considerations. Types of foundations and selection criteria

Brick masonry, stone masonry. Types of walls, partition and cavity walls. Prefabricated construction. Plastering and pointing. Damp proofing materials and techniques, Antitermite treatment.

Types floors, construction details and selection criteria

Types of roofs and roof covering, treatment for water proofing.

Stair and staircases: Types, materials, proportions

Doors and windows: sizes and locations, proportions.

Lifts and escalators. White washing, colour washing, painting, distempering.

Shuttering, scaffolding and centering. Expansion and construction joints
Sound and fire proof construction, I.S. specifications

References :

Arora, S.P. & Bindra, S.P., 'A text book of Building Construction" Dhanpat Rai & Sons, Delhi, 1977.
Jha, J. & Sinha, S.K., "Building Construction", Khanna Publishers, Delhi,1977.
Kulkarni, C.J., "A text book of Engineering Materials", Ahmedabad book Depot, Ahmedabad, 1968.
Kulkarni, C.J., "A text book of Engineering Construction", Ahmedabad Book Depot, Ahmedabad, 1968.
Kumar Sushil, "Engineering Materials, "Standard Publishers Distributors, Delhi, 1994.
Kumar Sushil, " Building construction", Standard Publishers, Distributors, Delhi, 1994
McKay W.B., "Building Construction, "Vol.1 to 4, Orient Longman Ltd., Hyderabad, Bombay, Madras, Delhi, Vol.1 & 2 -1995, Vol. 3-1996, Vol. 4-1998.
Punmia, B.C., "A text book of Building Construction ", Laxmi Publications, Delhi, Madras, 1987.
Singh Surendra, "Engineering Materials,", Konark Publishers Pvt. Ltd. 1994.
Civil Engg. Materials, TTTI Chandigarh, Tata McGraw- New Delhi.

STRUCTURAL ANALYSIS – I

Course Code CE 413 **Credit-4[2-1-2]**

Classification of Structures, stress resultants, degrees of freedom, Static indeterminacy Classification of Pin jointed determinate trusses, Analysis of determinate plane and space trusses (compound and complex)

Rolling loads, influence lines for beams and trusses, Absolute maximum bending moment, Muller-Breslau's principles & its application.
Analysis of Arches, Linear arch, Eddy's theorem, three hinged parabolic arch, two hinged arch, spandrel braced arch, moving load & influence lines.
Equilibrium of light cable, General cable theorem, uniformly loaded cable, anchor cables, temperature stresses in suspension cables, three hinged stiffening girder, two hinged stiffening girder, temperature stresses in two hinged girder.
Strain Energy of deformable systems, Maxwell's reciprocal & Betti's theorem, Castigliano's first theorem, unit load & Conjugate beam methods.

References

Wilbur and Norris, "Elementary Structural Analysis", Tata McGraw Hill.
Reddy, C.S., "Basic Structural Analysis", Tata McGraw Hill.
Jain, O.P. and Jain, B.K., "Theory & Analysis of Structures. Vol. I & II Nem Chand.
Coates, R.C., Coutie, M.G. & Kong, F.K., "Structural Analysis", English Language Book Society & Nelson, 1980.
Ghali, A. & Neville, M., "Structural Analysis", Chapman & Hall Publications, 1974.
Jain, A.K. "Advanced Structural Analysis", Nem Chand & Bors, roorkee, India, 1996.
Jain, O.P. & Arya A.S., "Theory of Structure", Vol. II, Nem Chand Bros.,Roorkee , 1976.
Kinney, J.S., "Intermediate Structural Analysis", McGraw Hill Book Company, 1957.
Wang, C.K. "Intermediate Sstructural Analysis", McGraw Hill Book Company, 1983.
Nautiyal, B.D., "Introduction to Structural Analysis", New Age International, 2001

FLUID MECHANICS-II

Course Code CE-501 **Credit -3(3-0-0)**

Fluid through pipe: Concept of equivalent pipe branched tripe lines, simple pipenetwork, water hammer, power transmission through pipe siphon. Flow through open channel:

Types of open channels, pipe versus open channels, velocity in open channels, kinetic energy and momentum correction factors, pressure distribution, elements of open channel. [Uniform flow- Formulae for velocity, derivation of chezys formula, Best hydraulic section-rectangular, Triangular, trapezoidal with side slopes given and side slopes unknown, computation of normal depth

Non-uniform flow: Critical flow**,** conditions for critical flow, specific energy, specific energy diagram for a rectangular channel, critical depth-rectangular, triangular, trapezoidal ,and circular channels, alternate depths, specific force, conjugate depths, application of specific energy – flow over humps , flow through a gradually expanding or contracting channels .

Gradually Varied Flow: Dynamic equation for gradually varied flow characteristics of flow profiles, compilation of length of surface profiles, step method, graphical integration method, direct integration method chore method.

Rapidly Varied flow: Definition, Hydraulic, Jump , Types Loss of energy , relative lose , Height , Length etc.

References:

1. Hydraulics and Hydraulic Mechanics – Dr. V.C.Agarwal

2. Open channel Hydraulics – Ven Tee Chow
3. Ranga Raju - K.G. , flow through open channels , Tata McGrew Hill co.

CIVIL ENGINEERING DRAWING

Course Code CE 404 **Credit -2 (0-0-4)**

1. Symbols used in Civil Engineering drawing, Masoury Bonds
2.Doors, Windows and staircases
3.Plumbing & Electrical fitting drawing.
4.Drafting Using AutoCAD.
5.Comprehensive Drawing of Residential building, (Layout, plan, elevation & sectional elevation)
6.Preparation of Layout planning for different Civil Engg. Projects.
7.Preparation of lay out plan/Maps and building drawing using computer.

