SYLLABUS

AND

SCHEME

B.TECH CIVIL ENGINEERING
(2012 Admission onwards)

COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY
B.TECH DEGREE COURSE IN CIVIL ENGINEERING

B.Tech - Scheme of Examinations (2012 admissions)

SEMESTER I&II   **(Common to all branches)**

Code No.	Subject	L Hrs/wk	T Hrs/wk	P Hrs/wk	C	Int	Univ	Total
1101	Engineering Mathematics –I	2	1		4	50	100	150
1102	Engineering Physics	3			4	50	100	150
1103	Engineering Chemistry	3			4	50	100	150
1104	Engineering Mechanics	3	1		5	50	100	150
1105	Engineering Graphics	1	-	3	5	50	100	150
1106	Basic Civil and Mechanical Engineering	2			4	50	100	150
1107	Basic Electrical and Electronics Engineering	2			4	50	100	150
1108	Computer Programming	1			4	50	100	150
1109	Environmental Studies and Technical Communication	2*			3	50	100	150
11 L1	Electrical and Mechanical Workshop	-	-	3	4	100	-	100
11 L2	Computer Programming Laboratory	-	-	2	2	100	-	100
11 L3	Language Laboratory	-	-	1	1	100	-	100
	TOTAL	**19**	**2**	**9**	**44**			

* 1 hour / week each for Environmental Studies and Technical Communication.

SEMESTER III

Code No.	Subject	Hrs/week L	Hrs/week T/D/P	C	Int	Univ	Total
CE/CS/EB/EC/EE/ EI/FT/IT/ME/SE 1301	Engineering Mathematics –II	3	1	3	50	100	150
CE 1302 A/B	Surveying –I	3	1	3	50	100	150
CE 1303 A/B	Strength of Materials	3	1	3	50	100	150
CE 1304 A/B	Concrete Technology	3	1	3	50	100	150
CE 1305 A/B	Fluid Mechanics -I	3	1	3	50	100	150
CE 1306 A/B	Building Technology and Habitat Engineering	3	1	3	50	100	150
CE 13L1 A/B	Survey Practicals –I	-	3	2	100	-	100
CE 13L2 A/B	Strength of Materials Lab	-	3	2	100	-	100
	TOTAL	18	12	22			

SEMESTER IV

Code No.	Subject	Hrs/week L	Hrs/week T/D/P	C	Int	Univ	Total
CE/CS/EB/EC/EE/E I/FT/IT/ME/SE 1401	Engineering Mathematics –III	3	1	3	50	100	150
CE 1402 A/B	Surveying –II	3	1	3	50	100	150
CE 1403 A/B	Analysis of Structures-I	3	1	3	50	100	150
CE 1404 A/B	Engineering Geology &Seismology	4		3	50	100	150
CE 1405 A/B	Fluid Mechanics II	3	1	3	50	100	150
CE 1406 A/B	Civil Engineering Drawing	1	3	3	50	100	150
CE 14L1 A/B	Survey Practicals –II and Survey Camp	-	3	2	100		100
CE 14L2 A/B	Fluid Mechanics Lab	-	3	2	100		100
	TOTAL	17	13	22			

STREAM A

SEMESTER V

Code No.	Subject	Hrs/week L	Hrs/week T/D/P	C	Int	Univ	Total
CE/CS/EB/EC/EE/E I/FT/IT/ME/SE 1501	Engineering Mathematics –IV	3	1	3	50	100	150
CE 1502 A/B	Design of Structures-I	3	1	3	50	100	150
CE 1503 A/B	Analysis of Structures –II	3	1	3	50	100	150
CE 1504 A/B	Geotechnical Engineering –I	3	1	3	50	100	150
CE 1505 A/B	Transportation Engineering –I	4		3	50	100	150
CE 1506 A/B	Water Resources and Irrigation Engineering	4		3	50	100	150
CE 15L1 A/B	Geotechnical Engineering Lab	-	3	2	100		100
CE 15L2 A	Transportation Engineering Lab	-	3	2	100		100
	TOTAL	20	10	22			

SEMESTER VI

Code No	Subject	Hrs/week L	Hrs/week T/D/P	C	Int.	Univ	Total
CE 1601 A/B	Environmental Engineering -I	3	1	3	50	100	150
CE 1602 A/B	Design of Structures-II	3	1	3	50	100	150
CE 1603 A/B	Analysis of Structures –III	3	1	3	50	100	150
CE 1604 A/B	Geotechnical Engineering –II	3	1	3	50	100	150
CE 1605 A/B	Transportation Engineering –II	4		3	50	100	150
CE 1606 A	Elective- I	3	1	3	50	100	150
CE 16L1 A/B	Environmental Engineering Lab	-	3	2	100		100
CE 16L2 A	CAD in Civil Engineering	-	3	2	100		100
	TOTAL	19	11	22			

SEMESTER VII

Code No.	Subject	Hrs/week L	Hrs/week T/D/P	C	Int	Univ	Total
CE 1701 A/B	Environmental Engineering - II	3	1	3	50	100	150
CE 1702 A/B	Design of Structures-III	3	1	3	50	100	150
CE 1703 A/B	Construction Management	3	1	3	50	100	150
CE 1704 A/B	Quantity Surveying and Valuation	3	1	3	50	100	150
CE 1705 A	Elective -II	3	1	3	50	100	150
CE 17L1 A/B	Computer Applications in Civil Engg.		3	2	100		100
CE 17L2 A/B	Building Technology and NDT Lab	-	3	2	100		100
CE 17L3 A/B	Seminar	-	2	1	50		50
CE 17L4 A	Industrial Training		6	1	50		50
CE 17L5 A/B	Project		2	1	50		50
	TOTAL	15	21	22			

SEMESTER VIII

Code No.	Subject	Hrs/week L	Hrs/week T/D/P	C	Int	Univ	Total
CE 1801 A/B	Architecture &Town Planning	4		3	50	100	150
CE 1802 A/B	Earthquake Engineering	3	1	3	50	100	150
CE 1803 A/B	Construction Safety & Fire Engineering	4		3	50	100	150
CE 1804 A	Elective –III	4	1	3	50	100	150
CE 18L1 A/B	Construction and Structural Engg. Lab	-	3	2	100		100
CE 18L2 A/B	Project		10	6	200		200
CE 18L3 A/B	Viva Voce			2		100	100
	TOTAL	15	15	22			

CE1606 A - Elective –I
E1 Cost Effective Building Techniques
E2 Environmental Geotechnics
E3 Traffic Engineering
E4 Air Pollution Control and Management

CE1705 A - Elective –II
E1 Design of special Structures
E2 Ground Improvement Techniques
E3 Highway & Airfield Pavement Design
E4 Ground water Engineering

CE1805 A - Elective –III
E1 Retrofitting and Rehabilitation of Structures
E2 Advanced Construction Techniques and Field Quality Control
E3 Industrial Waste Engineering & Management
E4 Remote Sensing & GIS.

STREAM B

SEMESTER V

Code No.	Subject	Hrs/week		C	Int	Univ	Total
		L	T/D/P				
CE/CS/EB/EC/EE/EI/FT/IT/ME/SE 1501	Engineering Mathematics –IV	3	1	3	50	100	150
CE 1502 A/B	Design of Structures-I	3	1	3	50	100	150
CE 1503 A/B	Analysis of Structures –II	3	1	3	50	100	150
CE 1504 A/B	Geotechnical Engineering –I	3	1	3	50	100	150
CE 1505 A/B	Transportation Engineering –I	4		3	50	100	150
CE 1506 A/B	Water Resources and Irrigation Engineering	4		3	50	100	150
CE 15L1 A/B	Geotechnical Engineering Lab	-	3	2	100		100
CE 15L2 B	Transportation Engineering Lab	-	3	1	50		50
CE 15L3 B	Industrial / Field Training		6	1	50		
	TOTAL	20	16	22			

SEMESTER VI

Code No.	Subject	Hrs/week		C	Int.	Univ	Total
		L	T/D/P				
CE 1601 A/B	Environmental Engineering -I	3	1	3	50	100	150
CE 1602 A/B	Design of Structures-II	3	1	3	50	100	150
CE 1603 A/B	Analysis of Structures –III	3	1	3	50	100	150
CE 1604 A/B	Geotechnical Engineering –II	3	1	3	50	100	150
CE 1605 A/B	Transportation Engineering –II	4		3	50	100	150
CE 1606 B	Elective- I	3	1	3	50	100	150
CE 16L1 A/B	Environmental Engineering Lab	-	3	2	50		100
CE 16L2 B	CAD in Civil Engineering	-	3	1	100		100
CE 16L3 B	Industrial / Field Training		6	1	50		
	TOTAL	19	17	22			

SEMESTER VII

Code No.	Subject	Hrs/week		C	Int	Univ	Total
		L	T/D/P				
CE 1701 A/B	Environmental Engineering - II	3	1	3	50	100	150
CE 1702 A/B	Design of Structures-III	3	1	3	50	100	150
CE 1703 A/B	Construction Management	3	1	3	50	100	150
CE 1704 A/B	Quantity Surveying and Valuation	3	1	3	50	100	150
CE 1705 B	Elective -II	3	1	3	50	100	150
CE 17L1 A/B	Computer Applications in Civil Engg.		3	2	100		100
CE 17L2 A/B	Building Technology and NDT Lab	-	3	2	100		100
CE 17L3 A/B	Seminar	-	2	1	50		50
CE 17L4 B	Industrial / Field Training		6	1	50		50
CE 17L5 A/B	Project		2	1	50		50
	TOTAL	15	21	22			

SEMESTER VIII

Code No.	Subject	Hrs/week		C	Int	Univ	Total
		L	T/D/P				
CE 1801 A/B	Architecture &Town Planning	4		3	50	100	150
CE 1802 A/B	Earthquake Engineering	3	1	3	50	100	150
CE 1803 A/B	Construction Safety & Fire Engineering	*4*		*3*	50	100	150
CE 1804 B	Elective –III	4	1	3	50	100	150
CE 18L1 A/B	Construction and Structural Engg. Lab	-	3	2	50		100
CE 18L2 A/B	Project		10	6	200		200
CE 18L3 A/B	Viva Voce			2		100	100
	TOTAL	15	15	22			

CE1606 B - Elective –I
E1 Cost Effective Building Techniques
E2 Construction Engineering & Materials Management
E3 MIS and Finance Management

CE1705 B - Elective –II
E1 Contracts and Legal Aspects in Construction
E2 Ground Improvement Techniques
E3 Highway & Airfield Pavement Design

CE1805 B - Elective –III
E1 Retrofitting and Rehabilitation of Structures
E2 Advanced Construction Techniques and Field Quality Control
E3 Industrial Waste Engineering & Management

1101 ENGINEERING MATHEMATICS I

Module I
Ordinary differential equations:

First order differential equations - exact differential equations, Bernoulli's equations--Methods of solution and Simple applications.

Linear differential equations of higher orders with constant co-efficients-Methods of solution of these equations. Cauchy's linear differential equations. Simultaneous linear differential equations- Simple applications of linear differential equations in engineering problems –Electrical Circuits, Mechanical Systems.

Module II
Infinite series : Integral test, comparison test, ratio test, Cauchy's root test, Raabe's test, seies of positive and negative terms, concept of absolute convergence, alternating series, Leibniz test(No proofs for any of the above tests)

Power series : Taylor and Maclaurin series of functions, Leibniz formula for the nth derivative of the product of two functions (No proof),use of Leibniz formula for the determination of co-efficients of the power series.

Module III
Partial differentiation: Partial differentiation-Concept of partial derivative   - Chain rule- Total derivative-Euler's theorem for homogeneous functions, Differentials and their applications in errors and approximations, Jacobians - Maxima minima of functions of two variables(Proof of the result not required)-Simple applications.

Co-ordinate systems: Rectangular co-ordinates-Polar co-ordinates-In plane and in Space-Cylindrical polar co-ordinates-Spherical polar co-ordinates.

Module IV
Integral calculus:
Application of definite integrals: Area, Volume, Arc length, Surface area.
Multiple integrals : Evaluation of double integrals-Change of order of integration. Evaluation of triple integrals-Change of Variables in integrals.
Applications of multiple integrals. Plane Area, Surface area &Volumes of solids

References:

1. S.S.Sastry, Engineering Mathematics -Vol1, PHI publishers
2. Erwin Kreyzig, Advanced Engineering Mathematics, Wiley Eastern
3. T.Veerarajan, Engineering Mathematics, TMGH Publishers
4. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules. (8x5 = 40 marks)
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B. (4x15 = 60 marks)

1102 ENGINEERING PHYSICS

Module 1

Laser-introduction--spontaneous and stimulated emission-principle of laser- properties of laser-Einstein coefficients and the analysis of lasing conditions-   Basic components of a laser-Different types of lasers-construction,working and applications of Ruby laser-Neodymium YAG laser- He-Ne laser- semiconductor laser-Applications of laser in medicine, industry, science and communication.

Holography-basic principle-Comparison with ordinary photography-Recording and reconstruction of holograms-applications.

Fibre optics - Basic structure of an optical fibre - step-index fibre and graded index fibre- propagation of light in an optical fibre-acceptance angle and acceptance cone- Numerical aperture of a step-index fibre-Numerical aperture of a graded index fibre-modes of propagation-step index monomode fibre-Multimode stepindex fibre-Graded multimode fibre-Attenuation in optic fibres-fibre losses-material loss,scattering loss,absorption loss,leaky modes- dispersion in optical fibres- Applications.

Module II

Crystallography – Space lattice- Basis- Unit cell- Unit cell parameters- Crystal systems- Bravais lattices-Three cubic lattices-sc, bcc, and fcc- Number of atoms per unit cell- Co-ordination number- Atomic radius-Packing factor- Relation between density and crystal lattice constants- Lattice planes and Miller indices-Separation between lattice planes in sc- Bragg's law- Bragg's x-ray spectrometer- Crystal structure analysis.

Liquid crystals- Liquid crystals, display systems-merits and demerits- Metallic glasses- Types of metallic glasses (Metal-metalloid glasses, Metal-metal glasses) – Properties of metallic glasses (Structural, electrical,magnetic and chemical properties).

Shape memory alloys- Shape memory effect, pseudo elasticity

Module III

Introduction to nanoscale science and technology- nanostructures-nanoring, nanorod, nanoparticle,

nanoshells- Properties of nanoparticles- optical, electrical, magnetic, mechanical properties and quantum

confinement- Classification of nanomaterials- C60, metallic nanocomposites and polymer nanocomposites-Applications of nanotechnology.

Superconductivity-Introduction--transition temperature-Meissner effect-properties of super conductors.Types of superconductors-type 1 and type 2- AC Josephsons effect- DC Jospehsons effect- Flux quantisation-Squid-High temperature superconductors-Applications of super conductivity.

Special Theory of Relativity - Michelson-Morley experiment. Einstein's postulates. Lorentz transformation equations (no derivation). Simultaneity. Length contraction. Time dilation. Velocity addition. Relativistic mass. Mass energy relation. Mass less particle.

Module IV

Quantum mechanics-Introduction-origin of quantum theory-black body radiation and photo electric effect (brief ideas only)-matter waves- wave packet-uncertainty principle-(two forms)Time dependent Shrodinger equation for a free particle-Particle in force field and time dependent Schrodinger equation-Time independent schrodinger equation-Physical intrepretation of wave function-application -Particle in a Box (one dimensional) –Energy eigen values and wave functions   **Ultrasonics**-piezo electric effect-Magnetostriction effect-production of ultrasonics-properties of ultrasonics- ultrasonic diffractometer and determination of velocity of ultrasonics in a liquid-Application of ultrasonics in non destructive testing - Accoustics of building-reverberation- Absorption Coefficient- Sabines formula for reverberation time(Derivation)-Accoustic intensity- loudness-decibel-phon-conditions for good acoustics(Qualitative study).

References:

1. S. Mani Naidu, A Text book of Engineering Physics, Pearson, 2010
2. M.C. Santosh Kumar, Engineering Physics, Nalpat Publishers.
3. B. Premlet, Advanced Engineering Physics, Phasor Books, Kollam.
4. A.S. Vasudeva, Modern Engineering Physics, S. Chand & Co.
5. Prabir K. Vasu and Hrishikesh Dhasmana, Engineering Physics, Ane books Pvt. Ltd., 2010.
6. S.O. Pillai & Sivakami, Applied Physics, New Age International (P) Ltd., Second Edition 2008.
7. G.S. Raghuvanshi, Engineering Physics, Prentice Hall of India.

Type of Questions for University Exam.

Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules. (8x5 = 40 marks)

Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B. (4x15 = 60 marks)

1103 ENGINEERING CHEMISTRY

Module I
Solid state chemistry: Fundamentals, Bonding in solids, Born-Haber cycle, Point defects, Methods to improve reactivity of solids, Free electron theory, Band theory, Fermi level in semiconductors, Molecular field theory of magnetic materials.
Spectroscopy: Molecular energy levels-Types of molecular spectra- Electronic spectra (Classification of electronic transitions- Beer Lamberts law, Vibrational spectra (mechanism of interaction and application), Rotational spectra (Determination of bond length and application). NMR spectra (Basic principle, chemical shift, spin-spin splitting)
Solid surface characterisation: Electron spectroscopy for chemical analysis, Chemical shift, BET isotherm, Thermodynamics of adsorption.

Module II
Electrochemistry: Fundamentals, Electrode potential, Nernst's equation, Types of electrodes, Salt bridge, E.M.F measurement. Concentration cells, Calculation of E.M.F of a concentration cell.
Acids and bases, Arrhenius concept, Bronsted-Lowry concept of acids and bases, Lewis concept, Buffer solutions, pH measurement, Polarisation, Overvoltage.
Power generation: Secondary cells, Fuel cells, Photovoltaic effect, Solar cells.
Corrosion and its control: Theories of corrosion - Galvanic series- Types of corrosion - Factors affecting corrosion and different methods of corrosion control.
Chemical Kinetics: reaction rate, rate constant, rate law, reaction order, first order, second order, pseudo-first order reactions, integrated rate laws, half-life of a reaction and its relation to rate constant. Molecularity, simple unimolecular and bimolecular reactions. Arrhenius equation.

Module III
Chemical Thermodynamics: Fundamentals, Molecular interpretation of internal energy, enthalpy and entropy, Heat of reaction, Kirchhof's equation, Trouton's rule, Entropy changes accompanying different processes, Nernst heat theorem, Third-law.
Free energy: Dependence on pressure and temperature, Gibbs-Helmholtz equation, Free energy changes and equilibrium constant, chemical potential, Fugacity, Thermodynamics of biochemical reactions.
Phase Rule: Terms involved in phase rule and examples, Application of phase rule to one component water system, Application of phase rule to two-component systems.

Module IV
Engineering materials:
Polymers- Classifications- Mechanism of polymerisation (Addition, free radical, cationic, anionic and coordination polymerisation)- Thermoplastics and thermosetting plastics-Compounding of plastics-Moulding techniques of plastics (Compression, Injection, Transfer and Extrusion moulding)-Preparation, properties and uses of PVC, PVA, Nylon, PET - Silicon polymers- Biodegradable plastics. Elastomers- structure of natural rubber- vulcanisation- synthetic rubbers (Buna-S, Butyl rubber and Neoprene).
Lubricants- Introduction-Mechanism of lubrication- solid and liquid lubricant- Properties of lubricants-Viscosity index- flash and fire point- cloud and pour point- aniline value.
Refractories: Classification – Properties of refractories.
Cement- Manufacture of Portland cement- Theory of setting and hardening of cement.

