

UNIVERSITY OF KERALA

**B.TECH DEGREE COURSE
(2008 SCHEME)**

REGULATIONS, SCHEME AND SYLLABUS

FOR

CIVIL ENGINEERING

B.Tech Degree Course – 2008 Scheme

REGULATIONS

1. Conditions for Admission

Candidates for admission to the B.Tech degree course shall be required to have passed the Higher Secondary Examination, Kerala or 12th Standard V.H.S.E., C.B.S.E., I.S.C. or any examination accepted by the university as equivalent thereto obtaining not less than 50% in Mathematics and 50% in Mathematics, Physics and Chemistry/ Bio- technology/ Computer Science/ Biology put together, or a diploma in Engineering awarded by the Board of Technical Education, Kerala or an examination recognized as equivalent thereto after undergoing an institutional course of at least three years securing a minimum of 50 % marks in the final diploma examination subject to the usual concessions allowed for backward classes and other communities as specified from time to time.

2. Duration of the course

- i) The course for the B.Tech Degree shall extend over a period of four academic years comprising of eight semesters. The first and second semester shall be combined and each semester from third semester onwards shall cover the groups of subjects as given in the curriculum and scheme of examination
- ii) Each semester shall ordinarily comprise of not less than 400 working periods each of 60 minutes duration
- iii) A candidate who could not complete the programme and pass all examinations within Ten (10) years since his first admission to the B.Tech programme will not be allowed to continue and he has to quit the Programme. However he can be readmitted to the first year of the programme if he/she satisfies the eligibility norms applicable to the regular candidates prevailing at the time of readmission.

3. Eligibility for the Degree

Candidates for admission to the degree of bachelor of technology shall be required to have undergone the prescribed course of study in an institution maintained by or affiliated to the University of Kerala for a period of not less than four academic years and to have passed all the examinations specified in the scheme of study

4. Subjects of Study

The subjects of study shall be in accordance with the scheme and syllabi prescribed

5. Evaluation

Candidates in each semester will be evaluated both by continuous assessment and end semester University examination. The individual maximum marks allotted for continuous assessment and University examination for each subject is as prescribed by the scheme of study.

5.1 Continuous Assessment (C.A)

The marks awarded for the continuous assessment will be on the basis of the day-to-day work, periodic tests (minimum two in a semester) and assignments (minimum of three – one each from each module). The faculty member concerned will do the continuous assessment for each semester. The C.A. marks for the individual subjects shall be computed by giving weight age to the following parameters.

Subject	Attendance	Tests	Assignments/ Class Work
Theory Subjects	20%	50%	30%
Drawing	20%	40%	40%
Practical	20%	40%	40%
Project Work	Work Assessed by Guide – 50% Assessed by a three member committee out of which one member is the guide – 50%		

The C.A. marks for the attendance (20%) for each theory, practical and drawing shall be awarded in full only if the candidate has secured 90% attendance or above in the subject. Proportionate reduction shall be made in the case of subjects in which he/she gets below 90% of the attendance for a subject. The CA marks obtained by the student for all subjects in a semester is to be published at least 5 days before the commencement of the University examinations. Anomalies if any may be scrutinized by the department committee and the final CA marks are forwarded to the university within the stipulated time.

5.2. End Semester University Examinations

- i) There will be University examinations at the end of the first academic year and at the end of every semester from third semester onwards in subjects as prescribed under the respective scheme of examinations. Semester classes shall be completed at least 10 working days before the commencement of the University examination.
- ii) The examination will be held twice in an year – April/May session (for even semester) and October/November session (for odd semester). The combined 1st and 2nd semester is reckoned as equivalent to an even semester for the purpose of conduct of examination and the University examination will be held during April/May. However VII and VIII Semester examination will be conducted in both the sessions. This schedule will not be changed
- iii) A student will be permitted to appear for the university examination only if he/she satisfies the following requirements
 - a. He/she must secure not less than 75% attendance in the total number of working periods during the first year and in each semester thereafter and shall be physically present for a minimum of 60% of the total working periods. In addition, he/she also shall be physically present in at least 50% of total working periods for each subject
 - b. He must earn a progress certificate from the head of the institution of having satisfactorily completed the course of study in the semester as prescribed by these regulations

- c. It shall be open to the Vice-Chancellor to grant condonation of shortage of attendance on the recommendation of the head of the institution in accordance with the following norms
 - d. The attendance shall not be less than 60% of the total working periods
 - e. He/she shall be physically present for a minimum of 50% of the total working periods
 - f. The shortage shall not be condoned more than twice during the entire course
 - g. The condonation shall be granted subject to the rules and procedures prescribed by the university from time to time.
 - h. The condonation for combined 1st and 2nd semesters will be reckoned as a single condonation for attendance purposes.
- iv) A student who is not permitted to appear for the University examinations for a particular semester due to the shortage of attendance and not permitted by the authorities for condonation of shortage of attendance shall repeat the semester when it is offered again. This provision is allowed only once for a semester.
 - v) The university will conduct examinations for all subjects (Theory, Drawing & Practical)
 - vi) The scheme of valuation will be decided by the chief examiner for theory / drawing subjects
 - vii) For practical examinations, the examiners together will decide the marks to be awarded. The student shall produce the certified record of the work done in the laboratory during the examination. The evaluation of the candidate should be as per the guidelines given in the syllabus for the practical subject.

6. Letter Grades

For each subject in a semester, based on the total marks obtained by the student in the University examination and Continuous assessment put together a letter grade (S,A+, A, B+, B, C+, C, D, E and F) will be awarded. ***All letter grades except 'F' will be awarded if the marks for the University examination is 40 % or above and the total mark (C.A marks + University Exam mark) is 50 % or above.*** No absolute mark will be indicated in the grade card. Letter grade corresponding to total marks (C.A marks+ University Exam mark) and the corresponding grade point in a ten-point scale is described below.

% of Total marks (C.A marks + University Exam mark)	Letter Grade	Grade Point (G.P)	Remarks
90 % and above	S	10	Excellent
85 % and above but less than 90%	A+	9	
80 % and above but less than 85%	A	8.5	
75 % and above but less than 80%	B+	8	
70 % and above but less than 75%	B	7.5	
65 % and above but less than 70%	C+	7	
60 % and above but less than 65%	C	6.5	
55 % and above but less than 60%	D	6	
50 % and above but less than 55%	E	5.5	
Below 50% (C.A + U.E) or below 40 % for U.E only	F	0	Failed

7. Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

Grade point average is the semester wise average points obtained by each student in a 10-point scale. GPA for a particular semester is calculated as per the calculation shown below.

$$GPA = \frac{\sum \text{Credit} \times \text{GP obtained for the subject}}{\sum \text{credit for subject}}$$

Cumulative Grade point Average (CGPA) is the average grade points obtained by the students till the end of any particular semester. CGPA is calculated in a 10-point scale as shown below.

$$CGPA = \frac{\sum \text{Credits for semester} \times \text{GPA obtained for the semester}}{\sum \text{credits for the semester}}$$

GPA and CGPA shall be rounded to two decimal points. The Grade card issued to the students shall contain subject number and subject name, credits for the subject, letter grades obtained, GPA for the semester and CGPA up to that particular semester. In addition to the grade cards for each semester all successful candidate shall also be issued a consolidated statement grades. On specific request from a candidate and after remitting the prescribed fees the University shall issue detailed mark to the individual candidate.

8. Minimum for a pass

- a) A candidate shall be declared to have passed a semester examination in full in the first appearance if he/she secures not less than 5.5 GPA with a minimum of 'E' grade for the all individual subject in that semester.
- b) A candidate shall be declared to have passed in an individual subject of a semester examination if he/she secures grade 'E' or above.
- c) A candidate who does not secure a full pass in a semester examination as per clause (a) above will have to pass in all the subjects of the semester examination as per clause (b) above before he is declared to have passed in that semester examination in full.

9. Improvement of Grades

- i) A candidate shall be allowed to re-appear for a maximum of two subjects of a semester examination in order to improve the marks and hence the grades already obtained subject to the following conditions
 - a) The candidate shall be permitted to improve the examination only along with next available chance.
 - b) The candidate shall not be allowed to appear for an improvement examination for the subjects of the VII & VIII semesters
 - c) The grades obtained by the candidate for each subject in the improvement chance he has appeared for or the already existing grades – whichever is better will be reckoned as the grades secured.
 - d) First & Second semester will be counted as a single chance and they can improve a maximum of three subjects

- ii) A candidate shall be allowed to repeat the course work in one or more semesters in order to better the C.A. marks already obtained, subject to the following conditions
 - a) He/she shall repeat the course work in a particular semester only once and that too at the earliest opportunity offered to him/her.
 - b) He/she shall not combine this course work with his/her regular course work
 - c) He/she shall not be allowed to repeat the course work of any semester if he has already passed that semester examination in full
 - d) The C.A marks obtained by the repetition of the course work will be considered for all purposes
- iii) A candidate shall be allowed to withdraw from the whole examination of a semester in accordance with the rules for cancellation of examination of the University of Kerala.

10. Classification of Successful candidates

- i) A candidate who qualifies for the degree passing all the subjects of the eight semesters within five academic years (ten consecutive semesters after the commencement of his/her course of study) and secures not less than 8 CGPA up to and including eighth semester (overall CGPA) shall be declared to have passed the B.Tech degree examination in **FIRST CLASS WITH DISTINCTION**
- ii) A candidate who qualifies for the degree passing all the subjects of the eight semesters within five academic years (ten consecutive semesters after the commencement of his/her course of study) and secures less than 8 CGPA but not less than 6.5 CGPA up to and including eighth semester shall be declared to have passed the B.Tech degree examination in **FIRST CLASS**.
- iii) All other successful candidates shall be declared to have passed the B.Tech Degree examination in **SECOND CLASS**
- iv) Successful candidates who complete the examination in four academic years (Eight consecutive semesters after the commencement of the course of study shall be ranked branch-wise on the basis of the CGPA in all eight semesters put together. In the case of a tie in the CGPA the total marks of the students who have got same CGPA shall be considered for finalizing the rank. Students who pass the examination in supplementary examination are also covered under this clause

11. Educational Tour

- a) The students may undertake one educational tour preferably after fourth semester of the course and submit a tour report
- b) The tour may be conducted during the vacation / holidays taking not more than 5 working days, combined with the vacation / holidays if required. Total number of Tour days shall not exceed 15 days.
- c) The tour period shall be considered as part of the working periods of a semester

12. Revision of Regulations

The university may from time to time revise, amend or change the regulations, curriculum, scheme of examinations and syllabi. These changes unless specified otherwise, will have effect from the beginning of the academic year / semester following the notification of the University

University of Kerala
Scheme of study for the B.Tech Degree in Civil Engineering
(2008 scheme)

Combined I and II Semesters
(Common for all branches)

Course No	Name of subject	Weekly load, hours			Max sessional marks	Exam Dur Hrs	Exam max marks	Credits
		L	T	D/P				
08.101	Engineering Mathematics	2	1	0	50	3	100	6
08.102	Engineering Physics	2	1	0	50	3	100	6
08.103	Engineering Chemistry	2	1	0	50	3	100	6
08.104	Engineering Graphics	1	0	2	50	3	100	6
08.105	Engineering Mechanics	2	1	0	50	3	100	6
08.106	Basic Civil Engineering	2	1	0	50	3	100	6
08.107	Basic Mechanical Engineering	2	1	0	50	3	100	6
08.108	Basic Electrical and Electronics Engineering	2	1	0	50	3	100	6
08.109	Basic Communication and Information Engineering	2	1	0	50	3	100	6
08.110	Engineering Workshops	0	0	2	50	3	100	4
	Total	17	8	4	500		1000	58

The subject 08.109 will be handled by the Department of Electronics and Communication Engineering,

Third Semester

Course No:	Subject	Credit	L	T	P/D	Sessional Marks	University Exam.		Total Marks
							Hrs.	Marks	
08.301	Engineering Mathematics (CMPUNERFHBTA)	4	3	1	-	50	3	100	150
08.302	Mechanics of Structures	4	3	1	-	50	3	100	150
08.303	Fluid Mechanics- I	4	3	1	-	50	3	100	150
08.304	Concrete Technology	3	2	1	-	50	3	100	150
08.305	Surveying I	4	3	1	-	50	3	100	150
08.306	Engineering Geology	4	3	1		50	3	100	150
08.307	Building Technology & Drawing	4	2	-	2	50	3	100	150
08.308	Practical Surveying – I	2	-	-	2	50	3	100	150
	Total	29	19	6	4	400		800	1200

Fourth Semester

Course No:	Subject	Credit	L	T	P/D	Sessional Marks	University Exam.		Total Marks
							Hrs.	Marks	
08.401	Engineering Mathematics – III (CMPUNERFHB)	4	3	1	-	50	3	100	150
08.402	Humanities (CTAFRHB)	3	3	-	-	50	3	100	150
08.403	Structural Analysis - I	4	3	1	-	50	3	100	150
08.404	Fluid Mechanics – II	4	3	1		50	3	100	150
08.405	Surveying II	5	3	2	-	50	3	100	150
08.406	Building Planning & Drawing	5	1	-	4	50	3	100	150
08.407	Strength of Materials Lab.	2	-	-	2	50	3	100	150
08.408	Fluid Mechanics Lab.	2	-	-	2	50	3	100	150
Total		29	16	5	8	400		800	1200

Fifth Semester

Course No:	Subject	Credit	L	T	P/D	Sessional Marks	University Exam.		Total Marks
							Hrs.	Marks	
08.501	Engineering Mathematics - IV	4	3	1	-	50	3	100	150
08.502	Design of Reinforced Concrete Structures	5	3	2	-	50	3	100	150
08.503	Structural Analysis – II	5	3	2	-	50	3	100	150
08.504	Transportation Engineering - I	4	3	1	-	50	3	100	150
08.505	Urban Planning and Architecture	4	3	1		50	3	100	150
08.506	Elective I	3	3	-	-	50	3	100	150
08.507	Practical Surveying II	2	-	-	2	50	3	100	150
08.508	Concrete Lab.	2	-	-	2	50	3	100	150
Total		29	18	7	4	400		800	1200

Sixth Semester

Course No:	Subject	Credit	L	T	P/D	Sessional Marks	University Exam.		Total Marks
							Hrs.	Marks	
08.601	Design of Steel Structures	5	3	2	-	50	3	100	150
08.602	Geo-technical Engineering – I	4	3	1	-	50	3	100	150
08.603	Water Resources Engineering	4	3	1		50	3	100	150
08.604	Transportation Engineering - II	4	3	1		50	3	100	150
08.605	Programming and Numerical Methods	4	3	1	-	50	3	100	150
08.606	Elective – II	4	3	1	-	50	3	100	150
08.607	Transportation Engineering Lab.	2	-	-	2	50	3	100	150
08.608	Computer Aided Design & Drafting Lab.	2	-	-	2	50	3	100	150
Total		29	18	7	4	400		800	1200

Seventh Semester

Course No:	Subject	Credits	L	T	P/D	Sessional Marks	University Exam.		Total Marks
							Hrs.	Marks	
08.701	Advanced Structural Analysis	5	3	2	-	50	3	100	150
08.702	Design of Hydraulic Structures	5	3	-	2	50	4	100	150
08.703	Geotechnical Engineering – II	4	3	1	-	50	3	100	150
08.704	Environmental Engineering - I	4	3	1	-	50	3	100	150
08.705	Elective – III	4	3	1	-	50	3	100	150
08.706	Environmental Engineering Lab.	2	-	-	2	50	3	100	150
08.707	Geotechnical Engineering Lab.	2	-	-	2	50	3	100	150
08.708	(a) Seminar & Project (b) Survey Camp & Industrial Training	3	-	-	3	100			100
Total		29	15	5	9	450		700	1150

