

SYLLABUS

AND

SCHEME

B.TECH CIVIL ENGINEERING

(2006 Admission on wards)

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

SEMESTER I&II

Code No	Subject	Hrs/week		Int.	Uni v.	Total
		L	T/D/P			
CE/CS/EB/EC/EE/EI/IT/ME/SE 101	Engineering Mathematics –I	3		50	100	150
CE/CS/EB/EC/EE/EI/IT/ME/SE 102	Engineering. Physics	2		50	100	150
CE/CS/EB/EC/EE/EI/IT/ME/SE 103	Engineering Chemistry	2		50	100	150
CE/CS/EB/EC/EE/EI/IT/ME/SE 104	Engineering Mechanics	3	1	50	100	150
CE/CS/EB/EC/EE/EI/IT/ME/SE 105	Engineering Graphics	1	3	50	100	150
CE/CS/EB/EC/EE/EI/IT/ME/SE 106	Basic Civil & Mechanical Engineering	2		50	100	150
CE/CS/EB/EC/EE/EI/IT/ME/SE 107	Basic Electrical & Electronics Engineering	2		50	100	150
CE/CS/EB/EC/EE/EI/IT/ME/SE 108	Computer Programming	2		50	100	150
CE/CS/EB/EC/EE/EI/IT/ME/SE 109	Technical Communication & Social Science	3		50	100	150
CE/CS/EB/EC/EE/EI/IT/ME/SE 110	Computer Programming Lab	-	3	100		100
CE/CS/EB/EC/EE/EI/IT/ME/SE 111	Workshops Practice	-	3	100		100
	TOTAL	20	10	650	900	1550

SEMESTER III

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 301	Engineering. Mathematics –II	4		50	100	150
CE 302	Surveying –I	3	1	50	100	150
CE /EE 303	Strength of Materials	3	1	50	100	150
CE 304	Concrete Technology	4		50	100	150
CE 305	Fluid Mechanics -I	3	1	50	100	50
CE 306	Engineering Materials & Building Construction	4		50	100	150
CE 307	Survey Practicals –I	-	3	100		100
CE 308	Strength of Materials Lab	-	3	100		100
	TOTAL	21	9	500	600	1100

STREAM A

SEMESTER IV

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 401A/B	Engineering Mathematics –III	4		50	100	150
CE 402A/B	Surveying –II	3	1	50	100	150
CE 403A/B	Mechanics of Structures	3	1	50	100	150
CE 404A/B	Engineering Geology & Seismology	4		50	100	150
CE 405A/B	Fluid Mechanics II	3	1	50	100	150
CE 406A/B	Construction Engineering & Management - I	3	1	50	100	150
CE 407 A	Survey Practicals –II	-	3	100		100
CE 408 A	Fluid Mechanics Lab	-	3	100		100
	TOTAL	20	10	500	600	1100

SEMESTER V

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 501A/B	Engineering. Mathematics –IV	4		50	100	150
CE 502A/B	Analysis of Structures –I	3	1	50	100	150
CE 503A/B	Design of Structures-I	3	1	50	100	150
CE 504A/B	Geotechnical Engineering –I	3	1	50	100	150
CE 505A	Transportation Engineering –I	4		50	100	150
CE 506A/B	Construction Engineering & Management -II	4		50	100	150
CE 507 A	Geotechnical Engineering Lab	-	3	100		100
CE 508 A	Transportation Engineering Lab	-	3	100		100
	TOTAL	21	9	500	600	1100

SEMESTER VI

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 601A	Environmental Engineering -I	3	1	50	100	150
CE 602A/B	Analysis of Structures –II	3	1	50	100	150
CE 603A/B	Design of Structures-II	3	1	50	100	150
CE 604A/B	Geotechnical Engineering –II	3	1	50	100	150
CE 605A	Transportation Engineering –II	4		50	100	150
CE 606A/B	Water Resources & Irrigation Engineering	4		50	100	150
CE 607 A	CAD in Civil Engineering	-	3	100		100
CE 608 A	Environmental Engineering Lab	-	3	100		100
	TOTAL	20	10	500	600	1100

SEMESTER VII

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 701A	Environmental Engineering - II	4		50	100	150
CE 702A/B	Prestressed Concrete Structures	3	1	50	100	150
CE 703A/B	Earthquake Engineering	3	1	50	100	150
CE 704A/B	Quantity Surveying and Valuation	3	1	50	100	150
CE 705A/B	Elective -I	3	1	50	100	150
CE 706A	Computer Applications in Civil Engg.		3	100		100
CE 707A	Construction and Structural Engg ..Lab	-	3	100		100
CE 708A/B	Seminar	-	2	50		50
CE 709A	Project		2	50		50
TOTAL		16	14	550	500	1050

SEMESTER VIII

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 801A/B	Architecture &Town Planning	4		50	100	150
CE 802A/B	Construction Safety & Fire Engineering	4		50	100	150
CE 803A/B	Retrofitting and Rehabilitation of Structures	4		50	100	150
CE 804A/B	Elective –II	4	1	50	100	150
CE 805A	Building Technology and NDT Lab	-	3	100		100
CE 806A	Project		10	200		200
CE 807A	Viva Voce				100	100
TOTAL		16	14	500	500	1000

Grand Total

8000

Elective –I

- 705 (a) Finite Element Method .
 (b) Advanced Construction Techniques & Field Quality Control
 (c) Advanced Foundation Engineering.
 (d) Groundwater Engineering
 (e) Highway & Airfield Pavement Design

804

Elective –II

- (a) Bridge Engineering
 (b) Cost Effectives Building Techniques.
 (c) Ground Improvement Techniques
 (d) Remote Sensing & GIS.
 (e) Industrial Waste Engineering & Management

STREAM B

SEMESTER IV

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 401A/B	Engineering Mathematics –III	4		50	100	150
CE 402A/B	Surveying –II	3	1	50	100	150
CE 403A/B	Mechanics of Structures	3	1	50	100	150
CE 404A/B	Engineering Geology & Seismology	4		50	100	150
CE 405A/B	Fluid Mechanics II	3	1	50	100	150
CE 406A/B	Construction Engineering and Management - I	4		50	100	150
CE 407 B	Survey Practicals –II	-	3	75		75
CE 408 B	Fluid Mechanics Lab	-	3	75		75
CE 409 B	Industrial/Field Training		6	75		75
	TOTAL	21	15	525	600	1125

SEMESTER V

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 501A/B	Engineering Mathematics –IV	4		50	100	150
CE 502A/B	Analysis of Structure –I	3	1	50	100	150
CE 503A/B	Design of Structures-I	3	1	50	100	150
CE 504A/B	Geotechnical Engineering –I	3	1	50	100	150
CE 505 B	Transportation Engineering	4		50	100	150
CE 506A/B	Construction Engineering Management II	4		50	100	150
CE 507 B	Geotechnical Engineering Lab	-	3	75		75
CE 508 B	Transportation Engineering Lab	-	3	75		75
CE 509 B	Industrial/Field Training		6	75		75
	TOTAL	21	15	525	600	1125

SEMESTER VI

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 601B	Environmental Engineering	3	1	50	100	150
CE 602A/B	Analysis of Structure –II	3	1	50	100	150
CE 603A/B	Design of Structures-II	3	1	50	100	150
CE 604A/B	Geotechnical Engineering –II	3	1	50	100	150
CE 605B	MIS & Finance Management	4		50	100	150
CE 606A/B	Water Resources & Irrigation Engineering	4		50	100	150
CE 607 B	CAD in Civil Engineering	-	3	75		75
CE 608 B	Environmental Engineering Lab	-	3	75		75
CE 609 B	Industrial/Field Training		6	75		75
	TOTAL	20	16	525	600	1125

SEMESTER VII

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 701 B	Contracts & Legal Aspects in Construction	5		50	100	150
CE 702A/B	Prestressed Concrete Structures	3	1	50	100	150
CE 703A/B	Earthquake Engineering	3	1	50	100	150
CE 704A/B	Quantity Surveying and Valuation	3	1	50	100	150
CE 705A/B	Elective -I	3	1	50	100	150
CE 706B	Computer Applications in Civil Engineering		3	75		75
CE 707 B	Construction & Structural Engg Lab		3	75		75
CE 708A/B	Seminar		2	50		50
CE 709 B	Industrial/Field Training		6	75		75
	TOTAL	17	18	525	500	1025

SEMESTER VIII

Code No	Subject	Hrs/week		Int.	Univ.	Total
		L	T/D/P			
CE 801A/B	Architecture and Town Planning	4		50	100	150
CE 802A/B	Construction Safety & Fire Engineering	4		50	100	150
CE 803A/B	Retrofitting & Rehabilitation of Structures	4		50	100	150
CE 804A/B	Elective -II	4	1	50	100	150
CE 805B	Industrially Oriented Project	-	13	250		250
CE 806B	Viva Voce				100	100
	TOTAL	16	14	450	500	950

Grand Total

8000

Elective -I

- 705
- (a) Finite Element Method .
 - (b) Advanced Construction Techniques & Field Quality Control
 - (c) Advanced Foundation Engineering.
 - (d) Groundwater Engineering.
 - (e) Highway & Airfield Pavement Design

Elective -II

- 804
- (a) Bridge Engineering.
 - (b). Cost Effectives Building Techniques
 - (c) Ground Improvement Techniques
 - (d) Remote Sensing & GIS.
 - (e) Industrial Waste Engineering & Management

SYLLABUS FOR B. TECH CIVIL ENGINEERING (2006 Admissions)

CE/CS/EB/EC/EE/EI/IT/ME/SE 101 ENGINEERING MATHEMATICS I

MODULE I

Ordinary differential equations:

First order differential 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, series of positive and negative terms, concept of absolute convergence, alternating series, Leibniz test(No proofs for any of the above tests) Power series: Interval of convergence of 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.