References:

1. Peter Atkins, Julio de Paula, Elements of Physical Chemistry, Oxford University Press, 2005.
2. John E. McMurry and Robert C. Fay, Chemistry, 5th Edition, Pearson, 2008.
3. O. G Palanna, Engineering Chemistry, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009.
4. R.N. Goyal, Harmendra Goel, Textbook of Engineering Chemistry, 2nd Edition, Ane Books Pvt. Ltd., 2011.
5. R Gopalan, D Venkappayya, Sulochana Nagarajan, Textbook of Engineering Chemistry, 2nd Edition, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.
6. Shashi Chawla, A Text Book of Engineering Chemistry, Dhanpat Rai & Co, New Delhi, 2003.
7. Kochubaby Manjooran, Modern Engineering Chemistry, Kannantheri Publication, Kochi.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules. (8x5 = 40 marks)
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B. (4x15 = 60 marks)

1104 ENGINEERING MECHANICS

A) STATICS

Module I
Concurrent forces in a plane: Principles of statics. Composition and resolution of forces. Equilibrium of concurrent forces in a plane. Method of projection. Method of moments. Friction.
Parallel forces in a plane: Two parallel forces. General case of parallel forces in a plane. Centre of parallel forces and centre of gravity, Pappus theorems, centroids of composite plane figures and curves. Distributed forces in a plane.
Module II
Properties of areas: . Moment of inertia of a plane figure with respect to an axis in its plane. Polar moment of inertia. Product of inertia. Principal axes. Mass moment of inertia of material bodies.
General case of forces in a plane: Composition of forces in a plane. Equilibrium of forces in a plane. Plane trusses **-** Method of joints. Method of sections. Plane frames : Method of members. **Principle of virtual work:** Equilibrium of ideal systems, stable and unstable equilibrium.

B) DYNAMICS

Module III
Rectilinear translation: Kinematics of rectilinear motion. Differential equation of rectilinear motion. Motion of a particle acted upon by a constant force, by a force as a function of time and by a force proportional to displacement. Simple harmonic motion. D'Alembert's principle. Momentum and impulse. Work and energy, ideal systems, conservation of energy. Impact.
Module IV
Curvilinear translation: Kinematics of curvilinear translation. Differential equations of motion. Motion of a projectile. D'Alembert's principle in curvilinear motion. Moment of momentum. Work and energy in curvilinear motion.
Rotation of a rigid body: Kinematics of rotation. Equation of motion of a rigid body rotating about a fixed axis. Rotation under the action of a constant moment. Compound pendulum. General case of moment proportional to the angle of rotation. D'Alemberts principle of rotation. Resultant inertia force in rotation. Principle of angular momentum in rotation. Energy equation for rotating bodies.

References:

1. Timoshenko and Young, Engineering Mechanics, McGraw Hill Book Company.
2. Beer F. P. and Johnston E. R, Mechanics for Engineers (Vol. 1- Statics and Vol.2 -Dynamics), Tata McGraw Hill.
3. Merriam H. L. & Kraige L. G, Engineering Mechanics (Vol. 1- Statics and Vol.2 -Dynamics), John Wiley and Sons.
4. Biju N, Engineering mechanics, Educational Publications.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules. (8x5 = 40 marks)
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B. (4x15 = 60 marks)

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1105 ENGINEERING GRAPHICS

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Module I
Introduction to engineering graphics. Drawing instruments and their use. familiarisation with current Indian Standard Code of Practice for general engineering drawing.
Scales- plain scale ,vernier scale, diagonal scale.
Conic sections- Construction of ellipse, parabola, hyperbola - construction of cycloid, involute, archimedian spiral and logarithmic spiral- drawing tangents and normals to these curves.

Module II
Introduction to orthographic projections- plane of projection- principles of first angle and third angle projections, projection of points in different quadrants.
Orthographic projection of straight lines parallel to one plane and inclined to the other plane- straight lines inclined to both the planes- true length and inclination of lines with reference planes- traces of lines.
Projection of plane laminae of geometrical shapes in oblique positions.

Module III
Projection of polyhedra and solids of revolution- frustum, projection of solids with axis parallel to one plane and parallel or perpendicular to other plane- projection of solids with axis inclined to both the planes- projection of solids on auxiliary planes.
Section of solids by planes inclined to horizontal or vertical planes- true shape of sections.

Module IV
Development of surface of cubes, prisms, cylinders, pyramids and cones
Intersection of surfaces- methods of determining lines of intersection - intersection of prism in prism and cylinder in cylinder.

Module V
Introduction to isometric projection- isometric scales, isometric views- isometric projections of prisms, pyramids, cylinders, cones and spheres.
Introduction to perspective projections : visual ray method and vanishing point method- perspective of circles- perspective views of prisms and pyramids.

References:

1. K.C. John. Engineering Graphics, PHI Learning
2. P.I. Varghese and K.C. John, Engineering Graphics, JET Publishers
3. N.D.Bhat , Elementary Engineering Drawing, Charotar publishing house
4. P.S.Gill , Geometric Drawing, B.D Kataria &Sons, Ludhiana
5. P I Varghese , Engineering Graphics, VIP Publishers.

<u>University Examination Question Paper pattern</u>
Two questions of 20 marks each from all the five modules. Answer one question from each module. (5x20 = 100 marks)

1106 BASIC CIVIL AND MECHANICAL ENGINEERING

PART- A: BASIC CIVIL ENGINEERING

Module I
Engineering Materials: Cement - varieties and grade of cement and its uses. Cement mortar- Steel- types of steel for reinforcement bars, steel structural sections. Brick- varieties and strength, tests on bricks.
Aggregates- types & requirements. Concrete- grades of concrete as per IS code, water cement ratio, workability, mixing, batching, placing, compaction and curing.
Construction   : Foundation- types of foundations- isolated footing, combined footing, raft, pile & well foundations- Foundation for Machinery
Module II
Super structure: Brick masonry, English bond and Flemish bond, Stone masonry-Ashlar masonry- Rubble masonry. Roofing- Steel trusses, roofing for industrial buildings
Surveying: Principles, instruments, ranging and chaining of survey lines, errors in chaining, field work, field book, selection of survey stations, reconnaissance.
Leveling: Leveling instruments, different types, temporary adjustments, mean sea level, reduced level of point, booking of field notes, reduction of levels by height of collimation method.

References:

1. S.C. Rangawala, Engineering Materials, Charotar Publishing House, Anand.
2. Roy M. Thomas, Fundamentals of Civil Engineering, Educational Publishers,Ernakulam
3   Surendra Singh, Building Materials, Vikas Publishing Company, New delhi.
4   S.C. Rangawala, Building Construction, Charotar Publishing House, Anand.
5. P. Kanetkar, Surveying and Levelling, Volumes 1 and 2, United Book Corporation, Poona.

PART A - Type of Questions for University Exam. (Maximum Marks: 50) (To be answered in separate answer book)
Q 1 Four short answer questions of 5 marks each with two questions from each modules. (4x5 = 20 marks)
Q 2. to Q.5 : Two questions A & B of 15 marks from each moduls with option to answer either A or B. (2 x 15 = 30 marks)

PART – B: BASIC MECHANICAL ENGINEERING
Module I
Thermodynamics: Thermodynamics systems – open, closed and isolated systems, equilibrium state of a system, property and state, process, cycle, Zeroth law of thermodynamics- concept of temperature, temperature scales. First law – internal energy, enthalpy, work and heat, Different processes, isobaric, isochoric, isothermal and adiabatic processes Second law – Kelvin-plank and Claussius statements, Carnot Cycle.
Internal Combustion Engines: Air standard cycles – Otto and Diesel cycles, working of two stroke and four stroke Petrol and Diesel engines, Carburatted and MPFI engines, fuel pump, fuel injector, ignition system, cooling system, lubricating system.
Module II
Refrigeration and Air conditioning: Vapour compression and vapour absorption refrigeration systems, summer, winter and comfort air conditioning.
Manufacturing processes – Casting (sand and die casting processes), Forging (open &closed die forging), Rolling, Extrusion, Welding (resistance, arc and gas), brazing and soldering
Elementary ideas of **simple reaction and impulse turbines**, compounding of turbines.
Transmission of power: Belt drives (open and closed), Chain drives.

References:

1. P.K. Nag, Engineering Thermodynamics, Tata McGraw Hill
2. J.P. Holman, Thermodynamics, Mc Graw Hill
3. Rogowsky, Elements of Internal combustion Engines, Tata McGraw Hill
4. Gill, Smith & Ziurys, Fundamentals of Internal Combustion Engines, Oxford & IBH
5. Stoecker, Refrigeration and Air Conditioning, Tata McGraw Hill
6. Raghavan : Material Science and Engineering, Prentice Hall of India

PART B - Type of Questions for University Exam. (Maximum Marks: 50) (To be answered in separate answer book)
Q 1 Four short answer questions of 5 marks each with two questions from each modules. (4x5 = 20 marks)
Q 2. to Q.5 : Two questions A & B of 15 marks from each moduls with option to answer either A or B. (2 x 15 = 30 marks)

1107   BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

PART- A: ELECTRICAL ENGINEERING

Module I

Resistance : Circular wires – Wire Tables – Temperature Effects – Types of Resistors – Colour Coding and Standard Resistor Values – Conductance – Ohmmeters – Metric Units –The Memristor. **Ohm's Law, Power and Energy** : Ohm's Law – Plotting Ohm's Law – Power – Energy – Efficiency – Circuits Breakers, GFCI's and Fuses – Applications .

Series dc Circuits: Series Resistors – Series Circuits – Power Distribution and Series circuit – Voltage Sources in a Series – Kirchoff's Voltage Law – Voltage Division in a Series Circuit – Interchanging Series Elements – Notation – Voltage Regulation and the Internal Resistance of Voltage Sources. **Parallel dc Circuits:** Parallel Resistors – Parallel Circuits – Power Distribution in a Parallel Circuit – Kirchhoff's Current Law – Current Divider Rule – Voltage Sources in Parallel – Open and Short Circuits.

Capacitors: The Electric Field – Capacitance – Capacitors, **Inductors:** Magnetic Field – Inductance.

Module II

AC Fundamentals: Sinusoidal Alternating Waveforms - Sinusoidal ac Voltage Characteristics and Definitions – Frequency Spectrum – The Sinusoidal Waveform – General format for the sinusoidal Voltage of current – Phase Relations – Average Value – Effective (rms) Values – ac Meters and Instruments. Elementary Concepts of Energy Meter Watt Meter, Volt Meter and Ammeter.

The Basic Elements and Phasors: Response of Basic R,L and C Elements to a Sinusoidal Voltage or Current – Frequency Response of the Basic Elements – Average Power and Power Factor – Complex Numbers – Rectangular Form – Polar Form – Conversion between Forms.

Series and Parallel ac Circuits: Impedance and the Phasor Diagram- Series Configuration – Voltage Divider Rule – Frequency Response for Series ac Circuits –Admittance and Susceptance – Parallel ac Networks – Current Divider Rule – Frequency response of Parallel Elements.

Introduction to 3 phase Systems: StarΔ Connection

Elementary Concepts of Generation, Transmission, and Distribution: Various Levels of Power Transmission – Conventional Sources of Electrical Energy, Hydro, Thermal, Nuclear and Diesel Power Station - Introduction to Primary and Secondary distribution - Basic Concepts of Transformers - Principle of Operation – Applications to Power Systems.

PART- B: ELECTRONICS ENGINEERING

Module III

The Diode - Biasing the Diode, Voltage - Current Characteristic of a Diode, Diode Models, **Diode Applications -** Half Wave and Full Wave Rectifiers, Power supply Filters and Regulators, **Special Purpose Diodes -** Zener Diodes- Applications, Varactor Diodes, Optical Diodes-Other Types of Diodes. **Bipolar Junction Transistors (BJTs) -** Transistor Structure - Basic Transistor Operation, Transistor characteristics and parameters, Transistor as an Amplifier, Transistor as a Switch.

Module IV

Sensors-Temperature, light, force and sound sensors; **Actuators** – Heat, Light, force and sound actuators.

Electronic measurements - measurements of voltages and currents, voltmeter, ammeter, multimeter, CRO (Block level treatment only)

Introduction to Electronic Communication systems: Modulation and Demodulation, Analog communication system, Electromagnetic frequency spectrum, Bandwidth and information capacity, Principles of Amplitude and angle modulation, Bandwidth requirements of angle modulated waves.

Optical communication: Fundamental concepts, Block diagram of an optical fibre communications system.

Cellular Telephone: Fundamental concepts, Frequency reuse, Block diagram of a simplified cellular telephone system, Roaming and handoffs

Satellite communication: Block diagram of Satellite system link models – Uplink, Transponder Downlink.

References:

1. Boylestad, *Introductory Circuit analysis*, Pearson Education, 12/e, 2012.
2. Thomas L. Floyd, Electronic Devices, Pearson Education Inc. 7th edition.
3. Neil Storey, Electronics A systems approach, Pearson Education Inc. 2011.
4. Wayne Tomasi, *Electronic Communication Systems: Fundamentals through Advanced,* Pearson Education Inc. 5th edition.

Type of Questions for University Exam.

Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules. (8x5 = 40 marks)

Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B. (4x15 = 60 marks)

1108 COMPUTER PROGRAMMING

Module I
Basics of Computer and Information Technology:
Digital Computer System (CPU, Memory, I/O devices)- Working of a digital computer- Hardware and Software : Definition - Categories of Software, Application of Computers – Role of Information Technology – Internet Services

Problem Solving Methodology:
Program - Programming Process (Problem statement, Analysis, Design a solution, Implement/Coding the solution, Test the solution, Iteration through the phases to refine/correct the program)- Design tools (Algorithm, Flow-chart, Pseudo-code)- Develop algorithms for simple problems.

Module II
Programming Languages:
Types and generation of programming languages- Compiler – Interpreter-Linker –Loader –Execution of Program

Basics of C:
Character set-Identifier- Keywords- Constants –Data Types- Variables and declaration –Operators and Expressions – Operator precedence and associativity – Expression Evaluation (Simple Examples) - Input and output functions – Simple computational problems involving the above constructs.

Module III
Control Statements:
Selection, Conditional operator, Iteration (for, while, do-while), Branching (switch, break, continue, goto), Nesting of control statements- Problems using control statements.

Arrays and Strings:
1D and 2D arrays –Searching (Linear and Binary) - Sorting (Bubble, Selection) – Matrix manipulation programs – Strings and basic operations on strings – Strings functions - Programs on string manipulation

Functions:
Definition – Calling – Declaration – Parameter Passing (by value and by reference) – Recursion – Library functions –Programs based on functions

Module IV
User defined data types:
Structure – Union - Enumerated data type - Programs involving structure and union.

Pointers:
Declaration, Initialization – Pointers and arrays – Pointers and structures – Pointers and functions – Command line arguments – Dynamic memory allocation – Operations on pointers – Programs involving the above concepts

Files:
File concept – File pointer – File handling operations (open, close, read, write etc) on sequential and random access files. Programs on file manipulations using fgetc(), fgets), fseek.

References:

1. Pradip Dey and Manas Ghosh, Computer Fundamentals and Programming in C, Oxford.
2. Samarjit Ghosh, All of C, PHI Learning
3. Byron Gottfried , Programming with C , 2nd edition, TMH publication.
4. B.W. Kernighan and D.M. Ritchie, The C Programming Language, Pearson Education.
5. R G Dromey , How to solve it by Computer, Prentice Hall
6. D.E. Knuth, The Art of Computer Programming – Volume 1,2 &3, Addison Wesley.
7. Yashwant P. Kanetkar, Let Us Use C, 8th Edition (Paperback).
8. Sukhendu Dey , Complete Knowledge in C, Narosa
9. Varghese Paul, Computer Fundamentals , EPD.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules. (8x5 = 40 marks)
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B. (4x15 = 60 marks)

PART – A: ENVIRONMENTAL STUDIES (1 hour / week)

Module I
Natural resources - issues related to the use and over exploitation of forest resources, water resources, mineral resources, food resources, energy resources and land resources- role of an individual in conservation of natural resources - equitable use of resources for sustainable life styles.
Concept of an ecosystem - structure and function - energy flow in the ecosystem - ecological succession - food chains, food webs and ecological pyramids - structure and functions of a forest ecosystem and an aquatic eco system.
Definition of biodiversity - genetic, species and ecosystem diversity - biogeographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Threats to biodiversity, Conservation of biodiversity.
Module II
Environmental Pollution - Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, marine pollution, thermal pollution and nuclear hazards - Causes, effects and control measures of urban and industrial solid wastes -Role of an individual in prevention of pollution - An overview of the various environmental legislations in India - Issues involved in enforcement of environmental legislation. Disaster Management: Floods, earth quake, cyclone and landslides. Role of public awareness in disaster management.
The concept of sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, water shed management - Resettlement and rehabilitation of people; its problems and concerns - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies - Population growth and problems of population explosion – Environment and human health – Human rights – Value education – Role of Information Technology in environment and human health - Environmental ethics: issues and possible solutions.

References:
1. Rajagopalan. R, Environmental Studies: From Crisis to Cure, Oxford University Press, 2005
2. Erach Bharucha, Textbook of Environmental Studies and Ethics, Universities Press (India), Hyderabad, 2005.
3. Jayashree A. Parikh, V.M. Balsaraf, P.B. Dwivedi, Environmental Studies, Ane Books Pvt. Ltd., 2010.
4. Anindita Basak, Environmental Studies, Pearson, 2009.
5. Gouri Suresh, Environmental Studies and Ethics, I.K. International Publishing House Pvt. Ltd., New Delhi, 2007.
6. S.P. Misra, Essential Environmental Studies, 3rd Edition, Ane Books Pvt. Ltd., 2011.
7. Benny Joseph, Environmental Science & Engineering, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
8. Meenambal T , Uma R M and K Murali, Principles of Environmental Science and Engineering, S. Chand & Company Ltd, 2005

PART – B: TECHNICAL COMMUNICATION (1 hour / week)

This is a practice oriented, need based, and functional – communicative course. It is intended to develop the student's skill of communication in listening, speaking, reading and writing. The student is advised to cultivate the habit of reading newspapers, magazines and books in a free, extensive manner to consolidate the skill already achieved. A more inter-active process of teaching/learning is called for in order to achieve effective communication.
Questions at the class tests and semester end examination will be largely problem solving and application oriented in nature.
Module I
Communicative Grammar: Time, tense and aspect; Verbs of state and event; Use of preposition; Expressing emotions and attitudes: Hope, anticipation of pleasure, disappointment, approval, disapproval, surprise.
The sounds of English: (it is not a course in phonetics. Technical terms will not be used except when absolutely necessary.)
Length of vowels-long and short vowels
/ | /, / 3 : /, /a :/, / : /, /U : / | / / 2 /, /,/ Λ /, / O /, / U / - Consonants : / f, v, o, o, s, z, 3/ - Stress pattern - Intonation: failing and rising.

Oral Communication: starting and ending a conversation; telling and asking people to do things; expressing opinions and ideas, decisions and intentions, offers and invitations, feelings, right and wrong, numbers and money.

Purpose and audience; dealing with customers and clients; face-to-face discussions; interviews; group discussions; meetings and attending meetings; checking understanding; raising questions; giving and receiving feedback; using body language; leading and directing discussions; concluding discussions; using graphics in oral presentations

Reading Comprehension and reference skills: skimming and scanning; factual and inferential comprehension; prediction; guessing meaning of words from context; word reference; comprehending graphics in technical writing.

Reading strategies; reading speed; reading between the lines for hidden meaning; interpreting graphics; using a dictionary; using an index; using a contents list to find information; choosing the right reference source.