Eighth Semester

Course No:	Subject	Credit	L	T	P/D	Sessional Marks	University Exam.		Total Marks
							Hrs.	Marks	
08.801	Design & Drawing of Reinforced Concrete Structures	4	2	-	2	50	4	100	150
08.802	Design & Drawing of Steel Structures	4	2	-	2	50	4	100	150
08.803	Environmental Engineering - II	4	3	1	-	50	3	100	150
08.804	Quantity Surveying and Valuation	3	3	-	-	50	3	100	150
08.805	Construction Management	3	3	-	-	50	3	100	150
08.806	Elective - IV	3	3	-	-	50	3	100	150
08.807	Elective - V	3	3	-	-	50	3	100	150
08.808	Project , Viva & Industrial Visit	5	-	-	5	100		100	200
Total		29	19	1	9	450		800	1250

List of Electives

Elective-I (Vth semester)

- 08.506.1 Modern Construction Materials
- 08.506.2 Geomatics
- 08.506.3 Free Surface Flow
- 08.506.4 Environmental Science and Management
- 08.506.5 Advanced concrete technology

Elective-II (VIth Semester)

- 08 606.1 Soil Exploration
- 08 606.2 Solid Waste Management
- 08 606.3 Wave Hydro dynamics
- 08 606.4 Advanced Computational Methods
- 08 606.5 Traffic Engineering
- 08 606.6 Valuation of Real Properties
- 08 606.7 Sustainable Development
- 08.606.8 Hydrology & Water Resources
- 08.606.9. Nano Science & Nano Technology
- 08 606 10 Natural Disaster Management
- 08.606.11 Communicative English and Technical Writing

Elective-III (VIIth Semester)

- 08.705.1 Theory of Elasticity
- 08.705.2. Earth Dam Engineering
- 08.705.3 Deep Foundations
- 08.705.4 Structural Analysis for Dynamic Loads
- 08.705.5 Wind loading on structures
- 08.705.6 Air quality Management
- 08.705.7 Personnel Management
- 08.705.8 Design of Offshore Structures
- 08.705.9 Urban water Management and Environmental Hydraulics
- 08.705.10 Pre-stressed Concrete
- 08.705.11 Highway and Airfield Pavement Materials
- 08.705.12 Artificial Intelligence Methods

Elective-IV (VIIIth Semester)

- 08.806.1 Design of Steel Concrete Composite structures
- 08.806.2 Design of Port, Harbour and Coastal structures
- 08.806.3 Design and Construction of pavements
- 08.806.4 Advanced Foundation Engineering
- 08.806.5 Finite Element Methods
- 08.806.6 Probabilistic Methods in Civil Engineering
- 08.806.7 Ground Water Engineering
- 08.806.8 Repair & Rehabilitation of Structures
- 08.806.9 Ground Improvement
- 08.806.10 Earthquake resistant design of structures
- 08.806.11 Environmental Impact Assessment
- 08.806.12 Instrumentation for Engineering Measurements

Elective-V (VIIIth Semester)

- 08.807.1 Geotechnical earthquake Engineering
- 08.807.2 Foundations on Expansive Soils
- 08.807.3 Industrial Waste Water Management
- 08.807.4 Design of Bridges
- 08.807.5 Transportation Planning
- 08.807.6 Materials Management
- 08.807.7 Optimization Techniques in Engineering.
- 08.807.8 Irrigation and drainage Engineering
- 08.807.9 Transportation system management
- 08.807.10 Reinforced Earth
- 08.807.11 Industrial Structures
- 08.807.12 Geo Environmental Engineering
- 08.807.13. Systems engineering for civil engineers

Syllabus for Combined I&II Semester

08-101 ENGINEERING MATHEMATICS- 1

L-T-P : 2-1-0

Credits: 6

MODULE- 1

Applications of differentiation:– Definition of Hyperbolic functions and their derivatives- Successive differentiation- Leibnitz’ Theorem(without proof)- Curvature- Radius of curvature- centre of curvature- Evolute (Cartesian ,polar and parametric forms)

Partial differentiation and applications:- Partial derivatives- Euler’s theorem on homogeneous functions- Total derivatives- Jacobians- Errors and approximations- Taylor’s series (one and two variables) - Maxima and minima of functions of two variables - Lagrange’s method- Leibnitz rule on differentiation under integral sign.

Vector differentiation and applications :- Scalar and vector functions- differentiation of vector functions- Velocity and acceleration- Scalar and vector fields- Operator ∇ - Gradient- Physical interpretation of gradient- Directional derivative- Divergence- Curl- Identities involving ∇ (no proof) - Irrotational and solenoidal fields – Scalar potential.

MODULE-II

Laplace transforms:- Transforms of elementary functions - shifting property- Inverse transforms- Transforms of derivatives and integrals- Transform functions multiplied by t and divided by t - Convolution theorem(without proof)-Transforms of unit step function, unit impulse function and periodic functions-second shifting theorem- Solution of ordinary differential equations with constant coefficients using Laplace transforms.

Differential Equations and Applications:- Linear differential equations with constant coefficients- Method of variation of parameters - Cauchy and Legendre equations –Simultaneous linear equations with constant coefficients- Application to orthogonal trajectories (cartisian form only).

MODULE-III

Matrices:-Rank of a matrix- Elementary transformations- Equivalent matrices- Inverse of a matrix by gauss-Jordan method- Echelon form and normal form- Linear dependence and independence of vectors- Consistency- Solution of a system linear equations-Non homogeneous and homogeneous equations- Eigen values and eigen vectors – Properties of eigen values and eigen vectors- Cayley Hamilton theorem(no proof)- Diagonalisation- Quadratic forms- Reduction to canonical forms-Nature of quadratic forms-Definiteness,rank,signature and index.

REFERENCES

1. Kreyszig; *Advanced Engineering Mathematics*, 8th edition, Wiley Eastern.
2. Peter O’ Neil ; *Advanced Engineering Mathematics*, Thomson
3. B.S.Grewal ; *Higher Engineering Mathematics*, Khanna Publishers
4. B.V.Ramana; *Higher Engineering Mathematics*, Tata Mc Graw Hill, 2006
5. Michel D Greenberg; *Advanced Engineering Mathematics*, Pearson International
6. Sureshan J, Nazarudeen and Royson; *Engineering Mathematics I*, Zenith Publications

08.102 ENGINEERING PHYSICS

L-T-P: 2-1- 0

Credits: 6

MODULE-I

Oscillations and Waves

Basic ideas of harmonic oscillations – Differential equation of a SHM and its solution. Theory of damped harmonic oscillations. Quality factor. Theory of forced harmonic oscillations and resonance. Types of waves. One dimensional waves – Differential Equation. Harmonic waves. Three dimensional waves - Differential Equation and solution. Plane waves and spherical waves. Energy in wave motion. Velocity of transverse waves along a stretched string.

Electromagnetic Theory

Del operator – grad, div, curl and their physical significance. Concept of displacement current. Deduction of Maxwell's equations. Prediction of electromagnetic waves. Transverse nature of electromagnetic waves. **E** and **H** are at right angles. Poynting's theorem (qualitative only)

Physics of Solids

Space lattice. Unit cell and lattice parameters. Crystal systems. Co-ordination number and packing factor with reference to simple cubic, body centered cubic and face centered cubic crystals. Directions and planes. Miller indices. Interplanar spacing in terms of Miller indices. Super conductivity - Meissner effect. Type-I and Type-II superconductors. BCS theory (qualitative). High temperature superconductors. Applications of superconductors. Introduction to new materials (qualitative) -Metallic glasses, Nano materials, Shape memory alloys, Bio materials.

MODULE- II

Interference of Light

Concept of temporal and spatial coherence. Interference in thin films and wedge shaped films. Newton's rings. Michelson's interferometer. Determination of wave length and thickness. Interference filters. Antireflection coating.

Diffraction of Light

Fresnel and Fraunhofer diffraction. Fraunhofer diffraction at a single slit. Fraunhofer diffraction at a circular aperture (qualitative). Rayleigh's criterion for resolution. Resolving power of telescope and microscope. Plane transmission grating. Resolving power of grating. Grating equation. X-ray diffraction. Bragg's law.

Polarization of Light

Types of polarized light. Double refraction. Nicol Prism. Retardation plates. Theory of plane, circular and elliptically polarized light. Production and analysis of circularly and elliptically polarized light. Polaroids. Induced birefringence. Photo elasticity – isoclinic and isochromatic fringes – photo elastic bench

Special Theory of Relativity

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

MODULE – III

Quantum Mechanics

Dual nature of matter. Wave function. Uncertainty principle. Energy and momentum operators. Eigen values and functions. Expectation values. Time Dependent and Time Independent Schrodinger equations. Particle in one dimensional box. Tunnelling (qualitative).

Statistical Mechanics

Macrostates and Microstates. Phase space. Basic postulates of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics. Distribution equations in the three cases (no derivation). Bosons and Fermions. Density of states. Derivation of Planck's formula. Free electrons in a metal as a Fermi gas. Fermi energy.

Laser

Einstein's coefficients. Population inversion and stimulated emission. Optical resonant cavity. Ruby Laser, Helium-Neon Laser, Carbon dioxide Laser (qualitative). Semiconductor Laser (qualitative). Holography. Fiber Optics - Numerical Aperture and acceptance angle. Types of optical fibers. Applications.

REFERENCE:

1. Sears & Zemansky ; *University Physics. XI Edn.,; Pearson*
2. Frank & Leno; *Introduction to Optics. III Edn., , Pearson*

3. J.C. Upadhyaya; *Mechanics.*, Ram Prasad & Sons
4. David J Griffiths; *Introduction to Electrodynamics, III Edn.*, Pearson
5. M Ali Omar; *Elementary Solid State Physics.*, Pearson
6. S O Pillai; *Solid State Physics.*, New Age International Publishers
7. John R Taylor, Chris D Zafiratos & Michael A Dubson; *Modern Physics for Scientists and Engineers. II Edn.*, Prentice Hall of India
8. Eugene Hecht; *Optics. IV Edn.*, Pearson
9. Robert Resnick ; *Introduction to Special Relativity.*, John Willey and Sons
10. Richard L Libboff; *Introduction to Quantum Mechanics. IV Edn.*, Pearson
11. Donald A Mcquarrie; *Statistical Mechanics.*, Vivo Books
12. Mark Ratner& Daniel Ratner; *Nanotechnology.*
13. T.A. Hassan et al; *A Text Book of Engineering Physics.*, Aswathy Publishers, Trivandrum
14. B. Premlet; *Advanced Engineering Physics* , Phasor Books, Kollam.

LIST OF DEMONSTRATION EXPERIMENTS

1. Newton's Rings – Determination of wave length.
2. Air Wedge – Diameter of a thin wire
3. Spectrometer – Plane transmission grating – wavelength of light.
4. Spectrometer – Refractive indices of calcite for the ordinary and extraordinary rays.
5. Laser – Diffraction at a narrow slit.
6. Laser – Diffraction at a straight wire or circular aperture.
7. Michelson's interferometer – Wavelength of light.
8. Michelson's interferometer – Thickness of thin transparent film.
9. Polarization by reflection – Brewster's law.
10. Computer stimulation – superposition of waves.
11. Computer stimulation – study of **E** & **H**. (Gauss' law & Ampere's law)

Pattern of Question Paper

University examination is for a maximum of **100 marks**, in **3 hour** duration. The syllabus is spread in 3 modules. The question paper will consist of two parts (A and B).

Part A contains short answer questions for **40 marks**. This part contains 10 questions without any choice, **each of 4 marks** (uniformly taken from all modules).

Part B contains long answer questions for **60 marks**. From each module, this part contains 3 questions out of which 2 are to be answered, **each of 10 marks**. Long answer questions from all the 3 modules will form 60 marks.

08.103 ENGINEERING CHEMISTRY

L-T-T: 2-1-0

Credits: 6

MODULE-1

Electrochemistry - Electrodes- Electrode potential- Origin of electrode potential- Helmholtz double layer- Nernst equation and application- Reference electrodes- Standard hydrogen electrode- Saturated calomel electrode- Quinhydrone electrode-Determination of P^H using these electrodes- Concentration cells- Fuel cells- Secondary cells- Lead acid cell- Nickel cadmium cell- Lithium-ion cell. - Conductometric and Potentiometric titrations (acid base, oxidation reduction and precipitation titrations). **(12hrs)**

Corrosion and its control- Theories of corrosion (chemical corrosion and electrochemical corrosion)- Galvanic series- Types of corrosion (Concentration cell corrosion, Stress corrosion, Galvanic corrosion) - Factors affecting corrosion (nature of metal and nature of environment) and different methods of corrosion control (corrosion inhibitors, cathodic protection). **(5hrs)**

Protective coatings- Metallic coatings- Chemical conversion coatings- paint **(4hrs)**

Nano materials- Introduction-Classification-preparation (laser abrasion technique and sputtering technique)- Chemical method (reduction)-Properties and Applications of nano materials-Nano tubes-Nano wires. **(4hrs)**

MODULE-2

Water treatment- Types of hardness- Degree of hardness- Related problems- Estimation of hardness- by EDTA method- Sludge and scales in boilers- Priming and foaming- Boiler corrosion-Water softening methods, Lime-soda process, Ion exchange methods-Internal treatments (colloidal, carbonate, phosphate and calgon conditioning)- Domestic water treatment- Methods of disinfection of water-Desalination process (Reverse osmosis, electro dialysis- Distillation). **(12hrs)**

Environmental damages and prevention- Air pollution- CFCs and ozone depletion- Alternative refrigerants- Green house effect-Water pollution- BOD and COD- Waste water treatment- Aerobic - Anaerobic and USAB processes. **(3hrs)**

Thermal methods of analysis-Basic principles involved in Thermo gravimetry, Differential thermal analysis and applications. **(2hrs)**

Spectroscopy- Molecular energy levels-Types of molecular spectra- Electronic spectra (Classification of electronic transitions- Beer Lambert's law, Vibrational spectra (mechanism of interaction and application), Rotational spectra (Determination of bond length and application). NMR spectra (Basic principle, chemical shift, spin-spin splitting) **(6hrs)**

Chromatography- General principles- High performance liquid chromatography- Gas chromatography. **(2hrs)**

MODULE-3

Polymers- Classifications- Mechanism of polymerization (Addition, free radical, cationic, anionic and coordination polymerization)- Thermoplastics and thermosetting plastics-Compounding of plastics-Moulding techniques of plastics (Compression, Injection, Transfer and Extrusion moulding)-Preparation, properties and uses of PVC, PVA, PMMA, Nylon, PET, Bakelite, Urea formaldehyde resin- Silicon polymers- Biodegradable plastics. Elastomers- structure of natural rubber- vulcanization- synthetic rubbers (Buna-S, Butyl rubber and Neoprene) **(12hrs)**

Organo electronic compounds -Super conducting and conducting organic materials like Polyaniline, polyacetylene and [polypyrrol and its applications. **(2hrs)**

Fuels- Calorific value- HCV and LCV-Experimental determination of calorific value-Theoretical calculation of calorific value by Dulong's formula - Bio fuels -Bio hydrogen and Bio-diesel **(5hrs)**

Lubricants- Introduction-Mechanism of lubrication- solid and liquid lubricant- Properties of lubricants-Viscosity index- flash and fire point- cloud and pour point- aniline value. **(4hrs)**

Cement- Manufacture of Portland cement- Theory of setting and hardening of cement **(2hrs)**

LAB-EXPERIMENTS (DEMONSTRATION ONLY)

1. Estimation of total hardness in water using EDTA.
2. Estimation of chloride ions in domestic water.
3. Estimation of dissolved oxygen.
4. Estimation of COD in sewage water.
5. Estimation of available chlorine in bleaching powder.