COMPUTER BASED NUMERICAL STATISTICALTECHNIQUES

Course Code MAS 491 **Credit -5[3-1-2]**

Introduction: Errors in Numerical Computation, Mathematical Preliminaries, Errors and their Analysis, Machine Computations, Computer Software.

Algebraic & Transcendental Equation: Bisection Method, Iteration Method, Method of False Position, Rate of Convergence, Method for Complex Root, Muller's Method, Quotient Difference Method, Newton Raphson Method.

Interpolation: Introduction, Errors in Polynomial Interpolation, Finite Differences, Decision of Errors, Newton's Formulae for Interpolation, Gauss, Stirling, Bessel's, Everett's Formulae, Interpolation by Unevenly Spaced Points, Lagrange's Interpolation Formula, Divided Difference, Newton's General Interpolation Formula.

Curve Fitting, Cubic Spline & Approximation: Introduction, Method of Least Square Curve Fitting Procedures, Fitting a Straight Line, Curve Fitting by Sum of Exponentials, Data Fitting with Cubic Splines, Approximation of functions.

Numerical Integration & Differentiation: Introduction, Numerical differentiation, Numerical Integration, Trapezoidal Rule, Simpson 1/3 Rule, Simpson 3/8 Rule, Boole's and Weddle's Rule, Eular—Maclariaun Formula, Gaussian Formula, Numerical Evaluation of Singular Integrals.

Statistical Computation: Frequency Chart, Regression Analysis, Least Square Fit, Polynomial Fit, Linear & Non Linear Regression, Multiple Regressions, Statistical Quality Control Methods.

References:

Jain, Iyengar, Jain, "Numerical Methods for Scientific & Engineering Computation", New Age International.
Balaguruswamy, "Numerical Methods", TMH.
Sastry, "Introductory Method of Numerical Analysis", PHI.
Gerald & Wheatly, "Applied Numerical Analysis", Addision Wesley.
Probability & Statistic, Schaum Series.
Hulquit, "Numerical Method for Engineers & Computer Scientist", Addision Wesley.
Flowers, "Numerical Methods In C++", Oxford University Press.
Vedamurthy, "Numerical Methods", Vikas.

List of Experiments:

Write Programs in C
To deduce errors involved in polynomial Interpolation.
Algebraic and transcendental equations using Bisection, Iterative method of false position, also give rate of conversions of roots in tabular form for each of these methods.
To implement Bessel's functions, Newton's, Stirling, Languages.
To implement method of least square curve fitting.
Implement numerical differential using trapezoidal, Simpson 3/8 rules.
To show frequency chart, regression analysis, Linear Square fit and polynomial fit.

ENVIRONMENTAL STUDIES – II

Course Code SES-416 **Credit -2[2-0-0]**

Natural Resources:

(a) Forest resources.
(b)Water resources.
(c)Mineral resources.
(d)Food resources.
(e)Energy resources.
(f)Land resources.

Role of an individual in conservation of natural resources.Equitable use of resources for sustainable life style.

Biodiversity and its conservation:

(a) Introduction -Definition: genetic, species and ecosystem diversity.
(b) Bio geographical classification of India.
(c) Value of diversity: consumptive use, productive use, social, ethical aesthetic and option values.
(d) Biodiversity at global, National and local levels.
(e) India as mega-diversity nation

ENGINEERING HYDROLOGY

Course Code SWLE 403 **Credit- 3(3-0-0)**

Weather and hydrology, Forms of precipitations; Measurements and estimations, Evaporation & transpiration: Factor affecting, Measurements and estimation, Stream flow measurement: Measurement of stage & velocity, Stage discharge relationship, Runoff: Introduction hydrograph, runoff characteristics of streams, yield (annual runoff volume), flow duration curve, flow mass curve. Hydrograph: Factors affecting flood hydrograph, Components of hydrograph, Base flow separation, Effecting rainfall, Unit hydrograph, Synthetic & Instantaneous unit hydrograph, Flood routing: Basic equations and Method of flood routing, Hydrologic channel routing, Clark method for instantaneous unit hydrograph, Nash conceptual model.

STRUCTURAL ANALYSIS – II

Course Code CE-505 **Credit - 4[2-1-2]**

Analysis of propped cantilever

Strain Energy -Castigliano,s second theorem and its applications

Muller Breslau Principle and its application for drawing influence lines for indeterminate beams

Fixed Beam—Fixed moment for uniform section, Effect of sinking of support, Effect of rotation of support, Slope and deflection at a point by moment area method

Continuous Beam-Analysis of continuous beams, Reaction at the support, Effect of rotation of support

Moment Distribution Method - Introduction, Analysis of Propped and Continuous beam, Analysis of single storey portal frames, Frame with slopping legs, Multi story frames, Box-Type frames, Gable frames

Slope Deflection Method -Introduction, Analysis of Indeterminate and Continuous beam, Analysis of Portal frames, Frame with slopping legs, Multi story frames, Gable frames