Module II

Written Communication: note making and note taking; summarizing; notes and memos; developing notes into text; organization of ideas: cohesion and coherence; Preparing notes – writing business letters and E-mail messages. Organizing a meeting, preparing an agenda, chairing a meeting, drafting motions and resolutions, writing minutes.

Paragraph writing: Paragraph writing – Topic sentence, cohesion and coherence- sentence liners

(so, but, however etc), ordering information in space and time; short essays: description and argument; comparison and contrast; illustration; using graphics in writing: tables and charts; diagrams and flow-charts; maps, plans and graphs. Preparation of a business report-writing a business proposal - format, length,structure.

Spelling rules and tips; writing a rough draft; editing and proof reading; writing the final draft; styling text; filling in complex forms; standard letters; Writing a curriculum vitae (both chronological & functional) along with an application for a job; Public relation – Concept and relevance – PR in a business organization-handing the media; writing a report; writing leaflets and brochures; writing references; essay writing: expository writing; description of processes and products; classification; the instructional process; arguments and presentation of arguments; narrating events chronologically.

References :
1. John Seely, Oxford Guide to Writing and Speaking, Oxford University Press.
2. C. Muralikrishna and Sunita Mishra, Communication Skills for Engineers, 2nd Edition, Pearson, 2011.
3. Meenakshi Raman and Sangeetha Sharma, Technical Communication: Principles and Practice, Oxford University Press, 2004.
4. Krishna Mohan and Meenakshi Raman, Effective English Communication,Tata Mc-GraHill,2000.
5. William Sanborn Pfeiffer, T.V.S. Padmaja, Technical Communication – A Practical Approach, Pearson, 2007.
6. R.C. Bhatia, Business Communication, 2nd Edition, Ane Books Pvt. Ltd., 2008.
7. Krishna Mohan and Meera Banerji, Developing Communication Skills, Mac Millan India Ltd, 2000.

University Examination Pattern
The question paper will have two parts. Part A and Part B will have a weightage of 50 marks each and they will have to be answered in separate answer books.

Question Paper Pattern for Part A (Environmental Studies)

Q I. – 6 short type questions of 3 marks each, with three questions from each module (6 x3 = 18)

QII. – 2 questions A and B of 16 marks from Module I with choice to answer one. Both A and B should have a minimum of two sub – sections.

QIII - 2 questions A and B of 16 marks from Module II with choice to answer one. Both A and B should have a minimum of two sub – sections.

 Question Paper Pattern for Part B (Technical Communication)
Q I – 10 short answer questions of 2 marks each, with five questions from each module. The questions shall be problem solving and application oriented in nature. (10x2 = 20 marks)
QII. – 2 questions A and B of 15 marks from Module I with choice to answer one. Both A and B should have a minimum of two sub – sections. The questions shall be problem solving and application oriented in nature.
QIII - 2 questions A and B of 15 marks from Module II with choice to answer one. Both A and B should have a minimum of two sub – sections. The questions shall be problem solving and application oriented in nature.

11 L1 ELECTRICAL AND MECHANICAL WORKSHOP

ELECTRICAL WORKSHOP

1. One lamp controlled by one switch 2. Series and parallel connections of lamps.
3. Stair case wiring.
4. Hospital Wiring.
5. Godown wiring.
6. Fluroscent lamp.
7. Connection of plug socket.
8. Different kinds of joints.
9. Transformer winding.
10. Soldering practice.
11. Familiarisation of CRO.

MECHANICAL WORK SHOP

Preliminary exercises for beginners in all the following shops. Specific models may be designed by the teachers.

1) Fitting Shop.
2) Sheet Metal Shop
3) Foundry Shop
4) Welding Shop
5) Carpentry Shop

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50 % marks in the aggregate and 50 % minimum in the end semester examination for a pass.

11 L2 COMPUTER PROGRAMMING LABORATORY

Application packages

Word
1. To create an advertisement in Word.
2. To illustrate the concept of mail merging in word.

Spread Sheet
3. To create a spread sheet to analyse the marks of the students of a class and also to create appropriate charts.

Power Point
4. To create the presentation for the department using Power Point.

C Programming Basics

Operators & Expressions
5. To write a simple menu driven calculator program   using switch statement

IO Formatting
6. To write a program to print Pascal's triangle.

Decision Making
7. To write a program for electricity bill preparation.

Looping
8. To write a program to print the *sine* and *cosine* series.

Arrays
9. To write a program to perform Matrix multiplication.
10. To write a program to prepare and print the sales report.
String
11. To write a program to perform string manipulation manipulations function like *string concatenations, comparison,   find the length and string copy* without using library functions.
12. To write a program to arrange names in alphabetical order.

Functions
13. To write a C program to calculate the mean, variance and standard deviation using functions.
14. To write a C program to perform sequential and binary search using functions.

Recursion
15. To write a program to print the Fibonacci series and to calculate the factorial of the given number using functions.

Structures
16. To print the mark sheet of n students using structures.

Pointers
17. To write a program using pointers to access the elements of an array and count the number of occurrences of the given number in the array.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50 % marks in the aggregate and 50 % minimum in the end semester examination for a pass.

11 L3 LANGUAGE LABORATORY

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Objectives:
1. To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
2. To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams.
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
4. To train them to use language effectively to face interviews, group discussions, public speaking.
5. To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.

SYLLABUS :

The following course content is prescribed for the **English Language Laboratory** sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues / Role Play.
4. Oral Presentations- Prepared and Extempore.
5. 'Just A Minute' Sessions (JAM).
6. Describing Objects / Situations / People.
7. Information Transfer
8. Debate
9. Telephoning Skills.
10. Giving Directions.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be conducted by two examiners. A candidate shall secure a minimum of 50 % marks in the aggregate and 50 % minimum in the end semester examination for a pass.

CE/CS/EB/EC/EE/EI/FT/IT/ME/SE 1301ENGINEERING MATHEMATICS 1I

Module I
Matrices and Vector spaces: Rank of matrix, Echelon and normal form, Solutions of linear systems of algebraic equations, Eigen values and Eigen vectors, Cayley Hamilton theorem (non proof).
Vector Spaces – Subspaces, - Linear Independence of vectors-Linear span-Dimension and Basis.   Linear transformations.

Module II
Fourier series and Fourier integrals: Forier series of Periodic functions- Euler formulae for Fourier coefficients-functions having period 2π, arbitrary period-even and odd functions-half range expansions, Fourier integral, Fourier cosine and sine transformations, linearity property, transform of derivatives, convolution theorem (no proof)

Module III
Laplace transforms: Linearity property, transforms of elementary functions, Laplace transforms of derivatives and integrals, differentiation and integration of transforms, convolution theorem (no proof) use of Laplace transforms in the solution of initial value problems, unit step function, impulse function - transform of step functions, transforms of periodic functions.

Module IV
Vector calculus: Scalar and Vector point functions-Gradient and directional derivative of a scalar point function-Divergence and Curl of a vector point functions-their physical meanings.
Evaluation of line integral, surface integral and volume integrals, Gauss's divergence theorem, Stoke's theorem (No Proof of these theorem), conservative force fields, scalar potential.

References:

1. R.K.Jain, S.R.K.Iyengar, Advanced Engineering Mathematics: Narosa Publishers.
2. C.R.Wilie & L.C.Barrett, Advanced Engineering Mathematics, Mc-Graw Hill
3. Larry C Andrews, Ronald C Philips, Mathematical Techniques for Engineers & Scientists, PHI Publishers
4. M.C.Potter, J.L.Goldberg, Advanced Engineering Mathemartics,   Oxford Unversity Press.
5. B.S.Grewal, Higher Engineering Mathematics:, Khanna Publishers.

Type of Questions for University Examination

Q1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8x5 = 40 marks)
Q2 to Q5 : Two questions A & B of 15 marks from each module with option to answer either A or B. (4x15 = 60 marks)

CE 1302 A/B SURVEYING I

MODULE I
Introduction : Classification of surveys, primary division of Surveying-Principle of working from whole to part-conventional signs. Chain Surveying: Instruments - principles of chain surveying-Filed bookplotting- Tie and check line-Chaining and Ranging-obstacles-chaining on sloping ground -Errors in chain Survey- uses of cross staff and optical square. COMPASS SURVEY : Prismatic compass-surveyor's Compass whole circle system and Quadrantel system-True and magnetic bearing-Dip and Declination-Local attraction-Traversing-Plotting a Traverse Survey -Graphical adjustment of closing error in a closed Traverse. Plane Table Survey: Instruments and accessories- Advantages and disadvantages of plane tabling orientation- Different methods of plane Tabling- Two point problem-Three point problem - Errors in plane tabling.

MODULE II
Levelling: Definitions of Terms used in Leveling-Bench marks- levelling instruments-Temporary and permanent adjustments-principles of leveling-Simple leveling, Differential levelling-Reduction of levels-Classification of leveling-Profile leveling and cross sectioning correction for curvature and refraction-Reciprocal leveling- Errors in leveling. Contour Survey: Definition-characteristics of Contour- uses of contours-Methods of contouring-Interpolation Contours-uses of Contour map.

MODULE III
Area and volumes: Areas along Boundaries- the Mid-ordinate rule-Average ordinate rule-Trapezoidal rule-Simpson's rule- Area by Meridian distance method- Area by Double meridian method. Departure and total latitude method-Coordinate method-use of Planimeter-Computation of volume by Trapezoidal and Prismoidal formule -Mars haul curve.Minor Instruments: Hand levels-Indian pattern clinometer-Ceylon ghat Tracer-Pantagraph-Eidograph- Box Sextant

MODULE IV
Theodolite Surveying: Study of Theodolite - Temporary and permanent adjustments- measurement of horizontal angle- method of repetition and reiteration- measurement of vertical angle – Theodolite traversing by direct observation of Angles and by direct observation of Bearings- Adjustment of a closed Traverse (angular error, bearings & closing error) - Bowditch rule-Transit rule-Gale's traverse Table- Omitted measurements.
Tacheometric Surveying : Instruments used-Stadia System-fixed and movable hair methods- Tacheometric constants- Anallatic lens-Tangential System-Direct reading tacheometer-Subtense Bar.

References:

1) Surveying Vol –I Dr.K.RArora- Standard Book House
2) Surveying Vol I –S.K.Duggal Tata Mc –Graw Hill Publishing Co LTD
3) Surveying - Vol I & II : Punmia B.C- Laxmi Publications Pvt Ltd
4) Surveying – Dr A.M.Chandra – New Age International Publishers

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1303 A/B STRENGTH OF MATERIALS

MODULE I

Tension, Compression and Shear : Normal stresses and strains – Mechanical properties of mild steel – Elasticity, plasticity and creep – Liner elasticity, Hooke's law and Poisson' s ratio- Constitutive relation – Shear stress and shear strain –-Relationship between modulus of elasticity, bulk modulus and rigidity modulus, Allowable stresses and allowable loads – design for axial loads and direct shear.

Axially loaded Members : Changes in lengths of axially loaded members – Changes in lengths of nonuniform bars – Thermal effects, misfits and pre strains – stress on inclined sections – strain energy.

MODULE II

Shear forces and bending moments: Types of beams, loads and reactions – shear forces and bending moments – relationships between loads, shear forces and bending moments – Shear force and bending moment diagrams

Stresses in beams : Pure bending and non uniform bending–Curvature of a beam – Longitudinal strains in a beam – Normal stresses in beams (linearly elastic materials) – Design of beams for bending stresses – Non-prismatic beams – Shear stresses in beams of rectangular cross section and circular cross section–Shear stresses in webs of beams with flanges

MODULE III

Torsion : Torsional deformation of circular bar – Circular bars of linearly elastic materials – nonuniform torsion – stresses and strains in pure shear –transmission of power by circular shafts – Circular shafts fixed on both ends – strain energy in torsion and pure shear- Closed coil helical spring – open coil springs

Analysis of stress and strain : Plane stress – Principal stresses and maximum shear stresses –Mohr's circle for Plane stress- Strains- Measurement of strains – Computation of stresses from strains

Application of plane stress: Spherical pressure vessel – Thin Cylindrical pressure vessel.

MODULE IV

Deflection of determinate Beams : Differential equation of deflection profile – Deflection by integration of the bending moment equations – Deflection by integration of the shear-force and load equation – Method of superposition – Moment area method

Columns : Buckling and stability – Columns with pinned ends – Columns with other support conditions – Columns with eccentric axial loads – The secant formula for columns

References:

1) Gere J M. – Mechanics of Materials, Brooks/Cole Thomson Learning
2) Popov E.P- Engineering Mechanics of Solids, Printice-Hall of India Limited, New Delhi, India.
3) Timoshenko S.P. and Young D.H - Elements of strength of materials, East-West Press Private Limited New Delhi, India.
4) Case J., Chilver L. and Ross C.T.F, Strength of Materials and Structures, Elsevier, new Delhi.
5) Nash – Strength of Materials – Shausm's OUTlines, McGraw Hill
6) Subramanian R " Strength of Materials " Oxford University Press.
7) Ramamurtham S " Strength of Materials " Dhanpur Rai & Sons

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B

MODULE I

Materials:-Cement – Ingredients, Chemical composition, basic properties of cement compounds, Hydration of cement- heat of hydration, physical properties of Portland cements, Indian standard tests and specification, various types and grades of cement, storage of cement

Aggregates:- Classification of aggregates. Characteristics of aggregates – Strength of aggregate, particle shape and texture, specific gravity, bulk density, porosity, water absorption and moisture content of aggregate, bulking of fine aggregate, deleterious substance in aggregate, soundness of aggregate , alkali- aggregate reaction , sieve analysis:- grading curves, fineness modulus, grading requirements, grading of fine and coarse aggregates, zoning, IS tests and specification for aggregates for concrete.

Water: - Quality of mixing water, effect of impurities in water on properties of concrete. permissible impurities as per I.S

Admixtures:- Functions and classification of admixtures, factors influencing the dosage of different admixtures- IS specification for admixtures for concrete. accelerators - retarders - plastizers - water reducing agents - use of silica fumes

MODULE II

Properties of fresh concrete:- Water/ Cement ratio and its significance in fresh concrete- workability- different methods for assessing workability according to IS Specification, factors affecting workability, requirements of workability for various work, segregation, bleeding, setting, hardening, strength development.

Process of manufacture of Concrete:- Mix proportion and grade of concrete - Various types of batching, mixing, transporting, placing, compacting, curing and finishing of concrete (in detail). Joints in concreting – construction and expansion.

MODULE III

Properties of Hardened concrete:- Strength of concrete- strength of concrete in compression, tension and flexure - stress- strain characteristics and elastic properties - shrinkage and creep. durability of concrete - permeability - chemical attack - sulphate attack - resistance to abrasion and cavitaion - resistance to freezing and thawing - resistance to fire - marine atmosphere - quality control - frequency of sampling - test specimens - statistical analysis of test results - standard deviation - acceptance criteria.

Non-destructive testing of concrete:-Rebound hammer and ultrasonic pulse velocity testing

MODULE 1V

Special concrete: Lightweight concrete, High strength concrete, Polymer concrete, fiber reinforced concrete, Ferro-cement, Ready mixed concrete. vacuum concrete - shotcrete - steel fibre reinforced concrete- high performance concrete.

Mix Design:- Quality Control - Factors causing variations in the quality of concrete - mix design - nominal mixes - design mixes - factors influencing mix design - A.C.I method - I.S method - design for high strength mixes

References :

1. A.M.Neville, Concrete Technology- Pearson Education
2. A.M.Neville, Properties of Concrete 4/e, Pearson Education
3. Shetty M.S., Concrete Technology, S I Chand & Company
4. A.R.Santhakumar, Concrete Technology , Oxford University Press,India(2006)
5. Gambhin M.L., Concrete Technology, Tata McGraw Hill
6. Orchard D.F., Concrete Technology Vol. I & II
7. Krishna Raju N., Design of Concrete Mixes, CBS publishers
8. John.H.Bungey, The Testing of Concrete in Structures, Urrey University of Press Hall

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

<center>**CE 1305 A/B FLUID MECHANICS –1**</center>

MODULE I
Fluids: Definition-types and properties. Fluid as a continuum, Control volume concept.
Fluid Statics: Fluid pressure-Measurement of pressure- Hydrostatic forces on immersed surfaces-Application of fluid pressure analysis in engineering problems. Buoyancy and stability of immersed and floating bodies, Pressure in case of accelerated rigid body motion.

MODULE II
Fluid kinematics- Methods of describing fluid motion, - Types of motion, Inviscid flows, Velocity and acceleration- Continuity equation- Potential flows-Velocity potential and Stream function. Cauchy Reimann equation – Flownet - Circulation and vorticity
Fluid Dynamics: Types of forces, Forces influencing fluid motion- Energy and Head-Energy correction factor, Euler and Bernoulli' s equations. Application of Bernoulli' s equation. Flow measurement, Linear momentum equations, momentum correction factors, Application of momentum equation.

MODULE III
Pipe flow: Laminar and turbulent forces- Reynolds' number, Major loss in pipe flow-Friction loss, Minor losses, Total energy and hydraulic gradient line, Compound pipes, Pipes in series and parallel, Branching pipes, Pipe network.
Laminar flow - Head loss. Hagen-Poisseulle Equation-Darcy's law for flow through porous media-Stroke's law -Transition from laminar to turbulent flow-Reynold's experiments.
Turbulent flow in pipes- Classification of turbulence - velocity distribution in turbulent flow - smooth and rough pipes -Nikuradse's experiments

MODULE IV
Boundary layer theory - Flow of real fluids-no slip condition Boundary layer growth in flow over a plate, laminar boundary layer and turbulent boundary layer Flow past immersed bodies. drag on a sphere, drag on a flat plate.
Dimensional analysis and similitude - Methods of dimensional analysis, Dimensionless numbers. Principles of similarity- Modeling using Reynolds and Froude laws, Distorted models and Scale effects.

References:

1) Shames I.H. – Mechanics of Fluids McGraw Hill, New York
2) Cengel & Cimbala – Fuild Mechanics – McGraw Hill
3) Streeter V.L and Wylie E.B. . – Fluid Mechanics, McGraw Hill , New York
4) Modi P.N. & Seth S.M. . – Hydraulics and Fluid Mechanics including Fluid Machines- Standard Book House. New Delhi.
5) Subramanya K. . – Theory and Applications of Fluid Mechanics, Tata McGraw Hill Publishing Co, New Delhi.
6) S.K. Agrawal. . – Fluid Mechanics and Machinery, Tata McGraw Hill Publishing Co,New Delhi.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1306 A/B BUILDING TECHNOLOGY AND HABITAT ENGINEERING

MODULE I
Building stones -Requirement of good building stone- characteristics - testing.
Lime: Properties- Classifications -Manufacture -Testing of lime. **Pozzolona:** Natural and Artificial pozzolonas.
Timber - Defects - Seasoning - Decay - Preservation, Tiles- Flooring and roofing tiles-specification-tests.
Paints varnishes and distempers, Common constituents, types and desirable properties.

MODULE II
Miscellaneous materials –Insulating Materials - Thermal and sound insulating material desirable properties and type. Geosynthetics and its applications
Lintels –Arches – Stairs- different types and its components
Doors, Windows and Ventilations -Classification - Technical terms-Classification and Types

MODULE III
Roof - Types of roofs – wooden trusses
Finishing works - Plastering, pointing, painting, white washing, colour washing, distempering; Damp proofing ant termite treatment.