6. Estimation of copper in brass.
7. Estimation of iron in a sample of hematite.
8. Determination of flash and fire point of a lubricating oil by Pensky Marten's apparatus.
9. Potentiometric titrations.
10. Preparation of buffers and standardisation of pH meter.
11. Determination of molarity of HCl solution pH -metrically.
12. Determinations of pH using glass electrode and quinhydrone electrode.

REFERENCES

1. H.A. Willard, L.L. Merrit and J.A. Dean ; "Instrumental methods of analysis"
2. A.K. De ; "Environmental Chemistry"
3. K.J.Klaunig; "Nanoscale materials in chemistry"
4. B.R. Gowariker ; "Polymer science"
5. B.W.Gonser ; "Modern materials"
6. V.Raghavan; "Material Science and engineering. A first course"
7. L.H. Van Vlack ; "Elements of Material science and Engineering"
8. J.W.Goodby ; "Chemistry of liquid crystals"
9. S.Glasstone ; "A text book of physical chemistry"
10. P.C. Jain; "Engineering Chemistry"
11. Juhaina Ahad ; "Engineering Chemistry"
12. Shashi Chawla ; "A text book of Engineering Chemistry"
13. R. Gopalan, D.Venkappayya & S. Nagarajan ; "Engineering Chemistry"
14. J.C. Kuriakose and J. Rajaram ; "Chemistry of Engineering and Technology volume I & II"
15. R.N Goyal and Harmendra Goel; "Engineering Chemistry", Ane Students Edition, Thiruvananthapuram

08.104 ENGINEERING GRAPHICS

L- T-D: 1-0-2

CREDITS: 6

INTRODUCTION: Introduction to technical drawing and its language. Lines, lettering, dimensioning, scaling of figures, symbols and drawing instruments. (1 sheet practice)

MODULE 1

PLAIN CURVES: Conic sections by eccentricity method. Construction of ellipse: (i) Arc of circles method (ii) Rectangle method (ii) Concentric circles method. Construction of parabola (i) Rectangle method (ii) Tangent method. Construction of hyperbola (i) Arc of circles method (ii) given ordinate, abscissa and the transverse axis (iii) given the asymptotes and a point on the curve. Construction of Tangent and Normal at any point on these curves

MISCELLANEOUS CURVES: Construction of Cycloid, Epicycloid and Hypocycloid, Involute of a circle. Archimedian spiral, Logarithmic spiral and Helix. Construction of Tangent and Normal at any point on these curves

PROJECTION OF POINTS AND LINES: Types of projections, Principles of Orthographic projection. Projections of points and lines. Determination of true length, inclination with planes of projection and traces of lines.

MODULE II

PROJECTION OF SOLIDS: Projection of simple solids such as prisms, pyramids, cone, cylinder, tetrahedron, octahedron, sphere and their auxiliary projections.

SECTIONS OF SOLIDS: Types of cutting planes, section of simple solids cut by parallel, perpendicular and inclined cutting planes. Their projections and true shape of cut sections.

DEVELOPMENT OF SURFACES: Development of surfaces of (i) simple solids like prisms, pyramids, cylinder and cone (ii) Cut regular solids.

MODULE III

ISOMETRIC PROJECTION: Isometric scale, Isometric view and projections of simple solids like prisms, pyramids, cylinder, cone sphere, frustum of solids and also their combinations.

INTERSECTION OF SURFACES: Intersection of surfaces of two solids as given below.

(i) Cylinder and cylinder

(ii) Prism and prism.

(iii) Cone and Cylinder

(Only cases where the axes are perpendicular to each other and intersecting with or without offset.)

PERSPECTIVE PROJECTION: Principles of perspective projection, definition of perspective terminology. Perspective projection of simple solids like prisms and pyramids in simple positions.

CAD: Introduction to CAD systems, Benefits of CAD, Various Soft wares for CAD, Demonstration of any one CAD software.

General Note:

(i) First angle projection to be followed

(ii) Question paper shall contain 3 questions from each module, except from CAD. Students are required to answer any two questions from each module.

- (iii) Distribution of marks
Module -I 2 x 16 = 32
Module -II 2 x 17 = 34
Module III 2 x 17 = 34
-

100

REFERENCES

1. Luzadder and Duff ; *Fundamentals of Engineering Drawing*
2. N. D. Bhatt ; *Engineering Drawing*
3. K. Venugopal ; *Engineering Drawing and Graphics*
4. P.S. Gill; *Engineering Graphics*
5. P.I. Varghese; *Engineering Graphics*
6. K.R. Gopalakrishnan; *Engineering Drawing*
7. Thamaraselvi; *Engineering Drawing*
8. K.C. John; *Engineering Graphics*
9. K.N. Anil Kumar; *Engineering Graphics*

MODULE I (20 HRS)

Idealizations of Mechanics- Elements of vector algebra

Statics of rigid bodies-Classification of force systems- principle of transmissibility of a force- composition and resolution- Resultant and Equilibrant of coplanar concurrent force systems-various analytical methods- Lami's theorem, method of resolution- Conditions of equilibrium-

Moment of a force, couple, properties of couple- Varignon's theorem- Resultant and equilibrant of coplanar non-concurrent force systems- Conditions of equilibrium. Equilibrium of rigid bodies-free body diagrams.(simple problems)

Types of supports - types of beams - types of loading- Support reactions of simply supported and overhanging beams under different types of loading.

Forces in space, equations of equilibrium, Vector approach.

Friction-Laws of friction-angle of friction- cone of friction- ladder friction- wedge friction.

MODULE II (20 HRS)

Properties of surfaces- centroid of composite areas- Theorems of Pappus-Guldinus- Moment of inertia of areas, Parallel and perpendicular axes theorems- Radius of Gyration- moment of inertia of composite areas.

Dynamics: Kinematics-Combined motion of translation and rotation-instantaneous centre, motion of link, motion of connecting rod and piston, wheel rolling without slipping.

Relative velocity - basic concepts-analysis of different types of problems

Kinetics- Newton's laws of translatory motion- D'Alembert's principle- Motion of lift- Motion of connected bodies.

MODULE III (20 HRS)

Work, Power and Energy - Work-Energy principle-Impulse, Momentum.

Collision of elastic bodies-Law of conservation of momentum-Direct and oblique impact between elastic bodies and impact with fixed plane.

Curvilinear motion- D'Alembert's principle in curvilinear motion- Mass moment of inertia of rings, solid discs and solid spheres (no derivations required)Angular momentum-Angular impulse.

Kinetics of rigid bodies under combined translatory and rotational motion – work – energy principle for rigid bodies.

Centrifugal and centripetal forces – motion of vehicles on curved paths in horizontal and vertical planes – super elevation – stability of vehicles moving in curved paths (qualitative ideas only).

Simple harmonic motion – vibration of mechanical systems - basic elements of a vibrating system – spring mass model – undamped free vibrations – angular free vibration – simple pendulum.

REFERENCES:

1. Beer & Johnston, "*Vector Mechanics for Engineers – Statics and Dynamics*", Tata Mc-Graw Hill Publishing Company Limited, New Delhi, 2005.
2. Irving. H. Shames, "*Engineering Mechanics*", Prentice Hall Book Company, 1966.
3. Timoshenko S. & Young D. H., "*Engineering Mechanics*", Mc-Graw Hill –International Edition
4. Popov, "*Mechanics of Solids*", Pearson Education,2007
5. Kumar K.L., "*Engineering Mechanics*", Tata Mc-Graw Hill Publishing Company Limited, New Delhi, 1998.
6. Rajasekaran S. & Sankarasubramanian G., "*Engineering Mechanics*", Vikas Publishing House Private Limited, New Delhi, 2003.
7. Tayal A K, "*Engineering Mechanics- Statics and Dynamics*" , Umesh Publications, Delhi,2004
8. Benjamin J., "*Engineering Mechanics*", Pentex Book Publishers and Distributors, Kollam, 2008

Note

Question For University Examination:- Part A – 8 compulsory questions covering entire syllabus, 5 marks each. (5 x 8 = 40) Part B – Three questions of 10 marks from each module, out of which two should be answered (10 x 2 x 3 = 60).

08.106 BASIC CIVIL ENGINEERING

L-T-P: 2- 1 - 0

Credits: 6

MODULE I

Surveying: Object and Principles of Surveying.

Linear Measurements: Direct measurements - Tape & chain only - Ranging out survey lines-Taking measurements of sloping ground - Errors - Tape correction (problems).

Levelling: Levelling instruments - Level (Dumpy Level, Tilting Level) Levelling Staff. Measurements in levelling - Temporary adjustments of a level, holding the staff, reading the staff - Principles of leveling - recording measurements in the field book - reduction of level - height of collimation method only (simple examples).

Contour maps (Brief description only). Computation of areas - Mid ordinate rule, average ordinate rule, Trapezoidal rule, Simpson's rule (examples)- Introduction to Distomat, Total Station & GPS (Brief description only)

MODULE II

Building construction: Selection of site for buildings - types of buildings - Components of buildings.

Foundation: Different types - Spread footing, Isolated footing, Combined footing, Mat foundation, Pile foundation (description only).

Safe Bearing Capacity of Soil: Importance of determination of the Safe Bearing Capacity of Soil (brief description only).

Super structure: Masonry - stone masonry, brick masonry –Types- desirable qualities of stone and brick.

Partition: Materials used for making partition - plywood, particle boards & glass.

Doors, windows & ventilators : Types - materials used for the construction of doors and windows - wood, steel & Aluminium.

Plastering: Mortar – properties - Preparation of Cement mortar

Painting: Preparation of surfaces for painting - plastered, wood and steel surfaces- Types of paint - enamel, emulsion & distemper. Flooring: Types - mosaic tiles, ceramic tiles, marble, granite and synthetic materials.

Roofing: Selection of type of roof -flat roof, sloping roof -Concrete roof, tiled roof. Selection of roof covering materials. GI Sheet , AC Sheet, PVC Sheet

MODULE III

Concrete: Ingredients- cement, aggregate, and water. Qualities of ingredients (brief description only).

Tests on Cement - consistency, initial and final setting times. Compressive strength -IS Specifications.

Aggregates – desirable qualities of fine and coarse aggregates

Plain Cement Concrete (PCC): preparation-proportioning-mixing of concrete.

Steel-common types used in construction- Mild Steel, HYSD Steel and their properties.

Reinforced Cement Concrete (RCC)-advantages of RCC over Plain Cement Concrete.

Elementary ideas on pre-cast and pre-stressed concrete constructions.

Building services – vertical transportation – stairs – types, escalators and elevators, ramps (brief description only). Plumbing services- brief description of water supply and sewage disposal arrangements for residential buildings.

REFERENCE:

1. Adler R., *Vertical Transportation for Buildings*, American Elsevier Publishing Company, New York.1970
2. B.C Punmia, “*Surveying & Leveling*” Vol. – I, Laxmi publications(P) Ltd,N.Delhi, 2004
3. Rangwala., *Building Materials*,Charotar publishing house, 2001
4. Rangwala, “*Building Construction*” , Charotar Publishing House., 2004
5. S.K. Roy, “*Fundamentals of Surveying*” Prentice-Hall of India, New Delhi.2004
6. Rangwala.,“*Water Supply and Sanitary Engineering*”, Charotar Publishing House. 1990
7. Moorthy, “*Building Construction*”, Modern Publishing House distributor., 1957
8. Jha and Sinha, “*Construction and Technology*”

9. Narayanan and Lalu Mangal ,”*Introduction to Civil Engineering*”Phasor Books,Kollam.
10. Santha Minu, “*Basic Civil Engineering*” Karunya Publications,Trivandrum

Note: *The question paper will consists of two parts. Part I and part II.*

Part I is Compulsory covering the entire syllabus, for 40 marks. It contains 8 questions of 5 marks each.

Part II is to cover 3 modules. There will be three questions of 10 marks from each module, out of which two should be answered .

08.107 BASIC MECHANICAL ENGINEERING

L-T-P/D : 3-1-0

Credits: 6

MODULE I

Thermodynamics : Basic concepts and definitions of Zeroth law, First law, Second law of thermodynamics- concept of reversibility and entropy. p-v and T-s diagrams

Air cycles: Carnot, Otto and Diesel cycles-Air standard efficiency (simple problems)

IC Engines: Working and comparison of two stroke and four stroke petrol and diesel engines - general description of various systems using block diagrams – air system, fuel system, ignition system and governing system. A brief description of CRDI, MPFI, GDI and Hybrid Vehicles

Steam boilers: Classification – Cochran boiler, Babcock and Wilcox boiler, Benson boiler- fluidized bed combustion,

MODULE II

Principles and fields of application of - compressors - reciprocating and centrifugal, blower, pumps- reciprocating, centrifugal and jet pumps, steam and hydraulic turbines- impulse and reaction, gas turbine cycles- open and closed

Elementary ideas of hydro electric, thermal and nuclear power plants

Refrigeration & Air Conditioning: Refrigerants, CFC free refrigerants. Vapor compression refrigeration system, Comfort and Industrial air conditioning-typical window air conditioning unit (general description only).

MODULE III

Mechanical Power transmission systems: Belt, rope and gear drives-types, comparison and fields of application-velocity ratio-slip (simple problems) friction disc, single plate clutch, gear trains (no derivations).

Manufacturing processes: Elementary ideas of casting, forging, rolling, welding, soldering and brazing

Machining processes- turning, taper turning, thread cutting, shaping, drilling, grinding, milling (simple sketches and short notes).

Non conventional machining - Electro discharge machining (EDM) and Electro chemical machining (ECM)

Principle, application and advantages of C N C machine

REFERENCES

1. Spalding and Cole, “*Engineering Thermodynamics*”
2. Gill, Smith and Zuirys, “*Fundamentals of IC Engines*”
3. Amstead, Ostwald and Begeman, “*Manufacturing processes*”
4. Crouse, “*Automobile Engineering*”
5. Roy and Choudhary, “*Elements of Mechanical Engineering*”
6. Hajra Choudhary, “*Workshop Technology*”
7. R K Bensal, “*Fluid mechanics and machines*”
8. J Benjamin, “*Basic Mechanical Engineering*”

Note: Lectures are to be supplemented by demonstration in laboratories.

Note: The question paper will consist of two parts. Part I is to be compulsory for 40 marks. This may contain 10 questions of 4 marks each. Part II is to cover 3 modules. There can be 3 questions from each module (10 marks each) out of which 2 are to be answered.

08.108 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L-T-P:2-1-0

Credits 6

MODULE – I

Elementary concepts - Kirchoffs laws - Magnetic Circuits - MMF, field strength, flux density, reluctance – problems in series magnetic circuits. Review of electromagnetic induction - Faradays laws, Lenz's law - statically induced and dynamically induced emf - self and mutual induction - inductance.

Alternating current fundamentals - generation of alternating currents – waveforms - frequency - period - average and rms values - form factor. Phasor representation of alternating quantities - rectangular polar and exponential forms.

Analysis of simple ac circuits – concept of impedance and admittance - phasor representation - j notation - power and power factor in ac circuits - active and reactive components. Solution of RL, RC and RLC series circuits.

Three phase systems - generation of three phase voltage - star and delta connection - relation between phase and line values of voltage and current - phasor representation - three wire and four wire systems.