Redundant Frames- Introduction, Analysis of frames Redundant to first degree , Deflection of statically indeterminate structure ,Frames with more than one degree of redundancy , Lack of fit in member of indeterminate frames, Temperature stresses in redundant frames , General equation for redundant frames , Composite Structures

Column Analogy Method - Introduction , Bending of curved bars , Theory of column analogy , Stiffness and carry over factors by column analogy method , Fixed end moment due to settlement of support , Moment of inertia about any axis , Moment of inertia of thin strip about any axis

Plastic Analysis of Structures –Introduction and Basics of plastic analysis , Plastic moment of a section , Moment curvature relationship, Shape Factor, Plastic Hinges, General theorems for determination of collapsible loads , Effect of uniformly distributed loads , Statical and mechanism methods of analysis of continuous beams , Portal Frames and Gable Frames , Plastic moment method

Basics of Force and Displacement Matrix Methods for beam and trusses

CONCRETE STRUCTURE – I

Course Code CE 414 **Credit -4[2-1-2]**

Introduction to Various Design Philosophies, Design of Rectangular Singly and Doubly Reinforced Sections by Working Stress Method. Assumptions in Limit State Design Method, Design of Rectangular Singly and Doubly Reinforced beams, T-beams, L-beams by Limit State Design Method.

Behaviour of RC beam in Shear, Shear Strength of beams with and without shear reinforcement, Minimum and Maximum shear reinforcement, design of beam in shear, Introduction to development length, Anchorage bond, flexural bond. (Detailed Examples by Limit State Design Method), Failure of beam under shear, Concept of Equivalent Shear and Moments.

Design of one way and two way solid slabs by Limit State Design Method, Serviceability Limit States, Control of deflection, cracking and vibrations.

Design of Columns by Limit State Design Method- Effective height of columns, Assumptions, Minimum eccentricity, Short column under axial compression, requirements for reinforcement, Column with helical reinforcement, Short column under axial load and uni-axial bending, Design of columns under bi-axial loading by Design Charts.

Note : All designs shall be conforming to IS : 456 – 2000.

Text Books

IS : 456 – 2000.

Reinforced Concrete – Limit State Design by A. K. Jain, Nem Chand & Bros., Roorkee.
Reinforced Concrete Design by P. Dayaratnam.

References:
Plain and Reinforced Concrete Vol. I & II by O. P. Jain & Jai Krishna, Nem Chand & Bros.
Reinforced Concrete Structures by R. Park and Pauley.
Reinforced Concrete Design by S. Unnikrishna Pillai & D. Menon, Tata Mc-Graw Hill Book Publishing Company Limited, New Delhi.

TRANSPORTATION ENGINEERING – I

Course Code CE 415 **Credit- 4[2-1-2]**

In**troduction**: Role of Transportation, Modes of Transportation, History of road development, Nagpur road plan, Bombay road plan & 3rd 20 Year Road Plan, Road types and pattern.
Geometric Design: Cross sectional elements, camber, shoulder, sight distance, horizontal curves, super elevation, extra widening, transition curves and gradient, vertical curves, summit and valley curves.
Traffic Engineering: Traffic characteristic, volume studies, speed study, capacity, density, traffic control devices, signs, signals, design of signals, Island, Intersection at grade and grade separated intersections, design of rotary intersection
Design of Highway Pavement: Types of Pavements, Design factors, Design of Flexible Pavement by CBR method (IRC : 37-2001), Design of rigid pavement, Westergaard theory, load and temperature stresses, joints, IRC method of rigid pavement design. (IRC : 58 – 2002).
Road Construction Methods : WBM, Surface dressing, bituminous carpeting, Bituminous Bound Macadam and Asphaltic Concrete, Cement Concrete road construction
Airport Engineering : Air craft characteristics, types of airports, layout of airports, airport planning & design, runway orientation, wind-rose diagram, estimation of runway length & correction

Text Books
Highway Engineering by S. K. Khanna & C.E.G.Justo.
Airport Planning & Design by S. K. Khanna, M. G. Arora & S. S. Jain.

References
Transportation Engineering by L. R. Kadiyali.
Highway Engineering by S. K. Sharma
Principles of Transportation Engineering by P. Chakraborty & A. Das.

GEOTECH ENGINEERING – I

Course Code CE 416 **credit-3[2-1-0]**

Preview of Geotechnical field problems in Civil Engineering, Soil formation, transport and deposit, Soil composition, Basic definitions, Clay minerals, Index properties, Particle size analysis, Soil classification.
Soil-water systems, capillarity-flow, Darcy's law, permeability, field and lab tests, piping, quick sand condition, seepage, flow nets, flow through dams, filters.
Soil compaction, water content – dry unit weight relationships, OMC, field compaction control, Proctor needle method.
Effective stress principle, Stresses due to applied loads, Boussinesq and Westergaard equations.
Compressibility and consolidation characteristics, Rate of consolidation, Terzaghi's one dimensional theory of consolidation and its applications, Over Consolidation Ratio, determination of coefficient of consolidation and secondary consolidation (creep), consolidation under construction loading.
Shear strength - direct & triaxial shear tests, Mohr – Coulomb strength criterion, drained, consolidated, undrained and unconsolidated tests, strength of loose and dense sands, Normally Consolidated and Over Consolidated soils, dilation, pore pressure, Skempton's coefficient.
Stability of slopes with or without pore pressure, limit equilibrium methods, methods of slices and simplified Bishop method, factor of safety.
Soil stabilization, Introduction to geosynthetics, classification, functions and its field application.