MODULE IV
Climate- Global climatic factors – Elements of climates –Classification of tropical climates- site climate
Comfort : The desirable conditions- Thermal comfort factors-Thermal comfort indices – Effective temperature
 Means of thermal control – Mechanical control- structural control- ventilation and air movement

References:

1. Gurucharan Singh, *Building materials,*,1996
2. Rangwala S. C, *Engineering Materials*, Charotar Publishing House, 1992, Anand
3. Punmia B. C, *Building Construction*, Laxmi Publlications, 1999, New Delhi.
4. Rangwala S. C, *Building Construction*, Charotar Publishing House, 1992, Anand
5. Huntington W.C, *Building Construction*, John Wiley, 1959, New York.
6. Koenigsberger,Manual of Tropical Housing and Building, Orient Longman Ltd

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 13L1 A/B SURVEY PRACTICALS –1

Chain survey :

1. Study of instruments.
2. Travelling and plotting of details-2 exercises.
3. Cross staff survey.

Compass Survey :

4. Study of Prismatic and Surveyor's compass.
5. Traversing with compass and plotting.
6. Open compass traverse- length of closing side by calculation and ploting.

Plane Table survey :

7. Method of Radiation.
8. Method of Intersection.
9. Solving three point problem - Bessel's method.
10. olving three point problem - trial and error method & tracing paper method.
11. Solving two point problem.

Levelling:

12. Study of levelling instruments.
13. Fly levelling.
14. Longitudinal sectioning.
15. Cross sectioning.
16. Contour surveying.
17. Permanent adjustments.

Minor Instruments:

18. Study of planimeter, pantagraph and ediograph.
19. Study of hand levels, clinometer, Ceylon Ghat Tracer and Sextant.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE 13L2 A/B STRENGTH OF MATERIALS LAB

1) Tension test   - mild steel bar, mild steel plate, mild steel wire
2) Double shear test - mild steel bar
3) Torsion test   - mild steel bar
4) Impact test   - IZOD and Charpy test
5) Hardness test   - Brinell, Rockwell
6) Tests of springs   - closed coil spring and open coil spring
7) Fatigue strength
8) Bending test of wooden beam
                              - flexural strength and modulus of elasticity
9) Cement Test   - Standard consistency, Setting time,
                                compressive strength
10) Test on fresh concrete   - workability test
11) Compression test -wood, rock, brick
12) Strength of concrete   - compressive strength, split tensile strength and
                                modulus of rupture
13) Modulus of elasticity of concrete

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE/CS/EB/EC/EE/EI/FT/IT/ME/SE 1401 ENGINEERING MATHEMATICS III

Module 1

Complex Analytic functions and conformal mapping: curves and regions in the complex plane, complex functions, limit, derivative, analytic function, Cauchy – Riemann equations, Elementary complex functions such as powers, exponential function, logarithmic, trigonometric and hyperbolic functions.

Conformal mapping: Linear factional transformations, mapping by elementary function like Z^2, e^z, sin z, cosz, sin hz, and Cos hz, $Z + 1/Z$

Module II

Complex integration: Line integral, Cauchy's integral theorem, Cauchy's integral formula, Taylor's series, Laurent's series, residue theorem, evaluation of real integrals using integration around unit circle, around the semi circle, integrating contours having poles, on the real axis.

Module III

Partial differential equations:

Formulation of partial differential equations.

Solutions of equations of the form F (p,q) = 0, F(x,p,q) = 0, F(y,p,q) = 0, F(z,p,q) = 0 F1(x,p) = F2 (y,q), Lagrange's form Pp+Qq = R

Linear homogeneous partial differential equations with constant co-efficient

Module IV

Vibrating string: one dimensional wave equation, D'Alembert's solution, solution by the method of separation of variables

One dimensional heat equation, solution of the equation by the method of separation of variables,

Solutions of Laplace's equation over a rectangular region and a circular region by the method of separation of variables.

References:

1. R.K.Jain, S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Publishers.
2. C.R.Wilie and L.C.Barrett Advanced Engineering Mathematics, Mc-Graw Hill.
3. Erwin Kreyszig, Advanced Engineering Mathematics, Wilsey Eastern.
4. Churchill R.V, Complex Variables & Applications, Mc-Graw Hill.
5. M.C.Potter, J.L.Goldberg. Advanced Engineering Mathematics, Oxford Unversity Press.
6. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers.

Type of Questions for University Examination

Q1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8x5 = 40 marks)

Q2 to Q5 : Two questions A & B of 15 marks from each module with option to answer either A or B. (4x15 = 60 marks)

MODULE I
Curves : Types of curves - Basic definitions-Elements of a simple curve - Methods of setting out (Linear methods and Angular methods)-Compound Curves-Elements of a compound curve-Reverse Curve-Transition curves-advantages-super elevation- length of a transition curve - vertical curves-Types of vertical curves- length of the vertical curve.

MODULE II
Triangulation : Principles of Triangulation-classification triangulation-reconnaissance-Selection of Triangulation Stations-Intervisibility of Triangulation stations-Determination of elevations of stations (No obstruction due to intervening ground and obstruction due to intervening ground) -Signals-Elevated towers- selection of site for base line-Base line measurement-corrections-Satellite station.- introduction to total station .

Adjustments of observations:
Laws of weight-Corrections to filed measurements with a closing error-Theory of least squares-Normal equation method-Most probable values of directly observed quantities and indirectly observed quantities-Method of differences - Triangulation adjustments -Station adjustments for 3 different. Cases (when the horizon is closed with angles of equal weight - unequal weight-when several angles are measured at a station individually and also in combinations)- Figure adjustment of a plane triangle adjustment of two connected triangles-adjustment of a braced quadrilateral - adjustment of a level network-adjustment of a closed traverse.

MODULE III
Field Astronomy:Definitions - solution of astronomical triangle-Co-ordinate systems-Time - Solar-Sidereal and Standard-Equation of time-sun dial-Determination of time, azimuth, latitude and longitude.

MODULE IV
Hydrographic Survey:Introduction - Shore Line Survey - River survey Soundings Methods of sounding - Method of locatingSoundings – plotting soundings-Three Point problem
Photogrammetry: Phototheodolite -Principle of the method of Terrestrial photogrammetry - Field work - Stereo - Photogrammetry -aerial Surveying - Terminology - Scale and distortio n of the vertical photograph - principle of Binocularvision & Stereoscopic fusion - Flight planning - plotting from Air Photographs - Heighting – Photo Interpretation Comparison between Air Photograph and Map -Application of Air photograph.

References:

1) Dr. B.C. Punmia : Surveying vol II & vol II - Laxmi Publications Pvt Ltd.
2) T.M. Lillesand & R.W Keifer : Remote Sensing and Image Interpretation.
3) Surveying Vol II – Dr K.R Arora Standard Book House
4) Surveying _ Dr.A.M.Chandra New Age Indian National Publishers

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1403 A/B ANALYSIS OF STRUCTURES I

MODULE I

Axially loaded members : Impact loading – Repeated loading at fatigue – Stress concentrations – Nonlinear behavior – Elastoplastic analysis

Stresses in Beams: Built-up beams and shear flow – beams with axial loads – stress concentration in bending – composite beams – transformed section method for composite beams.

Unsymmetrical bending: Doubly symmetric beams with inclined loads – Bending of unsymmetric beams – Shear center concept – shear stresses in beams of thin walled open cross sections – Shear stresses in wide flange beams – Shear centers of thin walled open section

MODULE II

Deflection of statically determinate trusses:– Castigliano's theorem for deflection - theorem of complementary energy – principle of least work-Strain Energy method for determination of deflection of truss joints – the unit-load method – concepts of the angle weights method and joint displacement equation method.

Analysis of statically indeterminate trusses: degree of indeterminacy – externally and internally redundant trusses-force method using reactions as redundant – force method using axial forces in members as redundant – force method using both reactions and axial forces in members as redundant – induced reactions due to yielding of support-pre-strains.

MODULE III

Statically indeterminate beams and frames: Degree of static and kinematic indeterminacies - brief introduction to force and displacement methods. Review of strain energy in tension, torsion and bending

Analysis of indeterminate beams and frames – method of super position- strain energy method- unit load method- induced reactions due to yielding of supports

Three moment equation: derivation of three moment equation – application of three moment equation to analysis of continuous beams subjected to applied loads – analysis of continuous beams subjected to uneven support settlement

MODULE IV

Slope deflection method: derivation of the slope-deflection equation: analysis of statically indeterminate beams- analysis of beams subjected to uneven support settlement – analysis of statically indeterminate rigid frames with and without unknown joint translation – rigid frames subjected to support settlement- Analysis of gable frames.

References :

1) Gere J M. – Mechanics of Materials, Brooks/Cole Thomson Learning.
2) Wang C.K – Intermediate Structural Analysis, McGraw Hill International Edition
3) Menon, D., Structural Analysis, Narosa publishers, 2008.
4) Pytel.A& Kiusalaas J. – Mechanics of Materials- Brooks/Cole Thomson Learning
5) Popov E.P- Engineering Mechanics of Solids, Printice-Hall of India Limited, New Delhi, India.
6) Reddy, C. S., Basic Structural Analysis, Tata McGraw Hill, 2007.
7) Timoshenko S.P. and Young D.H - Elements of strength of materials, East-West Press Private Limited New Delhi, India.
8)

Type of Questions for University Exam.

Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.

Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1404 A/B ENGINEERING GEOLOGY & SEISMOLOGY

MODULE I

Introduction: Definition - branches of geology -scope of geology – geology in civil engineering-Geological time scale

Physical Geology: Rock weathering and soils - physical weathering - chemical weathering - climate and soil formation - classification of soil - soil erosion and its control. *Wind* - Wind erosion - Wind transportation - Wind deposition

Rivers - erosion - transportation - deposition - river meandering - types of rivers - drainage patterns.-*Oceans* – sea erosion - transportation - deposition – coastal protection.

MODULE II

Mineralogy: Definition of minerals - physical properties – Study of physical properties of the following minerals - quartz, Telspar,Muscovite, Biotite, Augite, hornblende, Garnet, Tourmaline, Kyanite, Tale, Kaoline, Serpentine,Calcite, Flourite & Corundum.

Petrology : Classification, texture and structures of Igneous , Sedimentary and Metamorphic rocks- factors & kinds of metamorphism – Engineering properties of rocks- Description, engineering properties and uses of the following rocks – Granite , Syenite, Dioute Gabbro, Basalt, Sandstone, Limestone, Shale, Conglomerate, Breccia, Laterite, Gneiss, Schist, Slate, Quartzite, Marble.

MODULE III

Structural Geology: Attitude of beds, study of structures –folds, faults, fractures and joints – classification, recognition in the field, relevance to civil engineering

Geological Investigation : Objectives – Methods of investigation – Surface investigation – Sub - surface explorations –Geophysical Methods

Engineering Geology : Geological conditions necessary for design and construction of dam & reservoirs, tunnels, buildings & road cuttings – Landslides –definition, classification, causes and their corrections.

MODULE IV

Seismology : Internal structures of the earth – M-discontinuity – sources of seismic activity - Continental Draift - Plate tectonics –fault movement – Reservoir associated earthquakes – Elastic Rebound Theory - seismic waves – Terminology – Intensity and Magnitude of Earthquake – Energy Released during on earthquake – Locating Epicentre and Focus – Recording of an earthquake – Seismograph – working Principle and Sensitivity of a Seismographs – classification of earth quakes - based on depth of focus , magnitude, cause of origin – effects of earthquakes – Primary effects – Secondary effects - Distribution of earth quakes –Seismic History of India Seismic Zones of India – Tsunami – Introduction – Tsunami velocity – Velocity in deep ocean –Velocity in shallow water – wavelength of tsunami wave – Drawdown and Run up of a tsunami – inundates of Tsunami waves.

 References:

1) Parbin Singh : A text book of Engineering and General Geology (Katson Pub. Ludhiana)
2)Waltham .T- Foundations of Engineering Geology, Spon Press . London.
3) F.G.H. Blyth & M.H. de Frieitis Geology for Engineering
4) W.R. Judo : Principles of Engg. Geology and Geotechnics (McGraw Hill)
5) P.K. Mukerjee : A text book of geology (World Press Ltd., Calcutta)

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1405 A/B FLUID MECHANICS- II

MODULE I
Open channel flow in rigid boundary channels- Comparison with pipe flow, Classification of flow, uniform flow – Equations for uniform flow such as Chezy's and Manning's formula, Most efficient channel section – Circular. Rectangular, and Trapezoidal channel sections, Velocity distribution in Open channels, Conveyance, Normal depth, Hydraulic exponents for uniform flow, Determination of normal depth and velocity, Specific energy and Specific force diagrams , Critical flow, Hydraulic exponent for critical flow, Channel transitions , Venturi, Standing wave and Parshall flumes.

MODULE II
Non-uniform flow: Basic assumptions, Gradually Varied Flow, Dynamic Equation for Gradually Varied flow, Different forms of the Dynamic equation, Flow Profiles in Prismatic Channels, Computation of the Length of the Back Water Curve- Graphical Integration and Direct Step Methods. Rapidly Varied Flow- Hydraulic Jump, Hydraulic jump equations for a Rectangular Channel, Practical Applications, Energy loss and Efficiency of a Jump, Stilling Basins, Selection of Stilling Basins, Rapidly varied Unsteady flow – Surges.

MODULE III
Hydraulic Machines: Classification of Hydraulic Machines- Dynamic Thrust of a Jet on Fixed and Moving Surfaces- Work Done and Efficiency
Turbines: classification- head, power and efficiencies – Pelton wheel - Work done & Efficiency – Working proportions - Multiple jet pelton wheel- Design. Francis turbine- general description- Work done & Efficiency - Working proportions – Design- Draft tubes- Draft tube theory- Types of draft tubes Kaplan turbine; General description- Working proportions - Design - Governing of turbines- performance Characteristics- Selection of turbines. Runaway speed – Surge tanks

MODULE IV
Centrifugal pumps: Types-volute and whirlpool chambers-velocity triangle for pumps- least starting speed-efficiency – specific speed-selection and installation of pumps for various purposes-multistage pump.
Positive displacement machines: Reciprocating pumps-types- work cone-effect of acceleration and frictional resistance-slip and coefficient of discharge – separation in such and delivery pipes-air vessels-work save by air vessel-Rate of flow into and from air vessel.

References:

1) Chow V.T. – Open Channel Hydraulics, McGraw Hill, Inc. New York.
2) K.Subramanya. – Flow in Open Channels, Tata McGraw Hill, New Delhi. .
3) M. Hanif Chaudhry. –Open Channel Flow, Prentice Hall of India., New Delhi.
4) P.N. Modi & S.M. Seth. –Fluid Mechanics & Hydraulic Machines, Standard Book House, New Delhi
5) Jagadish lal. – Fluid Mechanics & Hydraulic Machines, Standard Book House, New Delhi
6) Streer and Wylie – Fluid Mechanics – McGraw Hill

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

MODULE I
Doors and Windows (Panelled and Glazed)-Sectional plan, sectional elevation and Front View
Roof Trusses-Elevation and joint details of wooden King post truss and a steel roof truss
Stairs-Plan & Section of RCC dog legged stair

MODULE II
Buildings –Preparation of working drawings (from line sketches or from specifications) of different types of buildings
i) Single storeyed and double storeyed residential buildings
ii) Public utility buildings
iii)Industrial building

MODULE III
Planning of Buildings
Technical terms in building planning, Building rules, preparation of site plans and service plans as per building Rules
Plumbing (including rain water harvesting) and house drainage drawing for building
Planning and designing from given requirements of areas and specifications and preparation of working drawing for residential buildings

References:

1. National Building Code of India
2. Kerala Municipal Building Rules
3. Shaw & Kale-Building Drawing.
4. Balagopal T.S. Prabhu - Building Drawing and Detailing, Spades, Calicut
5. R.S Malik &G.S Meo-Civil Engineering Drawing
6. BP Verma-Civil Engineering Drawing &House Planning-Khanna Publishers,Delhi

Note 1: The student should know the local (Panchayath/Muncipal/Corporation) building rules and should be in a position to prepare sketch design for clients and submission drawing for approval. As a term paper, at the end of the semester, each student should design and prepare a submission drawing in tracing paper for a proposed residential building.

Note 2:Question paper shall consist of Part A and Part B .Part A shall consists of 1 question of 30 marks from Module –I ,in the either or pattern. Part B shall be a compulsory question of 70 marks from Module II or Module III

CE 14L1 A/B SURVEY PRACTICAL – II & SURVEY CAMP

Part A

1.   Study of Theodolite.
2.   Permanent adjustments of Theodolite.
3.   Determination of Tacheometric Constants.
4.   Heights and distances by stadia tacheometry.
5.   Heights and distances by tangential tacheometry.
6.   Heights and distances by solution of triangles.
7.   Setting out simple curve-angular methods.
8.   Demonstration of Total Station.

Part B

Survey Camp - The minimum duration of the survey camp should be one week. The use of total station is compulsory for survey work.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE 14L2 A/B FLUID MECHANICS LAB

1) Study of instruments: Pressure gauge, Piezometer, Manometer, Pressure transducers, Pitot
2) tubes,Current meter
3) Demonstration: Bernoulli's theorem – Phreatic lines – Fluming horizontally and vertically.
4) Steady flow through pipes: Determination of friction factor for various types of pipes.
5) Orifices and mouthpieces: various types – steady case.
6) Notches and weirs: various types – steady case.
7) Time of emptying: unsteady flow.
8) Discharged measurements: Ventrurimeter, Venturi flume, orifice meter, water meter.
9) Open channel flow: determination of Manning's coefficient.
10) Plotting the specific energy curve.
11) Determination of hydraulic exponents.
12) Tracing back water profiles.
13) Tracing draw down profiles.
14) Hydraulic jump parameters.
15) Study of Pelton wheel, Francis, Kaplan turbines.
16) Study of centrifugal pumps, reciprocating pumps, jet pumps, deep well pumps.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE/CS/EB/EC/EE/EI/FT/IT/ME/SE 1501 ENGINEERING MATHEMATICS IV

MODULE 1
Probability distributions: random variables (discrete & continuous), Probability density, mathematical expectation, mean and variance of a probability distribution, binomial distribution, Poisson approximation to the binomial distribution, uniform distribution, normal distribution.
Curve fitting: method of least squares, correlation and regression, lines of regression.

Module II
Sampling distributions: Population and samples, the sampling distribution of the mean unknown(σ known), the sampling distribution of the mean (σ)the sampling distribution of the variance, point estimation, interval estimation, tests of hypotheses, null hypotheses and significance tests, hypothesis concerning one mean, type I and type II errors, hypotheses concerning two means. The estimation of variances: Hypotheses concerning one variance – Hypotheses concerning two variances.

Module III
Finite difference Operators: $\blacktriangledown$, Δ E, δ, μ, $x^{(n)}$
Newton's Forward and Backward differences interpolation polynomials, central differences, Stirlings central differences interpolation polynomial. Lagrange interpolation polynomial, divided differences, Newton's divided differences interpolation polynomial.
Numerical differentiation: Trapezoidal and Simpson's rules, compounded rules, errors of interpolation and integration formulae. Gauss quadrature formulae (No derivation for 2 point and 3 point formulae)

Module IV
Numerical solutions of ordinary differential equations: Taylor series method, Euler's method, modified Euler's method, Runge-Kutta formulae 4th order formula,
Numerical solution of boundary value problems: Methods of finite differences, finite difference methods for solving Laplace's equation in a rectangular region, finite differences methods for solving the wave equation and heat equation.

References:

1. Irvrin Miller & Freiend, Probability And Statistics For Engineers, Prentice Hall of India.
2. S.S.Sastry, Numerical Methods, PHI Publishers.
3. P.Kandaswamy.K.Thilagavathy, K.Gunavathy, Numerical Methods, S.Chand & Co.
4. A.Papoulis, Probability, Random Variables and Stochastic Processes, Mc-Graw Hill.