Measurement of power in three phase circuits (two wattmeter method). Measurement of energy – working of 1-phase energy meter.

MODULE – II

Transformers - Principle of operation - EMF equation - constructional details of single phase and three phase transformers

Methods of bulk generation of electric power. Block schematic of layout of generating stations - hydroelectric, thermal and nuclear power plants. Renewable energy sources - solar, wind, tidal, wave and geothermal energy.

Bulk transmission of electric power - typical electrical power transmission scheme - need for high transmission voltage - substations - substation equipments. Primary and secondary transmission and distribution systems

Different methods of wiring for LT installations. Schematic layout of LT switchboards. Earthing of installations - necessity of earthing - plate and pipe earthing. Protective fuses, MCBs, ELCBs and switches.

Working of incandescent lamps, -fluorescent lamps, energy efficient lamps

MODULE – III

Diodes - PN junction diodes,. V-I characteristics, dynamic & static resistance, principle of working and V-I characteristics of Zener diode, principle of Photo diode, Solar cell, & LED.

Rectifiers & power supplies - block diagram description of a dc power supply, circuit diagram & working of half-wave & full wave rectifier, final equations of V_{rms} , V_{dc} , ripple factor and peak inverse voltage in each case, principle of working of series inductor and shunt capacitor filters. Working of simple zener voltage regulator.

Power devices – V – I characteristics and applications of SCR and Triac Working principle of UPS and SMPS

Transducers – Resistance strain guage, thermistor, LVDT

REFERENCES

1. V.N. Mittle, “*Basic Electrical Engineering*”, Tata McGraw Hill, 1990.
2. DP Kothari, LJ Nagrath, “*Theory and Problems of Basic Electrical Engineering*”, Prentice Hall of India, 2000.
3. B.L. Thereja, “*A Text Book of Electrical Technology*”, Volume I, S Chand & Co, New Delhi, 1992.
4. Francis M Fernandez, “*A Basic Course in Electrical Engineering*”, Rajath Publishers, Ernakulam.
5. TP Imthias Ahmed, B. Premlet, “*Introduction to Electrical Engineering*”, Phasor Books, Kollam
6. Gopakumar, “*Introduction To Electronics and Communications*”, .Phasor Books, Kollam
7. Millman and Halkias, “*Integrated Electronics: Analog and digital circuits and systems*”, McGraw-Hill Book Co
8. Edward Hughes, “*Electrical and Electronic Technology*”, Pearson Education, 2002.
9. ML Soni, PU Guptha, US Bhatnagar and A Chakrabarthy, “*A Text Book on Power System Engineering*”,

Dhanpath Rai & Sons, New Delhi 1997

10. N.N.Bhargava, "*Basic Electronics and Linear Circuits*", Tata McGraw Hill
11. Rangan C.S., Sarma G.R., and Mani V.S.V., "*Instrumentation Devices and Systems*", Tata McGraw Hill, 1992.
12. Muhammad H. Rashid, "*Power Electronic Circuits, Devices and Applications*", Pearson education, Asia 2003.

Note : *The question paper will consist of two parts. Part – A is to be compulsory for 40 marks (10 questions of 4 marks each). Part-B is to cover 3 modules for 60 marks. (50% choice- One out of two or two out of four from each module).*

08.109 BASIC COMMUNICATION AND INFORMATION ENGINEERING

L – T – P: 2-1-0

Credits: 6

MODULE 1(Qualitative Treatment)

- (a) Bipolar junction transistors: NPN & PNP transistors, structure, typical doping, working of NPN transistor, concepts of common base, common emitter & common collector configurations, current gain of each, input & output characteristics of common emitter configuration, comparison of three configurations with reference to voltage & current gain, input & output resistances and applications. (6 hrs)
- (b) **Field effect Transistors** : basic principles of JFET, MESFET and MOSFET, comparison with BJT. (3 hrs)
- (c) **Amplifiers & Oscillators**: circuit diagram & working of common emitter amplifier, function of each component in the circuit, need of proper biasing, frequency response, voltage gain and 3dB bandwidth, concepts of class A, B, AB and Class C power amplifiers, circuit diagram & working of push pull amplifiers, concepts of feedback, working principles of oscillators, circuit diagram & working of RC phase shift oscillator (7 hrs)
- (d) **Integrated circuits**: advantages of ICs, analog and digital ICs, functional block diagram of operational amplifier, ideal operational amplifier, use as inverting amplifier, non inverting amplifier, summing amplifier, integrator and comparator. (4 hrs)
- (e) **Digital ICs**: logic gates, realization of logic functions, principle of combinational and sequential logic circuits, flip flop (JK), logic families: TTL and CMOS Logic (No internal diagram) (4 hrs)
- (f) **IC fabrication**: purification of silicon, crystal growth, wafer preparation. unit process: oxidation, diffusion, ion implantation, epitaxy, deposition, photolithography. (4 hrs)

MODULE 2 (Qualitative Treatment)

- (a) **Measurements**: principle and block diagram of analog and digital multimeter, working principle of CRT, block diagram of CRO, measurements using CRO, principle of digital storage oscilloscope, principle and block diagram of function generator. (5hrs)
- (b) **Radio communication**: principle of AM & FM, wave forms, bandwidths, block diagrams of AM & FM transmitters, principle of AM & FM demodulation, comparison of AM & FM, principle & block diagram of super heterodyne receiver. (4 hrs)
- (c) **Color television**: TV Standards, interlaced scanning, block diagram of PAL TV transmitter & receiver, basic principles of cable TV, CCTV system, basic principles of HDTV, basic principles of LCD & Plasma displays. (5 hrs)
- (d) **Radar and navigation**: principle of radar and radar equation, block schematics of pulsed radar, factors affecting range, applications of radar in measurements and navigation. (4 hrs)
- (e) **Satellite communication**: microwave frequency bands, concept of geo-stationary satellite, frequency bands used, satellite transponder, block diagram of earth station transmitter & receiver, advantages of satellite communication, principle of Global Positioning System(GPS). (3 hrs)
- (f) **Optical communication**: block diagram of the optical communication system, principle of light transmission through fiber, concepts of Single Mode and Multi Mode optical fiber, working principle of source (semiconductor Laser) & detector (PIN,APD), advantages of optical communication. (5 hrs)

MODULE 3 (Qualitative Treatment)

- (a) **Computer Architecture**: functional units: basic concept of ALU- data path and control, memory hierarchy, caches, main memory, virtual memory, operating systems, microprocessors - functional block diagram of 8085 (9 hrs)
- (b) **Data communication**: overview, analog and digital data transmission, transmission media, digitization of wave forms, PCM , digital modulation techniques- ASK, PSK, FSK, basic concepts of error detection , parity checking. (6hrs)
- (c) **Mobile communication**: basic principles of cellular communications, concepts of cells, frequency reuse, principle and block diagram of GSM, principle of CDMA, WLL & GPRS technologies. (4hrs)
- (d) **Internet Technology**: concepts of networking: client - server computing, IP addresses, domain names, network interface unit - modem, switching technologies- circuit switching and packet switching,

LAN,MAN,WAN &World wide web, network topologies, communication protocols- TCP/IP, Introduction to web languages-HTML ,XML, internetworking concepts, network devices- basic principles of router, bridge, switch, network security- Firewall. (7 hrs)

REFERENCES

1. Santiram Kal, *Basic Electronics – Devices, Circuits and IT fundamentals*, PHI
2. Louis.E.Frenzel, *Principles of Electronic Communication Systems*, TMH
3. William Stallings, *Wireless Communications and Networks*, Pearson Education.
4. M.Moris Mano, *Computer Architecture*, PHI
5. Neil H E Weste, Kamran Eshraghian, *Principles of CMOS VLSI design – A system perspective*, Pearson Education [Module 1(f)]
6. David A. Bell, *Electronic Instrumentation and Measurements*, PHI .[Module 2(a)]
7. N N Bhargava, D C Kulshreshtha, S C Gupta, *Basic Electronics & Linear Circuits*, TMH
8. ITL Education Solution Ltd., *Introduction to Information Technology*, Pearson Education, 5th edition, 2008
9. R.R. Gulati, *Monochrome and Colour Television*, New Age International [Module 2 (c)]
10. K Gopakumar, *Introduction to Electronics & Communication* , 3rd edition, 2008,Phasor Publisher's, Kollam

This subject shall be handled by faculty of Dept.of Electronics and Communication in the Colleges.

Question Paper :

The question paper shall consist of two parts. Part I is to cover the entire syllabus, and carries 40 marks. This shall contain 10 compulsory questions of 4 marks each. Part II is to cover 3 modules, and carries 60 marks. There shall be 3 questions from each module (10 marks each) out of which 2 are to be answered.

08.110 ENGINEERING WORKSHOPS

L - T-P: 0-0-2

CREDITS: 4

- A. Carpentry:
Study of tools and joints. Practice in planning, chiseling, marking and sawing. Joints – Cross joint, T joint, Dove tail joint.
- B. Fitting:
Study of tools, Practice in filing, cutting, drilling and tapping. Male and female joints, Stepped joints.
- C: Sheet Metal Work:
Study of tools. Selection of different gauge GI sheets for jobs. Practice on riveted joints. Preparing tube joints, frustums, trays and containers.
- D. Plumbing:
Study of tools. Details of plumbing work in domestic and industrial applications. Study of pipe joints, cutting, threading and laying of pipes with different fittings using PVC pipes. Use of special tools in plumbing work.
- E: Foundry:
Study of tools. Preparation of sand, moulding practice and demonstration of casting.
- F. Welding:
Study of welding machines. Straight line practices, Making of Butt joint, T joint and Lap joint.
- G: Smithy:
Study of tools. Demonstration on forging of square prism, hexagonal bolt, T bolt and Eye bolt.
- H: Machine Tools:
Study and demonstration on working of machine tools. Lathe and Drilling machine.

NOTE: For the university examination the student shall be examined in sections A, B, C, D and E only.

Syllabus for III Semester

08. 301

ENGINEERING MATHEMATICS-II

(CMPUNERFHBTA)

L	T	P/D	Cr
3	1	0	4

Module I

Multiple Integrals: Double Integrals (Cartesian only). Change of order of integration. Area enclosed by plane curves. Triple integrals. Volume of solids.

Vector integration: Line and surface and volume integrals. Green's theorem in the plane. Stokes theorem and Gauss divergence theorem (no proof).

Module II

Fourier series: Fourier series of periodic functions of period 2π and $2l$. Dirichlet's condition for convergence. Odd and even functions. Half range expansions.

Fourier Transforms: Fourier integral theorem (no proof)-Fourier transforms- Fourier sine and cosine transforms, inverse Fourier transforms, properties

Module III

Partial differential equations: Formation of PDE. Solution of Lagrange's linear equation. First order nonlinear equations-standard forms -Homogeneous PDE with constant coefficients.

Application of PDE: Derivation of one dimensional Wave and Heat equations. solution by separation of variables. Boundary value problems in one dimensional Wave and Heat equations.

References

1. Advanced Engineering Mathematics : Kreyszig, 8th wiley.
2. Advanced Engineering Mathematics : Peter O Neil, Thomson
3. Higher Engineering Mathematics : B.S.Grewal, Khanna
4. Higher Engineering Mathematics : B.V.Ramana, Mc Graw Hill
5. Advanced Engineering Mathematics : Michel D Greenberg, Pearson

Question Paper: Duration: 3 hours

Note: The question paper shall consist of two parts.

Part A (40 marks) **Ten** compulsory questions of 4 marks each.

Part B (60 marks) Student must answer one out of two from each module .Each question carries 20 marks.

L	T	P/D	Cr
3	1	0	4

Module I

Rigid and deformable bodies – Type of external loads – Self weight – Concept of internal stresses – Normal stress and shear stress – Concept of strain – Normal strain and shear strain – Constitutive relation – Hooke's law – Poisson's ratio – Stress-strain diagram – Working stress – Deformation of axially loaded bars of constant and varying section – Principle of superposition – Composite sections – Elastic constants - Relationship between elastic constants – Temperature stresses – Stress on inclined plane for axial and biaxial stress fields – Principal stresses and strains – Mohr's circle of stress .

Module II

Analysis of pin-jointed plane frames by the method of joints and sections.

Introduction to analysis of beams - Concept of bending moment and shear force - Relationship connecting intensity of loading, shear force and bending moment – Shear force and bending moment diagrams for cantilever, simply supported and overhanging beams for different loadings such as point load, UDL, uniformly varying load and applied moment – Theory of simple bending – Limitations – Flexural Rigidity - Bending stress distribution in beams of different cross-sections – Moment of resistance – Composite beams – Beams of uniform strength - Shear stress distribution in beams of different cross-sections – Introduction to shear centre and shear flow (concept only – no numerical examples).

Module III

Theory of columns – Short columns – Direct and bending stresses in short columns - Kern of section - Pressure distribution of dams and retaining walls – Torsion of solid and hollow circular shafts – Power transmission – Closely coiled and open coiled helical springs – Stresses in thin cylindrical and spherical shells – Stresses in thick cylindrical shells – Compound cylinders – Wire wound cylinders.

Strain energy – Strain energy due to normal stress, shear stress and bending stress – Instantaneous stresses and strains due to suddenly applied and impact loading.

References

1. Junarkar S. B. and Shah S. J., Mechanics of Structures, Vol. I, Charotar Publishing House Pvt. Ltd., New Delhi.
2. Egor P. Popov Engineering Mechanics of Solids, Prentice-Hall of India, New Delhi.
3. Timoshenko S.P. and J.M. Gere, Mechanics of Materials, CBS Publishers & Distributors, New Delhi.
4. James M. Gere, Mechanics of materials, Thomson Books, New Delhi.
5. Crandall S. H., Dahl N. C. and Lardner T. J., An Introduction to the Mechanics of Solids, McGraw Hill International, Tokyo.
6. Singh D. K., Strength of materials, Ane Books India, New Delhi.
7. Punmia B.C., Ashok kumar Jain and Arun kumar Jain, Mechanics of materials, Laxmi Publications(P) Ltd, New Delhi.

Question Paper: Duration: 3 hours

The Question paper contains Part A and Part B.

Part A carries 8 compulsory questions (short answer questions) covering the entire syllabus and is for 40 marks.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question out of two.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

L	T	P/D	Cr
3	1	0	4

Module I

Review of Fluid properties, Classification of fluids, Newtonian and Non Newtonian fluids.(No questions to be asked)

Fluid statics: Fluid pressure, variation of pressure in a fluid, measurement of pressure using manometers-simple manometers, differential manometers, pressure measurement using mechanical gauges. Pressure head forces on immersed plane and curved surfaces. Pressure distribution diagram for vertical surfaces, Practical application of total pressure –Dams and gates.

Buoyancy and Floatation: Buoyant force, stability of floating and submerged bodies, metacentre and metacentric height, analytical and experimental determination of metacentric height

Kinematics of fluids: Methods of describing fluid motion, Lagrangian and Eulerian methods, Types of fluid flow, steady and unsteady flow, uniform and non-uniform flow, one, two and three dimensional flow, laminar and turbulent flow, rotational and irrotational flow, stream line, path line, streak lines, conservation of mass, equation of continuity in one, two and three dimensions, (Derivation in Cartesian co-ordinate system)

Module II

Acceler Introduction to structural analysis – Concept of determinate, indeterminate structures and stability – deflection of beams – Moment-curvature relation – Load-deflection differential equation – Slope and deflection of beams by the method of successive integration – Macaulay's ation of fluid particle, convective and local acceleration, circulation and vorticity, velocity potential, stream function, equipotential lines, flow net, uses of flow net.