Taylor's series expansion for a function on two variables-Simple problems

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.

Improper Integrals-Beta function-Gamma function 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. Mathematical Techniques: Oxford University Press
2. Engineering Mathematics: T.Veerarajan, TMGH Publishers
3. Higher Engineering Mathematics: B.S.Grewal, Khanna Publishers
4. Engineering mathematics -Vol1:S.S.Sastry, PHI publishers Advanced Engineering Mathematics: Erwin Kreyzig, Wiley Eastern

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 or B.

CE/CS/EB/EC/EE/EI/ME/IT/SE 102: ENGINEERING PHYSICS

Module I:

Interference of light - Michelson interferometer - Applications-Interference in thin films Antireflection coatings - Interference filters - Fringes produced by air wedge - Testing of flat surfaces- Diffraction of light -Zone plate - Plane diffraction grating - Reflection and transmission gratings - Determination of wavelength of light - Dispersive and resolving powers - Polarization of light - Double refraction - Nicol's prism - Quarter and half wave plates - Elliptically and circularly polarized light - Optical activity - Specific rotation - Half-shade polarimeter Applications of polarized light.

Module II:

Lasers and Holography - Properties of laser light - Coherence of light - Principles of laser action - Population inversion - Optical pumping - Metastable states - Conditions for laser action Types of lasers - Helium-Neon, Ruby and Semiconductor lasers - Applications of lasers Principles of holography - Recording and Reconstruction of holograms - Applications of holography- Fiber optics - Light transmission through optical fiber - Numerical aperture - Multi and single mode fibers - Step index and graded index fibers - Fiber drawing - Fiber optic communication (basic ideas) - Ultrasonics - Generation of ultrasonic waves - Applications of Ultrasound.

Module III:

Quantum mechanics - Heisenberg's uncertainty principle - Experimental illustrations - Quantum mechanical wave equation - Time independent Schrodinger equation - Physical significance of wave function - Properties of the wave function - Solution of Schrodinger equation - Atomic and nuclear physics - The Vector atom model- Quantization of orbital angular momentum - Electron spin - Magnetic moment of orbital electron - Pauli's exclusion principle- Zeeman effect - Stark effect - Raman effect. Nuclear physics - Nuclear forces - Properties of the nucleus - Nuclear reactions-Nuclear reaction cross section-Artificial radioactivity - Nuclear reactors - Nuclear fusion - Thermonuclear reactions-Controlled thermonuclear reactions.

Module IV :

X-rays - Production of X-rays - Origin of X-rays and X-ray spectra - Moseley's law - Properties of X-rays - Applications of X-rays - Diffraction of X-rays by crystals - Bragg's law Crystallography - Unit cell - Seven crystal systems - Bravais space lattices - Packing factor Lattice planes and Miller indices - Energy bands in solids - Conductors, semiconductors and insulators - Intrinsic and extrinsic semiconductors - Conductivity of semiconductors - Fermi level - Applications of semiconductors - p-n junctions - solar cells - Hall effect and its applications - Superconductivity - Superconducting transition - The Meissner effect - Type I and Type n superconductors - Isotope effect - High temperature superconductors - Josephson effect - SQUIDS - Applications of superconductors

References

1. J. Jacob Philip - A text book of Engineering Physics, Educational Publishers and Distributors 2002

2. A.S. Vasudeva - Modern Engineering Physics, S. Chand & Co.

3. M.R. Sreenivasan - Physics for Engineers - New Age International

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/ CS/EB/EC/EE/EI/ME/IT/SE 103 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, Conventional and organic superconductors, High temperature superconductors, Liquid crystals, Applications. Solid surface characterisation: Electron spectroscopy for chemical analysis, Chemical shift, BET isotherm, Thermodynamics of adsorption.

Module II Electrochemistry: Fundamentals, Electrode potentials, Types of electrodes, Salt bridge, emf measurement. Concentration cells, Acids and bases, Buffer solutions, pH measurements, Polarisation, Overvoltage. Power generation: Secondary cells, Fuel cells, Photovoltaic effect, Solar cells. Corrosion: Different forms of corrosion, Prevention of corrosion.

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.

Fast reactions - flash photolysis, flow techniques and relaxation methods.

Module III Chemical Thermodynamics: Fundamentals, Molecular interpretation of internal energy, enthalpy and entropy, Heat of reaction, Kirchhoff'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.

Module IV Engineering materials: Industrial polymers-polymerization techniques, structure-property relationships, polymer additives, polymer processing methods (extrusion, injection, compression, transfer and blow molding methods). Nanomaterials: definition, classification and applications.

Nanomaterials and nanoceramics - examples and properties.

Lubricants: classification, functions and properties. Mechanism of lubrication.

Refractories: classification and properties. Portland cement, lime and plaster of Paris manufacture, setting and hardening.

Chemistry of optical fibres, fullerenes and organoelectronic materials (introduction only).

Text Books

1. Peter Atkins and Julio de Paula Elements of Physical Chemistry, Oxford University Press, 2005
2. Shashi Chawla A Text Book of Engineering Chemistry (3rd edn.); Dhanpat Rai & Co, New Delhi, 2003.

Referencess

1. Atkins, P.W., Physical Chemistry, Oxford University Press, UK, 1998
2. Bhatnagar, M. S., Textbook of Pure & Applied Physical Chemistry, A. H. Wheeler & Co, New Delhi, 1999.
3. Geoffrey Ozin, Andre Arsenault Nanochemistry: A Chemical Approach to Nanomaterials.; Royal Society of Chemistry, U.K. 2005.

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/ME/EC/CS/SE/IT/EB/EI/EE 104 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'Alembert's principle of rotation. Resultant inertia force in rotation. Principle of angular momentum in rotation. Energy equation for rotating bodies.

REFERENCES

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

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

CE/ME/EC/CS/SE/IT/EB/EI/EE 105 ENGINEERING GRAPHICS

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, archimedean 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. Engineering Graphics | P.I.Varghese & K.C. John, JET Publishers |
| 2. Elementary engineering drawing | N.D.Bhat, Charotar publishing house |
| 3. Geometric drawing, | P.S.Gill , B.D Kataria &sons Ludhiana |
| 4. Engineering Graphics | P I Varghese, VIP Publishers. |

Type of Questions for University Exam.

Q 1. to Q.5 : Two questions A & B of 20 marks from each modules with option to answer either A or B.

CE/CS/EB/EC/EE/EI/IT/ME/SE 106 BASIC CIVIL AND MECHANICAL ENGINEERING

(A) CIVIL ENGINEERING

MODULE I

Materials: *Cement* - varieties and grade of cement and its uses. *Steel*- types of steel for reinforcement bars, steel structural sections. *Brick*- varieties and strength , tests on bricks.

Aggregates- types & requirements of good aggregates. *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,

MODULE II

Super structure : Brick masonry, English bond and Flemish bond , Stone masonry, Random 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 ,,

Levelling : Levelling instruments, different types, temporary adjustments, mean sea level, reduced level of point, booking of field notes, reduction of levels by height of collimation method.

Text Books & References :

1. Engineering materials : Rangawala
2. Building construction : Punmia
3. A Text book of building construction : N.K.R. Murthy
4. Fundamentals of Civil Engineering- : Roy M Thomas-Educational Publishers.
5. A Text book of building construction : Jha & Sinha
6. Surveying & Levelling : T P Kanetkar
7. Surveying & Levelling : Hussain

B) MECHANICAL ENGINEERING

MODULE III

Thermodynamics: thermodynamic systems - open, closed and isolated systems, equilibrium state. of a system, property' and state, process, cycle, work, Zeroth law of thermodynamics-concept of temperature, temperature scales. First law - internal energy, enthalpy. Second law - Kelvin-Planck and Clausius statements, Carnot Cycle.

Refrigeration and Air conditioning: Vapour compression and vapour absorption refrigeration systems, summer and winter Air conditioning, Comfort and industrial Air conditioning.

Elementary ideas of simple reaction and impulse turbines, compounding of turbines.

MODULE IV

Internal Combustion Engines: working of two stroke and four stroke Petrol and Diesel engines, simple Carburettor, ignition system, fuel pump, fuel injector, cooling system, lubricating system.

Transmission of Power: Belt drives (open and closed), chain drives.

Metal fabrication: Welding - Arc, gas, resistance welding, Welding defects, Soldering, Brazing

Text Books & References:

- | | |
|--|------------------------------------|
| 1. Engineering Thermodynamics | P.K.Nag |
| 2. Engineering Thermodynamics | D.B. Spalding & E.H.Cole |
| 3. Engineering Thermodynamics | Van Wylon |
| 5. Thermodynamics | J.P.Holman |
| 6. Elements of Internal Combustion Engines | Rogowsky, Tata McGraw Hill |
| 7. Fundamentals of Internal Combustion Engines | Gill, Smith & Ziurys, Oxford & IBH |
| 8. Refrigeration and Air Conditioning, | Stoecker Tata McGraw Hill |

Type of Questions for University Exam.