Text Books
1. V.N.S. Murthy – Soil Mechanics and Foundation Engineering (Fifth Edition)
2. K.R. Arora – Soil Mechanics and Foundation Engineering

References
1.Alam Singh – Modern Geotechnical Engineering
2. Brij Mohan Das – Geotechnical Engineering
3. I.H. Khan – Text Book of Geotechnical Engineering
4. C. Venkataramaiah – geotechnical Engineering

5. Gopal Ranjan and A.S.R. Rao – Basic and Applied Soil Mechanics
6. G.V. Rao & G.V.S.S. Raju – Engineering with Geosynth

HYDRAULIC MECHANICS

Course Code CE-511 **Credit- (3(2-0-2)**

1. Fluid Machines and impact of gets classification of machines, ruler's equations, degree of section ,hydro dynamic thrust of a jet on a fixed and moving surface (flat, reaction, curved) effect of inclination of jet with the flat surface.

2. Hydraulic Turbines: Pelton Wheel, Francis and Kaplan turbines classifications of turbines , working principles, work done , efficiency , draft tube theory, cavitations in turbines, performance , testing of turbine , model testing , selection of a turbine , stability of a turbine (static & Dynamic), performance curves, constant efficiency curves, muschel curves, governing of turbines, specific speeds.

3. Pumps: Centrifugal pumps , classifications , work done by impeller , efficiencies of centrifugal pumps , priming, specific speed, cavitations and separation, model testing, performance characteristics , reciprocating pumps, classification , work done (single and double acting) slip , indicator diagram, work saved by fitting air vessels, multicylinder pumps, comparison of centrifugal and reciprocating pumps, design aspects.

4. Hydraulic Machines: Hydraulic systems, hydraulic press, cranks, jacks, accumulator, intensifier , ram , fluid coupling , fluid torque converter, jet pumps and air lift pumps

References;

1. fluid power , Dr. V.C. Agarwal
2. Hydraulic Machines, Dr. J.Lal
3. A Text book of Fluid Mechanics & Hydralic Machines, R. K. Rajput .

GROUND WATER ENGINEERING

Course Code SWLE – 508 **Credit-3 (3-0-0)**

Occurrence distribution & movement of ground water supply, Geologic formation of ground water supply, Ground water possibilities, Aquifer properties; Hydrologic properties of aquifer, Flow through aquifers properties, Properties of water in relation to flow, storage equations, steady and unsteady flow in confined, unconfined & semi confined aquifer, aquifer test partially penetrated aquifers, seepage from canal, stream-aquifer- well interaction, water level measurement in wells, monitoring water level, geologic control, ground water provinces in India, hydro geologic well logging, ground water modeling, ground water development, assessment of usable ground water & ground water balances, ground water recharge, ground water legislation.

ELEMENTS OF ECONOMICS & PRINCIPALS MANAGEMENT SCIENCE

Course Code BAM 315 **Credit -4[3-1-0]**

Industrial Economics;

Introduction: -Nature and significance of economics, meaning of science, Engineering and technology and their relationship with economic development.

Basic concept: - The concept of demand and supply, indifference curve analysis, price effect, income effect and substitution effect.

Money and banking: - Function of money, value of money, inflation and measure to control it. Brief idea function of banking system, viz; commercial and central banking, business fluctuation.

Management:

Introduction: Definition, nature and significance of management, evaluation of management thought, contribution of Max Weber, Taylor and Fayol.

Human behaviour: Factors of individuals' behaviour, perception. Learning and personality development, inte r personal relationship and group behaviour.

References:

Dewett, K.K./Modern Economics Theory.
Luthers, Fred / Organizational Behaviours.
Prasad L.M/ Principles of Management
A.W. Stonier &D.C Hergne/ A Text Book of Economics Theory /Oxford Publishing House Pvt Ltd

ESTIMATION AND COSTING MANAGEMENT*

Course Code CE- 503 **Credit 3[2-1-0]**

Importance of estimation, different types of estimates, specifications: general and detailed. Methods of estimation, Estimates of RC works, Estimates of Buildings.
Analysis of rates, Prime cost, Work charge establishment, Quantity of materials per unit of work for major Civil Engineering items, Resource planning through analysis of rates, market rates, P.W.D. schedule of rates and cost indices for building material and labour. Introduction to Valuation.
Project cycle, Organisation, Planning, Scheduling, Monitoring, Updating and Management System in Construction. Bar Chart, Milestone charts, Work down structure and preparation of networks. Application of network, Techniques like PERT, GERT, CPM, AON and AOA techniques.
Project monitoring; cost planning, resources allocation through network techniques. Time value of money, Present economy studies, Equivalence concept, financing of projects, economic comparison, present worth method, equivalent annual cost method, discounted cash flow method, Depreciation and break even cost analysis.
Legal aspects of contracts, their relative advantages and disadvantages, Different types of contracts, their relative advantages and disadvantages, Elements of tender preparation, process of tendering, pre-qualification of contracts, Evaluation of tender preparation, process of tendering, Evaluation of tender, Contract negotiation and award of work.

Text Books

1.Estimating and Costing by B. N. Dutta.
2.PERT and CPM Principles and Appluication by L. S. Shrinath.