Type of Questions for University Examination
Q1. Eight short answer questions of 5 marks each with two questions from each of the four modules. (8x5 = 40 marks)
Q2 to Q5 : Two questions A & B of 15 marks from each module with option to answer either A or B. (4x15 = 60 marks)

MODULE I
Introduction to different design philosophies. Principles of Working Stress and Limit State methods (Limit State method in detail), Analysis of singly and doubly reinforced beams of rectangular, and flanged sections. Design for bending, compression, shear and torsion – Design of singly and doubly reinforced beams of rectangular and flanged sections.

MODULE II
Types of **slabs** – design of one-way slabs – temperature and shrinkage reinforcement – behavior of two way edge supported slab – analysis by coefficient method – Design of two way edge supported slab.
Analysis and design for torsion: Torsion in plain concrete members – torsion in reinforced concrete members – combined torsion and shear – Limit state design of beams – Code provision for torsion design

MODULE III
Bond, anchorage and development length: Fundamentals of flexural bond – ultimate bond strength and development length – Code provisions for development of tension reinforcement – anchorage of tension bars by hooks – anchorage requirements for web reinforcement – development of bars in compression – bundled bars – bar cutoff and bend points in beams
Serviceability: Cracking in flexural members – Code provisions for crack control – control of deflection – immediate deflection – deflection due to long term loads – Code provisions for control of deflection – deflection due to shrinkage and temperature changes.

MODULE IV
Staircases- types of staircase-design of straight flight stair cases.
Columns: Design of short columns – axial compression – lateral ties and spirals – compression plus bending in rectangular columns – strain compatibility analysis and interaction diagrams – balanced failure – distributed reinforcement –unsymmetrical reinforcement – circular columns – Code provisions for design of short columns – biaxial bending – Design of slender columns – concentrically loaded columns – compression plus bending – Code provisions for design of slender columns.

References:

1) Nilson A.H –Design of Concrete Structures, McGraw Hill Companies Inc.
2) Pillai S.U & Menon D – Reinforced Concrete Design, Tata McGraw Hill Publishing Company Limited, New Delhi, India.
3) Varghese P.C –Limit State Design of Reinforced Concrete, Prentice Hall of India Pvt Ltd, New Delhi, India.
4) Syal and Goel – Reinforced concrete structures – S Chand

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1503 A/B ANALYSIS OF STRUCTURES II

MODULE I

Moment distribution method: stiffness and carry over factors – distribution factors – analysis of statically indeterminate beams subjected to applied loads – check on moment distribution – modified stiffness factors at the near end when far end is hinged – analysis of statically indeterminate beams subjected to uneven support settlement – analysis of statically indeterminate rigid frames with and without joint translation – rigid frames subjected to support settlement.

MODULE II

Approximate methods of multistorey frame analysis: Vertical and lateral load analysis of multistory frames – degree of indeterminacy– assumptions for vertical load analysis –Substitute frame method- assumptions for lateral load analysis – portal method – cantilever method – alternate moment and shear distribution – comparison of methods

MODULE III

Influence lines and moving loads: definition of influence line – influence line for statically determinate beams – criterion for maximum reaction or shear in simple beams – criterion for maximum bending moment in simple beams – absolute maximum bending moment in a simple beam – Muller Breslau influence theorem for statically determinate beams – influence lines for statically determinate trusses – criterion for maximum bending moment at a panel point on the loaded chord of a truss – criterion for maximum bending moment at a panel point on the unloaded chord of a truss – criterion for maximum bending moment at a panel point on the web member of a truss – Muller Breslau influence theorem for statically determinate trusses

MODULE IV

Arches and frames: Three Hinged arches-Two hinged arches – symmetrical hingeless arches – Influence lines for bending moment shear force and axial thrust – frames with and without hinges
Cable Suspension bridges: Equilibrium of unstiffened cable – tension in the cable – Length of the cable – anchor cable – roller support – effect of cable length due to change in temperature

References:

1) Wang C.K –Intermediate Structural Analysis, McGraw Hill International Edition.
2) Menon, D., Structural Analysis, Narosa publishers, 2008.
3) Pandit and Gupta – Theory of structures – Tata McGraw Hill
4) Roy and Chakrabarty – Fundamentals of Structural Analysis – S Chand
5) Norris C. H. and Wilbur J. B., Elementary Structural Analysis, McGraw Hill, New York.
6) Punmia B.C, Jain A.K and A.K. Jain, Theory of Structures, Laxmi Publications (P) ltd.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1504 A/B GEOTECHNICAL ENGINEERING –I

MODULE I
Nature of soil and functional relationships: Soil types – residual soil and transported soil. Three phase system – void ratio – specific – specific gravity- dry density – porosity-water content-saturate unit weight-submerged unit weight – degree of saturation –Relationship between Basic Soil properties.
Concepts of single grained, honey combed and flocculant structure - Basic Structural units of clay minerals-common clay minerals.
Laboratory and field identification of soils: Determination of water content by oven drying – specific gravity using Pyenometer and specific gravity bottle – grain size analysis by sieve analysis, hydrometer analysis and pipette analysis – Atterberg limit and indices, sensitivity & thixotropy field density by core cutter, sand replacement and wax coating methods. Classification of Soils: Necessity – Principles of classification – I.S. classification – plasticity chart.

MODULE II
Soil water: Classification- effective stress - total stress - pore pressure - pressure diagrams for different conditions
Permeability: definition - Darcy's law - factors affecting permeability - laboratory determination – permeability of stratified soils
Stress distribution: Boussinesque's and Westergaard's equations for vertical pressure due to point loads and uniformly distributed loads - assumptions and limitations - pressure bulb – Newmarks` charts and their use

MODULE III
Consolidation: definition - concepts of coefficient of compressibility - coefficient of volume change and compression index - e-log p curves - pre-consolidation pressure - Terzaghi's theory of one dimensional consolidation - determination of coefficient of consolidation - difference between consolidation and compaction
Compaction: definition and objectives of compaction - proctor test and modified proctor test - concept of OMC and maximum dry density - zero air voids line - factors influencing compaction - field compaction methods - Proctor needle for field control

MODULE IV
Shear Strength: definition - Mohr's strength and stress circles - Mohr's envelope - Mohr-Coulomb strength theory - direct, triaxial and UCC tests - drainage conditions-UU, CU and CD tests - vane shear tests - total and effective stress - strength parameters –
Stability of slopes: slope failure, base failure and toe failure - Swedish circle method - friction circle method - Taylor's stability number - stability charts

References:

1) Gopal Ranjan & Rao A.S.R – Basic and Applied Soil Mechanics, Wiley Eastern Ltd
2) Das B.M – Principles of Geotechnical Engineering – Thomas Brooks Cole, Singapore
3) Punmia B.C. – Soil Mechanics and Foundations, Saurabh
4) Terzaghi K. & Peck R.B. – Soil Mechanics in Engineering Practice, John Wiley
5) Venkataramaiah, C- Geotechnical Engineering, New Age International Publishers.
6) Arora K.R. Soil Mechanics and Foundation Engineering, Standard Publishers, Distributors.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1505 A/B TRANSPORTATION ENGINEERING – I

MODULE I
Classification, Alignment & surveys: Classification of highways – typical cross sectional roads in embankment and in cutting, definition of various cross sectional elements – requirements and factors controlling alignment of roads, Engineering surveys.
Geometrical Design of Highways: Camber – sight distances – Stopping, passing and overtaking Sight distances, Overtaking zone requirements, worked out problems – design of horizontal alignments, design speed – horizontal curves – Super elevation – Super elevation design – radius of horizontal Curve – extra widening of pavement – transition curves and methods of provision of super elevation and design of horizontal alignment – design of vertical alignment – gradient and grade Compensation Vertical
curves – summit curves – length of summit curve - valley curves – length of valley curve

MODULE II
Traffic Engineering: Traffic Characteristics – various traffic studies and their application- traffic regulations and controls – Traffic control Devices – Traffic Signals – classification of signals – carriage way markings – traffic islands – Highway intersections.

MODULE III
Highway Materials, Testing & Design:: Road aggregates – Desirable props & tests – Bituminous materials – Types of bituminous materials used in highway construction – requirements – desirable properties and tests.
Highway construction & Maintenance : Construction of earth roads, Gravel roads WBM roads, Bituminous pavements, Bituminious construction Procedures – Construction of Cement concrete pavements. Joints in Concrete pavements – types and causes of failures in flexible and rigid pavements – Highway drainage. Pavement Design –Basic difference between flexible and rigid pavements – factors to be considered in Design of pavements – Design of flexible pavements by CBR method only.

MODULE IV
Aircraft characteristics – Regional planning airport site selection – Surveys for site selection Airport obstructions zoning laws-classification of obstructions – Imaginary surfaces. Runway orientation- wind, rose diagram-basic runway length and corrections required- Airport classification – runway configurations. Taxiway Design requirements.
Apron- factors controlling size and number of gate positions –Aircraft parking System –Hangar site location – facilities required in the terminal building-Blast fences-Typical airport layout-airport marking-airport lighting. Air traffic control-Airway aids and landing aids.

References:

1) S.K. Khanna & C.E.G. Justo – Highway Engineering, New Chand & Bros
2) L.R. Khadiyali – TrafficEngg. And Transport Planning, Khanna Publishers
3) S.K. Khanna, M.G. Arora & S.S. Jain – Airport Planning & Design, New Chand & Bros
4) S.C. Rangwala – Airport Engineering, CharoterPublishing House.
5) Horenjeef Robert & Francis – Planning & design of airport.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1506 A/B WATER RESOURCES & IRRIGATION ENGINEERING

MODULE I

Hydrologic cycle, scope, application of hydrology. Precipitation: Formation of precipitation –forms of precipitation – type of precipitation - measurement of precipitation –recording and non recording gauges – gauge network - adjustments of precipitation data - average depth of precipitation over an area - Arithmetic mean, Theissen polygon and isohyetal method – Hyetograph – Mass curve - Depth area duration curves. Water Loses : Evaporation, transpiration and infiltration – Factors affecting evaporation-measurement of evaporation - Evaporation formulas – Infiltration, factors affecting infiltration. Determination of infiltration rate - Effect of infiltration on run–off - Recharge of ground water

Run off : Factors affecting run–off – Empirical formulae-runoff – hydrograph - Components of hydrograph - Separation of base flow - Hydrograph for isolated storm and complex storm - unit hydrograph - derivation of unit hydrograph for isolated and complex storm – Unit hydrograph for different duration – S hydrograph.

MODULE II

Ground water Hydrology : Occurrence, distribution of ground water – Darcy' s law – Permeability, safe yield - Location and development of ground water supplies - Hydrology of well – Steady flow in confined and unconfined aquifers - open well – yield of an open well – Effect of partial penetration - Interference of wells - Boundary effect - Specific capacity of well – Tube wells –Yield from a tube well - Strainers – Site for a tube well Flow and lift Irrigation –Perennial and Inundation irrigation - Important Crops and crop seasons –Duty and delta – Method of Cultivation - Water requirement – Irrigation efficiency – Multipurpose projects. Reservoirs : Investigation and planning – Selection of site – Engineering, Geological, and hydrological Investigations - Fixation of storage capacity - Contours- Mass curve - operation of reservoirs - reservoirs sedimentation.

MODULE III

Head works : Storage and diversion works- Layout of head works - Selection of site – Weirs- Types of weirs – Weirs on permeable foundation – Uplift and piping – Bligh' s creep theory - Lane' s weighted creep theory – Khosla' s theory of independent variables - Design of aprons- Body wall – vertical drop weir - design of sloping glacis weir. River regulators - Silt excluder -Silt vane. Surplussing Arrangements : Spillways – Type and Functions – design of Ogee Spillway and Siphon Spillway - energy dissipation below spillways – stilling basin – spillway crest gates. Distribution works : Classification of canals – design of canals – erodible canals - canals in alluvial soils – regime theory – Kennedy, Lacey traction theories – Manning' s formula - Design. Non–erodible canals - Friction formula—Chezy,Manning' s formula, Silting in canal and prevention – Scour-protection against scour.

MODULE IV

Storage works : Type of dams-Gravity dams –Forces acting on a gravity dam-Elementary profile-Single step method of design –Method of stability analysis-Zonal method of designsafety criteria-Galleries in dams. Arch dams – Types-Thin cylinder theory. Earth and rockfill dams-Types of earthern dams.

References:

1) Subramanya K, Engineering Hydrology, Tata McGraw-Hill.
2) Punmia & Lal, Irrigation and Water Power, Laxmi Publications Pvt Ltd.
3) Modi P N, Irrigation Water Resources & Water Power, Standard Book House.
4) Sahasrabudhe S F, Irrigation Engineering & Hydraulic Structures, Kataria Publications.
Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 15L1 A/B GEOTECHNICAL ENGINEERING LABORATORY

1) Determination of Specific gravity, water content and particle size distribution by hydrometer method.
2) Determination of field density by core cutter and sand replacement method.
3) Determination of Atterberg Limits.
4) Compaction tests – I.S. light and heavy compaction.
5) California Bearing Ratio Test
6) Permeability tests – constant head and variable head methods.
7) Consolidation test.
8) Shear strength tests – Direct shear, Triaxial, UCC & Vane Shear Test
9) Demonstration of field tests like Standard Penetration Test, Dynamic Cone Penetration Test, Static Cone Penetration Test, Electrical Resistivity method, Pressure meter test, Plate load test.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE 15L2 A TRANSPORTATION ENGINEERING LABORATORY

Tests on Aggregates

    (i)   Crushing Value
    (ii)   Los-Angeles Abrasion Value
    (iii)   Impact Value
    (iv)   Specific Gravity
    (v)   Water Absorption
    (vi)   Shape Test – Flakiness Index, Elongation Index & Angularity Number

2. Tests on Bitumen

    (vii)   Viscosity Test
    (viii)   Ductility Test
    (ix)   Softening Point Test
    (x)   Specific Gravity
    (xi)   Penetration Test
    (xi)   Flash Point Test

3. Tests on Soil

    (xii)   CBR Test

4. Test on Bituminous mixes

    (xiii)   Marshall Test

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE 15L2 B TRANSPORTATION ENGINEERING LABORATORY

Tests on Aggregates

    (i)   Crushing Value
    (ii)   Los-Angeles Abrasion Value
    (iii)   Impact Value
    (iv)   Specific Gravity
    (v)   Water Absorption
    (vi)   Shape Test – Flakiness Index, Elongation Index & Angularity Number

2. Tests on Bitumen

    (vii)   Viscosity Test
    (viii)   Ductility Test
    (ix)   Softening Point Test
    (x)   Specific Gravity
    (xi)   Penetration Test
    (xi)   Flash Point Test

3. Tests on Soil

    (xii)   CBR Test

4. Test on Bituminous mixes

    (xiii)   Marshall Test

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE 15L3 B INDUSTRIAL/FIELD TRAINING

Students selected under the B stream shall undergo an Industrial/Field training of 2 weeks duration during semester break between IV and V semester in the construction sites of BAI (Builders Association of India) on topics related to the following.

Visit to various production units of Engineering Materials

Bricks, Cement blocks, Stones, aggregates, Cement, steel.

Types of concretes and concreting practices.

Construction

Setting out-familiarization with plans
Rubble masonry-brick masonry

Note: A report of the same should be submitted at the beginning of the 5th semester and evaluation shall be conducted based on the report, presentation and viva-voce.

CE 1601 A/B ENVIRONMENTAL ENGINEERING –I

MODULE I
Scope of Environmental Engineering-Global environmental problems. Water supply Engineering-Quantity of water-forecasting population-rate of consumption of various purposes-factors affecting consumption-fluctuations in demand. Quality of water – effect of storage on quality of water, drinking water standards-physical, chemical and bacteriological analysis of water.

MODULEII
Sources of water –surface water sources-Intakes-Groundwater sources-water supply schemes-pumps-pumping stations-transmission of water-materials of water supply pipes –Design of gravity and pumping main-Distribution systems-Different layout of pipe networks-House connection from mains-Different valves, meters and hydrants- Storage of water, Storage reservoirs-balancing reservoir-Detection and prevention of leaks in the distribution systems-maintenance of distribution systems.

MODULE III
Sanitary plumbing-Sanitary fixtures-Systems of piping-House drainage-Connection of house drains and street sewers. Systems of sewerage-Quantity of storm sewage-Quantity of sanitary sewage-Sewers, types, materials, shape, construction, appurtenances, hydraulic design of sewers,-sewage pumping, ejectors, sewer junctions-maintenance, inspection and ventilation of sewers.

MODULE IV
Natural methods of wastewater disposal: land disposal-Sewage farming-disposal by dilution-self-purification of streams-oxygen sag curve-dilution into sea, comparison of disposal methods. Air pollution: type of pollutants, sources, health effects, meteorological aspects, stack height, type of plume rise, monitoring and air pollution control. Solid waste management : type, sources, characteristics, collection, vehicles for transportation and processing – Disposal: composting, sanitary land fill, incineration. Noise pollution: Sources, effects, control, noise survey.

References:

1. Garge.S.K, Environmental & Engineering, Vol I & II, Khanna publications,2001, New Delhi.
2. Birdic G.S & Birdic J.S, Water supply and Sanitary Engineering, Dhanput Rai & Sons,1998 , New Delhi
3. Peavy Rowe, Tchobanoglous, Environmental Engineering,Mc Graw Hill International Editions.
4. Veslind & Morgan- Introduction to Environmental Engineering,Thomson Learning
5. M.N.Rao & H.V.N.Rao, Air Pollution, Tata Mc Graw Hill Pvt.Ltd, New Delhi.
6. Mark.J.Nammer & Mark. J .Hammer Jr, Water and Wastewater Technology, Prentice Hall of India,Pvt Ltd,1998, New Delhi.4

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1602 A/B DESIGN OF STRUCTURES II

MODULE I
Materials and specifications: rolled steel sections- types of structural steels – specifications-Limit state and working stress design concepts, **Types of connections** – *Bolted joints*-Types of bolted joints-load transfer mechanism-failure of bolted joints-efficiency of the joint-*welded joints*- advantages and disadvantages of welded joints – types of welds and their symbols -Design of welded and bolted connections.

MODULE II
Tension member: Net sectional area – permissible stresses – design of axially loaded tension member.
Compression member: strength of an axially loaded compression member – effective length – maximum slenderness ratio – compression member with two rolled sections back to back – design of compression members – lacing and battening for built-up compression member – column base – slab base – gussetted base.

MODULE III
Beams: design procedure for laterally supported and unsupported beams – built up beams
Plate girders- design of section, curtailment of flange plate, bearing and intermediate stiffeners, connections, flange and web splices, Gantry girders (only design concept).

MODULE III
Light gauge steel structures – Types of sections, Flat width ratio, Buckling of thin elements, Effective design width, Form factor, Design of tension, compression members and beams.
Plastic design- basic assumptions - shape factor, load factor- Redistribution of moments - upper bound lower bound and uniqueness theorems- analysis of simple and continuous beams, two span continuous beams and simple frames by plastic theory - static and kinematic methods.

References:

1. Subramanian N., Design of steel structures, Oxford University Press
2. Arya A.S. and J. L. Ajmani, Design of Steel Structures, Nemchand & Bros
3. Dayaratnam P., Design of Steel Structures, Wheeler
4. Ramachandra, Design of Steel Structures, Standard books
5. Duggal S.K., Design of Steel Structures, T.M.H. Publications
6. IS. Codes: IS:800-2007, IS:811-1987, IS:801- 1975

Use of IS. Codes: 800-2007, 811-1987, 801- 1975 and Structural Steel Tables is permitted in the Examination Hall.