Part A -

Question 1- 4 short answer questions of 5 marks each. 2 questions from each module

Question 2-3 – There will be two choices from each module .Answer one question from each module of 15 marks

Part B

Question 4-4 short answer questions of 5 marks each. 2 questions from each module

Question 5-6 – There will be two choices from each module .Answer one question from each module of 15 marks

CE/CS/EB/EC/EE/ EI/IT/ME/SE 107 BASIC ELECTRICAL ENGINEERING & ELECTRONICS

(A) ELECTRICAL ENGINEERING

Module I

Basic principles of Electric circuits: Review of Ohms law - Definition of resistance, current, voltage and power - Series and parallel circuits- constant voltage source and constant current source.

Network Theorems: Kirchoffs laws- Network analysis by Maxwell's circulation currents Thevenin's theorem - Superposition theorem -Norton's theorem - Simple illustrative problems on network theorems.

Review of electrostatics - Coulomb's Law- Electric field strength and Electric flux density capacitance.

Module II

Review of electromagnetic induction -Faraday's Law- Lenz's Law - mutually induced emf.

Magnetic circuits - magnetic field of a coil - Ampere turns calculation - magnetic flux - flux density - field strength.

Measuring instruments: Working principle of galvanometer, Ammeter, Voltmeter, watt meter & energy meter.

AC fundamentals: Generation of alternating voltage and current - equations of sinusoidal voltage and current - wave form, cycle frequency, time period, amplitude, phase difference, rms value, average value, power factor & form factor. Vector diagram - addition and subtraction of vectors- sine waves in phase and out of phase. AC circuits: RC, RL, RLC circuits-series and parallel - current, voltage and power relationships. Poly phase circuits: vector representation phase sequence - star and delta connections.

(B) ELECTRONICS ENGINEERING

Module III

Passive components: Resistor - Capacitor - Inductor - Color coding. Transformer- different types, construction.

Semiconductors: Energy band diagram - intrinsic & extrinsic semi conductors, doping - PN junction - Diodes, Zener diodes- Characteristics - Application of diodes. Rectifiers- Half wave, full wave and Bridge rectifiers - Ripple factor and regulation.

Transistors: - PNP and NPN transistors - theory of operation - Transistor configurations characteristics - comparison.

Special semiconductor devices - PET - SCR - LED - LCD - V -I characteristics, applications.

Module IV

Fundamentals of Instrumentation: Transducers - Definition - Classification - Active & passive - Transducer for position, pressure, velocity, vibration and temperature measurements.

CRO - principle of operation - measurement of amplitude, frequency and phase.

Fundamentals of Communication: Analog communication - concept of modulation, demodulation. Types: AM - FM -PM- Block diagram of general communication system - Basic concepts of digital communication - Block diagram.

Text Book:

1. Basic Electronics - Solid State - B. L. Theraja, S. Chand & Co.
2. Fundamentals of Electrical Engineering - Leonard S. Bobrow, Oxford University Press.

Further References:

1. Electrical Technology: Edward Hughes, Addison Wesley Publication
2. Electronic Devices & Circuits: G.K. Mithal & Ravi Mittal, 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.

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

CE/CS/EB/EC/EE/E1/IT/ME/SE 108 COMPUTER PROGRAMMING

Module 1

Introduction to programming in C: Fundamental data types- integer, floating point, and enumerated data types, typedef Expressions – arithmetic, relational and logic operators, Type conversion – simple and compound statement, Access to standard library, standard I/O-getchar, putchar, Formatted I/O, scanf, printf, error handling, line input and out put, control structures, selection statement, **IF, SWITCH, WHILE, DO WHILE, FOR, BREAK, CONTINUE, GOTO, RETURN** statements.

Module 2

Functions: Declarations and functions, parameter passing mechanism, storage classes-scope, visibility, and life time of variables, AUTO, EXTERN, STATIC and REGISTER modifiers, Recursion.

Module 3

Arrays : Single and multi dimensional arrays, sorting, selection sort, search-linear search and binary search, Structures and union.

Module 4

Pointers: Pointers and addresses, pointer arrays, function returning pointers, pointers to function, pointer arithmetic, pointers to structures, array of structures, preprocessor directive, command line arguments

Text Book

1. Mullish & Cooper The Spirit of C An introduction to Modern programming Jaico Publication 1988
2. B.S. Gotfried (Schaum series, TMH)- Programming in C, *

References:

1. Pradeep Dey and Manas Ghosh,"Computer Fundamentals and Programming in C", Oxford 2006
2. Varghese Paul- Computer Fundamentals,* EPD,Kochi
3. Brian W. Kernighan and Dennis M.Richie,"The C Programming Language" PHI,2nd ed.,

Type of questions for University Examination

Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module

Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

**CE/CS/EB/EC/EE/EI/ME/IT/SE 109 TECHNICAL COMMUNICATION AND
SOCIAL SCIENCES**

(Module IV Environmental Studies: 1 hour per week, Other modules : 2 hours per week)

PART - A TECHNICAL COMMUNICATION

Module I (25 hours)

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; 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 (20 hours)

Written Communication: note making and note taking; summarising; notes and memos; developing notes into text; organisation of ideas: cohesion and coherence; paragraph writing: 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.

Spelling rules and tips; writing a rough draft; editing and proof reading; writing the final draft; styling text; filling in complex forms; standard letters; CV; 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.

PART - B SOCIAL SCIENCES

Module III (15 hours)

Science, Technology and Ethics

Impact of science and technology on the development of modern civilization. The philosophy of modern science: scientific determinism - uncertainty principle. Relevance of scientific temper. Science and religion. Science and technology in developing nations. Technological advances of modern India. Intermediate and appropriate technology.

Development of technical education in India.

Senses of Engineering Ethics - Variety of moral issues - Types of inquiry - Moral dilemmas - Moral autonomy Kohlberg's theory - Gilligan's theory - Consensus and Controversy - Professional ideals and virtues - Attributes of an ethical personality - Theories about right action - Self interest.

Responsibilities and Rights of engineers - Collegiality and Loyalty - Respect for authority - Collective bargaining Confidentiality - Conflicts of interest - Professional rights.

Module IV Environmental Studies: (30 hours)

Natural resources - issues related to the use and over exploitation of forest resources, water resources, mineral resources, food resources and energy 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.

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.

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 - Population growth and problems of population explosion - Environmental ethics: issues and possible solutions..

Text Books:

Meenakshi Raman and Sangeetha Shanna : Technical Communication: Principles and Practice, Oxford University Press, 2004

Rajagopalan. R : Environmental Studies: From Crisis to Cure, Oxford University Press, 2005

Jayashree Suresh and B.S. Raghavan Professional Ethics, S. Chand & Company Ltd, 2005. History of Science, Cambridge University Press.

Adrian Doff & Christopher Jones, References:
Language in Use. Upper intermediate, self-study workbook & classroom book, Cambridge University Press,2000

Krishna Mohan & Meenakshi Raman,	Effective English Communication ,Tata Mc-Graw HiII,2000.
Edmund D. Seebaur & Robert L. Barry	Fundamentals of Ethics for Scientists and Engineers, Oxford University Press, 2001
Krishna Mohan & Meera Banerji,	Developing Communication Skills Mac Millan India Ltd,2000.
Rajendra Pal & JS Koriahali	Essentials of business communication, S. Chand & Company Ltd
Sarah F'reeman,	Study Strategies, Orient Longman, 1978.
Meenambal T , Uma R M and K MuraU	Principles of Environmental Science and Engineering, S. Chand & Company Ltd, 2005

University Examination pattern

The question paper will have two parts. Part A (Technical Communication) will cover Modules I, II and will have a weightage of 50 marks. Part B (Social Sciences) will cover Module III and Module IV (Environmental Studies) and will have a weightage of 50 marks. Part A and Part B will have to be answered in separate answer books.

Part A

University examination pattern

Q1- 4 short type questions of 5 marks, 2 each from module I and II

Q II - 2 questions A and B of 15 marks from module I with choice to answer any one QIII-2 questions A :md B of! 5 marks from module II ",ith choice, to answer an)' one

Part B

University examination pattern

Q I - 5 short type questions of 4 marks, 2 from module III and 3 from module IV

QII- 2 questions A and B of to marks from module III with choice to answer anyone

Q III -2 questions A and B of 20 marks from module IV with choice to answer any one

CE/CS/EB/EC/EE/EI/ME/IT/SE 110 COMPUTER PROGRAMMING LABORATORY

1. Study of as commands. General introduction to application packages.
- 2 Programming using C control structures & pointers.
3. Searching & sorting
4. Creation and use of databases in a suitable database package
5. Programming exercises in C.

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE/CS/EB/EC/EE/EI/ME/IT/SE 111 ELECTRICAL AND MECHANICAL WORKSHOPS

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. Flurosent lamp.
7. Connection of plug socket.
8. Different kinds of joints.
9. Transformer winding.
10. Soldering practice.
11. Familiarisation of CRO.

MECHANICAL WORK SHOP

- 1) Fitting Shop.
- 2) Sheet Metal Shop
- 3) Foundry Shop
- 4) Welding Shop
- 5) Carpentry Shop (Preliminary exercises for beginners in all shops. Specific models may be designed by the teachers.)

Introduction to the use of concrete mix.