Factors influencing motion: Euler's equation of motion and integration of Euler's equation of motion along a streamline, Bernoulli's Equation, Energy and Momentum correction factors, vortex motion, free and forced vortex. Applications of Bernoulli's equation, Pitot tube, Venturimeter and orifice meter .

Pipe flow: Major and minor energy losses, Darcy- Weisbach equation, hydraulic gradient and total energy line, pipe connecting reservoirs-pipes in series, pipes in parallel, equivalent pipe, siphon, transmission of power through pipes, nozzles and nozzle diameter for maximum power transmission.

Module III

Flow through orifices: Different types of orifices, Flow over a sharp edged orifice, Hydraulic coefficients – Experimental determination of these coefficients, flow through large rectangular orifice, Flow through submerged orifices, flow under variable heads, time of emptying.

Flow through mouthpieces: Types of mouthpieces, flow through an external mouthpiece, flow through convergent divergent mouthpiece, flow through internal mouthpiece.

Flow over weirs: Types of weirs flow over rectangular sharp crested weir, Francis formula, Flow over a trapezoidal weir, Cipolletti weir, broad crested weir, submerged weirs, proportional weir, time of emptying through weirs.

Viscous flow: Laminar flow through circular pipes, Hagen Poiseuille equation, Reynolds experiment. Laminar flow between two stationary parallel plates.

Boundary layer theory-no slip condition, boundary layer thickness, boundary layer growth over long thin plate, laminar, turbulent boundary layer, laminar sub layer, Momentum integral equation of boundary layer (no derivation), Blasius boundary layer equations for laminar and turbulent boundary layer, computation of drag on a flat plate. Separation of boundary layer.

References:

1. P.N.Modi &S.M.Seth, 'Hydraulics & Fluid Mechanics,' S.B.H Publishers & Distributors, New Delhi
2. John K. Vennard & Robert L. Street, 'Elementary Fluid Mechanics', John Wiley and Sons, New York.
3. Streeter, V.L and Wylie, E.B , 'Fluid Mechanics', McGraw Hill Series.
4. Dr.D.S.Kumar, S.K, 'Fluid Mechanics and Fluid Power Engineering', Kataria & Sons, New Delhi.
5. A.K. Jain , ' Fluid Mechanics' Khanna Publishers.
6. Douglas, 'Fluid Mechanics', 4/e Pearson Education.
7. S.Narasimhan 'A first course in Fluid Mechanics' University Press(India) Pvt.Ltd (2006)
8. Zoeb Husain et.al 'Basic Fluid Mechanics & Hydraulic Machines' B S Publications (2008)
9. Dr. R. K. Bansal 'A Textbook of Fluid Mechanics and Hydraulic Machines, Laxmi Publications
10. Subramanya, K. , Theory and Applications of Fluid Mechanics, Tata McGraw-Hill

Question Paper:

The Question paper contains Part A and Part B.

Part A carries 8 compulsory questions (short answer questions) covering the entire syllabus and is for 40 marks. **Part B** is for 60 marks. There will be two questions from each module. The candidate has to answer one question out of two.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

L	T	P/D	Cr
2	1	0	3

Module I

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

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

Water: - Quality of mixing water, effect of impurities in water on properties of concrete.

Admixtures:- Functions and classification of admixtures, factors influencing the dosage of different admixtures- IS specification for admixtures for concrete.

Module II

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

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

Special concrete (Brief discussion only): Lightweight concrete, High strength concrete, Polymer concrete, fiber reinforced concrete, Ferro-cement, Ready mixed concrete.

Formwork for concrete:- Materials used for formwork- formwork for beams, columns, slabs.

Module III

Properties of Hardened concrete:- Strength of concrete- factors influencing the strength of concrete, Stress and strain characteristics of concrete, I S tests for assessing the performance of hardened concrete, Effect of creep, shrinkage and temperature. Durability of concrete, factors affecting durability - permeability, chemical attack, sea water attack and air entrainment

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

Mix Design:- Quality Control - Factors causing variations in the quality of concrete -statistical quality control, quality management in concrete construction, Proportioning of concrete mixes- factors influencing the choice of mix proportions, General principles of concrete mix design by IS Method, Importance of trial mixes and adjustment of ingredients of concrete.

References:

- 1 A.M.Neville, Concrete Technology- Pearson Education
- 2 A.M.Neville, Properties of Concrete 4/e, Pearson Education
- 3 Peurifoy R.I & Ledbetter W.B, Construction planning & Methods, MGH Publishers.
- 4 M.S.Shetty, Concrete Technology , S I Chand & Company.
- 5.Gambhin M.L., Concrete Technology, Tata McGraw Hill
- 6.Krishna Raju N., Design of Concrete Mixes, CBS publishers
- 7 A. R. Santhakumar, Concrete Technology , Oxford University Press,India(2006)

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

L	T	P/D	Cr
3	1	0	4

Module I

Compass Surveying – Prismatic Compass only – Bearing of survey lines – Method of booking – Magnetic dip and declination – Local attraction – Latitude and departure – Traverse, adjustment of closing error by different methods – Traverse Computation – Omitted measurements and area Computation from latitude and departure.

Plane table Surveying – Accessories of plane table equipment and their uses – Setting up of plane table, – method of plane tabling – radiation, intersection, resection and traversing – Two and three point problems – their practical application and methods of solution – Advantages and disadvantages of plane table surveying – errors in plane table – precaution to be taken.

Module II

Leveling – Principles of leveling – Methods of leveling – Spirit leveling, Booking and Reducing levels – Profile leveling, Reciprocal leveling – cross sectioning- Curvature and refraction – Sensitiveness of bubble tube – Difficulties in leveling – errors in leveling, Precise leveling

Contouring – Contour interval – Characteristics, method of contouring – Contour gradient – uses.

Volumes – Methods of computations – Prismoidal and Trapezoidal formula – Prismoidal correction – Curvature corrections for volumes Mass diagram – Construction of mass diagram – Characteristics of mass diagram- lead and lift – Calculation of reservoir capacity – Uses of mass diagram.

Module III

Theodolite Surveying – Instrument - various types – principle – Temporary adjustment- Measurement of horizontal and vertical angles – errors in theodolite surveying

Tacheometric Surveying – Principles – Methods – Stadia System – Fixed and Movable hair methods – Methods with staff held vertical and normal– Determination of instrument constants. Tangential system

Hydrographic Survey-Sounding-Different methods of locating sounding -Three point problem- analytical method.

References:

1. Prof. T.P.Kenetkar & Prof. S.V.Kulkarni - Surveying and Levelling , Pune Vidyarthi Griha Prakashan,2004
2. Dr. B.C.Punmia , Ashok kumar Jain & Arun Kumar Jain - Surveying , Laxmi publications (P)Ltd ,2005
3. R.Agor - A Text book of Surveying and Levelling, Khanna Publishers, 2005
4. S.K.Duggal - Surveying Vol. I & II, Tata Mc Graw Hill Ltd ,2006.
5. Moffitt - Surveying, 10/e Pearson Education, 2006.
6. Alak De - Plane surveying, S. Chand & Company Ltd, 2006.

Question Paper: Duration: 3 hours

The Question paper contains Part A and Part B.

Part A carries 8 compulsory questions (short answer questions) covering the entire syllabus and is for 40 marks.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question out of two.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

L	T	P/D	Cr
3	1	0	4

Module I

Scope of Geology in Civil Engineering and scope of Geological Engineering Subdivisions of Geology.
 Exogenous and Endogenous geological processes and their relevance in civil engg. Interior of the Earth.
 Basic concepts of Continental drift hypothesis and Plate tectonics theory.
 Soil genesis-Weathering : Factors , agents , types , products and engineering significance of weathering.
 Soil profile , Geologic classifications of soils, Soil erosion and Soil conservation measures.
 Rivers : Erosion , transportation and deposition. Major Erosional and Depositional Landforms
 Oceans : Coastal landforms , Marine erosion and Coastal protection.
 geological hazards: Landslides – Types , causes and prevention ; Landslides of Kerala Earthquakes – Terminology and classifications , Safety factor

Module II

Definition and physical properties of minerals.

Physical properties and Chemical composition of : Quartz , Feldspars (Orthoclase , microcline and plagioclase) , Micas (Biotite and Muscovite) , Amphibole (Hornblende only) , Pyroxenes (Augite and Hypersthene) , Olivine , Sillimanite , Garnet , Talc , Gypsum , Calcite , Dolomite , Clay minerals (Kaolinite only)

Genetic divisions of rocks , rock cycle.

Brief account of texture , structure and classifications of igneous , sedimentary and metamorphic rocks. Brief study of Granite , Gabbro , Dolerite , Basalt , Pegmatite , Sandstone , Limestone , Shale , Granulite , Gneiss , Schist , Slate , Marble and Quartzite . rock types of Kerala . Engineering properties of rocks used as site rocks , building stones and aggregates

Module III

Attitude of rocks and Geological structures – strike and dip , Brunton compass. Terminology ,classification and engineering significance of Folds , Faults , Joints and Unconformities.

Major geological factors to be considered in the construction of Dams and Reservoirs , Tunnels , Building foundations , Bridges and Transportation routes. Hydrogeology-occurrence of ground water-types of aquifers. Geophysics: Electrical resistivity seismic refraction methods.

Geoinformatics-Basic principles of Remote sensing , Geographic Information Systems and Global Positioning Systems.

References:

- 1 Anji Reddy (2001), Text book of Remote sensing and Geographic Information Systems BS Publications.
2. Chenna Kesavulu (1993) Text book of Engineering Geology , Macmillan , India .
3. Parbin Singh (2001) Engineering and General Geology, Kataria and Sons.
4. Venkat Reddy (1995) Engineering Geology for Civil Engineers - Oxford IBH.
5. Krynine and Judd (2001), Principles of Engineering Geology and Geotechnics , Cbs Publishers
6. KVGK Gokhale Principles of Engineering Geology, B S Publications (2005)

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08 . 307 BUILDING TECHNOLOGY AND DRAWING

L	T	P/D	Cr
2	0	2	4

Module I

Building stones – Building stones - properties and uses of granite and laterite stones quarrying- Dressing of stones, Stones masonry – Various types of masonry (Review only)

Brick masonry - Bricks - Classifications , dimensions as per ISS, strength requirements - different tests as per ISS. Brick bond - English, Flemish bond 1, 1¹/₂ brick walls, load bearing walls.

Timber :- Characteristics of good timber- properties and uses - seasoning of timber, different methods for seasoning of timber- common defects - treatment of timber - strength requirements - tests as per ISS - commonly used timber for building construction.

Tiles :- flooring & Roofing tiles – specifications, common tests as per ISS. (Review only)

Reinforcing steel :- Common types used in construction. Mild steel rods HYSD and TMT, steels- properties and its uses- strength requirements and test as per ISS, structural steel - different shapes - strength requirements -Applications. (Review only)

Aluminium alloy- properties and it uses- strength requirements

Module II

Scaffolding, 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 timbering of trenches. **Doors, windows & ventilators** - various types. Hardware fittings.

Stairs:- different types and its components, **Arches lintels and weather Shades- various types**

Construction equipment:- Earth moving equipment, Excavators, Bulldozer, Power shovels, Dumper, Rollers and Compactors, Aggregate Crushers. Pile Driving equipment .

Module III (Drawing)

General – Study of IS codes of practice on building drawing, Symbols for various materials

Doors, Windows And Ventilators – Sectional plan, Sectional elevation, Front view and joint details of doors – Panelled, Glazed and flush, Glazed wooden windows and ventilators.

Roofing - Elevation and joint details of lean-to roof, coupled and collar roof, King post, Queen post trusses with A.C. and tile roofing – Steel (French) roof truss with A.C. sheet roofing

Stairs – Plan and sectional elevation of RCC of Dog legged stairs.

RCC lintel and sunshade – longitudinal and cross section.

Footing- Isolated and combined footing

References:

- 1 Chudley, Construction Technology Vol. 1,2,3 & 4
2. Rangawala, Building Materials, Charotar Publishing House.
3. Rangawala, Building Construction, Charotar Publishing House.
- 4 Jah & Singha, Construction and Technology
5. Shaw and Kale Building Drawing, , Tata McGraw Hill
- 6.Arora and Bindra ,A Textbook of Building Construction, Dhanpat Rai & Sons, New Delhi.
7. Balagopal T.S. Prabhu, Building Drawing and Detailing, Spades Publishers, Calicut.
8. Barry, Building Constructions, Vol. I , II & III , ELBS Publications.
9. Sharma & Kaul , A Textbook of Building Construction , S. Chand & Co., New Delhi.
- 10.McCay , Building Construction , Vol. I , II & III , ELBS Publications.

Note: Minimum 8 sheets must be drawn

Question Paper: Duration: 3 hours

Part A carries 4 compulsory questions (short answer questions) covering Modules I and II and is for 20 marks.

Part B is for 40 marks. There will be two questions each from Modules I and II. The candidate has to answer one question out of two.

In Part C (Drawing) , there will be two questions carrying 40 marks each from Module III. The candidate has to answer one question in full.

Notes:

1. Question for Part C (Drawing) should be set such that the student will be able to complete the drawing within one hour duration. No charts, tables, codes are permitted in the examination hall. If necessary, relevant data shall be given along with the question paper by the question paper setter.

2. For the calculation of sessional marks this paper is to be considered as a drawing paper.

08 . 308

PRACTICAL SURVEYING (I)

L	T	P/D	Cr
0	0	2	2

1. Chain survey & compass survey– Study of instruments , ranging etc. - 1 class.
2. Plane table survey – Radiation, intersection, traversing ,
two point problem, Three point problem etc - 4 class.
3. Levelling – H.I. method Rise and fall method - 3 class.
4. Theodolite survey study of instrument, measurement of
Horizontal angle, problems in distance only - 2 class
5. Study of Instruments: Electronic Theodolite, Automatic Levels, Distance meter,
Subtense bar, Planimeter ,minor instruments etc. - 1 class
6. Class test - 2 class

Note: University examination from Plane table survey and levelling only

Duration 3 Hours,

Max . Marks 100

Syllabus for IV Semester

08. 401

ENGINEERING MATHEMATICS-III

L	T	P/D	Cr
3	1	0	4

(C M P U E H B N)

Module I

Complex Differentiation: Limits ,continuity and differentiation of complex functions. Analytic functions-Cauchy Reimann equations in Cartesian form (proof of necessary part only) properties of analytic functions-harmonic functions. Milne Thomson method

Conformal mapping:The Transformations $w=1/z$, $w=z^2$, $w=z+1/z$, $w=\sin z$, $w=\cos z$,Bilinear transformation

Module II

Complex Integration:Line integral- Cauchy's integral theorem-Cauchy's integral formula. Power series-radius of convergence-Taylor's and Laurent's series-zeros and singularities –Residues and residue theorem. Evaluation of real definite integrals-

2π

$\int_0^{2\pi} f(\sin \theta, \cos \theta) d\theta$, $\int_{-\infty}^{\infty} f(x) dx$ with no poles of $f(z)$ on the real axis (proof of theorems not

required)

0

Module III

Numerical Techniques: Errors in numerical computation-solution of algebraic and transcendental equations by bisection method, regula false method, Newton- Raphson method. Solution linear systems by Gauss elimination and Gauss-Seidal method. Newtons forward and backward interpolation formula. Lagranges interpolation formula.Numerical integration. Trapezoidal and Simpson's rule. Numerical solution of ODE Taylor series method,

Eulers method, Runge Kutta methods(derivation of formulae not required for the above methods.)