References

1.Estimating, Costing and Valuation in Civil Engineering by M. Chakraborty.
2.Construction, Planning, Equipment and Methods by R. L. Peurify
3.Network Analysis Techniques by S. K. Bhatnagar.
4.Construction Planning and Management by U. K. Srivastava.

CONCRETE STRUCTURE – II

Course Code CE 507 **Credit -4[2-1-2]**

Nature of Stresses in flat slabs with and without drops, coefficient for design of flat slabs, reinforcement in flat slabs. (IS Code Method).
Analysis and design of beam curved in plan.
Structural behaviour of footings, design of footing for a wall and a single column, combined rectangular and trapezoidal footings, Design of strap footing.
Structural behaviour of retaining wall, stability of retaining wall against overturning and sliding, Design of T-shaped retaining wall, Concept of Counter fort retaining wall.
Loads, forces and I.R.C. bridge loadings, Design of R.C. slab culvert.
Design criteria, material specifications and permissible stresses for tanks, design concept of circular and rectangular tanks situated on the ground / underground, design of overhead tanks.
Advantages of prestressing, methods of prestressing, losses in prestress, analysis of simple prestressed rectangular and T-section.

Text Books:

IS : 456 – 2000.
Reinforced Concrete – Limit State Design by A. K. Jain, Nem Chand & Bros., Roorkee.

References

Plain and Reinforced Concrete Vol. I & II by O. P. Jain & Jai Krishna, Nem Chand & Bros.
Reinforced Concrete Structures by R. Park and Pauley.
Reinforced Concrete Design by P. Dayaratnam.

TRANSPORTATION ENGINEERING – II

Course Code CE 508 **Credit-3[2-1-0]**

Indian railways: Development and organization of Indian Railways.
Permanent way: Sub-grade, formation, embankment and cutting, track drainage.
Rails: Rail gauges, types of rails, defects in rails, rail failure, creep of rail.
Rail Fastenings: Fish plates, spikes, chairs, keys, bearing plates.
Sleepers: Timber, steel, cast iron, concrete and prestressed concrete sleepers, manufacturing of concrete sleepers, sleeper density.
Ballast: Ballast materials, size of ballast, screeming of ballast, specification of ballast, tests on ballast.

Railway Track Geometry: Gradients, horizontal curves, super-elevation, safe speed on curves, cant deficiency, negative super elevation, compensation for curvature on gradients, track resistance and tractive power.
Points & Crossings : Elements of a simple turn-out, details of switch, details of crossings, number & angle of crossings, design of turn-out.
Stations & Yards: Site selection for a railway station, layout of different types of stations, classification of stations, types of railway yard, functions of Marshalling yards.
Signalling & Interlocking: Classification of signals, method of train working, absolute block system, mechanical interlocking of a two line railway station.
Introduction to Steel Bridges, Types of Steel Bridges, Economical Span, Loads, Permissible Stresses, Fluctuation of Stresses, Secondary stresses in trusses, Design of Plate Girder Bridges.
Design of Truss Bridges, General arrangement, Economic proportions, Types of Bridge trusses, Wind Forces on Lattice Girder Bridge, Top lateral bracing, Bottom lateral bracing, Brief introducation to Bearing.
Text Books
A Text Book of Railway Engineering by S. P. Arora & S. C. Saxena
IS : 800 – 1984.
Design of Steel Structures by A. S. Arya & J. L. Ajmani, Nem Chand

ENGINEERING GEOLOGY

Course Code CE – 622 **Credit-4[2-1-2]**

Earth Sciences and its importance in Civil Engg. Minerals and their physical properties. Study of common rock forming minerals.
Internal structure of the earth. Suitability of rocks as engineering materials. Building stones occurrences and characteristics, selection
Rocks origin, Characteristics, Texture, structure and classification of igneous, sedimentary and metamorphic rocks. Engineering properties of rocks.
Strike and dip of strata, folds, faults, joints, unconformity and their classification, Causes and relation to engineering behaviour of rock masses. Overlap.
Landslides causes, classification and preventive measures.
Earthquake causes, classification, earthquake waves, intensity and magnitude, Seismic zones for India, Geological consideration for construction of building.
Underground water, sources, Aquifer, Aquiclude, Artesian well, Ground water provinces of India and its role as geological hazard.
Geological investigations for site selection of dams & reservoirs, tunnels, bridges and highways. Reservoir induced seismicity.
Methods of Geophysical explorations-gravity, electrical and seismic, methods.

References
1.Prabin Singh, “Engineering and General Geology”, Katson publishing house.
2.Legget, R.F., “Geology and Engineering”, McGraw Hill, New York.
3.Blyth, F.G.M., “A Geology for Engineers” , Arnold, London.
4.P.K. Mukerjee, “A Text Book of Geology”, Calcutta, world publisher.
5.Krynine and Judd: “Principles of Engineering Geology & Geotechnics,” Mc Graw Hill, New York.
6.B.S. Sathya, Narayanswamy:”Engg. Geology” Dhanpat Rai & Co.New Delhi.
7.K.S. Valdiya: “Environmental Geology”, Tala Mc Graw Hill, New Delhi.