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE/CS/EB/EC/EE/EI/ME/IT/SE 301 Engineering Mathematics II

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: Fourier series of Periodic functions – Euler formulac for Fourier coefficients – functions having period 2, 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 and volume integrals, Gauss's divergence theorem, Stoke's theorem (No proof of these theorem), conservative force fields, scalar potential.

TEXT BOOKS

- 1.Advanced engineering mathematics : R.K. Jain , S.R.K.Iyengar, narosa Publishers.
- 2.Advanced engineering mathematics : C.R. Wilie & L.C. Barrett, Mgh

REFERENCES

- 1.Mathematics techniques for engineers & scientists Larry C Andrews , Ronald C, Philips, Phi Publishers.
- 2.Advanced engineering mathematics M.C. Potter, J.L.goldberg Oxford University Press
- 3.Higher engineering mathematics B.S. Grewal , Khanna Publisers

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 302 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 Quadrantal 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 formulæ -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.

Reference

- 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/EE 303 Strength of Materials

Module I

Tension, Compression and Shear : Normal stresses and strains – Mechanical properties of mild steel – Elasticity, plasticity and creep – Linear elasticity, Hooke's law and Poisson's ratio – Shear stress and shear strain – 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 prestrains – stress on inclined sections – strain energy

Module II

Torsion : Torsional deformation of circular bar – Circular bars of linearly elastic materials – nonuniform torsion – stresses and strains in pure shear – relationship between modulus of elasticity, bulk modulus and rigidity modulus – transmission of power by circular shafts – Circular shafts fixed on both ends – strain energy in torsion and pure shear

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

Module III

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 – Nonprismatic beams – Shear stresses in beams of rectangular cross section – Shear stresses in beams of circular cross section – Shear stresses in webs of beams with flanges

Analysis of stress and strain : Plane stress – Principal stresses and maximum shear stresses – Mohr's circle for Plane stress – Hooke's law for plane stress – Maximum stresses in beams – Plane strain

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

Reference

- 1) Gere J M. – Mechanics of Materials, Brooks/Cole Thomson Learning
- 2) Ramamurtham S “ Strength of Materials “ Dhanpur Rai & Sons
- 3) Pytel.A& Kiusalaas J. – Mechanics of Materials-, Brooks/Cole Thomson Learning
- 4) Popov E.P- Engineering Mechanics of Solids, Printice-Hall of India Limited, New Delhi, India.
- 5) Timoshenko S.P. and Young D.H - Elements of strength of materials, East-West Press Private Limited New Delhi, India.
- 6) Nash – Strength of Materials – Shausm's OUTlines, McGraw Hill
- 7) Subramanian R “ Strength of Materials “ Oxford University Press.

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 304 Concrete Technology

Module I

Cement: Manufacture of Portland cement – basic chemistry of cement – hydration of cement – heat of hydration and strength – Tests on cement: fineness of cement – consistence of standard cement paste – setting time – soundness – strength – Types of Portland cement: Ordinary Portland cement – rapid hardening cement – low heat cement – sulphate resisting cement – blast furnace cement – supersulphated (slag) cement – white and colored cement – Portland pazzalona cement - expansive high alumina cement

Normal aggregate: Size classification – petrographic classification – shape and texture classification – mechanical properties: bond – strength – toughness – hardness – physical properties: specific gravity – bulk density – porosity and absorption – moisture content – bulking of sand – unsoundness due to volume changes – thermal properties – deleterious substances – organic impurities – clay and other fine materials – salt contamination – unsound due to impurities – sieve analysis – grading curves – fineness modulus – grading requirements – maximum size aggregate – practical grading – gap graded aggregate

Module II

Fresh concrete: workability – factors affecting workability – cohesion and segregation – bleeding – workability test – slump test – compacting factor test – Vebe test – flow table test – ball penetration test – density of fresh concrete

Strength of concrete: tensile strength considerations – behavior under compressive stress – practical criteria of strength – Porosity – Gel/space ratio – total voids in concrete – pore size distribution – micro cracking and stress-strain relation – factors affecting strength

Module III

Mixing, handling, placing and compacting concrete: mixers – charging the mixer – uniformity of mixing – mixing time – prolonged mixing – read-mixed concrete – handling – pumped concrete – placing and compacting – vibration of concrete – internal vibrators – external vibrators – vibrating tables – revibration – shotcrete – preplaced aggregate concrete

Admixtures: accelerators – set retarders – water reducers (plasticizers) – superplasticizers – mineral additives – bonding admixture – water repellent admixtures

Concreting in extreme climates: hot weather concreting – cold weather concreting

Module IV

Development of strength: normal curing – method of curing – influence of temperature – maturity rule – steam curing Strength properties of concrete: relation between tensile and compressive strength – fatigue strength – impact strength – resistance to abrasion – bond to reinforcement – modulus of elasticity – factors affecting the modulus of elasticity – Poisson's ratio Testing: precision of testing – analysis of fresh concrete – strength test – compressive strength – tensile strength – test core – accelerated curing – Schmidt hammer – penetration resistance – pullout test – ultrasonic pulse velocity test – Mix design: Bureau of Indian Standard method

References

- 1) Neville A.M & Brooks J.J – Concrete Technology, Longman.
- 2) Shetty M.S – Concrete Technology, S.Chand and Company Ltd.
- 3) A.R. Santhakumar – Concrete Technology, Oxford University Press.
- 4) Metha & Monteiro – Concrete, Microstructure, Properties of Materials – TataMcGraw 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.

CE305 Fluid Mechanics –1

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.

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- Source, Sink and Doublet.

Module II

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,

Laminar flow - Head loss. Hagen-Poiseuille 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

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.

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 – Fluid 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 306 ENGINEERING MATERIALS AND BUILDING CONSTRUCTION

Module I

Building stones -Requirement of good building stone- characteristics - testing. Common building stones. Preservation of stones. **Clay products:** Tiles- Manufacture-Properties-Types-Problems of efflorescence and lime bursting in tiles. **Lime:** Properties- Classifications -Manufacture -Testing of lime. **Mortar:** Types –Properties-Tests on mortar, selection and desirable properties of fine aggregate for good mortar. **Gypsum:** Forms of gypsum and gypsum plaster, properties of gypsum plaster, building products of gypsum and their uses. **Pozzolona:** Natural and Artificial fly ash, Surkhi (burnt clay pozzolona), rice husk and ash pozzolona, properties and specifications for use in construction.

Module II

Timber - Defects - Seasoning - Decay - Preservation, Wood based products. **Iron and steel** - Structural sections - Properties and uses of structural steel – Corrosion- forms and preventive measures. **Paints varnishes and distempers**, Common constituents, types and desirable properties, Cement paints. **Glass** - Ingredients, properties types and use in construction. **Plastics** - classification, advantages of plastics, Mechanical properties and their use in construction. **Miscellaneous materials** – Asbestos, Insulating Materials - Thermal and sound insulating material desirable properties and type. Geosynthetics and its applications,

Module III

Cavity walls – Partition walls - Types and features.

Lintels – Classification and loading, Arches – Classification and construction details- Technical terms.

Stairs- Technical terms- Classification and Types of stairs

Doors, Windows and Ventilations- Technical terms-Construction details of different types

Module IV

Floors and flooring - Types of floors - Types of floor coverings; Roof - Types of roofs - Types and uses of roofing materials

Finishing works - Plastering, pointing, painting, white washing, colour washing, distemping ; Damp proofing ant termite treatment.

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 Publications, 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.

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 307 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 plotting.

Plane Table survey :

7. Method of Radiation.
8. Method of Intersection.
9. Solving three point problem - Bessel's method.
10. Solving 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 edigraph.
19. Study of hand levels, clinometer, Ceylon Ghat Tracer and Sextant.

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 308 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 shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE/CS/EB/EC/EE/EI/ME/IT/SE 401 A/B 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 fractional transformations, mapping by elementary function like Z^2 , e^z , $\sin z$, $\cos z$, $\sin hz$, 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 $F(p,q) = 0$, $F(x,p,q) = 0$, $F(y,p,q) = 0$, $F(z,p,q) = 0$ $F_1(x,p) = F_2(y,q)$, 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

Advanced Engineering Mathematics Erwin Kreyszig, Wiley Eastern

Complex Variables & Applications Churchill R.V.. Mgh Publishers.

Advanced engineering mathematics M.C.Potter, J.L.Goldberg Oxford University Press

Higher engineering mathematics: B.S.Grewal, Khanna Publishers

Advanced engineering mathematics: R.K.Jain, S.R.K.Iyengar, Narosa Publishers.

Advanced engineering mathematics: C.R.Wylie & L.C.Barrett, Mgh

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 402A/B Surveying- II

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 field 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 locating Soundings – plotting soundings-Three Point problem

Photogrammetry: Phototheodolite -Principle of the method of Terrestrial photogrammetry - Field work - Stereo - Photogrammetry -aerial Surveying - Terminology - Scale and distortion of the vertical photograph - principle of Binocular vision & 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 I & 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 403A/B Mechanics of Structures

Module I

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

Torsion : Thin walled tubes – Stress concentration in torsion – closed coil helical spring – open coil springs

Module II

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 III

Application of plane stress : Spherical pressure vessel – Cylindrical pressure vessel – Combined bending and torsion in circular beam

Strains: Measurement of strains – Computation of stresses from strains

Triaxial state of stress – Mohr's circle triaxial state

Module IV

Deflection of determinate beams : Strain energy of Bending – Castigliano's theorem – Deflection produced by Impact – temperature effects - The unit load method of computation of deflection and slopes in beams

Statically indeterminate beams : Types of statically indeterminate beams – Analysis by differential equation of the deflection curve – method of superposition – temperature effects – longitudinal displacements at the ends of the beam

Text Book

- 1) Gere J M. – Mechanics of Materials, Brooks/Cole Thomson Learning.
- 2) Wang C.K – Intermediate Structural Analysis, McGraw Hill International Edition

References

- 1) Pytel.A& Kiusalaas J. – 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) Nash – Strength of Materials – Shausm's OUTlines, 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.