References

- 1.Advanced Engineering Mathematics,Peter v. O'neil (Thomson)
2. Advanced Engineering Mathematics, Erwin Kreyzig (Wiley Eastern)
3. Advanced Engineering Mathematics, Greenberg(Pearson)
- 4.Higher Engineering Mathematics. B.S Grewal (Khanna Publishers)
5. Higher Engineering Mathematics B.V Ramana (Tata Mc Graw hill)
6. Numerical Methods with programming in C T.Veerarajan and T.Ramachandran
- 7.Introductory methods of numerical analysis. S.S.Sastry

Question Paper: Duration: 3 hours

Note: The question paper shall consists of two parts.

Part A (40 marks) **Ten** compulsory questions of 4 marks each.

Part B (60 marks) Student must answer one out of two from each module .Each question carries 20 marks.

08 . 402

HUMANITIES
(C T A F R H B)

L	T	P/D	Cr
3	0	0	3

PART-I ECONOMICS (2periods/week)

Module I

Definition of Economics – Basic Concepts Goods – Choice of techniques – Production possibility curve
National Income concepts - GNP – GDP – NNP – Per Capita Income – Three Sectors of the Economy –
Primary – Secondary, Tertiary Sector – Significance of Money.
Meaning of Demand and Supply – Types of demand – Determinants of Demand – Demand forecasting
Production function – Law of Variable proportion – Returns to scale - Least cost combination of inputs –
Cost concepts – Cost output relationship

Module II

Inflation – causes of inflation – measures to control inflation – Demand – Pull inflation – cost push inflation
– effects of Inflation – effects of inflations comparison between inflation and deflation

India's Economic crisis in 1991 – New economic policy – Global Financial meltdown in 2008 –
Applicability of Keynesian Theory to UDC'S.
Stock Market and present scenario – Industrial sector past and present – Industry Analysis – Electronics –
Chemical – Automobile – FMCG Industry.

Environment and Development – Basic Issues – Sustainable Development and Environmental Accounting –
Population – Resources and the Environment – Poverty and the Environment – Growth versus the
Environment – The Global Environment .

PART II - ACCOUNTANCY (1period/week)

Module III

Book- Keeping and Accountancy -Elements of Double Entry -Book- Keeping-rules for journalizing -Ledger
accounts –Cash book-Banking transactions – Trial Balance- Method of Balancing accounts- the journal proper
(simple problems).

Final accounts: Preparation of trading and profit and loss Account- Balance sheet (with simple problems) -
Introduction to Accounting packages (Description only)

References:

1. K.K Dewett, 'Modern Economic theory', S.Chand &Co.
2. Michael-Todaro, 'Economic Development', Addison Wesley Longman Ltd.
3. Mohinderkumar Sharma, 'Business Environment in India'.
4. D.M .Mithani. 'Money,Banking, International Trading and Public finance', Himalaya publishing house,NewDelhi
5. Rudder Dutt and K.P.M.Sundaran,Indian Economy, S.Chand & Co.
6. Hal R Varian- Intermediate micro Economics, W.W.Norton & Co.
7. Koutsiannis (second edition) Micro Economics
8. Batliboi - Double Entry book Keeping
9. Dr K.G. Chandrasekharan Nair - A Systematic approach to Accounting

University question:

Note: Part I and Part II to be answered in separate answer books.

Part – I. Economics

Part A – 30 Marks (short answers) covering entire syllabus (3x10=30)

Part B – 40 marks (50% choice one out of two or two out of four from each module)

Part – II. Accountancy

Three questions covering entire syllabus out of which two questions have to be answered (2x15=30)

L	T	P/D	Cr
3	1	0	4

Module I

Introduction to structural analysis – Concept of determinate, indeterminate structures and stability – deflection of beams – Moment-curvature relation – Load-deflection differential equation – Slope and deflection of beams by the method of successive integration – Macaulay’s method – Principle of superposition. Slope and deflection of beams with non-uniform flexural rigidity - Moment-area method and Conjugate beam method.

Introduction to energy methods – Strain energy and complementary energy – Castigliano’s theorems - Application of theorem to statically determinate beams and rigid-jointed plane frames. Introduction to structural analysis – Concept of determinate, indeterminate structures and stability – deflection of beams – Moment-curvature relation – Load-deflection differential equation – Slope and deflection of beams by the method of successive integration

Module II

Principle of virtual work and its application to statically determinate beams, rigid-jointed frames and pin-jointed frames – Visual integration of virtual work equation – Clark-Maxwell’s reciprocal theorem – Betti’s theorem – Principle of minimum total potential energy - Arches – Behaviour and types of arches – Analysis of three hinged arches – Axial force, shear force and bending moment in circular and parabolic three hinged arches – Analysis of three dimensional pin-jointed frames by the method of tension coefficients.

Module III

Elastic stability of slender columns – Euler’s formula for long columns with different end conditions – Limitations of Euler’s formula – Rankine’s formula – Columns subjected to eccentric loading. Influence lines – Influence line diagram for reactions, shear force and bending moment in simply supported and cantilever beams and overhanging beams – Moving loads – Maximum effects under distributed loads, two concentrated loads and series of concentrated loads – Absolute maximum shear force and bending moment – Shear force and bending moment envelope – Equivalent uniformly distributed load – Influence lines for member forces in statically determinate trusses.

References

1. Junarkar S.B.&Shah S.J ‘Mechanics of Structures’, Vol.II, Charotar Publishing House Pvt. Ltd., New Delhi
2. Devdas Menon, Structural Analysis, Narosa Publishing House, New Delhi.
3. Reddy C. S., Basic Structural Analysis, Tata McGraw Hill, New Delhi.
4. Norris, C. H. and Wilbur J. B., Elementary Structural Analysis, McGraw Hill, New York.
5. Hibbeler R. C., Structural Analysis, Pearson Education, New Delhi.
6. Ghali A., Neville A. M. And Brown T. G., Structural Analysis – A unified classical and matrix approach, Spon Press, London and Newyork.

Question Paper:Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

L	T	P/D	Cr
3	1	0	4

Module I

Flow in open channels-types of channels, types of flow, geometric elements of channel section, velocity distribution in open channels, uniform flow in channels, Chezy's equation, Kutters and Bazin's equations, Mannings formula, Most economic section for rectangular, trapezoidal and triangular channels. Condition for maximum discharge and maximum velocity through circular channels, computations for uniform flow, normal depth, conveyance of a channel section, section factor for uniform flow.

Specific energy, critical depth, discharge diagram, Computation of critical flow, Section factor for critical flow. Specific force, conjugate or sequent depths, hydraulic jump, expression for sequent depths and energy loss for a hydraulic jump in horizontal rectangular channels, types of jump, length of jump, height of jump, uses of hydraulic jump.

Module II

Gradually varied flow, dynamic equation for gradually varied flow, different forms of dynamic equation, classification of surface profiles, Backwater and drawdown curves, characteristics of surface profiles in prismatic channels. Computation of length of surface profiles, direct step method.

Dimensional analysis and model studies-dimensions, dimensional homogeneity, methods of dimensional analysis, Rayleigh method, Buckingham method, dimensionless numbers, Similitude. geometric, kinematic and dynamic similarities. Model laws-Reynold's and Froude model laws, scale ratios, types of models, distorted and undistorted models, scale effect in models.

Momentum equation and its applications-linear momentum equation, application to one dimensional flow-forces on bends- momentum equation for steady flow –the moment of momentum equation.

Module III

Hydraulic Machines-Impulse momentum principle, impact of jets, force of a jet on fixed and moving vanes. Turbines-classification and comparison of velocity triangles for Pelton wheel and reaction turbines(Francis and Kaplan), work done and efficiency, characteristic curves, specific speed, draft tube-different types, penstock, surge tank-types, cavitation in turbines.

Pumps-Centrifugal pumps-types, work done, efficiency, minimum speed, velocity triangle for pumps, specific speed, priming, characteristic curves, multi-stage pumps.

Reciprocating pumps, working of a reciprocating pump, types, work done in single acting and double acting pumps, coefficient of discharge, slip, effect in velocity due to acceleration and frictional resistance, indicator diagram, separation in suction and delivery pipes, air vessels, work saved by air vessels, rate of flow into and from air vessels.

References:

1. P.N.Modi & S.M.Seth, 'Hydraulics & Fluid Mechanics', SBH Publishers & Distributors, New Delhi.
2. V.L Streeter. and E.B Wylie, "Fluid Mechanics", Mc Graw Hill Series.
3. Dr.D.S Kumar, "Fluid Mechanics and Fluid power Engineering", S.K.Kataria & Sons, New Delhi.
4. K.Subramanya 'Open Channel Hydraulics'. Tata Mc Graw Hill Series
5. Douglas, "Fluid Mechanics", 4/e Pearson Education.
6. Dr. R. K. Bansal 'A Textbook of Fluid Mechanics and Hydraulic Machines', Laxmi Publications
7. V.T.Chow, 'Flow through Open Channels', Mc Graw Hill Series
8. K.G.Rangaraju, 'Flow through open channels' Tata Mc Graw Hill
9. M. Hanif Chaudhry, 'Open channel Flow' Prentice Hall of India, New Delhi

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

08 . 405

SURVEYING - II

L	T	P/D	Cr
3	2	0	5

Module I

Triangulation – General Principles – Order of triangulation –triangulation figures – Selection of base line – connecting the base line to the main net work – base line measurement and correction – intervisibility of stations – Scaffolds and signals – Satellite Stations – triangulation computations – reduction to centre.

Theory of errors – Types – theory of least squares – weighting of observations – most probable value – application of weighting – computations of indirectly observed quantities – Method of normal equations – conditioned quantities – station adjustment – figure adjustment.

Module II

Curves:- Elements of simple and compound curves - Method of setting out - obstacles – Reverse curve – Transition curve – length of curve – Characteristics – Elements of cubic Parabola, true spiral and cubic spiral – Length of combined curve – Vertical curve – types – properties of parabola – highest and lowest point – Length of vertical curve

Field Astronomy- Terrestrial latitude and longitude, Celestial Sphere-Astronomical triangle, Co-ordinate system

Module III

Photogrammetry – Terrestrial and Aerial photogrammetry– heights and distances from photographic measurement – flight planning -Vertical Photograph – Geometry and scale of vertical photographs – Ground coordinates from vertical photographs- Relief displacement – Planimetric mapping from vertical photos – different methods- Stereoscopy and parallax – Different types of stereoscopes - Photomaps and Mosaics.

Electro magnetic distance measurement (EDM) – Principle of EDM -Types of EDM instruments – Distomat – Total Station – Principle – procedure and Surveying using Total Station – Data retrieval and processing

References:

- 1.Satheesh Gopi ,Madhu .N & Sathikumar. R -Advanced Surveying , Pearson Education ,2004
2. Prof. T.P.Kenetkar and Prof. S.V.Kulkarni - Surveying and Levelling , PuneVidyarthi Griha Prakashan,2004
3. Dr. B.C.Punmia , Ashok kumar Jain & Arun Kumar Jain - Surveying , Laxmi publications (P)Ltd ,2005
4. R.Agor - A Text book of Surveying and Levelling, Khanna Publishers, 2005
5. S.K.Duggal - Surveying Vol. I & II, Tata Mc Graw Hill Ltd ,2006.
6. Moffitt - Surveying, 10/e Pearson Education, 2006.
7. Alak De - Plane surveying, S. Chand & Company Ltd, 2006.

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08. 406

BUILDING PLANNING AND DRAWING

L	T	P/D	Cr
1	0	4	5

Module I

Detailed discussion on Building bye - laws.

Elements of Computer Aided Drawing-Lines-Curves-Geometric shapes-Text-Dimensioning

Setting Out of Building , Computation of Plinth Area, Carpet Area, Covered Area ratio, Floor Area Ratio,

Computation of storage capacity of rain water harvesting system as per norms, CRZ rules

ModuleII

Preparation of working drawings (from line sketches or from specifications) of different types of buildings namely

- (i) Single storeyed buildings with flat roof, pitched roof and partly pitched and partly flat roof
- (ii) Two–storeyed and multi–storeyed buildings
- (iii) Public utility buildings like hostel, hospital, library etc. and
- (iv) Industrial building.

Preparation of lay- out plan of house drainage for a given building.

Preparation of site plans and service plans as per building rules.

Preparation of working drawings from specifications for different types of culvert namely - slab culvert and box culvert.

Using a computer software (AutoCAD/ Micro station etc.) draw the plan, section and elevation of a residential building.

References:

- 1. National Building Code of India
- 2. Kerala Municipal Building Rules
- 3. Building Drawing- Shaw and Kale, Tata McGraw Hill.
- 4. Balagopal T.S. Prabhu - Building Drawing and Detailing, Spades, Calicut

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

Note 2: Minimum 10 sheets must be drawn, out of which at least 2 should be computer print-outs on building details. **In the distribution of sessional mark, 25% weightage in marks for class work should be given to the term paper mentioned in Note1. and 25% for drawings using computer software.**

University exam pattern: Duration – 3 hrs.

The question paper shall consist of two parts .

Part A – Compulsory 4 short answer questions covering the entire portion for 20 marks.

Part B – Two questions carrying 80 marks each covering Module II. Students should answer any one question in full.

08. 407 STRENGTH OF MATERIALS LAB

L	T	P/D	Cr
0	0	2	2

- 1 Study of UTM, Torsion, Hardness and Impact Testing Machines
- 2 Test on M S, Tor steel
- 3 Shear test on M S Rod
- 4 Torsion test on M S Rod
- 5 Torsion test using Torsion Pendulum on M S, Aluminum and Brass wires.
- 6 Izod and Charpy Impact Test
- 7 Hardness tests (Rockwell and Brinell)
- 8 Spring test (open and close coiled)
- 9 Bending test on wood
- 10 Determination of E of wood and steel and verification of Clark Maxwell's Law of Reciprocal Deflection

Examinations : Duration 3 Hours,

Max . Marks 100

08. 408 FLUID MECHANICS LAB

L	T	P/D	Cr
0	0	2	2

1. Study of pipe fitting, plumbing tools, water meters, current meters, manometers and pressure gauges
2. Study and Experiment on orifices, mouthpieces, notches, orifice meter and venturimeter.
3. Study and Experiment on reciprocating and centrifugal pumps
4. Study and Experiment on Hydraulic turbines.
- 5.

Note : Sufficient experiments shall be given depending upon the facilities available in the laboratory

Examinations : Duration 3 Hours,

Max . Marks 100

Syllabus for V Semester

08.501 ENGINEERING MATHEMATICS – IV

(C M P U)

L	T	P/D	Cr
3	1	0	4

Module I

Discrete and continuous random variables and their probability distributions - Probability distribution (density) functions - Distribution functions - Mean and Variance - Simple problems. - Binomial, Poisson, uniform and exponential distributions - Mean and Variance of the above distributions - Normal distribution - Properties of normal distribution - Computing probabilities using Binomial, Poisson, uniform, exponential and normal distributions

Module II

Curve fitting - Principle of least squares - Fitting a straight line - Fitting a parabola - Linear correlation and regression - Karl Pearson's coefficient of correlation - Sampling distributions - Standard error - Estimation - Interval estimation of population mean and proportions (small and large samples) - Testing of Hypothesis - Hypothesis concerning a mean, Equality of means - Hypothesis concerning one proportion, difference of two proportions.