GEOTECHNICAL ENGINEERING – II

Course Code CE 509 **Credit -4[2-1-2]**

Review of principles of soil mechanics.
Characterization of ground, site investigations, groundwater level, methods of drilling, sampling, in situ test, SPT, CPT, DCPT, pressure meter test, geophysical exploration- brief description, resistivity, reflection and refraction methods, Sub-soil investigation report.
Earth pressure theories, Coulomb and Rankine approaches for c-φ soils, smooth and rough walls, inclined backfill, depth of tension crack, graphical solutions, types of retaining structures.
Types of foundations – shallow / deep, isolated, combined, mat, etc., Definitions, Bearing capacity of shallow foundations (Terzaghi analysis), general, local and punching shear failures, corrections for size, shape, depth, water table, Bearing capacity by consolidation method, in situ bearing capacity determination, Provisions of IS code of practice, selection of depth of footing, eccentrically loaded footings. Classifications of piles, loading capacity of single pile in clay, silt and sand by static methods. Pile groups, under-reamed piles – their design and construction, negative skin friction, pile load test, well foundations – various parts, forces acting on well.

Machine foundations, classification, definitions, vibration analysis by mathematical model, design principles in brief.

Ground improvement techniques, methods for difficult and problematic ground conditions-soft soils, loose sands, expansive soils, etc., preloading, vertical drains, stone columns, grouting methods.

Text Books

V.N.S. Murthy – Soil Mechanics and Foundation Engineering (Fifth Edition)

K.R. Arora – Soil Mechanics and Foundation Engineering

References

J.E. Bowles – Foundation Analysis and Design

Gopal Ranjan and A.S.R. Rao – Basic and Applied Soil Mechanics

ENVIRONMENTAL ENGINEERING – I

Course Code CE 510 **Credit-4[3-1-0]**

Water supply: Water demands and domestic use, variation in demands; population forecasting by various methods using logistic curve method; per capita supply, basic needs and factors affecting consumption; design period.

Sources of water: Kinds of water sources and their characteristics, collection of surface and ground water; quality of surface and ground waters; factors governing the selection of a source of water supply; intakes and their design for lakes, streams and rivers, impounding reservoir and canal; determination of the capacity of impounding reservoir.

Transmission of water: Various types of conduits, capacity and sizes including economical sizes of rising main, structural requirements; laying and testing of water supply pipelines; pipe materials, joints, appurtenances and valves; leakages and control; water hammer and its control measures.

Storage and distribution of water: Methods of distribution, pressure and gravity distribution systems, concept of service and balancing reservoirs, capacity of distribution reservoirs; general design guidelines for distribution system, Hardy - Cross method, Newton - Raphson method and equivalent pipe method of pipe network analysis; rural water supply distribution system.

Water supply, plumbing systems in buildings and houses: water connections, different cocks and pipe fittings, hot water installation. Institutional and industrial water supply.

Wastewater collection: Systems of sanitation and wastewater collection, estimation of wastewater flows and variations in wastewater flows.

Storm water: Collection and estimation of storm water by different formulae.

Flow in sewers: Flow in full and partially full sewers and design of sewers; types of sewers, materials and construction of sewers, joints and sewer appurtenances, layout and construction of sewer lines; small bore sewer systems. Planning of sewerage systems. Institutional and industrial wastewater management.

Air pollution: Composition and structure of atmosphere; units of measurement, sources of pollutants, classification of pollutants and their effects, air quality monitoring and standards.

Brief introduction to Control devices for particulate contaminants – gravitational settling chambers, centrifugal collectors, wet collectors, fabric filters and electrostatic precipitators; control devices for gaseous contaminants; automotive emission control, concept of clean and biofuels.

Noise pollution: Definition of decibel, sound power level, sound intensity level and sound pressure level; measurement of noise level; basic concept of community noise, transportation noise and industrial noise; acceptable outdoor and indoor noise levels; effects of noise and control measures.

Text books:

Peavy, Rowe and Tchobanoglous: Environmental Engineering

Metcalf and Eddy Inc.: Wastewater Engineering

Garg: Water Supply Engineering (Environmental Engineering Vol. – I)

Garg: Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol. – II).

References:

Manual on Water Supply and Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi

Manual on Sewerage and Sewage Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi

Steel and McGhee: Water Supply and Sewerage

Fair and Geyer: Water Supply and Wastewater Disposal

Arceivala: Wastewater Treatment for Pollution Control

Hammer and Hammer Jr.: Water and Wastewater Technology

Raju: Water Supply and Wastewater Engineering

Sincero and Sincero: Environmental Engineering: A Design Approach

Pandey and Carney: Environmental Engineering

Rao: Textbook of Environmental Engineering

Davis and Cornwell: Introduction to Environmental Engineering
Kshirsagar: Water Supply and Treatment and Sewage Treatment Vol. I and II
Punmia: Water Supply and Wastewater Engineering Vol. I and II
Birdie: Water Supply and Sanitary Engineering
Ramalho: Introduction to Wastewater Treatment Processes
Parker: Wastewater Systems Engineering
Nevers: Air Pollution Control Engineering
Mycock, McKenna and Theodore: Handbook of Air Pollution Control Engineering and Technology
Suess and Craxford: W. H. O. Manual on Urban air Quality Management
W. H. O.: Selected Methods of Measuring Air Pollu

SURVEY CAMP

Course Code CE 503 **Credit-2[0-0-4]**

A mini field work on any of the topics covered in Basic Surveying & Advanced Surveying

WATER RESOURCE ENGINEERING – I

Course Code SWLE 408 **Credit-3[2-1-0]**

Water Resources planning and management: Objectives, constraints and criteria based on technical, economical, social and political factors. Assessment of surface water resources of India, Intra and inter basin development concepts. Single and multipurpose projects.