CE 404A/B ENGINEERING GEOLOGY & SEISMOLOGY

Module I

Introduction: Definition - branches of geology -scope of geology – geology in civil engineering.

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 time scale

Geological Investigation : Geological conditions necessary for design and construction of dam & reservoirs , tunnels, buildings & road cuttings.

Module IV

Seismology : Internal structures of the earth – seismic waves- Continental Draift & Plate tectonics –fault movement – other sources of seismic activity –classification of earth quakes –effects of earthquakes –Size of earth quakes – intensity, magnitude, energy –Seismographs - Location of earthquake- Distribution of earth quakes –Seismic History – Seismic Zones of India.

Tsunami – Tsunami velocity – Run up & 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 Frietis 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 405A/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.

CE 406A/B Construction Engineering & Management –I

Module I

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

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

Engineering Economics : Nature and scope of economics, economics decision and technical decision, wants and utility, 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.

National income – Macro economics approach , GNP, NNP, NI, DI, PI methods of calculation of national income.

ModuleIII

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.

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. Gurucharan Singh – Building construction engineering – standard book house
2. Arora and bindra – building construction Planing Techniques and methods of construction – Dhanpat rai& Sons
3. R.R. Barthwalk - Industrial economics
4. Paul A Samuelson – Economics – An introductory analysis
5. O.P. Khanna- Industrial Engineering and Management, Dhampat 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 407 A Survey Practical – II

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.

Note : 50 % marks is earmarked for continuous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 407 B SURVEY PRACTICALS - II

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

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 408A 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: Venturimeter, 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 shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 408 B FLUID MECHANICS LABORATORY

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

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE/CS/EB/EC/EE/EI/ME/IT/SE 501 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: ∇ , 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. Numerical Methods: P.Kandaswamy, K.Thilagavathy, K.Gunavathy, S.Chand & Co.
2. Probability, Random Variables and Stochastic Processes A.Papoulis, Mgh Publishers
3. Probability And Statistics For Engineers: Irvin Miller & Freund, Prentice Hall Of India
4. Numerical Methods: S.S.Sastry, Phi 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 502A/B Analysis of Structures I

Module I

Deflection of statically determinate trusses: methods of joints and sections – methods for determination of deflection of truss joints – the unit-load method – the angle weights method – joint displacement equation method – graphical method: Willot-Mohr diagram

Analysis of statically indeterminate trusses: degree of indeterminacy – force method using reactions as redundant – 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 on statically indeterminate trusses due to yielding of support

Module II

Statically indeterminate beams and frames: strain energy in tension, torsion and bending – theorem of least work – the reciprocal theorem – 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 III

Slope deflection method: derivation of the slope-deflection equation: without rotation of member axis – analysis of statically indeterminate beams subjected to applied loads – derivation of the slope-deflection equation: with rotation of member axis – analysis of statically indeterminate beams subjected to uneven support settlement – analysis of statically indeterminate rigid frames: without unknown joint translation – analysis of statically indeterminate rigid frames: with unknown joint translation – analysis of statically indeterminate rigid frames subjected to support settlement – analysis of gable frames

Module IV

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: without unknown joint translation – analysis of statically indeterminate rigid frames: with unknown joint translation – analysis of statically indeterminate rigid frames subjected to support settlement – analysis of gable frames

Reference

- 1) Khurmi – Theory of Structures – S Chand
- 2) Wang C.K – Intermediate Structural Analysis, McGraw Hill International Edition.
- 3) Timoshenko S.P. & Young D.H – Theory of Structures, McGraw Hill International 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.

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

CE 503A/B Design of Structures I

Module I

Concrete structures: Concrete, reinforced concrete and prestressed concrete – structural forms – loads – serviceability, strength and structural safety – design basis – design codes and specifications **Material properties:** Properties in compression – tensile strength – strength under combined stress – shrinkage and temperature effects – high strength concrete – reinforcing steels for concrete **Design Philosophy.**

Flexural analysis and design of beams: Bending of homogeneous beams – reinforced concrete beam behaviour – design for tension reinforcement in rectangular reinforced concrete beam – design aids – practical considerations to design of beams – rectangular beams with tension and compression reinforcement – design of T-beams

Module II

Shear and diagonal tension in beams: Diagonal tension in homogeneous elastic beams – reinforced concrete beams without shear reinforcement – reinforced concrete beams with shear reinforcement – limit state design of beams – Code provision for shear reinforcement – Beams with varying depth

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

Edge supported slabs: Types of slabs – design of one-way slabs – temperature and shrinkage reinforcement – behavior of two way edge supported slab – analysis by coefficient method – reinforcement for two way edge supported slab – deflection control - design of stair cases slab – design of continuous slab

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.

Reference

- 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 504A/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, Concepts of single grained, honey combed and flocculant structure and their effects on the basic soil properties.

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

Reference

- 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.

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 505A 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, Bituminous 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.

Reference

- 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 505 B TRANSPORTATION ENGINEERING

Module I

Classification of highways – typical cross section of roads in embankment and in cutting, definition of various cross sectional elements – requirements and factors controlling alignment of roads .Camber – sight distanes – Stopping, passing and overtaking Sight distances, Overtaking zone requirements, worked out problems – design of horizontal alignment, 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 –valley curves (length of summit curve & valley curve only) Road aggregates – Desirable properties and tests Bituminous materials – Types of bituminous materials used in highway construction – requirements – desirable properties and test. Construction of WBM roads, Bituminous roads Cement concrete roads – Joints in Concrete pavements – types and causes of failures in flexible and rigid pavements – Basic difference between flexible and rigid pavements – factors to be considered in design of pavements – design of flexible pavement by CBR method only.

Module II

Aircraft characteristics – airport site selection – Surveys for site selection – Airport obstruction – zoning laws. Runway orientation – Wind rose diagram – basic runway length and corrections required – problems – Runway Configurations – Aircraft parking system – airport marking and lighting.

Module III

Railway Engineering, Permanent way – main requirements – Component parts – rails – functions of rails- requirements of a good rail – weight and length – defects in rails – coning of wheels – creep & wear of rails – Sleeper – its functions and requirements – sleeper density – Ballast – function and requirements Super elevation, negative super elevation in branches – widening of gauge on curves – Principe of track circuiting – control of train movement by Centralized traffic Control systems.Tunnel Engineering
Tunnel alignment – transferring Center grade into tunnel – tunneling through hard and soft rock (only full-face method and Neeble beam Method) – tunnel ventilation and drainage.

Module IV

Harbours Engineering: Classification of harbours – Breakwaters – necessity and functions – different types – Construction of break waters. Dock Engineering: Functions & type of docks – dry docks – floating docks – Dredging – Mechanical and hydraulic dredgers – general study of bucket ladder – Dredger, grab dredger and dipper dredgers.

References:

- 1) S.K. Khanna & C.E.G. Justo : Highway Engineering, New Chand & Bros
- 2) S.K. Khanna, M.G. Arora & S.S. Jain: Airport Planning & Design, New Chand & Bros
- 3) S.C. Rangwala : Airport Engineering, Charoter Publication House
- 4) S.C. Rangwala : Railway Engineering , Charoter Publication House
- 5) Dr. S.D. Bindra : A Course in Docks & Harbour Engg, Dhanpatrai & Sons.
- 6) Chandola- A text booki 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 506A/B Construction Engineering & Management –II

Module I

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

Module II

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 costs/replacement decision – equipment cost control – plant layout.

Module III

Construction Monitoring: 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 IV

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

Reference:

1. Stevens JD – Techniques for construction network scheduling – McGraw Hill Publishing company
2. Arora and bindra – building construction Planning Techniques and methods of construction – Dhanpat rai& Sons
3. Peurifoy,RL, Ledbetter WB & Schexnayder CJ – Construction planning equipment and method – McGraw Hill Publishing company

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 507A 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 shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 507 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) Permeability tests – constant head and variable head methods.
- 5) Consolidation test & Compaction test –I.S. Light and Heavy compaction
- 6) California Bearing Ratio Test
- 7) Shear strength tests – Direct shear, Triaxial, UCC & Vane Shear Test
- 8) 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 shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 508A Transportation Engineering Laboratory

Test on Road Aggregates

1. Aggregate Crushing Value.
2. Aggregate Impact Value.
3. Aggregate Abrasion Value.

Test on Bitumen

4. Softening point of Bitumen.
5. Ductility test on Bitumen.
6. Specific gravity of Bitumen.
7. Flash and Fire point test.
8. Stripping Value Test.
9. Viscosity using Viscometer.
10. Determination of bitumen content by bitumen extractor.

Test on Bituminous Mixes

11. Marshall Test.
12. Indirect Tensile Test.
13. Creep Test.
14. Resistance to fatigue cracking by repeated load indirect tensile test.
15. Fields Tests.