Module III

Linear programming - Formation of LPP - graphical solution - General linear programming problem - Slack and surplus variables - Standard form - Solution of LPP - basic solution - Basic feasible solution - Degenerate and non-degenerate solutions - Optimal solution - Solution by simplex method - Artificial variables - Big-M method - Canonical form of LPP - Duality in LPP - Properties of primal and dual optimal solutions - solution using duality

References

1. T. Veerarajan, Probability and Random Processes, TMH
2. Richard A. Johnson, Probability and statistics for engineers, Pearson
3. G. Hadly, Linear Programming, Addison Wesley
4. Ravindran, Philips, Solberg, Operations Research, Wiley
5. Dr.B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers

Question Paper:

The question paper shall consist of two parts. Part A (40 marks) shall contain 10 compulsory questions of 4 marks each. PartB (60 marks) will have 3 modules . There shall be 2 questions from each module (20 marks each) out of which one is to be answered

**08 . 502 DESIGN OF REINFORCED CONCRETE
STRUCTURES**

L	T	P/D	Cr
3	2	0	5

Module I

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

Module II

Design of slab spanning in one direction and two directions .Design of continuous beams. Staircases – Design of straight flight and dog-legged staircases. Columns-Interactions curves- Design of short columns and long columns with axial loads, uniaxial moment and biaxial moments- Use of SP–16 Charts.

Module III

Footings- Design of Isolated footings- axial and eccentric loading- Design of Combined footings- rectangular and trapezoidal footings. Pre-stressed Concrete – General principles- systems of prestressing- Losses in Prestress. Analysis of prestressed beams of rectangular and I sections, slabs.

References:

1. P.C.Varghese, 'LimitState Design of Reinforced Concrete', PrenticeHall of India Ltd
2. N.Krishnaraju, 'Structural Design and Drawing - Reinforced Concrete and Steel', Universities Press Ltd.
3. Ashok K Jain , 'Reinforced Concrete Limit State Design .Nem Chand Brothers, Roorkee
4. Unnikrishna Pillai & Devadas Menon, Reinforced Concrete Design, Tata McGraw- Hill
5. S.N.Sinha, Reinforced Concrete Design Tata McGraw- Hill
6. N.Krishnaraju, Prestressed Concrete Tata McGraw- Hill
7. H. Mehra and V. N Vazirani, Limit State Design, Khanna Publishers

Question Paper: Duration : 3 hours

The question paper consists of **Part A** and **Part B**.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Use of IS 456:2000; IS 1343 and Interaction curves for columns are permitted in the examination hall.

L	T	P/D	Cr
3	2	0	5

Module I

Concept of static indeterminacy and their determination in beams, rigid-jointed frames and pin-jointed frames - Statically indeterminate beams - Analysis of fixed beams by moment-area method – Effect of rotation and settlement of supports - Analysis of continuous beams by the theorem of three moments – Effect of settlement of supports – Introduction to force method of analysis – Method of consistent deformation and its application to indeterminate beams, rigid-jointed plane frames, pin-jointed plane frames and two-hinged arches – Effect of lack of fit and temperature change in pin-jointed plane frames - Influence lines for statically indeterminate structures – Müller-Breslau principle – Influence line diagrams for various force components in propped cantilever and two span continuous beams.

Module II

Concept of kinematic indeterminacy and their determination in beams, rigid-jointed frames and pin-jointed frames - Kinematically indeterminate beams – Introduction to displacement method of analysis – Slope-deflection method for beams and rigid jointed plane frames (with and without sway) including frames with sloping legs – Effect of settlement of supports – Moment Distribution method for beams and rigid jointed plane frames (with and without sway) – Effect of support settlement – Kani’s method for beams and rigid jointed plane frames of different geometry (with and without sway) – Introduction to approximate methods of analysis for multistoreyed frames - Substitute frame method – Cantilever method – Portal method (No numerical examples in approximate methods)

Module III

Introduction to Structural Dynamics – Dynamic systems and loads – D’Alembert’s principle – Systems with single degree of freedom – Equation of motion - Free vibration and forced vibration – Undamped and damped free vibration – Logarithmic decrement – Response of single degree of freedom systems subjected to harmonic loading – Single degree of freedom systems subjected to support motion such as earthquake ground motion – formulation of equation of motion.

References:

1. Junarkar S. B. and Shah S. J., Mechanics of Structures, Vol. II, Charotar Publishing House Pvt. Ltd., New Delhi
2. Devdas Menon, Structural Analysis, Narosa Publishing House, New Delhi.
3. Reddy C. S., Basic Structural Analysis, Tata McGraw Hill, New Delhi.
4. Anand A. S., Theory of Structures, Indeterminate Structural Analysis, Sathyaprakasan, NewDelhi.
5. Wang C. K., Indeterminate Structural Analysis, Tata McGraw Hill, New Delhi.
6. Norris, C. H. and Wilbur J. B., Elementary Structural Analysis, McGraw Hill, New York.
7. Hibbeler R. C., Structural Analysis, Pearson Education, New Delhi.
8. Ghali A., Neville A. M. And Brown T. G., Structural Analysis – A unified classical and matrix approach, Spon Press, London and Newyork.
9. Mario Paz, Structural Dynamics – Theory and Computation , CBC Publishers and distributors, New Delhi
10. Clough R W. and Penzien J. Dynamics of Structures, Mc-Graw Hill, Newyork
11. Anil K.Chopra, Structural Dynamics- Theory and Applications to Earthquake Engineering, Pearson.

Question paper: Duration : 3 hours

The question paper consists of **Part A** and **Part B**.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

L	T	P/D	Cr
3	1	0	4

08.504 TRANSPORTATION ENGINEERING – I

Module I

Introduction- Classification and characteristics of transportation modes- Comparison of railway and highway transport

Railway track- Alignment-requirements of good alignment-Factors in selection of good alignment.

Requirements of an ideal permanent way- capacity of a railway track- Gauges in railway track- selection-uniformity of gauge-railway track cross-sections-coning of wheels

Rails-functions-requirements-types-length of rails-rail joints-welding of rails-advantages. Defects in rails-remedial measures-wear on rails-failure of rails-creep of rails.

Sleepers-Functions-requirements-timber, metal and concrete sleepers-sleeper density

Ballast-functions-requirements-types

Rail fixtures and fasteners-purpose and types-modern elastic fastenings.

Geometric design of tracks-Necessity-gradients-grade compensation on curves-radius and degree of a curve-super elevation-cant deficiency-equilibrium speed-safe speed on curves-negative super elevation-necessity of providing transition curve-length of transition curve- widening of gauge on curves

Module II

Traction and tractive resistances-Comparison of tractions-Tractive resistances-train resistances-resistance due to track profile, resistance due to starting and acceleration, wind resistance-Hauling capacity of a locomotive-Tractive effort of a locomotive-Problems

Points and Crossings-Necessity-Left and Right hand turn outs-switches-types- crossings. Design of turn outs.

Track junctions-Types (General awareness only). Design of crossovers between parallel tracks-Design of diamond crossing.

Signalling-Objectives-Classification and characteristics, types

Control systems of train movement-ATC, CTC only-Track circuiting -Interlocking of signals and points-necessity and functions -Methods-mechanical, electrical methods

Stations and yards-Classification of railway stations, platforms, loops, sidings, station yards, passenger yards, level crossings

Modern trends on railways-modernization of traction , track , trends in track vehicles (general awareness only)

Module III

Tunnelling- Necessity of tunnels, size and shape of tunnels-Construction systems of tunnels-vertical shaft system, pilot tunnel system-Methods of construction in rocks-full face method, heading and benching method, drift method. Methods of tunneling in soft grounds-liner plate method, compressed air method-Removal of excavated materials. Tunnel lining- necessity, objects, materials (General awareness only)

Ventilation and Drainage of tunnels

Harbours- Classification-Requirements of commercial harbour-typical layout with general features-factors controlling harbour size-location and width of entrance-Stevenson's formula for entrance width-Depth of harbour and approach channel-shape of harbour. Meteorological phenomena-Wind, tides, Waves-wave parameters, fetch, Characteristics of wave, Stevenson's formula, Wave action-Coastal currents-littoral drift

Breakwater-classification- forces acting on breakwater construction. Marine facilities- wharf, pier, fenders, dolphins, aprons, transit shed, warehouse, (General awareness only). Docks- functions-wet and dry docks-floating dry dock- lock gates (General awareness only). Navigational aids- beacons-buoys-lighthouse-light ship-moorings-off shore moorings. Dredging-types-choice of dredger

References:

1. Rao.G.V,Principles of Transportation and Highway Engineering, Tata McGraw Hill
2. Mundrey J.S, Railway Track Engineering, Tata McGraw Hill
3. Srinivasan ,R, Harbour, Dock and Tunnel Engineering, ,Charotar Publishing house
4. Quinn,A.D,Design and Construction of Ports and Marine structures,Tata McGraw Hill

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus. **Part B** is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

L	T	P/D	Cr
3	1	0	4

08.504 URBAN PLANNING AND ARCHITECTURE

Module I

Architecture: definition–factors influencing architectural development. Principles of architecture: Contrast, proportion, scale, balance, rhythm, character, colour and unity. Indian architecture: A brief study of the architecture of Buddhist, Hindu and Indo- Islamic period. Kerala architecture: Traditional temple and domestic architecture of Kerala. Contributions of Laurie Baker to Kerala architecture. Modern architecture: Contributions of Le Corbusier and Frank Lloyd Wright to modern architectural philosophy.

Module II

Basics of planning: Evolution of towns – problems of urban growth – demography - rural – urban migration – beginning of town planning acts – ideal towns – garden city movement – concept of new towns and conservative surgery - comprehensive planning of towns. Basics of town planning surveys – Land use surveys and analysis – Socio-economic surveys. Development plans – Regional planning – Zoning and subdivision regulation – FSI/FAR – Neighborhood planning – planning principles – site planning – site selection criteria for housing development – types – site analysis.

Module III

Basic concepts of sustainable habitat – goals for sustainable development – global initiatives for sustainable development – resource based planning – urban infrastructure planning in sustainability context – urban growth and sustainability of water resources – socio-economic development and sustainable planning – sustainable new towns.

Introduction to the concept and issues of Sustainable Architecture – basic concepts of Green Buildings – energy efficiency in buildings(brief description only) – resource conservation and sustainable construction – various rating systems for the assessment of sustainability - Indian systems TERI GRIHA, LEED India rating – Sustainable building practices in India.

References:

1. Ernest Pickering, Architectural Design, John Wiley & Sons.
2. G.K. Hiraskar, The great ages of World Architecture, Dhanpat Rai Publications, New Delhi, 2003.
3. Sir Banister Fletcher, A history of Architecture, Taraporevala.
4. Percy Brown, Indian Architecture – Buddhist and Hindu Periods, Hardcover.
5. Percy Brown, Indian Architecture _ Islamic Period, D.B. Taraporevala
6. Balagopal T.S.Prabhu,.A. Achyuthan, Vastuvidyapravesika A Text Book of Vastuvidya, Vastuvidya Pratisthanam Calicut.
7. Arthur B. Gallion, Urban Pattern, D.Van Nostrand CD. Inc.
8. Pelic Hall , Urban and Regional Planning Routledge, London and New York. 2002
9. Lewis Keeble , Principles and Practices of Town Planning, Estates Gazette, London
10. R. Ramachandran , Urbanization and Urban System in India
11. Rob Krueger, David Gibbs ‘Sustainable Development’, Guilford Press, 2007
12. Andrews Blowers, Planning for a Sustainable Environment- Guilford Press
13. S.C Agarwala, Architecture and Town Planning, Dhanpat Rai Publications, New Delhi
14. Chen, K., Energy Management in Illuminating Systems, CRC Press, Boca Raton, Florida. 1999.
15. Allard, F., 1998. Natural Ventilation in Buildings: A Design Handbook, James & James, London
16. Ghosh, S, Solar Architecture and Planning, Centre for Built Environment, Calcutta.
17. Frey, H. W., Designing the City: Towards A More Sustainable Form, E & FN Spon, London,1999.
18. Roelofs, J., Greening Cities: Building Just and Sustainable Communities, Bootstrap Press, New York.
19. B.C.Bose, “Integrated approach to sustainable Development”, Rajat Publications, Delhi
20. Laurie Baker’s, “Chamoli Earthquake hand book”, Costford.
21. Fuller Moore, “Environmental control systems Heating, Cooling, Lighting”. McGraw Hill, Newyork.
22. Caring A.Langston, Grace K.C.Ding, “Sustainable practices in built environment”, Butterworth Heinmann Linacre House Jordanhill Oxford.
23. R.N.Trivedi, “Environmental Sciences”, Anmol Publications Pvt Ltd, New Delhi.

Question Paper: Duration 3 hours

The question paper consists of Part A and Part B. **Part A** is for 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

08. 506.1. Elective -1 MODERN CONSTRUCTION MATERIALS

L	T	P/D	Cr
3	0	0	3

Module I

Review of properties, specifications, manufacturing methods, tests and uses of building materials like stones, ceramic materials and concrete- special concretes for specific purposes like lightweight concrete, ready mixed concrete, high performance concrete, self compacting concrete. Metals-steel and aluminium, timber and bituminous materials.

Module II

Recent developments in the use of glass, plastics, asbestos, wood products, adhesives, polymer composites and composite materials- definition, characteristics, classifications based on structure and matrices. Smart composites- advantages and limitations. History, production and areas of application of the above materials.

Module III

Materials for thermal and acoustic insulation- properties-decorative finishes. Construction materials from industrial waste and recycled materials-areas of applications- innovation in materials technology

References:

1. Michel S.MamloukandJohnPZaniewski',MaterialsforCivilandConstructionEngineers',PrenticeHall
2. L. Reed Brantley and Ruth T Brantley, 'Building Materials Technology',Mcgraw-hill publishers
3. Neil Jackson and Ravindra K.Dhir, 'Civil Engineering Materials', Palgrave Foundations
4. Don A Watson, 'Construction Materials and Processes ',Career Education
5. F.Young,S.Mindess,RJGrayandABentur,'TheScienceandTechnologyofCivilEngineeringMaterials' Prentice Hall
6. M.V Gandhi and B.S Thompson, 'Smart Materials and Structures ',Chapmann & Hall, London

Question paper:

Duration:3 Hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short questions of 5 marks each covering the entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

08. 506. 2. Elective-I**GEOMATICS**

L	T	P/D	Cr
3	0	0	3

Module I

Fundamentals of GIS : Definition-components of GIS-GIS operations-Coordinate systems-Geographic coordinate systems-Map projections-Projected coordinate systems-Spatial data modelling-Raster and vector data representation-Data Input methods-Geometric Transformation-RMS error, Vector data Analysis-buffering, overlay, Modelling surfaces-DTM, Triangulated irregular network (brief description only)-GIS output.

Module II

Introduction to Remote Sensing : Definition- Electromagnetic spectrum-Energy interactions with atmosphere and earth surface features-spectral reflectance of vegetation, soil and water- Classification of sensors-spatial resolution-spectral resolution-radiometric resolution-Temporal resolution- Optical Infra red sensors-Active and Passive sensors-Multi spectral scanning-Along track scanning, across track scanning, IRS LISS Camera-Thermal detection-Microwave sensing (brief description only)-Visual Image Interpretation –Indian Remote Sensing System.

Module III

GPS Basics- system overview-working principle of GPS-Satellite ranging-calculating position- Ranging errors and its correction-code phase and carrier phase measurements-application of GPS Surveying methods-Static, Rapid static , Kinematic methods -Real time and post processing DGPS-GPS Survey planning and observation-horizontal and vertical control-data sheet-visibility diagram-GPS data processing-WAAS system-Hydrographic surveying with GPS.