MODULE I
Introduction to the Flexibility and Stiffness Matrix Methods: Concept of flexibility and stiffness influence coefficients – Development of flexibility matrix- Concept of element approach – Development of equilibrium matrix – Element flexibility matrices for truss and beam elements - Development of structure flexibility matrix-Evaluation of displacements in statically determinate beams, rigid jointed and pin-jointed plane frames by flexibility matrix approach – Analysis of statically indeterminate beams and rigid jointed plane frames by flexibility method.

MODULE II
Analysis by Stiffness Matrix Method:
Concept of development of stiffness matrix– Element approach – Development of compatibility matrix – Element stiffness matrices for truss and beam elements – Equivalent joint loads-Development of structure stiffness matrix by element approach– Analysis of statically indeterminate beams, rigid jointed and pin-jointed plane frames by stiffness matrix approach-effect of fabrication errors or temperature changes – effect of support settlement

MODULE III
Concept of direct stiffness method –Local and global coordinate system-Transformation of element stiffness matrices from local to global co-ordinates – Equivalent nodal forces and load vector- Overall stiffness matrix-Application of direct stiffness method to two span continuous beams-plane frames- Advantages of direct stiffness method – Comparison of flexibility matrix and stiffness matrix methods

MODULE IV
Finite element method: Concept of discretization of continuum-Finite element analysis procedure- Stress-strain relation (Constitutive relation)- Types of finite elements – Plane stress and plane strain problems – Displacement function – Convergence and compatibility requirements -natural coordinate system – shape functions – truss element, beam element and linear 2D element-Lagrange and Serendipity elements –- computation of element stiffness matrix and nodal load vector- Isoparametric element

References:

1. William Weaver Jr. and James M. Gere, Matrix analysis of framed structures, CBS Publishers, New Delhi.
2. Pandit G. S. and Gupta S. P., Structural analysis – A Matrix Approach , Tata McGraw Hill, New Delhi.
3. Krishnamoorthy C.S. – Finite Element Analysis , Theory and Programming, Tata McGraw Hill Publishing Company Limited, New Delhi, India.
4. Cook R.D, Malkus D.S. & Plesha M. E, Concepts and Applications of Finite Element Analysis, John Wiley & Sons.
5. Mukhopadhyay M. and Sheik A.H, Matrix and Finite Element Analysis of Structures, ane Books Pvt. Ltd.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1604 A/B GEOTECHNICAL ENGINEERING-II

MODULE I
Earth Pressure-General and local states of plastic equilibrium – Rankines and coulomb's theories for active and passive conditions- influence of surcharge – Rebhann's and Culmann's graphical methods for active earth pressure
Sheet pile walls and cofferdams : Types and uses of sheet piles – Design of cantilever and anchored sheet pile walls. Types and uses of coffer dams.

MODULE II
Site investigation and soil exploration: objectives - planning - reconnaissance - methods of subsurface exploration - test pits - Auger borings - rotary drilling - depth of boring - boring log - soil profile- location of water table - S.P.T, Cone Penetration Tests, Plate load test, field vane shear test - geophysical methods (in brief) - sampling - disturbed and undisturbed samples – soil investigation report

MODULE III
Foundation -Functions of foundations - requisites of satisfactory foundations - definition of shallow and deep foundation - different types of foundations -selection of type of foundation
Bearing capacity: ultimate bearing capacity and allowable soil pressure - Terzaghi's equation for bearing capacity for continuous , circular and square footings - bearing capacity factors and charts - Skempton's formulae - effect of water table on bearing capacity – IS recommendation
Settlement analysis: distribution of contact pressure – estimation of immediate and consolidation settlement - causes of settlement - permissible, total and differential settlements us per IS recommendation
Design considerations – Proportioning shallow foundations
Raft foundations: bearing capacity equations - design considerations - floating foundations

MODULE IV
Pile foundations: uses of piles - classification of piles based on purpose and material –selection of type of piles - determination of capacity of axially loaded single vertical pile - (static and dynamic formulae) - determination of capacity by penetration tests and pile load tests (IS methods) - negative skin friction - group action and pile spacing – settlement analysis of pile groups.
Caissons: different types – different shapes of well foundations- construction details and design considerations of well foundations

References:

1) Gopal Ranjan & Rao A.S.R – Basic and Applied Soil Mechanics., Wiley Eastern Ltd
2) Joseph.E. Bowles – Foundation Analysis and Design., Mc Graw Hill
3) Tomlinson – Foundations Design and Construction.
4) W.C.Teng, Foundation Design, Prentice Hall of India
5) N.P. Kurian – Design of foundation system, Narosa Publication
6) Das B.M – Principles of Foundation Engineering – Thomson Learning
7) P.C.Varghese- Foundation Engineering, Prentice Hall of India
8) Arora K.R. Soil Mechanics and Foundation Engineering, Standard Publishers, Distributors.

 Note: Structural designs of foundations are not contemplated in this course.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1605 A/B TRANSPORTATION ENGINEERING –II

MODULE I

Railway Engineering: Permanent way – main requirements – Component parts. Rails –functions of rails – requirements of a good rail, weight and length., defects in rails, rail joint and other fastenings, check and guard rails, coning of wheels, creep of rail. Sleeper- its functions and requirements, types of sleepers, sleeper density. Ballast- functions and requirements, different types used. Geometric Design: Design of horizontal curves-Super elevation, negative super elevation in branches, length of transition curves –grade compensation on curves, widening of gauge on curves.

MODULE II

Railway Operation control: Points and Crossings-Design features of a turn out-Types of railway track points – Details of station yards and Marshalling yards-Signaling and interlocking – Principles of track circuiting-Control of train movement by absolute block system-automatic block system-Centralized traffic control systems.

Tunnel Engineering: Tunnel sections-types size and shapes-tunnel surveying-Alignment, transferring center grade in to tunnel-tunnel driving procedure-tunneling through hard and soft soils(Only Full face Method and Needle Beam Method) –Tunnel lining ventilation lighting and drainage of tunnels.

MODULE III

Harbor Engineering: Classification of harbours Breakwaters-necessity and functions-different types-forces acting on breakwater-design principles-construction of breakwaters-general study of pier heads, quays, landing stages-wharves, jetties, transit sheds and warehouses-channel demarcation-signal characteristics Beacons,buoys,channel- lighting, light houses).

MODULE IV

Dock Engineering Function and types of docks, dry docks, floating docks slipways, dock gates and caissons-s Dredging-Mechanical and hydraulic dredgers-general study of bucket ladder-Dredger, grab dredger and dipper dredgers.

References:

1) S.C.Rangwala – Railway Engineering , CharoterPublishing House
2) Saxena & Arora – Railway Engineering, Dhanpatrai & Sons.
3) Subash C.Saxena – Railway Engineering , Dhanpatrai&Sons
4) S.P.Bindra – A Course in Docks & harbor Engg., Dhanpatrai & Sons
5) Chandola – A text book of Transportation Engineering – S Chand

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1606 A/B E1 COST EFFECTIVE BUILDING TECHNIQUES

MODULE I
Cost Reduction Techniques – Planning aspects
Innovative techniques for foundation- ground improvement by rope drains-bamboo reinforcement-sand piles- Brick arch foundation- stub foundation
Foundations in weak soil deposits

MODULE II
Locally available building materials and their usability, Corrugated roofing sheets from coir, Applications of bamboo in building construction-flooring-roofing-ceiling-Trusses.
Innovative techniques for walls- Lato blocks-cellular concrete blocks-hollow concrete blocks-hollow clay blocks- Stabilized Soil blocks-Stone masonry blocks- Sand lime bricks. Straw-bale technology.
Innovative technique for super structure- Rat trap bond masonry (Practical assignment)

MODULE III
Innovative techniques for roofing- Funicular shells-Precast reinforced concrete channel units- Precast reinforced concrete cored units- Prestressed concrete hollow cored units- Precast RCC joists flooring/roofing systems- roofing system with cellular units- Reinforced brick panel roofing system-Two-way spanning flooring system using precast units- Cellular light weight concrete roofing units- Ferro cement ribbed slabs and folded plates- Filler slabs .

Innovative roofing technology- Filler slabs (Practical assignment)

MODULE IV
Mud Construction – Mud as building and building material – Field tests for identification of suitable soil for mud construction- Techniques for mud stabilization.- Techniques of mud construction- finishes and protective treatments

Mud Construction- Production of mud blocks (Practical assignment)

MODULE IV
Prefabricated building components – advantages of prefabrication. Ferro-cement products. Applications of industrial wastes in building process – Fly ash-Lime sludge

Prefabrication- Ferro-cement slab (Practical assignment)

References:

1) A.G Madhava Rao and D.S Ramachandra Murthy : Appropriate Technologies for Low cost housing
2) Mohan Rai and M.P Jaisingh: Advances in building materials and construction, CBRI Rookie Publications
3) F.S. Merrit : Building Construction Hand book.
4) D.J.Perry & P.S.Brandew : Cost planning of buildings.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1606 A E2 ENVIRONMENTAL GEOTECHNIQUES

MODULE I

Clay mineralogy and soil structure: Gravitational and surface forces-inter sheet and inter layer bonding in the clay minerals- Basic structural units of clay minerals- isomorphous substitution – kaolinite mineral-montmorillonite mineral- illite mineral- electric charges on clay minerals – base exchange capacity- diffused double layer- adsorbed water- soil structure- methods for the identification of minerals (introduction only).

MODULE II

Effect of environment on Geotechnical properties of soils: Effect of drying on Atterberg limits.-Volume change behaviour- factors controlling resistance to volume change- general relationship between soil type, pressure and void ratio.- importance of mineralogical composition in soil expansion. Activity- sensitivity-causes of sensitivity-influence of exchangeable cations, pH and organic matter on properties of soils. Permeability of soils- hydraulic conductivity of different types of soils – Darcy's law and its validity- factors affecting permeability

MODULE III

Wastes and Contaminants (introduction only): sources of wastes-types of wastes- composition of different wastes- characteristics and classification of hazardous wastes- generation rates- ground water contamination-sources of ground water contamination- transport mechanisms-potential problems in soils due to contaminants.
Soil waste interaction; contaminant transport - advective, diffusive, dispersive and combined process - attenuation capacity- change in engineering properties; permeability, shear strength, atterbergs limit, compressibility and swell. Soil remediation- soil washing, fixation, electrokinetic remediation, biological treatment, thermal treatment and containment

MODULE IV

Disposal and containment technics: Criteria for selection of sites for waste disposal-hydrological aspects of selection of waste disposal sites- disposal facilities- subsurface disposal technics-disposal systems for typical wastes (sketches only)
Containment control systems- liners and covers for waste disposal- rigid liners- flexible liners. Ground modification technics in waste management – waste modification- ground modification- mechanical modification-hydraulic modification- chemical modification.

References:

1. Mitchell, J (1976), " Fundamentals of soil behaviour", John Wiley and sons, New York
2. Lambe, T. W & Whitman, R. V (1979), " Soil Mechanics ", John Wiley and Sons, New York.
    Gopal Ranjan & A.S.R Rao (1991), " Basic and Applied Soil Mechanics", Wiley Eastern Ltd., New Delhi.
3. Wilson, M. J (1987), " A Hand book of Determinative methods in Clay Mineralogy", Chapman and Hall, New York.
4. Robert M. Koerner (1984), "Construction and Geotechnical methods in Foundation Engineering", McGraw Hill Book Co., New York.
5. Yong R. N. (1992), " Principles of contaminant Transport in Soils", Elsevier, New York.
6. Ramanatha Iyer T. S (2000), "Soil Engineering Related to Environment", LBS centre
7. Datta M (1997), "Waste disposal in engineered landfills", Narosha publication New Delhi,
8. Gulathi S. and Datta M(2005), "Geotechnical Engineering ",Tata MC Graw-Hill Publishing Company Ltd. New Delhi
9. Sharby R(2000), "Environmental Geo technology", Chapman and Hall London
10. Daniel D. E (1993), "Geo technical Practice of waste disposal", Chapman and Hall London
11. Bachi, "Design Construction and monitoring of landfills" ,John Wiley and Sons New York

MODULE I
Traffic Engineering: Definition, Functions.
Road User, Vehicle and The Road: Human factors governing road user behaviour - Vehicular characteristics.
Traffic Surveys: Speed, Journey time and delay study – Methods-Moving observer method, Presentation of data- grouping of speed data, cumulative frequency curve, problems. Vehicle volume counts and classifications - methods Parking surveys. Uses of photographic techniques in traffic survey.
Origin- Destination Surveys- methods, zoning and presentation of results.

MODULE II
Traffic Controls: Different types of traffic signs and markings. Traffic signals - design, coordinated signals-time-distance diagram -area traffic control-Other traffic control aids and street furniture.
Intersections And Interchanges –Types-Planning and layout
Traffic Safety: Accidents-causes and prevention.
Parking: Parking problems – desirable parking space standards for different land use -common methods of on-street parking, off-street parking facilities, parking surveys
Traffic Management-Concept and techniques.
ITS, GIS And GPS- Introduction to Intelligent Transportation Systems, Geographic Information System and Global Positioning System
Street Lighting- Necessity, methods, arrangement- at carriageways, T, rotary, bend, bridge, tunnels.

MODULE III
Highway Capacity And Level Of Service: Definitions - PCU-LOS concept, Factors affecting capacity and LOS. Capacity of highways, urban streets, rotary, weaving sections and intersections.
Theory Of Traffic Flow: Fundamental diagram of traffic flow-Relationship among the variables.

MODULE IV
Transportation Economics: Road user cost-Motor Vehicle operation cost – fixed and variable costs – road user benefits – principles of economics – analysis through annual cost – rate of return and benefit cost ratio methods – worked out problems.

References:

1. Traffic Engineering & Transport Planning- Kadiyali L R, Khanna Publishers.
2. Traffic Planning and Engineering- Hobbs, F .D., Pergamon Press
3. Traffic Engineering- Mc. Shane, William R., Roess, Roger P., Prentice Hall ,New Jersey.
4. An Introduction Transportation Engineering - Jotin Khisty C., Kent Lall B., Prentice Hall.
5. Principles of Transportation Engineering - Partha Chakraborthy, Animesh Das, Prentice Hall India.
6. Recommended Practice for Traffic Roataries - IRC 65-1976
7. Guidelines for capacity of roads in rural areas -IRC 64-1990
8. Guidelines for design and installation of Road Traffic Signals -IRC 93- 1985

CE 1606 A E4 AIR POLLUTION CONTROL AND MANAGEMENT

MODULE I
Sources and effects of Air pollution : Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming - ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

MODULE II
Dispersion of Pollutants: Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate – Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models - Applications.

MODULE III
Air Pollution Control :   Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

MODULE IV
Air Quality Management **:** Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality. Noise Pollutin **:** Sources of noise pollution – Effects – Assessment - Standards – Control methods – Prevention

References:

1.   W.L.Heumann, Industrial Air Pollution Control Systems, McGraw-Hill, New Yark, 1997.
2.   Mahajan S.P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company, New Delhi, 1991.
3.   Peavy S.W., Rowe D.R. and Tchobanoglous G. Environmental Engineering, McGraw Hill,New Delhi, 1985.
4.   Garg, S.K., "Environmental Engineering Vol. II", Khanna Publishers, New Delhi
5.   Mahajan, S.P., "Pollution Control in Process Industries", Tata McGraw-Hill, New Delhi, 1991.
6.   Anjaneyulu, D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
7.   Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
8.   Rao M.N., and Rao H. V. N., Air Pollution Control, Tata-McGraw-Hill, New Delhi, 1996.

CE 1606 B E2 CONSTRUCTION ENGINEERING AND MATERIALS MANAGEMENT

MODULE I
Formwork: Requirements of a good formwork – Loads on form work – guiding points in the design of form work – properties of timbers used in the form work – column form work – spacing of yokes – formwork for beams and floors – form work for deck slabs in bridges

MODULE II
Scaffolding/ Falsework, Shoring and Underpinning: Scaffolding – parts of scaffolding – types of scaffolding – points to be kept in view of scaffolding – shoring – types of shoring – underpinning – methods of underpinning
Construction dewatering- Coffer dams- Temporary sheeting and bracings

MODULE III
Drilling and blasting equipments – Tunneling equipments – equipments for the production of crushed aggregates – Factors affecting selection of equipments.
Managing construction equipments – equipment economics – owning costs – operating costsreplacement decision – equipment cost control – plant layout.

MODULEIV
Materials Management and Inventory Control :
Materials Management – Functions of materials Management, objectives of materials management, Inventory, Inventory control, Inventory classification & Management, Inventory control, its objectives and how to achieves them, Functions of inventories, Economics order Quantity, Inventory models- Simple EOQ model EOQ model with stock out, Inventory model under risk ABC analysis.

References:

1. Peurifoy,RL, Ledbetter WB & Schexnayder CJ – Construction planning equipment and method – McGraw Hill Publishing company
2. Gurucharan Singh – Building construction Engineering – standard book house
3. P.Gopalakrishnan & M. Sunderesan- Materials Management- an Integrated Approach.
4. A.Deb- Materials Management-Academic Publishers
5. O.P. Khanna- Industrial Engineering and Management, Dhampat Rai Publications .

CE 1606 B E3 MIS & FINANCE MANAGEMENT

Module I
Introduction to MIS Introduction to networking-concepts of networking- types and inter connection of various networks(LAN/MAN/WAN) Data base: DBMS definition, advantages of RDBMS,
Concept of data and information –role of MIS for managing information system for decision making –phases in the information system life cycle
File storage : selection consideration for file media and file organization methods

Module II
Engineering Economics : Nature and scope of economics, Demand and Supply, elasticity of demand and supply, concept of cost and revenue, concept of equilibrium and margin. Four factors of production and their peculiarities
Money and banking- Functions of money, functions of bank, commercial and central banks, monetary policy of the reserve bank of India.

Module III
Finance Management : Tasks evolution of corporate management , Long term financing equity, preference and debenture, term loans . Short term financing, working capital, influencing factors, cash budgeting, Budgets and budgetary control-objectives of budgeting classification ratio analysis.

Module IV
Management of Accounting: Fundamentals of book keeping , journalizing ledger accounts, subdivision of journal cash book, banking transactions, trail balance, preparation of trading profit and loss account and bank balance sheet ,adjustments.

References:

1)   Murdick & Rose : Information systems of Modern Management, Prentice Hall
2)   Prasanna Chandra Tata: Financial Management, Mc Graw Hill
3)   R.R. Barthwalk - Indstrial economics
4)   Paul A Samuelson – Economics – An introductory analysis
5)   V.Rajaraman : Analysis and design of information systems
6)   Stefar K & Staney : Theory and Practice of relational data bases.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each module with option to answer either A & B.

CE 16L1 A/B ENVIRONMENTAL ENGINEERING LAB

1. Determination of solids (total, dissolved, organic, inorganic and settleable) in water.
2. Determination of turbidity and optimum coagulant dose.
3. Determination of alkalinity and ph of water.
4. Determination of hardness and chlorides in water.
5. Determination of iron in water.
6. Determination of sulphates and sulphides in water.
7. Determination of h.o and BOD of waste water.
8. Determination of available chlorine in bleaching powder and the chlorine dose required to trent the given water sample.
9. Determination of manganese in water.
10. Determination of coliforms in water.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE16L2 A CAD IN CIVIL ENGINEERING

1. Panelled door
2. Glazed window
3. Roof truss in structural steel sections- king post truss
4. Reinforced concrete staircase

Residential buildings

5. A cottage
6. A residence
7. A twin house with combination roof
8. Flats

Public buildings

9. A small hospital
10. A factory building

Note: serial no 1,2 ,3& 4 drawings shallbe drawn in drawing sheet and also using AutoCAD or other equivalent software. Sl. No. 5 to 10 shall be drawn only using software.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE16L2 B CAD IN CIVIL ENGINEERING

1. Panelled door
2. Glazed window
3. Roof truss in structural steel sections- king post truss
4. Reinforced concrete staircase

Residential buildings

5. A cottage
6. A residence
7. A twin house with combination roof
8. Flats

Public buildings

9. A small hospital
10. A factory building

Note: serial no 1,2 ,3& 4 drawings shall be drawn in drawing sheet and also using AutoCAD or other equivalent software. Sl. No. 5 to 10 shall be drawn only using software.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE16L3 B INDUSTRIAL/FIELD TRAINING

Students selected under the B stream shall undergo an Industrial/Field training of 2 weeks duration during semester break between V and VI semester in the construction sites of BAI (Builders Association of India) on topics related to the following.