Canal irrigation: Classes and alignment, Parts of a canal system, Commanded area, curves in channels, channel losses.

Sediment Transportation: Suspended and Bed load and its estimation

Irrigation channels: Types: lined and unlined, silt theories: Kennedy's and Lacey's Design procedure for irrigation channels, Longitudinal cross section, Schedule of area statistics and channel dimensions, use of Garret's Diagrams in channel design, cross sections of an Irrigation channel, Computer programes for design of channels

Lining of Irrigation Canals: Advantages and types, factors for selection of a particular type, design of lined channels, cross section of lined channels, Economics of canal lining.

Water Logging: Definition, effects, causes and anti-water logging measures, Drainage of water logged land, Types of drains open and closed, spacing of closed drains.

Regulation and control of canal system: Purpose, Types of canal regulation works and their functional aspects

Irrigation Outlets: Requirements, types, non-modular, semi-module and rigid module, selection criterion

River Training: Objective and need, classification of rivers, and river training works, meandering, stages, methods of river training, bank protection, Methods for measurement of discha

CAD IN STRUCTURES

Course Code CE 601 **Credit- 4[2-0-4]**

STAAD Pro

(Perquisite: Concrete Structures-I, Concrete Structures-II, Steel Structures)

1. Model generation of steel and concrete structures

2. Analysis and design of steel portal frames, analysis & design of reinforced concrete frame, modeling and analysis of slabs, modeling of other surface entities like walls using plate elements. Mesh generation method for generating the finite element model of plates, Introduction to STAAD etc. for performing secondary analysis and design tasks on a structure for which the primary analysis and design have already been accomplished using STAAD.Pro. Analysis & design of trusses, Autodesk Civil 3D, (Perquisite: AutoCAD 2D (Classic), Basic Functionality of Civil 3D (navigation and the common features of the interface)

Workspaces: for understanding and using the main windows of the application.

Panorama Window: its use and customization. How to change display of An Object. In this tutorial, you will learn how to change the appearance of a surface by changing its style. The: to display a surface in three dimensions (3D).To change the location and format of object labels in AutoCAD Civil 3D using Labels.

How to work with coordinate geometry (COGO) points, which are the basis for modeling land surfaces.

To organizing a large set of points, how to use point groups, layers, external references, and styles to display points. The various ways to edit points using standard AutoCAD tools. How to add custom properties to points.

Learn to create and work with land surfaces, create an empty TIN surface and then add data to the surface, including a set of survey points (in a point group), boundaries, and break lines. Learn how to change and constrain the surface styles and display. Basic concepts of some common surface editing tasks, including edge swapping, TIN line deletion, and surface smoothing, hide part of the surface using a hide boundary etcetera. Create base and comparison surfaces, and then create a persistent volume surface from them, as well as

composite volume calculations. Learn to add multi-view blocks to a surface and render it using a sample of the visualization techniques included with AutoCAD Civil 3D.
Learn to access the survey functionality and define and manage the survey settings in AutoCAD Civil 3D, to import survey data to the AutoCAD Civil 3D survey database, and to insert and browse to the survey data in your drawing. Learn how to analyze and reduce survey data. Learn to view information reports for figures and how to use the figures as a source for surface data.

ENVIRONMENTAL ENGINEERING – II

Course Code CE 603 **Credit- 4[2-1-2]**

Introduction: Beneficial uses of water and quality requirements, standards.
Concepts of water and wastewater quality: physical, chemical and bacteriological examination of water and wastewater. Water borne diseases and their control.
Wastewater characteristics: Temperature, pH, colour and odour, solids, nitrogen and phosphorus, chlorides, toxic metals and compounds, BOD, COD etc.
Objectives of treatment: Water and wastewater treatment, unit operations and processes and flow sheets.
Sedimentation: Determination of settling velocity, efficiency of ideal sedimentation tank, short circuiting; different classes of settling; design of primary and secondary settling tanks; removal efficiency for discrete and flocculent settling.
Coagulation: Mechanisms of coagulation, coagulants and their reactions, coagulant aids; design of flocculators and clariflocculators.
Filtration: Theory of filtration; hydraulics of filtration; Carmen - Kozeny and other equations; slow sand, rapid sand and pressure filters, backwashing; brief introduction to other filters; design of filters.
Disinfection: Requirements of an ideal disinfectant; kinetics of disinfection, various disinfectants, chlorination and practices of chlorination.
Water softening and ion exchange: calculation of dose of chemicals. Adsorption
Wastewater Treatment: Preliminary, primary, secondary and tertiary treatment processes.
Primary Treatment: Screens, grit chamber and their design, sedimentation and chemical treatment to be given.
Secondary Treatment: Theory of organic matter removal; activated sludge process, design of different units and modifications, extended aeration systems; trickling filters; aerated lagoons, waste stabilization ponds, oxidation ditches, R.B. C. etc.
Anaerobic digestion of sludge: Design of low and high rate anaerobic digesters and septic tank.
Basic concept of anaerobic contact process, anaerobic filter, anaerobic fixed film reactor, fluidized bed and expanded bed reactors and upflow anaerobic sludge blanket (UASB) reactor.
Disposal of wastewater on land and in water bodies.
Introduction to Duckweed pond, vermiculture and root zone technologies and other emerging technologies for wastewater treatment.
Text books:
Peavy, Rowe and Tchobanoglous: Environmental Engineering
Metcalf and Eddy Inc.: Wastewater Engineering
Garg: Water Supply Engineering (Environmental Engineering Vol. – I)
Garg: Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol. – II).