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 508 B Transportation Engineering Laboratory

Test on Road Aggregates

1. Aggregate Crushing Value.
2. Aggregate Impact Value.
3. Aggregate Abrasion Value.

Test on Bitumen

1. Softening point of Bitumen.
2. Ductility test on Bitumen.
3. Specific gravity of Bitumen.
4. Flash and Fire point test.
- 5 Stripping Value Test.
6. Viscosity using Viscometer.
7. Determination of bitumen content by bitumen extractor.

Test on Bituminous Mixes

1. Marshall Test.
2. Indirect Tensile Test.
3. Creep Test.
4. Resistance to fatigue cracking by repeated load indirect tensile test.

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 601A 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 –drinking water standards-physical, chemical and bacteriological analysis of water.

Module II

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 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 sewage-Quantity of storm sewage-Quantity of sanitary sewage(Domestic waste water)-Sewers and Sewer appurtenances,-sewage pumping-maintenance 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, Monitoring. Solid waste management : Type and sources of solid waste, characteristics, collection. Transportation and processing- Disposal composting, sanitary land fill, incineration.Noise pollution: Sources, effects.

Reference

1. Garge.S.K, Environmental & Engineering,vol I & II, khanna publications,2001, NewDelhi.
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.raw & H.V.N.rao, Air Pollution, Tata Mc Graw Hill Pvt.Ltd, New Delhi.
6. Mark.J.Nammer & Mark .j.Hammer Jr,water and waste water 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 601 B ENVIRONMENTAL ENGINEERING - I

Module I

Scope of environmental engineering, Health effects, effects on resources, effect on the balance of ecosystem natural resources. *Global environmental issues*. Water supply engineering, Quantity of water. Water demands – various types, total requirements of water for a town/city, per capita demand, variation in demand and their effects on the design of various components of a water supply scheme, design periods, population growth, population forecasting methods *Water supply scheme*. Gravitational, pumping and combined schemes, pumps, classification, hand pumps, well pumps Quality of water. Drinking water standards, physical, chemical and bacteriological analysis of water.

Module II

Water Treatment. Screening Sedimentation – theory of sedimentation, plain sedimentation, design of sedimentation tanks, coagulation and flocculation, design of flash mixers, flocculators, clariflocculators, Filtration, theory, filtering media, design, construction, control and operation of slow, rapid sand and pressure filters, dual media filters. Disinfection, methods of disinfection, chlorination, prechlorination, superchlorination, dechlorination, chloramine process, break point chlorination. Miscellaneous treatments, Colour, odour and taste removal, iron and manganese removal, flouridation and deflouridation, removal of hardness. Aeration, application in removal of iron and manganese.

Module III

Wastewater engineering. Sanitary pumping, closets, urinals, wash basins, sinks, baths, traps, soil pipes, antisiphonage pipes, wastewater pipes, systems of piping pipe joints, pipe fittings. House drainage, principles of house drainage, inspection chambers, ventilation, testing of drains, connection of house drains and street sewers. *Systems of sewerage*. Separate, combined and partially combined system. conservancy and water carriage system. *Quantity of sanitary sewage*. Source of sewage, relation to water consumption, ground water infiltration, fluctuation of sewage flow. Quantity of storm sewage, factors affecting storm water drainage, determination of storm water flow, time of concentration. Sewers and sewer appurtenances, materials used in construction of sewers, shapes of sewers, hydraulics of sewers, design of sewers, manholes, inlets, catch basins, flushing devices, regulators, leaping weirs, side weirs, syphon spillway, inverted syphons, sewage pumps, pumping stations, ejectors, sewer junctions, outlets, maintenance of sewers, inspections and repairs, ventilation of sewers.

Module IV

Wastewater treatment. Characteristics of sewage, physical, chemical and biological characteristics, physical and chemical analysis, sampling. Sewage disposal, dilution, disposal into stream, pollution assimilation capacity of streams, disposal by irrigation, surface and subsurface irrigation. Treatment of wastewater. Screens, grit chambers, detritus tanks, skimming tanks sedimentation tanks, oxidation ponds, design, construction and operation of these units. Design construction and operation of trickling filter and activated sludge treatment units. Sludge treatment and disposal, anaerobic digestion, sludge drying beds, sludge disposal. Design of septic tanks as per BIS specifications.

Solid waste management. Collection, transportation and processing. Types and sources of solid wastes, vehicles for solid waste collection and transportation, solid waste characteristics, disposal, composting, incineration, sanitary landfill. Air pollution. Types of pollutants, sources, health effects, Air pollution control, Noise pollution, Sources, effects, control

References:

- 1) K.N. Duggal : Elements of public health engineering (S.Chand&Col., Delhi)
- 2) S.K.Hussain : A text book of water supply and sanitary engineering
1. (Oxford I.B.Hpub.Co.,New Delhi)
- 3) Emil T. Cchanlett : Environmental protection (2nd Ed.) Mc Graw Hill)
- 4) Fair Geyer & Okun : Water supply Wastewater Engineering
- 5) Earnest W. Steel : Water supply and Sewage
- 6) Ehlers & Steel : Municipal & Rural sanitation (Mc Graw Hill)
- 7) Sawyer & Mc Ganty : Chemistry for Environmental Engineering (Mc Graw Hill)
- 8) Metcaif & Eddy Inc: Waste water Engg-Treatment, disposal and reuse
(2nd Ed.) 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.

CE 602A/B Analysis of Structures II

Module I

Column analogy method: fixed end moments for a beam with constant moment of inertia – stiffness and carryover factor to beam with constant moment of inertia – fixed end moments for a beam with variable moment of inertia – stiffness and carryover factor to beam with variable moment of inertia – moments in quadrangular frames with one axis symmetry – moments in closed frame with one axis symmetry – moments in unsymmetrical quadrangular frames – moments in unsymmetrical closed frames

Module II

Approximate methods of multistory frame analysis: Vertical and lateral load analysis of multistory frames – degree of indeterminacy– assumptions for vertical load analysis – 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: 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

Reference

- 1) Wang C.K –Intermediate Structural Analysis, McGraw Hill International Edition.
- 2) Khurmi RS – theory of structures – Schand
- 3) Timoshenko S.P. & Young D.H –Theory of Structures, McGraw Hill International Edition.
- 4) Pandit and Gupta – Theory of structures – Tata McGraw Hill
- 5) Roy and Chakrabarty – Fundamentals of Structural Analysis – 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 603A/B Design of Structures II

Module I

Materials and specifications: rolled steel sections- types of structural steels – specifications

Structural Fasteners: Riveting – bolted joints – types of riveted and bolted joints – failure of riveted joints – strength of a riveted joints – efficiency of a joint – design of riveted joints for axially loaded members – welded joints – advantages and disadvantages of welded joints – types of welds and their symbols – design of fillet weld – design of butt weld – design of plug and slot weld. Design of bolted joint

Eccentric connections: riveted joints subjected to moment acting in plane of joint – rivets and bolts in tension and shear – design of eccentric connection – butt-welded joint loaded eccentrically – fillet welded joint loaded eccentrically

Module II

Tension member: Net sectional area – permissible stresses – design of axially loaded tension member – lug angle – tension splice

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 – gussette base – grillage foundation – column splices

Computation of loads using IS 875 in trusses

Module III

Beams: design procedure for laterally supported and unsupported beams – built up beams – plate thickness – simple beam end connectors. Beam column: eccentricity of load – eccentrically loaded base plate. Welded connections in beams

Plate girder: economic depth and self weight of plate girder – design of web – design of flanges – curtailment of flange plate – riveted connection – web stiffeners – web splice – flange splice

Module IV

RC Column footing: Design of square, rectangular & circular footing:- combined footing rectangular & trapezoidal and strap footing by limit state method

RC Retaining walls : Types-Design of Cantilever and counterfort retaining walls by limit state method.

RC Water tanks: Design of underground & ground water tanks as per IS codes – rectangular water tanks – Circular Water tanks – Design of sidewalls

Reference

- 1) Ram Chandra –Design of steel structures, Standard Book House, Delhi.
- 2) Dayaratnam – Design of Steel Structures – S Chand
- 3) Negi L.S – Design of steel structures, Tata Mc Graw Hill.
- 4) Raz WA – Structural design of steel, 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 604A/B Geotechnical Engineering-II

Module I

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 –

Bearing capacity: ultimate and allowable bearing capacity - 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 –

Module II

Foundation -Functions of foundations - requisites of satisfactory foundations - different types of foundations - definition of shallow and deep foundation - selection of type of foundation

Footings: Individual, combined and continuous - design considerations –Allowable soil pressure- footings subjected to eccentric loading - procedure for proportioning footings for equal settlement

Raft foundations: bearing capacity equations - design considerations - conventional design procedure for rigid mat - floating foundations

Settlement analysis: distribution of contact pressure – estimation of immediate and consolidation settlement - causes of settlement - permissible, total and differential settlements

Module III

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

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

Module IV

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.

Reference

- 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) N.P. Kurian – Design of foundation system, Narosa Publication
- 5) Das B.M – Principles of Foundation Engineering – Thomson Learning
- 6) P.C.Varghese- Foundation Engineering, 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.

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

CE 605 A 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.

Reference

- 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 605 B MIS & FINANCE MANAGEMENT

Module I

Introduction to MIS Classification of computers-hardware & software details –introduction to networking-concepts of networking- Configuration –types and inter connection of various networks(LAN/MAN/WAN) Data base: definition- n analysis of DBMS- classification of data items –coding considerations –types of coded structures.