Visit to various Construction sites of Multistoreyed Building

Bar bending schedule-Placing of reinforcement-Concreting- finishing work

Building Services- plumbing for water supply and sanitary works-air conditioning-lift

Note: A report of the same should be submitted at the beginning of the 6th semester and evaluation shall be conducted based on the report, presentation and viva-voce.

CE 1701 A/B ENVIRONMENTAL ENGINEERING – II

MODULE I
Storage of water - effect of storage on quality of water: general layout of treatment plant. Sedimentation – plain sedimentation, theory of sedimentation, continuous flow sedimentation tanks. Theory of coagulation and flocculation, design of flash mixers, clarifiers and clarifloculators. Filtration - Theory of filtration, Classification of filters, design, construction, control, operation and maintenance of these units. Disinfection, methods of disinfection, chlorination. Miscellaneous treatment methods: color, odour and taste removal, iron and manganese removal, deflouridation, removal of hardness. Aeration, purpose of aeration.

MODULE II
Objectives of wastewater treatment - Effluent standards, KSPCB Standards, BIS Standards. Layout of conventional treatment plant - preliminary, primary, secondary and tertiary treatments in general. Preliminary process: screens - types of screens, design, disposal of screenings- comminutors, grit chamber - function, design, construction and operation, disposal of grit , detritus tank, skimming tank -function, design and operation, disposal of skimming Sedimentation: Theory of sewage sedimentation - design construction and operation, rectangular and circular tanks, disposal of sludge.

MODULE III
Biological process: principle and theory of biological treatment. Sewage filtration; Trickling filters - design, construction and operation. Activated sludge process: Design, construction and operation of conventional and extended aeration, aeration methods. Miscellaneous methods- Stabilization ponds, Oxidation ditch, Aerated lagoons, rotating biological contactors; disinfection of sewage effluents.

MODULE IV
Sludge treatment and disposal: quantity of sludge, characteristics of sludge, sludge thickening, digestion, conditioning and disposal, design of sludge digesters only. Septic Tanks: Design (as per Ministry of urban development) construction, disposal of effluents, cleaning of tanks, Imhoff tanks.
Sewage treatment by high rate anaerobic methods: Anaerobic digestion suspended growth, contact process, UASB, attached growth, filters, expanded bed- only basics .

References:

1. S.K.. Garg, Environmental Engineering Vol. I & II, Khanna Publishers, New Delhi.
2. Metcalf & Eddy, Waste water Engg. 3 rd Edbn, Mc Graw Hill International Editions.
3. Sawyer and mc Carthe, Chemistry for Environmental Engineering, Mc Graw Hill
4. Fair, Geyer & Okun, Water and Waste water Engineering,
5. Mark J Hammer, Water and waste water technology, John Wiley and Sons,Inc.
6. Vesilind & William A. Worrell- Solid waste Engineering-Thomson Learning.
7. B.C.Punmia, Water supply Engineering, Arihant Publications, Jodpur.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

MODULE I
Footings- Design of Isolated footings- axial and eccentric loading- Design of Combined footings- rectangular and trapezoidal footings.
Retaining walls – Design of cantilever retaining walls with horizontal and inclined surcharge- counterfort retaining walls.

MODULE II
Pre-stressed Concrete – General principles- systems of prestressing- materials for prestressing - **Loss of prestress**: Significance – Lump sum estimate – elastic shortening of concrete – time dependent losses – loss due to creep of concrete – loss due to shrinkage of concrete – loss due to steel relaxation – loss due to anchorage take up – loss or gain due to bending of members – practical considerations for frictional loss – theoretical considerations for frictional loss – total amount of losses elongation of tendons

MODULE III
Analysis of sections for flexure: Stresses in concrete due to prestress – stresses in concrete due to loads – stresses in steel due to loads – discussion on moment curvature relationship of a prestressed concrete beam
Design of sections for flexure: Preliminary design – general concepts of elastic design – elastic design with no tension in concrete – elastic design allowing tension – elastic design allowing and considering tension – ultimate design – arrangement of steel and prestressing in stages

MODULE IV
Water tanks – design of circular, square and rectangular water tanks at ground level- design of overhead water tank (excluding supporting structure).

References:

1. P.C.Varghese- 'LimitState Design of Reinforced Concrete',PrenticeHall of India Ltd.
2. Ashok K Jain -'Reinforced Concrete Limit State Design .Nem Chand Brothers, Roorkee
3. Unnikrishna Pillai & Devadas Menon- Reinforced Concrete Design, Tata McGraw- Hill
4. N.Krishnaraju, Prestressed Concrete Tata McGraw- Hill
5. Lin T.Y & Burns N.H – Design of prestressed concrete structures, John Wiley & Sons, New York.

*Note: Relevant IS codes are permitted during the Examination***.**

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1703 A/B CONSTRUCTION MANAGEMENT

MODULE I
Organisation and Management: Concept of organisation, characteristics of organisation, elements of organisation, organisational structures, organisation charts, Types of organisation - formal line, military or scalar organisation, functional organisation, line and staff organisation, project organisation, matrix organisation, management by objectives
Organisational conflict , group Dynamics, Organisational change, motivation and leadership, Authority and responsibility, span of control, Delegation of authority. – Centralisation and decentralization.

MODULE II
Construction Planning: Objects of planning – stages of construction – Construction team – resources of construction industry – objects of management – planning and scheduling – scheduling using bar charts - limitations of bar chart – Material schedule – labour schedule – equipment schedule – financial schedule – mile stone chart –Gantt Charts

MODULE III
CPM and PERT networks – Difference between CPM and PERT – development of a network – representation of various activities and events in a CPM network – Network logic – network calculation – advantages of CPM over bar chart – crashing the programme – crash cost – time cost balancing – progress control – recording progress – methods increasing productivity – PERT network – Selection of network techniques

MODULE IV
Construction Equipments : Engineering Fundamentals – Tractors and related equipments – excavating equipments – Bull dozer, power shovel, dragline, Clam shells, scrapers – Hauling and Conveying equipments – Trucks and Wagons - Belt conveyor systems – Cranes.

References :

1. B.Sengupta and H.Guha - Construction Management and Planning- Tata McGraw Hill
2. Arora and bindra – Building construction Planning Techniques and methods of construction – Dhanpat rai& Sons
3. Peurifoy and Schexnayder – Construction Planning, Equipment, and Methods- Tata McGraw Hill
4. Shrivastava-Construction Planning and Management- Galgotia Publications
5. Gahlot and Dhir- Construction Planning and Management- New Age International
6. O.P Khanna- Industrial Engineering and Management- Dhanapat Rai Publications

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1704 A/B QUANTITY SURVEYING AND VALUATION

MODULE 1
Purpose of estimates- different methods-Preparation of detailed estimates and abstracts for RCC single storey buildings – Road works - R C.C footings -Columns – Beams and slabs -preparation of bar bending schedule

MODULE 2
Preparation of specification for common materials of construction and its items of works with reference to IS specifications. Analysis of rates for earth works, mortars, RCC Works, plastering, brick works, stone works, laterite work, Pointing, , flooring , reinforcement works.

MODULE 3
Valuation – explanation of different technical terms
Depreciation – methods of calculating depreciation – straight line method – constant percentage method, sinking fund method – and quantity survey method.

MODULE 4
Principles of valuation of old buildings and valuation of land – comparative method – abstractive method- belting method- valuation of based on hypothetical building schemes. Methods of valuation of property – rental method – direct comparison with capital cost – valuation based on profit – valuation based on cost – development method – depreciation method. Free hold and leasehold properties – gilt edged securities
Rent fixation- Methods

References:

1. B.N.Dutta : Estimating and Costing in Civil Engineering
2. Chakrabarthi : Estimating Costing and Specifications in Civil Engg.
3. N.A.Shah : Quantity Surveying and Valuation.
4. Ranagawala : Valuation of Real Properties

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1705 A E1 DESIGN OF SPECIAL STRUCTURES

MODULE I

Design of Special RC Elements
Design of RC walls - Ordinary walls and shear walls - Design of Corbels - Deep beams and grid floors.
Design of Flat Slabs and Folded Plates
Design of flat slabs. Design of folded plates- Folded Plate structures - structural behaviour - Types - Design by ACI - ASCE Task Committee method

MODULE II

Design of Shell Structures
Membrane theory of shells-Classification of shells - Types of shells - Structural action-Membrane theory - Shells of revolution and shells of translation - Examples - Limitations of membrane theory.
Design of Spatial Structures
Space frame - design philosophy-Space frames - configuration - types of nodes – general principles of design Philosophy – Behaviour. Analysis of space frames - Formex Algebra, FORMIAN - Detailed design of Space frames.

MODULE III

Design of Power Plant Structures
Bunkers and Silos - Chimneys and Cooling Towers - High Pressure boilers and piping design – Nuclear containment structures.
Analysis and Design of Power Transmission Structures
Analysis and design of Transmission Line Towers. Types of bracing patterns - Sag and Tension calculations. Substation Structures. Tower foundations-Design of foundations for towers - Structural design of supports for foundation excavation design of ground anchors

MODULE IV

Design of Short Span Bridges: Load distribution theories, analysis and design of slab culverts, tee beam and slab bridges
Design of Long Span Girder Bridges: Design principles of continuous bridges, box girder bridges, balanced cantilever bridges **-Foundations for Bridges:** well and caisson foundations

References:

1. Purushothaman, P, Reinforced Concrete Structure Structural Elements : Behaviour Analysis and Design ,Tata Mc Graw Hill, 1986.
2. Krishna Raju, N.Advanced Reinforced Concrete Design, CBS Publishers and Distributors, 1986.
3. Ramasamy, G.S., Design and Construction of Concrete Shells Roofs, CBS Publishers, 1986
4. Principles of Space Structures by Dr.N.Subramanian - 1999, Wheeler Publishing Co.
5. A.R.Santhakumar and S.S.Murthy, Transmission Line Structures, Tata McGraw Hill, 1992.
6. Raina V.K. "Concrete Bridge Practice" , Tata McGraw Hill Publishing Company, New Delhi, 1991.
7. Krishnaraju, N., "Design of Bridges" Oxford and IBH Publishing Co., Bombay, Calcutta, New Delhi, 1988
8. Ponnuswamy, S., "Bridge Engineering", Tata McGraw Hill, 1989
9. Thomlinson, M.J. and Boorman.R., "Foundation design and construction", ELBS Longman,VI edition, 1995.

Note: Relevant IS codes are permitted during the Examination.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1705 A/B E2 GROUND IMPROVEMENT TECHNIQUES

MODULE I
Introduction to Ground improvement techniques: Role of ground improvement in foundation engineering-Geotechnical problems in alluvial, lateritic and black cotton soils
Drainage and Dewatering: well point system, shallow & deep well system, vacuum dewatering, electro osmosis
Chemical and Thermal Methods of stabilization: cement stabilization-types of soil cement-factors affecting soil cement mixing
Lime stabilization-effect of lime on soil properties – Brief description of Electrical and Thermal methods

MODULE II
In-situ densification methods in granular soils: Introduction-mechanical stabilization-deep dynamic compaction-vibro compaction- blasting
In-situ densification methods in cohesive soils: Preloading- Concept of three dimensional consolidation –sand drain design and methods of their installation – fabric drains-stone columns & lime piles (installation techniques only)

MODULE III
Introduction to grouts and grouting- basic functions -Classification of grouts -Grout ability Ratio
Properties of grouts: viscosity, fluidity, stability, rigidity, thixotropy, permeance
Grouting applications: seepage control in soil and rock under dams- seepage control in soil for cut off walls – stabilization grouting for underpinning

MODULE IV
Earth Reinforcement- Concept of reinforced earth –load transfer mechanism and strength development – Stability analysis of reinforced earth retaining walls-external stability analysis, internal stability analysis (brief mention about the methods only) - application areas.
Geosynthetics: Classification- Functions of geotextiles as separators, reinforcement, filters and in drainage-damage and durability of geotextiles- Natural Geotextiles and its application

References:

1) M.J. Tomlinson - Foundation design and construction
2) Robert M. Koerner - Construction and Geotechnical Methods in Foundation Engineering, Mc Graw Hill
3) C.J.F.P Jones - Earth Reinforcement and soil structures,Buuterworths
4) F.G.Bell , Foundation Engineering in Difficult Ground, Butterworth, London, 1983
5) Purushothama Raj.P – Ground Improvement techniques ,Laxmi Publications(P) Ltd., New Delhi
6) Shashi.K.Gulhati & Manoj Datta –Geotechnical Engineering , Tata McGraw Hill
7) G.L.Sivakumar Babu --- An Introduction to Soil Reinforcement and Geosynthetics - 2007
8) Beena K.S - Soil improvement and Coir Geotextiles, Cochin University Publications.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1705 A/B E3 HIGHWAY AND AIRFIELD PAVEMENT DESIGN

MODULE I
Introduction: types and component parts of pavements - Functions of various layers of pavements-prime coat, tack coat, seal coat- factors affecting design and performance of pavements - comparison between highway and airport pavements – functions and significance of sub grade properties – various methods of assessment of sub grade soil strength for pavement design - cause and effects of variations in moisture content and temperature - depth of frost penetration - design of bituminous mixes by Marshall method.

MODULE II
Stress analyses and methods of flexible pavement design: stresses and deflections in homogeneous masses - Burmister theoy - wheel load stresses - ESWL of multiple wheels - repeated loads and EWL factors - empirical, semi - empirical and theoretical approaches for flexible pavement design - group index, CBR, -IRC method ,triaxial, Mcleod and Burmister layered system methods.

MODULE III
Rigid Pavements: Westergaard's approach-Bradbury's stress coefficients-IRC method of design. Temperature Stresses in Concrete pavements-Warping stress-Frictional Stress-Combination of stresses. Joints in Concrete pavements-Necessity-requirements-Types-Expansion joints-Contraction Joints-Construction joints . Design of joints-dowel bars and tie bars. Design of Airport pavements-requirements of airport pavements, overview of design methodology, design of flexible and rigid airport pavements.

MODULE IV
Pavement evaluation: structural and functional requirements of flexible and rigid pavements - pavement distress - evaluation of pavement structural condition by Benkelman beam rebound deflection and plate load tests - introduction to design of pavement overlays, Problems of highway rehabilitation

References:

1. Yoder and W Nitezak, 'Principles of Pavement Design', John Wiley
2. Yang, 'Design of Functional Pavements', McGraw Hill
3. Khanna S.K. and Justo, CEG, *Highway Engineering*, NemChand and bros.
4. David Croney, 'The Design and Performance of Road pavements', HMSO publications
5. Hass and Hudson, 'Pavement Management System', McGraw Hill Book Co.
6. IRC: 37 - 2001, 'Guidelines for the Design of Flexible Pavements'
7. IRC: 58 - 2002, 'Guidelines for the Design of Rigid Pavements'
8. IRC 81-1981- 'Tentative Guidelines for Strengthening of Flexible Pavements by Benklman Beam Deflections Techniques'.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1705 A E4 GROUND WATER ENGINEERING

MODULE I

Introduction – Characteristic of Ground water – Distribution of water - ground water column –Permeability - Darcy's Law - Types of aquifers – Hydrogeological Cycle – water level fluctuations. Storage coefficient - Specific field – Heterogeneity and Anisotrophy -Transmissivity

MODULE II

Governing equations of ground water flow - Steady state flow - Dupuit Forchheimer assumptions – Velocity potential - Flow nets. Transmissivity and Storativity – Pumping test – Unsteady state flow - Thiess method – Jacob method -Chow's method – Thesis recovery method – conditions to check for steady state – unconfined aquifer constants – well losses and well efficiency and well interfaces.

MODULE III

Image well theory – Effect of partial penetrations of wells - Collector wells. Infiltration gallery - Conjunctive use - Artificial recharge- Rainwater harvesting - Safe yield –Yield test – Geophysical methods – Selection of pumps.

MODULE IV

Ground water chemistry - Groundwater development – hydrological maps - Origin, movement and quality - Water quality standards – groundwater contamination - Saltwater intrusion –control measures Environmental concern. Introduction to Groundwater modeling .

References:

1. Todd D.K., "Ground Water Hydrology", John Wiley and Sons, 2000.
2. Raghunath H.M., "Ground Water Hydrology",Wiley Eastern Ltd., 2000.
3. C Walton, "Ground Water Resource Evaluation", McGraw-Hill Publications.
4. V.V.N. Murthy, Land and Water Management Engineering. 1985. Kalyani Publishers, New Delhi

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1701 B E1 CONTRACTS & LEGAL ASPECTS IN CONSTRUCTION

MODULE I
Law of Contracts: Introduction to the Indian Contract Act, 1872- Definitions, Communication, Acceptance, Revocation, Contract, Void Agreement, Contingent contracts, Performance, Breach of contract.
Arbitration clauses in contract - Arbitration process, Benefits of arbitration.
Bidding process–Methods of bidding, Negotiation.

MODULE II
Contract Labour Act, 1970, and Central Rules 1971: Important definitions, Registration of establishments, Licensing of contractors, Welfare and Health provisions in the Act and the Rules, Penalties. Familiarisation with important forms such as Form I, II, IV, V, VI, VI-A, VI-B, VII, XVI and XVII appended to the Central Rules.
Building & Other Construction Workers' (RE & CS) Act, 1996 and Central Rules, 1998: Applicability, Administration, Registration, Welfare Board & Welfare Fund, Training of Building workers, General OSH provisions, Penalties.

MODULE III
Workmen's Compensation Act, 1923: Important definitions, Employer's liability for compensation, Calculation of amount of compensation. Employer's Liability Act, 1938: Grounds for barring defense of common employment, contracting out. EPF and Miscellaneous Provisions Act 1952: Introduction to the Act and EPS-95 scheme.

MODULE IV
Object, applicability, important provisions and penalty for non-compliance pertaining to the following Acts: Payment of Wages Act 1936; Minimum Wages Act, 1948; Equal Remuneration Act, 1976; Employment of Children Act; Children (Pledging of Labour) Act, 1933; Interstate Migrant Workmen Act, 1979.