DESIGN OF STEEL STRUCTURES

Course Code CE 605 **Credit -4(3-1-0)**

Introduction to rolled steel sections, loads, factor of safety, permissible and working stresses. Riveted and welded connections, strength, efficiency and design of joints.
Compression members- Effective length, Slenderness ratio, Strength of Compression members, Design of Struts, Columns, Built-up Columns, Design of eccentrically loaded columns.
Tension members – Net and Gross sectional areas,Strength of members and their design.
Design of slab and Gusset bases, Design of Grillage footing.
Beams – web crippling and web buckling, design of laterally supported beam, design of laterally unsupported beam, Purlins.
Design of Industrial Buildings – Detailed design of roof trusses.
Text Books
1.IS : 800 – 1984.
2.Design of Steel Structures by A. S. Arya & J. L. Ajmani, Nem Chand & Bros., Roorkee
References
3.Design of Steel Structures by S. K. Duggal, Tata Mc-Graw-Hill Publishing Company.
4.Design of Steel Structures by Gaylord & Gaylord

PROJECT PLANNING AND CONSTRUCTION MANAGEMENT

Course Code CE-606 **Credit -4(3-1-0)**

1. Elements of Management: project cycle. Organization, planning, scheduling monitoring updating and Management system in construction.

2.Network Techniques: Bar charts, milestone charts, work break down structure and preparation of networks. Application of network Techniques like PERT, GERT, CPM AON and AOA in construction management . project monitoring , cost planning , resource allocation through network techniques .Line of balance technique.

3.Engineering Economics : Time value of money , Present economy studies , Equivalence concept , financing of projects, economic comparison present worth method Equivalent annual cost method , discounted cash flow method , analytical criteria for postponing of investment retirement and replacement of asset . Depreciation and break even cost analysis.

4.Contract Management : Legal aspects of contraction , laws related to contracts, land acquisition , labour safety and welfare . different types of contracts, their relative advantages and disadvantages. Element of tender preparation, process of tendering pre-qualification of contracts, Evaluation of tenders, contract negotiation and ward of work , monitoring of contract extra items , settlements of disputes , arbitration and commissioning of project.

5.Equipment Management : Productivity operational cost , owning and hiring cost and work motion study . Simulation techniques for resources scheduling.

References:

1.“ Construction Planning “, Equipment and Methods: R.L. Peurity . T.M.H. International Book Company.
2.PERT & CPM principle and applications” L.S. Srinath , E.W.P. Ltd. New Delhi.
3.“ Network Analysis Techniques “ S.K. Bhatnagar, Willey Eastern Ltd.

IRRIGATION ENGINEERING

Course Code SWLE 503 **Credit -4(3-0-2)**

Source of irrigation water, measurement of irrigation water infiltration, application of soil plant atmospheric continuum and principles of fluid mechanics to design of irrigation system, water balance equation and evaluation of different components; measurement of evaporation and evapotranspiration; Estimation of irrigation water requirement and irrigation scheduling; efficiencies of irrigation systems, hydraulics, design and evaluation of surface, sub-surface, overhead and drip irrigation systems; design of water conveyance systems including control structures, design principles, characteristics curves, selection of pumps and prime movers.

CE 650-679 Elective – I	**4[3-1-0]**
CE 670-679 Elective – II	**4[3-1-0]**
CE – 650-679 Elective –III	**3(3-0-0)**
CE 699 Project	**6[0-0-12]**

WATER RESOURCES ENGINEERING II

Course Code SWLE 516 **Credit -3 (2-1-0)**

Types of Head works: Component parts of a diversion headwork, Failure of hydraulic structures founded on permeable foundations, Principles of design, Bligh’s theory, Khosla’s theory for determination of pressure and exit gradient.

Regulation Works: Falls, Classification, Introduction to design principle of falls, Design of Sarda type and straight glacis tall.

Principle and design of Distributory head regulatior and cross regulator, canal escape, Bed bars.

Canal head works: Functions, Location, Layout of head works. Weir and Barrage, Canal head Regulator, Introduction to the design principles of Weirs on permeable foundations, Design of vertical drop and sloping glacis weir.

Cross drainage works: Necessity and types. Aqueduct, Siphon Aqeduct, supeer passage, canal siphon, level crossing, Introduction to design principles of cross drainage works.

Flood routing: Types, methods of reservoir routing, channel routing by Muskingham Method.

Investigation and planning of dams and Reservoirs: Zones of storage, Estimation of storage capacity, Reservoir losses, Reservoir sedimentation and its control, life of a reservoir.

Dams: classification and selection criteria.

Earth Dams: Classification, causes of failure Pheratic line, and its determination Introduction to statislity analysis.

Gravity dams: Forces method of analysis, modes of failure and factor of safety, Elementary profile, stability analysis, galleries, joints, control of cracks.

Spillways: Spillway capacity, types of spillways, Design of ogee spillway, Energy dissipation below spillway, Design criteria for Hydraulic Jump type stilling basins with horizontal and sloping aprons, spillway gates.

Hydro-Electric Power: assessment of potential specially in reference to India, classification of power plants, important terms, types of turbines and their suitability. Power House layout and important structures of a powerhouse.