Module II

Concept of data and information –role of MIS for managing information system for decision making –phases in the information system life cycle .File storage : composition of data files classification – selection consideration for file media and file organization methods –file design considerations.

Module III

Finance Management : Tasks evolution of corporate management , long term financing equity, preference and debenture, term loans ,dividends and share valuation, legal aspects of dividends, short term financing, working capital, influencing factors, cash budgeting, ,terms of liquidity, management of receivable and inventories, 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) V.Rajaraman : Analysis and design of information systems
- 4) 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 modules with option to answer either A or B.

CE 606A/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, Thiessen 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 design-safety criteria-Galleries in dams. Earth and rockfill dams-Types of earthen dams.

Reference

- 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.

CE607A 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 continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE607 B CAD in Civil Engineering

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

Residential buildings

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

Public buildings

8. A small hospital
9. A factory building

Note: serial no 1,2 & 3 drawings shall be drawn in drawing sheet and also using AutoCAD or other equivalent software. Sl. No 4 to 9 shall be drawn only using software.

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 608A 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 treat the given water sample.
9. Determination of manganese in water.
10. Determination of coliforms in water.

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 608 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, chlorides and iron in water.
5. Determination of sulphates and sulphides in water.
6. Determination of h.o and BOD of waste water.
7. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample.
8. Determination of manganese in water.
9. 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 shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 701A 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 .

Reference

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.

CE 701 B 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 702A/B Prestressed Concrete Structures

Module I

General principles of prestressed concrete – classification and types – stages of loading – advantages of prestressed concrete over reinforced concrete – partial prestressing – design codes for prestressed concrete

Materials: Strength requirements of concrete – strain characteristics of concrete – special manufacturing techniques of concrete – self stressing cement – steels for prestressing – steel wires – steel strands – steel bars – fiberglass tendons – grouts

Module II

Prestressing systems and end anchorages: pretensioning system and end anchorages – tensioning methods in posttensioning – posttensioning anchorages utilizing wedge action – posttensioning anchorages for wires – posttensioning anchorages for bars

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

Limit state design of prestressed concrete sections: strength and serviceability limits state – crack widths in prestressed members – design of section for flexure – design of section for shear and torsion – design of member for bond – design of member for bearings

Design of pretensioned and posttensioned flexural beam: dimensioning of flexural members – estimation of self weight of beam – design of pretensioned beam – design of post-tensioned beam – design of partially prestressed beam

Reference

- 1) Lin T.Y & Burns N.H – Design of prestressed concrete structures, John Wiley & Sons, New York.
- 2) Raju N.K – Prestressed concrete, Tata McGraw Hill Publishing Company Limited, New Delhi 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.

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

CE 703 A/B Earthquake Engineering

Module I

Earthquake Ground Motion: Intensity and Magnitude of earthquake – energy released in earthquake – earthquake frequency – Strong motion – source effect – path effect – site effect – use of strong motion data; Strong motion characteristics – Accelerogram – Amplitude – acceleration – duration – Response spectrum – design spectrum – seismic zoning map of India

Module II

Seismic Resistant Building Architecture : Effects of irregularity - Lateral load resisting system – moment resisting frames – building with shear wall – building with frame and shear wall – building configuration – building configuration – mode shapes and fundamental frequency – building frequency and ground period – damping – ductility – seismic weight – redundancy – nonstructural elements – foundation soil/liquefaction – foundations – quality of construction and materials – construction joints .

Module III

Structural Dynamics: Free vibration and forced vibration – SDOF and MDOF systems – Free vibration of undamped SDOF system – free vibration of viscously damped SDOF system – Force vibration of SDOF systems – harmonic excitation – base motion – principles of vibration isolation – determination of damping coefficient – including concepts of dynamic spectrum.

Module IV

Lateral Loads : IS 1893 based determination of design lateral forces in multi-storey RC building

Soil structure interaction effects: direct approach – sub-structure approach (description only)

Ductility Requirements of RC buildings: displacement ductility – rotational ductility – considerations based on IS 13920 in flexural members, columns, joints of frames.

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) Balachandran B & Magrab EB- Vibrations –Thomson Learning.
- 4) Benson H. Tongue – Principles of Vibration, Oxford University Press.
- 5) Park .R and T. Paulay - Reinforced, Concrete Structure , John Wiley.
- 6) Anil K Chopra, Dynamics of Structures , Pearson Education (Singapore) 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 704 A/B Quantity Surveying and Valuation

Module I

Preparation of detailed estimates for building, reinforced concrete and steel structures, roads, irrigation structures, sanitary and water supply works. Preparation of specifications for common materials of construction and items of work with reference to Indian Standard Specifications. Analysis of rates and preparation of abstract of estimates for building and other engineering structures. Estimate of material costs at various stages of construction. Preparation of reports accompanying estimates.

Module II

Valuation – explanation of items – value, market value, rate, years purchase –free hold and lease hold purchase p depreciation- methods of calculating depreciation –straight line method, constant percentage method, sinking fund method and quantity survey method – sinking fund.

Module III

Method of valuation of land-comparative method-abstractive method

Methods of valuation of property-rental method-direct comparison with capital cost-valuation based on profit-valuation based on cost-development method-depreciation method.

Module IV

Method of valuation of landed property- gilt edge security as the base returns as investment-capital value-value of land- investment basis of valuation-Belt method- front land and recessed land-valuation of lease land based on hypothetical building schemes-cost of development, financing charges and price fixation of developed land. Valuation of 1) residential properties 2) offices 3) shop premises 4) commercial properties 5) industrial properties and 6) agricultural land-valuation of lease hold properties and land with circumstances like easement.

Reference

- 1) B.N.Dutta : Estimating and Costing in Civil Engineering
- 2) Chakrabarth : Estimating Costing and Specifications in Civil Engg.
- 3) N.A.Shah : Quantity Surveying and Valuation.
- 4) Ranagawala : Valuation of Real Properties
- 5) I.S.1200 (1968) : Methods of Measurements of Building and Civil Engg.

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 705A/B (a) Finite Element Method

Module I

Matrix Operations: matrix notation for linear equations – rule for matrix multiplication – matrix inversion – solution of simultaneous linear equation by forward elimination and backward substitution – solution of simultaneous linear equation by Gauss Jordan elimination – matrix transposition – properties of matrix

Module II

Matrix displacement method of truss analysis: Degree of freedom, number of independent unknown forces and degree of indeterminacy – deformation matrix – element stiffness matrix – force displacement matrix – static matrix – principle of virtual work – global stiffness matrix – local stiffness matrix – direct stiffness method – law of reciprocal forces and law of reciprocal displacements – joint force matrix – effect of fabrication errors or temperature changes – effect of support settlement

Module III

Matrix displacement method of beam analysis: Joints, elements and degree of freedom – nodal load computation – degree of indeterminacy and independent unknown forces – static matrix – deformation matrix – principle of virtual work – element stiffness matrix – force displacement matrix – global stiffness matrix – local stiffness matrix – effect of support settlement

Module IV

Finite element method: Plane stress/strain and axisymmetric elements – plate bending and shell elements – solid elements – displacement models – relationship between nodal degrees of freedom and generalized coordinates – convergence requirements – natural coordinate system – shape function – Lagrange and Serendipity elements – assembly of elements varying number of nodes – computation of element stiffness matrix using principle of virtual displacement or principle of stationary potential energy – static condensation.

Reference

1. Wang C.K – Intermediate Structural Analysis, McGraw Hill International Edition.
2. Krishnamoorthy C.S. – Finite Element Analysis , Theory and Programming, Tata McGraw Hill Publishing Company Limited, New Delhi, India.
3. Cook R.D, Malkus D.S. & Plesha M. E, Concepts and Applications of Finite Element Analysis, John Wiley & Sons.
4. Logan – A first course in the finite element method – Thomson Learning
5. Rajasekaran – Finite Element Analysis in Engineering design – 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 705 A/B (b) 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, Asphaltting, 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, Purchasing 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 705A/B (c) Advanced Foundation Engineering

Module I

Vibration of elementary systems –vibratory motion- single degree of freedom system - free and forced vibration with and without damping.

Wave propagation in an elastic homogeneous isotropic medium – Raleigh, shear and compression waves – waves in elastic half space.

Module II

Elastic properties of soils- coefficient of elastic, uniform and non – uniform compression and shear – effect of vibration dissipative properties of soils – determination of dynamic properties of soil – codal provisions.

Module III

Design criteria – dynamic loads – simple design procedures for foundations under reciprocating machines – machines producing impact loads – rotary type machines.

Vibration isolation technique – mechanical isolation – foundation isolation –isolation by location –isolation by barriers.

Module IV

Shell foundations: Structural form and efficiency-different types of shell foundations – General principles of design of shell foundations – Construction of shell foundations.

Special foundations : Foundations for special structures such as water tanks, silos, cooling towers, guyed structures, ground storage tanks, chimneys, telecommunication towers, transmission line towers, foundations for underground conduits, foundations for coastal and offshore structures- foundation in special soils-prestressed foundation.

References

- 1) Swarrisaran – Soil Dynamics and Machine Foundations, Galgotia Publications Pvt Ltd
- 2) Srinivasulu P. & Vaidyanatha C.V.- Handbook of Machine Foundations (Tata McGraw Hill)
- 3) Alexander Major - Dynamics in soil Engineering – Voll.2 and 3
- 4) N.P.Kurian - Modern Foundations (Tata McGraw Hill)
- 5) IS.2974-Part I to Part V
- 6) IS 5249 – Method of test for determination of dynamic properties of soils.