References:

1) Law of Contracts – M. Krishanan Nair (Orient Longman)
2) Law of Contracts & Specific Relief – Avtar Singh (Eastern Book Co.)
3) Law of Contracts - P.S. Narayanan & S.R.C. Nair (Gogia Law Agency)
4) Law of Arbitration & Conciliation –Avtar Singh (Eastern Book Co.)
5) Lectures on Arbitration, Conciliation and - Dr. Rega Surya Rao (Andhra Law House)
6) Labour Laws – H.L. Kumar (Universal Law Publishing Co.)
7) Acts & Rules mentioned above with latest amendments.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 17L1 A/B COMPUTER APPLICATIONS IN CIVIL ENGINEERING

Using STAAD of Equivalent package

1) Analysis & Design of truss system
2) Analysis & Design of steel frames
3) Analysis & Design of RC frame
4) Analysis & Design of combined steel truss and RC frame (Auditorium)
5) Design of footings

Using Primavera or MS project or equivalent package

Identification of activities and preparation of bar chart and
Network diagram of following projects

1) Construction of multi-storey building
2) Installation of new water supply scheme
3) Construction of high way

References:

1) STAAD Reference Manual / Equivalent package reference manual.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE 17L2 A/B BUILDING TECHNOLOGY AND NDT LAB

Building Science Laboratory

1) wind flow using anemometer
2) temperature contours inside a room using digital thermometer
3) sound intensity contours inside a room
4) light intensity contours inside a room
5) humidity measurement inside a room
6) shadow in a building model

Nondestructive Testing Laboratory

1) Ultrasonic Pulse velocity test   -concrete
2) Rebound hammer test   -concrete
3) Penetration resistance   -concrete
4) Core sampling   -concrete

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE 17L3 A/B SEMINAR

Students shall individually prepare and submit a seminar report on a topic of current relevance related to the field of Civil Engineering. The reference shall include standard journals, conference proceedings, reputed magazines and text books, technical reports and URLs. Each student shall present a seminar for about 30 minutes duration. Each students shall evaluated by a team of internal experts comprising of 3 teachers based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the seminar report.

CE 17L4 A INDUSTRIAL TRAINING

Students have to visit at least one industry relevant to civil engineering as part of industrial training and spend a minimum of 15 days during semester break between VI and VII semester. A report of the same should be submitted at the beginning of the 7th semester and evaluation shall be conducted based on the report, presentation and viva-voce.

CE 17L4 B INDUSTRIAL/FIELD TRAINING

Students selected under the B stream shall undergo an Industrial/Field training of 2 weeks duration during semester break between VI and VII semester in the construction sites of BAI (Builders Association of India) on topics related to the following.

Soil Investigation

Construction-different types of foundation, Highways and Embankments

Prestressing- Bridges

Industrial Structures- steel-fabrication and erection

Specification for various works- measurement and Billing

Note: A report of the same should be submitted at the beginning of the 7th semester and evaluation shall be conducted based on the report, presentation and viva-voce.

CE 17L5 A/B PROJECT

Each batch comprising of around 5 students shall identify a project related to the curriculum of study. At the end of the semester, each student shall submit a project synopsis comprising of the application and feasibility of the project.

Guidelines for evaluation :

1.	Attendance and Regularity	10
2.	Theoretical knowledge and individual involvement	15
3.	Quality and contents of project synopsis	15
4.	Presentation	10

	Total	50 Marks

Note : Evaluation will be done by the respective project guide and project coordinator.

MODULE I
Principles of Architectural Design: Definition of Architecture – factors influencing architectural development, Qualities of Architecture, Creative and Design Principles in architecture Characteristic features of a style – historical examples from Neolithic, Egyptian, Roman and Gothic architecture.

MODULE II
Functional Planning of Buildings: Occupancy classification of buildings – general requirements of site and building- building codes and rules
Functional planning of residential buildings
Basic concepts of Sustainable architecture- Green buildings – Various rating systems for the assessment of sustainability

MODULE III
Town Planning Theory: Evolution of towns – problems of urban growth-beginning of town planning acts – ideal towns –garden city movement – concept of new towns -comprehensive planning of towns. Re- planning of existing towns
Survey –Necessity- Collection of data- types-uses-Methods-drawings-reports
Zoning-Objects- principles-importance-advantage-transition zone-economy of zoning-zoning powers

MODULE IV
Housing- classification of residential buildings- Agencies for housing- Housing finance agencies- problems of housing in India
Slums – causes- Characteristics- Effects-slum clearance schemes –Re-housing

Master Plan – Objects- –Necessity- Collection of data- drawings- features- Planning standards- Report
Neighborhood planning- Principles- importance- features, Public utility services, Green belt

References:

1) Barister Fletcher – A History of world Architecture
2) Ernest Pickering - Architecture Design
3) G.K. Hiraskar – Great Ages of World Architecture
4) Rangwala - Town Planning –Charotar Publishing House
5) Satish Chandra Agarwala - Architecture & Town Planning –Dhanpat Rai & Co (P) Ltd

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1802 A/B EARTHQUAKE ENGINEERING

MODULE I
Earthquake Ground Motion: Causes of earthquake- Seismic waves-Intensity & Magnitude of earthquake-Energy released in an earthquake-earthquake frequency- seismic zones in India-**strong motion**-source effect-path effect-site effect-use of strong motion data; strong motion characteristics-**Response spectrum**-types of response spectra-design spectrum.

MODULE II
Seismic Resistant Building Architecture: Seismic effects on structures-Inertia forces-deformations-horizontal & vertical shaking-Importance of architectural features-effects of irregularity-Lateral load resisting systems-**Building Characteristics**-Mode shapes & fundamental period, Building frequency & ground period, Damping, Ductility, Seismic weight, Hyperstaticity, Non structural elements, foundation soil/Liquefaction, foundations-Quality of construction & materials.

MODULE III
Structural Dynamics: Free vibrations & forced vibrations-SDOF & MDOF systems- Free vibration of undamped SDOF system- free vibration of viscously damped SDOF system-Forced vibration of SDOF systems-harmonic excitation-base motion-principles of vibration isolation-determination of damping coefficient.

MODULE IV
Lateral Loads: IS 1893 based determination of design lateral forces in multi-storey RC buildings.
Soil structure interaction effects: direct approach-sub structure approach(description only)
Ductility requirements of RC buildings: displacement ductility-rotational ductility-considerations based on IS13920 in flexural members, columns , joints of frames(description only)

References:

1) Agarwal P& Shrikhande M-Earthquake Resistant Design of Structures, Prentice Hall of India Pvt Ltd, New Delhi.
2) Duggal - Earthquake Resistant Design of Structures, Oxford University Press.
3) Park R and T Paulay – Reinforced Concrete Structures, John Wiley.
4) Anil K Chopra- Dynamica of Structures, Pearson Education Pvt Ltd.
5) Mario Paz-Structural Dynamics, Theory & Computation, CBS Publishers & Distributors, New Delhi.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1803 A/B CONSTRUCTION SAFETY & FIRE ENGINEERING

MODULE I
Introduction to Construction Industry and Safety: Basic concepts – accident – injury –lost time accidents, reportable accident, frequency rate, severity rate, incidence rate.

Technological, Organisation and Behavioral Aspects of safety in construction. Human factors that are Impediments to safety in construction. Roles of different groups in ensuring safety, health, welfare and social security. Steps to be taken in construction sites in case of accidents. Introduction to ergonomics and its relevance to construction.

MODULE II
Safety in various construction operations such as soil excavation, rock blasting, dewatering, piling, demolition, working at heights-ladders and scaffolds, working in confined spaces. Safety in electrical works at construction site.

Safety in storage, stacking and handling of construction materials-cement, lime, aggregates, bricks and blocks, steel, glass, paint and varnish, flammable and hazardous materials used at sites.
Safety in the operation of construction equipments- excavators, trucks, tower cranes, mobile cranes, lifting tackles, chain and pulley. Personal protective equipment's for construction.

MODULE III
Classification of fire. Effect of high temperature on the properties of concrete, steel, masonry, wood. Fire damage to concrete, steel, masonry and timber. Repair techniques to the fire damaged reinforced concrete columns, beams, slabs and to the steel structural members.

MODULE IV
Design principles of fire resistant walls.
Classification of buildings based on occupancy, types of construction as per National Building code of India; Fire zones; General Requirements of fire protection for all individual occupancies.
Life safety aspects of building fires – Exit Requirements as per NBC of India. Requirements other than general requirements for buildings of different occupancy classification.

References:

1. K N Vaid :Construction Safety Management
2. Smith & Harmathy : Design of Buildings for Fire Safety
3. National Building Code of India, Part –IV and VII
4. Linger L. :Modern Methods of Material Hand ling.
5. E.W. Merchant :A Complete Guide to Fire & Buildings
6.V K Jain : Fire Safety in Buildings , New Age International (p) Ltd , New Delhi

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1804 A/B E1 RETROFITTING AND REHABILITATION OF STRUCTURES

MODULE I

Concept of Repairing – retrofitting – strengthening – rehabilitation – restoration – remoulding

Repair materials/ methods : – Repair methodology, issues related to material Technology - Desired properties of repair materials – materials for repair – new repair systems / products.

Distresses in concrete structures – Deterioration of structures – causes and prevention – crack repair techniques – Repair techniques/ materials for structures – repair of structural components

MODULE II

Retrofitting of Masonry buildings: Failure mode of masonry buildings – out-of-plane failure – in-plane failure – diaphragm failure – failure of connection – methods of retrofitting – cement or epoxy injection– using wire mesh and cement mortar – re construction of bulged portion of masonry wall – grouting with cement – pointing with mortar – shotcreting – using FRP fabric – using RC and steel frames – adding reinforcements to masonry – stitching of wall corners – use of tie rods – Prestressing of masonry – external binding or jacketing – Splint and bandage technique – Inserting new walls – exterior supplemental elements – strengthening of parapets

MODULE III

Retrofitting of RC structure: Global retrofitting methods – adding new shear walls – adding steel bracing – adding infill walls – non-conventional methods – seismic base isolation – Supplemental damping devices; Member or local retrofit methods – jacketing/confinements –jacketing of columns using steel sections – reinforced concrete jacketing – FRP jacketing – beam jacketing – beam column joint jacketing – slab column connection – foundation – cost comparison of different methods

MODULE IV

Repair of Concrete Floors: Surface preparation – thin bonded toppings – reinstating joint sealants – Crack repair – crack cleaning and resin injection – crack cutting and mortar filling – application of cement/sand screed – use of toppings

Retrofitting of Steel Structure: Rain water protection – drainage in structural members – preparation of surface by sand blasting – protective coatings – Cathodic protection – Sacrificial metal – adding additional plates strengthening the joints – concrete jacketing

References:

1) Agarwal P & Shrikhande M – Earthquake Resistant Design of Structures – Prentice Hall of India Pvt Ltd, New Delhi.
2) Balachandran and Margrab – Vibrations – Thomason Books Cole
3) A.R.Santhakumar – Concrete Technology , Oxford University Press New Delhi

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1804 A/B E2 ADVANCED CONSTRUCTION TECHNIQUES & FIELD QUALITY CONTROL

MODULE I
Advanced Construction Techniques: Light construction Techniques – Foundation, Framing Accoustical ceiling, Doors & Windows , Stairs, Thermal, insulation, Plumbing, Prestressing Techniques, Transportation of concrete by conveyers, pumping, cranes etc. Improved Building Technologies – Walls, Roofs, Prefabrication.

MODULE II
Heavy construction - Rock drilling, Conveying equipments, Pneumatic equipments, Rock blasting, Tunneling, Concrete forming, Asphalting, Soil Reinforcement & application of geosynthetics, Application of Ferro cement. Use of new Construction chemicals - Ready mix concrete and grouting materials .

MODULE III
Inspection of works and checklists –Excavation, Backfilling, Site Development, Blasting, Demolition, Piling, Caissons and well foundation and other underwater works, Under ground works, Stone Masonry, Brick masonry, Preparation of mortar, Concrete, Centering & Shuttering, Reinforcement, Concreting, Plastering, Painting Scaffolding, Plumbing & sanitary works, Flooring, Roofing, Structural steel works, Field QA/QC plan, Records.

MODULE IV
Quality control in Road works: Introduction to IRC and MOST standards – General system Requirements, Field Laboratory, Material specifications, Introduction to ISO 9000/IS 14000 Series – Relevance to Construction, Overview, Interpretation of important clauses, Elements / System Requirements of ISO 9001 – Quality Policy, Quality System, Contract Review Process, Design control. Control of documents, Puchasing Standards, Product Identification and Traceability, Process Control Standards to prevent nonconformities, Inspection and Testing Standards, Standards for personnel training. Building the ISO System – Quality Manual, Procedure Manual, Quality Documentation. Implementation – Quality System Management, Auditing, follow up audits.

References:

1. John E.Ball - Light Construction Techniques
2. S.P Brahma - Foundation Engineering
3. A.G. Madhava Rao -Appropriate Technologies for Low-cost housing
D.s. Ramachandra Murthy
4. V.N. Vazirani, S.P Chadola –Heavy Construction
5. James E. Russel - Construction Equipment
6. Robert L. Pecrifoy, W.B. Ledbeffer,- Construction Planning, Equipment and methods
Clifford J Schexnayder
7. R. Chudley -Construction Technology
8. A.C. Panchadhari -Construction Inspection
9. O.Brein - Construction Inspection Hand Book
10. James E. Russel - Construction Equipments
11. MOST Standards Hand Book   12. RDSO Standards   13. CPWD Standards

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1804 A/B E3 INDUSTRIAL WASTE ENGINEERING & MANAGEMENT

MODULE I

Effect of industrial waste on stream, land and air, Stream quality criteria for public water supply and effluent standards, characterisation studies, Variation in wastewater flowrates and constituents, Objective of wastewater treatment, Plant analysis and design, General layout of an effluent treatment plant, Volume reduction, Strength reduction,Neutralisation, Equalisation and Proportioning.

MODULE II

Disposal of treated waste into rivers, lake, reservoirs and estuaries, De-oxygenation and Re-oxygenationin river and Streams, Development of Oxygen sag model, Application of Streeter Phelp's equation, Estimation of assimilation capacity of stream. Design of river out fall, Ocean disposal, Water reclamation and reuse.

MODULE III

Physico–chemical treatment methods, Application of sedimentation. coagulation, flocculation, adsorption, chemical precipitation, ion exchange, reverse osmosis and electrodialysis process, Biological treatment methods, Principle, Attached and suspended culture systems, modification of activated sludge process, rotating biological contactors, biotower, stabilisation pond, oxidation ditch, aerated lagoon, sequencing batch reactors Conventional and high rate anaerobic treatment concept of anaerobic contact process, anaerobic rotating biological contractors, Anaerobic Expanded/Fluidised bed reactors, Upflow anaerobic sludge blanket reactors and modifications.

MODULE IV

Manufacturing process, Characterization and treatment of Industrial wastes - paper and pulp mill waste, breweries and distilleries waste, tannery waste, textile mill waste, pharmaceutical plant wastes, Fertiliser plant waste, sugar mill waste, Flow diagram for treatment

Removal and control of particulate matter and gaseous pollutants, Waste management techniques. Control of Volatile organic compounds by absorption, adsorption, combustion and biofitration. Environmental management through ISO 14000, Environmental Auditing procedures, Auditing for waste minimisation, Ecolabelling and Life Cycle Assessment.

References:

1) Metcalf and Eddy – Wastewater Engineering, Treatment, Disposal and Reuse – Tata McGraw Hill Publications
2) Nemerow, H N Liquid Waste from Industry – Theory, Practice and Treatment – McGraw Hill Publications.
3) Rao M.N and Datta A.K – Waste Water Treatment – Oxford IBH Publication
4) Wark and Warner – Air Pollution – Harper and Row Publication.
5) Eckenfelder W.W – Industrial Water Pollution Control – McGraw Hill Publication.
6) Vesilind, Worrell and Reinhart – Solid Waste Engineering, Tomson Brook Cole
7) Arcevala and Asolekar – Waster water Treatment for pollution control and Reuse – Tata McGraw Hill Publications.

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 1804 A E4 REMOTE SENSING & GIS

MODULE I

Remote sensing: Definition-Components of Remote sensing - Energy, Sensor, Interacting Body - Active and passive Remote Sensing – Platforms - Aerial and Space Platforms-Balloons, Helicopters, Aircraft and Satellites - Synoptivity and Repetivity – Electro Magnetic Radiation (EMR) - EMR spectrum-visible, Infra Red (IR), near IR, Middle IR, Thermal IR and Microwave - Black Body Radiation – Planck's law - Stefan-Boltzman law.

EMR Interaction with Atmosphere and Earth Materials :   Atmospheric characteristics-Scattering of EMR - Raleigh, Mie, Non–selective and Raman Scattering - EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows - EMR interaction with Earth Surface Materials. Radiance, Irradiance, Incident, Reflected, Absorbed and transmitted energy - Reflectance – Specular and diffuse reflection surfaces - Spectral Signature – Spectral Signature curves EMR interaction with water, soil and earth surface.

MODULE II

Optical and Microwave Remote Sensing : Satellites – Classification based on orbits - Sun Synchronous and Geo Synchronous - based on purpose - Earth Resources Satellites, communication satellites, weather satellites, spy satellites – Satellite sensors - Resolution-Spectral, Spatial Radiometric and Temporal Resolution, description of Multispectral Scanning, Along and Across Track Scanners - Description of sensors in Landsat , SPOT, IRS series- Current Satellites – Radar-Speckle-Back Scattering – Side Looking Airborne Radar - Synthetic Aperture Radar – Radiometer - Geometrical characteristics.

MODULE III

Geographic Information system (GIS) : GIS – Components of GIS – Hardware, Software and Organizational Context - Data-Spatial and Non – Spatial, Maps - Types of Maps, Projection - Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structure, Analysis using Raster and Vector data- retrieval, Reclassification, Overlaying , Buffering – Data Output – Printers and Plotters.

MODULE IV

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Images, Image enhancement, Filtering , Classification – Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS, Urban Applications – Water resources – Urban Analysis - Watershed Management - Resources Information systems.

References:

1) Lillesand T M, Kiefer R W & Chipman J W : Remote Sensing and Image Interpretation,   JohnWiley & Sons.
2) Sabinne : Remote Sensing Principles and Interpretation, W.H.Freeman & Co.
3) Burrough & McDonnel : Principles of GIS, Oxford University Press
4) Heywood J, Cornelius S & Carver S An Introduction to GIS, Pearson Education

Type of Questions for University Exam.
Q 1.Eight short answer questions of 5 marks with two questions from each of the four modules.
Q 2. to Q.5 : Two questions A & B of 15 marks from each modules with option to answer either A or B.

CE 18L1 A/B CONSTRUCTION AND STRUCTURAL ENGINEERING LABORATORY

1) Mix Design
2) Testing of under reinforced and over reinforced flexural reinforced concrete beams
3) Testing of masonry wallettes
4) Testing of riveted and welded steel joints
5) Dynamics of scaled building frame model subjected to harmonic base motion
6) Dynamics of single storied building frame model having plannar asymmetry subjected to harmonic base motion

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate has to obtain a minimum of 50% marks for the continuous assessment and end semester examination put together, with a minimum of 50% marks in the end semester examination, for a pass.

CE 18L2 A/B PROJECT

Each batch of students shall develop the project started during the VII semester.

- A detailed project report in the prescribed formal shall be submitted at the end of the semester. All test results and relevant design and engineering documentation shall be included in the report
- The work shall be reviewed and evaluated periodically

The final evaluation of the project shall be done by a team of minimum 3 internal examiners including the project guide and shall include the following.

- Presentation of the work
- Oral examination
- Quality and content of the project report

Guidelines for evaluation:

i. Regularity and progress of work	50
ii. Work knowledge and involvement	50
iii. End semester presentation and oral examination	50
iv. Project Report – Presentation style and content	50
Total	200 marks

Note : Points (i) and (ii) to be evaluated by the respective project guide and the project coordinator based on continuous evaluation(iii)-(iv) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.

CE 18L3 A/B VIVA - VOCE

Each student is required to appear for a viva-voce examination at the end of the complete course work. The examination panel shall comprise of two internal examiners and one external examiner appointed by the University. The examiners shall evaluate the students in terms of their conceptual grasp of the course of study and practical/analysis skills in the field. The students shall produce the seminar report and project reports duly attested by the institutional authorities, before the examiners