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 705(A/B)(d)Groundwater Engineering

Module I

Groundwater resources, groundwater in hydrologic cycle, occurrence of groundwater, groundwater in India. Aquifer properties and groundwater flow, determination of specific yield, storage coefficient, piezometric test, pumping test. Land subsidence due to withdrawals, movement of groundwater, factors affecting permeability, water table contour maps and flownet analysis

Module II

Well hydraulics: Steady radial flow into a well, unsteady radial flow into a well, Theis solution, leaky artesian aquifer, unsteady radial flow in unconfined, confined and leaky aquifers, Hantush and Jacob solution. Fluctuation in groundwater levels, multiple well systems, hydraulics of open wells.

Module III

General mechanism of groundwater contamination - infiltration, direct migration, inter aquifer exchange, recharge from surface water. Sources of groundwater contamination. Movement of contaminants in groundwater – advection, dispersion and retardation. Groundwater tracers. Introduction to seawater intrusion.

Ground water quality: Water quality standards for different uses – drinking, agricultural, industrial. Type of groundwater quality investigations – regional, local and site investigation Groundwater sampling Important groundwater pollutants, - chemical and microbiological, organic pollutants and metals, iron, arsenic, fluorides. Treatment technologies

Module IV

Groundwater restoration – Physical containment techniques, removal, barrier to groundwater flow, surface water control, limitations of physical containment. Hydrodynamic control – Well systems, limitations. Withdrawal and treatment – physical, chemical and biological, limitations, In-situ treatment techniques – chemical, physical, bioremediation, microbial system for bioremediation, site characteristics, solid and slurry phase bioremediation.. Management of groundwater protection programmes, Case studies.

Reference

- 1) Raghunath H.M., Groundwater, Wiley Eastern Limited
- 2) Todd D K, Groundwater Hydrology, John Wiley & Sons
- 3) Cookson J.T, Bioremediation Engineering, McGraw-Hill
- 4) Barcelona M., Contamination of Groundwater, Noyes Data Corporation

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 705A/B (e) Highway & Airfield Pavement Design

Module I

Types and Component parts of Pavements - 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 Subgrade Soil Strength for Pavement Design –Causes and Effects of variation in Moisture Content and Temperature , Depth of frost penetration

Module II

Stresses in Flexible Pavements : Stresses and Deflections in Homogeneous Masses – Burmister’s 2-layer, 3-layer Theories – Wheel Load Stresses, ESWL of Multiple Wheels Repeated Loads and EWL factors – Sustained Loads and Pavement behaviour under Traffic Loads.

Methods of Flexible Pavement Design: Empirical – Semi-empirical and Theoretical Approaches ;Development, Principle, Design steps, Advantages and Applications of different Pavement Design Methods

Module III

Stresses in Rigid pavements : Types of Stresses and Causes – Factors influencing the Stresses, General conditions in Rigid Pavement Analysis, ESWL, Wheel Load Stresses, Warping Stresses, Friction Stresses, Combined Stresses

Module IV

Methods of rigid pavement design: Types of Joints in Cement Concrete Pavements and their Functions, Joint Spacings, Design of Slab Thickness, Design of Joint Details for Longitudinal Joints, Contraction Joints and Expansion Joints, IRC Method of Design

Reference

- 1) Yoder and Witezak, Principles of pavement design ,John Wiley and sons
- 2) Yang, Design of functional pavements, Mc Graw -Hill
- 3) RRL, DSIR, Concrete Roads, HMSO Publications
- 4) IRC: 37-2001, Guidelines for the Design of Flexible Pavements
- 5) IRC: 58-2002, Guidelines for the Design of Rigid Pavements

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 706A 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 shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 706 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)

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:

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 shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 707A Construction and Structural Engineering Laboratory

- 1) Testing of under reinforced and over reinforced non-prestressed flexural reinforced concrete beams
- 2) Testing of shear critical prestressed concrete beam
- 3) Testing of masonry wallettes
- 4) Testing of riveted and welded steel joints
- 5) Dynamics of scaled three storied building frame model subjected to harmonic base motion
- 6) Dynamics of single storied building frame model having plannar asymmetry subjected to harmonic base motion
- 7) Vibration isolation of secondary system
- 8) Dynamics of vibration absorber

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 707 B Construction and Structural Engineering Laboratory

1. Testing of under reinforced and over reinforced non-prestressed flexural reinforced concrete beams
2. Testing of shear critical prestressed concrete beam
3. Testing of masonry wallettes
4. Testing of riveted and welded steel joints
5. Dynamics of scaled three storied building frame model subjected to harmonic base motion
6. Dynamics of single storied building frame model having plannar asymmetry subjected to harmonic base motion
7. Vibration isolation of secondary system & Dynamics of vibration absorber

Note : 50 % marks is earmarked for continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 708 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 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 709 A 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.

CE 801 A/B Architecture & Town Planning

Module I

Principles of Architectural Design: Definition of Architecture – factors influencing architectural development-characteristic features of a style –historical examples.

Creative Principles – function, strength and aesthetics deciding the space and form-detailed analysis of factors influencing the space, activity space, circulation space and tolerance space –factors influencing form –from perception – from expressive of function, form related with material and structural system.

Design principles –elements of composition - point, line, plane, texture, colour etc, mass and scale, proportions – rhythm, balance and unity – iconic, pragmatic and analogue design.

Module II

Functional Planning of Buildings: Occupancy classification of buildings – general requirements of site and building- building codes and rules – licensing of building works.

Functional planning of buildings such as residential, institutional, public, commercial and industrial buildings – the process of identifying activity area & linkages – drawing built diagrams – checking for circulation, ventilation, structural requirements and other constraints – preparing sketch plans and working drawing – site plants .

Consideration of comfort factors such as acoustics, lighting, ventilation and thermal aspects.

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.

Survey and analysis of town-base maps- land used classification – transportation network - housing – demographic and social surveys – economic studies – environmental aspects-theories of land use planning transportation planning and housing development.

Urban area delineation – urban influence zone – urban region - concept of regional planning.

Module IV

Concept of master plan: Structure plan, detailed town planning scheme and action plan. Estimating future needs – planning standards for different land use allocation for commerce, industries, public amenities, open areas etc, - planning standards for density distributions – density zones – planning standards for traffic network – standard of roads - Plan implementation –town planning legislations and municipal acts – panning of control development schemes – urban financing – land acquisition –slum clearance schemes – pollution control aspects.

Reference

- 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 802A/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 803A/B 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.

CE804(A/B)(a) Bridge Engineering

Module I

Investigation for Bridges: Investigation stages – classification of bridges – investigations – estimates – Major bridges – coverage – topographic details – catchments area map – hydrologic particulars – geotechnical details – seismology of the area - navigation requirements – construction resources – particulars of nearest bridges – traffic forecast – Major bridges – factors for choice of ideal site – techno economic feasibility – project report preparation – preparation of drawings

Module II

Loading standards: components of bridge structure – need for loading standard – loading requirement – railway loading standards – road bridge loadings.

Construction of bridges: Setting out of pier and abutments – setting out of single span bridge – setting out of multi span bridge – Open excavation in dry condition – foundation below water table – pile foundations – precast driven piles – cast in situ piles – load test on piles – well foundation – sinking of wells – construction of super structure

Module III

Concrete Bridges for Road Transport: Design of simply supported solid slab bridge – Dispersion of load along the span – design of slab – Design of Girder Bridge – Design of deck slabs – design of longitudinal girders – Courbon's method – Design of bearings

Steel Bridge for Railways: Steel girder design

Module IV

Inspection of Bridges: Necessity for inspection of bridges – inspection procedures – aspects of inspection – testing of bridges – assessment of safe load bearing capacity

Maintenance of Bridges: Substructure maintenance – super structure maintenance – bearings – girders.

References

- 1) Ponnuswamy S. – Bridge Engineering, Tata McGraw Hill Publishing Company Ltd
- 2) Aswani MG, Vazirani V.N. & Ratwani M.M. – Design of Concrete Bridges, 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.

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

CE 804 A/B (b) 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 804A/B (c) 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

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

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.

Module IV

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

Cement and lime stabilization: cement stabilization-types of soil cement-factors affecting soil cement mixing

Lime stabilization-effect of lime on soil properties

Reference

- 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) Purushothama Raj.P – Ground Improvement techniques ,Laxmi Publications(P) Ltd., New Delhi
- 5) Shashi.K.Gulhati & Manoj Datta –Geotechnical Engineering , Tata 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.

CE 804A/B (d) 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 804A/B (e) 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-oxygenation in 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 electro dialysis 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 biofiltration. Environmental management through ISO 14000, Environmental Auditing procedures, Auditing for waste minimisation, Ecolabelling and Life Cycle Assessment.

Referencess

- 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 805A 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 continous evaluation, and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50 % marks separately for the two components to be eligible for a pass in that subject.

CE 805(B) INDUSTRIALLY ORIENTED PROJECT

Each batch of around 5 students shall identify a field oriented project

- 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	75
iii. End semester presentation and oral examination	75
iv. Project Report – Presentation style and content	50
Total	<hr/> 250

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 806 A 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 806B / 807A 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 a minimum of one internal examiner and one external examiner, both 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