References

1. Arora K.R., “Surveying-Vol 3”, Standard Book House
2. Satheesh Gopi, Madhu N & Sathikumar R., “Advanced Surveying”, Pearson Education, 2004
3. Barry F K, “Geomatics”, Pearson Education Ltd.
4. Satheesh Gopi, “The Global Positioning System and Surveying”, Pearson Education ,2004
5. Heywood, Cornelius and Carver, “ An introduction to GIS”, Pearson Education Ltd
6. Chang,K , “Introduction to Geographic Information Systems”, Tata McGraw-Hill Publishing Co. Ltd, 2008
7. Anji Reddy M., “ Remote sensing and Geographical Information Systems”, B S Publications, Hyderabad, 2001
8. George Joseph, “Fundamentals of Remote Sensing”, University Press, 2003
9. Lillesand M and Kiefer W, “Remote Sensing and Image Interpretation”. John iley and Sons,Inc.,2000
10. Iliffe, C.J., Datums and Map Projections for Remote Sensing, GIS and Surveying, Whittles Publishing, 2006
11. Burrough P , Principles of Geographical Information systems, Oxford University Press
12. Kang-tsung chang, ‘Introduction to GIS’ , Tata McGraw-Hill Publishing Co. Ltd

Question paper**Duration: 3 Hrs**

The Question paper consists of Part A and Part B.

Part A carries 8 compulsory questions (short answer questions) covering the entire syllabus and is for 40 marks.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question out of two.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08. 506. 3. Elective -1**FREE SURFACE FLOW**

L	T	P/D	Cr
3	0	0	3

Module I

Open channel flow-Velocity and pressure distribution- energy & momentum correction factors- Pressure distribution in curvilinear flows. Energy and Momentum principle-critical flow, Application of specific energy principle to channel transitions with hump or change in width. Uniform flow-composite sections, Hydraulic exponents N and M.-computation of uniform flow.

Module II

Design of channels for uniform flow-Non erodible channel-Minimum permissible velocity-channel slopes-best hydraulic section. Erodible channels which scour but do not silt-Methods of approach-Method of permissible velocity-Tractive force –Method of tractive force-stable hydraulic section.

Profiles on channels with break in grade-computation of GVF profile-Bresse’s method,, standard step method-flow profiles in divided channels.

Module III

Hydraulic jump-jumps in non rectangular channels-exponential channels-jump on a sloping floor-location of jump, use of jump as an energy dissipater. Ogee spillway-uncontrolled crests-profile. Standing wave flume, parshall flume, sluice gate. Stilling basin-practical features to be considered in the design of stilling basin-jump position, tail water conditions, and jump types-USBR Type II (Description only). Rapidly varied unsteady flow –Positive surges, Negative surges.

References:

1. Ven Te Chow, ‘Open Channel Hydraulics’, Tata Mc Graw Hill Book Co
2. K.Subramanya, ‘Flow in Open Channels’, Tata Mc Graw Hill Series.
3. Ranga Raju, ‘Flow through Open Channel’, Tata Mc Graw Hill.
4. M Hanif Chaudhary, ‘Open Channel Flow’, Prentice Hall India Private Ltd.
5. Henderson FM , ‘Open Channel Flow’, MacMillan, Newyork.

Question paper:

Duration: 3 hrs.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 4 marks each covering the entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

08. 506. 4. Elective -I ENVIRONMENTAL SCIENCE AND MANAGEMENT

L	T	P/D	Cr
3	0	0	3

Module I

Man and Environment – Health and Environment – Environmental Ethics – Interdisciplinary nature of Environment – air, water and land.

Natural resources of Environment – water, land and energy.

Module II

Ecology – Ecosystem – Types, Functions, Productivity, Energy Flow and Food chains

Material cycling – Hydrologic cycle, Carbon Cycle, Nitrogen Cycle, Phosphorous Cycle, Sulphur Cycle.

Sustainable development – Social, economical and environmental dimensions

Global environmental issues – Green house effect, ozone layer depletion, Global warming, Acid rain, deforestation.

Module III

Waste Management – Air Pollution – Sources, Types, Effects, Air Quality Standards

Water Pollution – Characteristics of water pollution – Water Quality Standards.

Waste Management hierarchy – Benefits of Pollution Prevention

Resource conservation – Good house keeping practice, Applications of remote sensing and GIS in environmental management.

References:

1. Kurian Joseph & R. Nagendran “Essentials of Environmental Studies”, Pearson Education(Singapore) Pte. Ltd, Indian branch, 482.FIE Patparganj – New Delhi - 110092
2. S.C. Bhatia, “Environmental Pollution and Control in Chemical Process Industries”, Khanna Publishers, Naisarak - Delhi
3. P. Aarne Vesilind and Susan M Morgan, “Introduction to Environmental Engineering”
4. Dr. Suresh K Dhameja, “Environmental Engineering and Management”, S.K. Kataria & Sons, 4424/6 Guru Nanak Market, Naisarak, Delhi – 110006
5. M. Anji Reddy, “Remote Sensing and Geographical Information System”, B.S. Publications, 4-4-309, Giriraj Lane, Hyderebad.
6. S.T Misra&S.N Pandey, “Essential environmental studies”. ANNE Books INDIA Publications New Delhi

Question paper : Duration : 3 Hrs

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be 2 questions form each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

08.506. 5. Elective -I**ADVANCED CONCRETE
TECHNOLOGY**

L	T	P/D	Cr
3	0	0	3

Module I

Cements: Review of cements including blended cements, chemical composition; tests on chemical and physical properties; process of hydration.

Aggregates: Review of types; production of artificial aggregates; sampling and testing; effects on properties of concrete; special aggregates.

Chemical Admixtures: Review of types and classification; actions and interactions; usage; effects on properties of concrete; methods of test; applications.

Mineral Admixtures: Flyash, ground granulated blast furnace slag, metakaolin, rice-husk ash and silica fume; chemical composition; physical characteristics; effects on properties of concrete; methods of test; applications

Module II

Special concrete: Lightweight concrete; autoclaved aerated concrete; no-fines concrete; lightweight aggregate concrete and foamed concrete.

High strength concrete; refractory concrete; high density and radiation-shielding concrete;

Polymer concrete; fibre reinforced concrete; Ferro-cement; recycled aggregate concrete; Prepacked concrete.

High-performance concrete, Self compacting concrete, Pumpable concrete, Ready mixed concrete

Module III

Non-destructive testing of concrete-Surface Hardness, Ultrasonic, Penetration resistance, Pull-out, pull-off and break-off methods, Chemical testing for chloride and carbonation

Mix Design : Factors considered in the design of mix design of low and medium strength mixes. Introduction to ACI, FM, Road Note No.4 Methods, Mix design of High strength, High density concrete, Light weight concrete and Ready mix concrete

References:

1. A. R. Santhakumar 'Concrete Technology', Oxford University Press
2. Shetty M.S., 'Concrete Technology', S.Chand &Co.
3. Neville, 'Properties of Concrete', Prentice Hall, Newyork
4. Mehta and Monteiro, 'Concrete-Micro structure, Properties and Materials', McGraw Hill Professional
5. John Newman and Ban Seng Choo , 'Advanced Concrete Technology', Butterworth-Heinemann Ltd.
6. Orchard , 'Concrete Technology Vol.1 & 2', Applied Science Publishers Ltd.
7. Satish Chandra , 'Waste materials used for concrete manufacturing', William Andrew Publishing
8. Malhotra and Ramezianpour , 'Fly ash in Concrete', Kluwer Academic Publishers
9. Lea, 'Chemistry of Cement and Concrete', Butterworth-Heinemann Ltd.
10. Aitcin , 'High performance concrete' , E & FPON, NewYork .
- 11 Bungey, Millard, Grantham – The Testing of Concrete in Structures- Taylor and Francis
- 12 IRC Highway Research Board – State of the Art: Non-Destructive Testing Techniques of Concrete Bridges

Question Paper:**Duration: 3 hours**

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

L	T	P/D	Cr
0	0	2	2

08 . 507

PRACTICAL SURVEYING - II

Theodolite survey

- 1. Problems in heights and distances using : -7 classes
 - (a) Tangential and stadia tacheometry
 - (b) Trigonometric levelling
- 2. Three point problem
- 3. Setting out of Simple curve using Theodolite

Total Station Survey, GPS survey & Data processing - 4 classes

Class Test - 2 classes

Note:--University examination only for survey using theodolite

Examination: 100 marks. **Duration:** 3 Hours

08. 508

CONCRETE LABORATORY

L	T	P/D	Cr
0	0	2	2

Tests on cement

- Standard consistency of cement
- Initial and final setting time of cement
- Compressive strength of cement
- Fineness of cement (Air permeability test -Demonstration only)

Tests on aggregates (Fine aggregate & coarse aggregate)

- Particle size distribution and grading
- Fineness modulus, bulk density, void ratio and porosity
- Bulking of fine aggregate
- Specific gravity of aggregate

Tests on fresh concrete

- Slump test
- Compaction factor test
- Vee- bee test (Demonstration only)
- Flow test (Demonstration only)

Tests on hardened concrete

- Compressive strength of concrete
- Modulus of elasticity of concrete
- Flexural and split tensile strength of concrete
- Rebound hammer test

Tests on bricks and tiles

- Compressive strength of burnt bricks
- Water absorption tests on bricks
- Transverse strength test on tiles (M P tiles and mosaic tiles)

Examination: 100 marks **Duration:** 3 Hours

Syllabus for VI Semester

08. 601

DESIGN OF STEEL STRUCTURES

L	T	P/D	Cr
3	2	0	5

Module I

Properties of structural steel, Structural steel sections, Limit state and working stress design concepts, Types of connections - Design of welded and bolted connections, Design of tension members and compression members, Design of laterally supported and unsupported beams - Built up beams, Simple beam to column connections.

Module II

Plate girders- design of section, curtailment of flange plate, bearing and intermediate stiffeners, connections, flange and web splices, Gantry girders (only design concept).

Columns- Design of axially and eccentrically loaded compression members, simple and built up sections, lacing and battening, Column bases- slab bases and gusseted bases.

Module III

Light gauge steel structures – Types of sections, Flat width ratio, Buckling of thin elements, Effective design width, Form factor, Design of tension, compression members and beams.

Plastic design- basic assumptions - shape factor, load factor- Redistribution of moments - upper bound lower bound and uniqueness theorems- analysis of simple and continuous beams, two span continuous beams and simple frames by plastic theory - static and kinematic methods.

References:

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

Question Paper:

Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

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

Note: No other charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter

08.602

GEOTECHNICAL ENGINEERING-I

L	T	P/D	Cr
3	1	0	4

Module I

Soil formation - Major soil deposits of India - Basic soil properties - Weight-volume relationships - Void ratio, porosity, degree of saturation, air content, percentage air voids, moisture content, specific gravity, bulk, saturated and submerged unit weights - Relationship between basic soil properties

Index properties - Sieve analysis – Well graded, poorly graded and gap graded soils - Stoke's law - Hydrometer analysis – Relative density – Consistency - Atterberg Limits - Practical Applications - Field identification of soils - I.S. classification of soils

Compaction of soils - Standard Proctor, Modified Proctor, I.S. light & Heavy Compaction Tests – OMC - Zero Air voids line - Control of compaction - Field methods of compaction[Brief discussion only].

Module II

Permeability of soils - Darcy's law – Factors affecting permeability - Constant head and falling head permeability tests - Average permeability of stratified deposits

Principle of effective stress - Total, neutral and effective stress variation diagrams - Quick sand condition - Critical hydraulic gradient - Estimation of quantity of seepage using flow nets[only for the case of seepage around a single row of sheet piles] – Definition of phreatic line and exit gradient.

Compressibility and Consolidation - Void ratio versus pressure relationship - Coefficient of compressibility and volume compressibility – Compression index - Change in void ratio method - Height of solids method - Normally consolidated, under consolidated and over consolidated states - Estimation of pre consolidation pressure - Estimation of magnitude of settlement of normally consolidated clays – Terzaghi's theory of one-dimensional consolidation(no derivation required) - average degree of consolidation – Time factor - Coefficient of consolidation - Square root of time & logarithm of time fitting methods-

Module III

Shear strength of soils - Mohr's circle - Mohr-Coulomb failure criterion - Direct shear test, triaxial compression test, vane shear test, unconfined compression test - Merits and drawbacks of the tests - UU and CD tests[Brief discussion only] - Sensitivity - Thixotropy - Liquefaction - Critical void ratio

Stability of finite slopes - Toe failure, base failure, slip failure - Swedish Circle Method – Friction circle method – Factor of safety with respect to cohesion and angle of internal friction - Stability number - Stability charts - Methods to improve slope stability

References:

1. Gopal Ranjan & A.S.R Rao --- Basic and Applied Soil Mechanics – New Age International (P) Limited, New Delhi, 2002
2. K.R. Arora --- Geotechnical Engineering – Standard Publishers Distributors, New Delhi, 2006
3. Venkatramaiah --- Geotechnical Engineering – Universities Press (India) Limited, Hyderabad, 2000
4. Terzaghi and Peck --- Soil Mechanics in Engineering Practice – John Wiley & Sons, New York, 1967
5. D.W.Taylor --- Fundamentals of Soil Mechanics – Asia Publishing House, New Delhi, 1948
- 6.P.Purushothamaraj --- Soil Mechanics and Foundation Engineering – Pearson Education, Delhi, 2008

Question Paper:

Duration: 3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No other charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter

08.603

WATER RESOURCES ENGINEERING

L	T	P/D	Cr
3	1	0	4

Module I

Hydrology-Hydrologic cycle - Precipitation types, forms, measurements-Computation of mean precipitation- - rain gauge density and optimum number of rain gauges-water losses-Infiltration-measurement by double ring infiltrometer- Horton's equation- infiltration indices. Evaporation,-measurement by IMD Land pan. Runoff-Computation of runoff by different methods. Hydrograph (Sherman), Unit hydrograph and its applications-S-hydrograph.

Module II

Planning of irrigation schemes-types of irrigation-lift and flow irrigation-Mode of irrigation water application-duty of water-soil water plant relationships-consumptive use (methods of estimation not required).-depth and frequency of irrigation water application-irrigation efficiencies.

Irrigation canals-types-canal alignment- Typical cross sections of unlined canals-Balancing depth. Design of canals on alluvial soils based on Kennedy's theory (no numerical problems) and Lacey's silt theory-canal lining-design of lined canals-Economics of canal lining-Stream flow measurement- velocity measurements-Computation of discharge(Area-velocity method)-rating curve (stage-discharge curve).

Module III

Groundwater –vertical distribution of groundwater-Types of aquifer-Aquifer properties- Darcy's law-Steady radial flow to a well-unconfined and confined aquifers-Types of wells-open well, artesian well and tube well-Estimation of yield of an open well-Types of tube wells (only description, no design) River Engineering-meandering-river training –objectives, classification, river training methods-levees, guide banks, groynes, artificial cut-offs, pitching, pitched islands (Design not necessary). Reservoir-various types-zones of storage-storage capacity and yield-analytical and mass curve method-reservoir sedimentation-control of sedimentation-useful life of reservoir.-computation.

References:

1. Biswas, "Water resources: Environmental planning and development", Tata Mc Graw Hill
2. B.C.Punmia & BB Pande, "Irrigation and Water Power Engineering", LaxmiPublications (P) Ltd.
3. K.Subramanya, "Engineering Hydrology", Tata Mc Graw Hill Series, New Delhi..
4. P.N.Modi and S.M.Seth , "Irrigation Engineering"-,S.B.H Publishers and Distributors, New Delhi.
5. Ven Te Chow, "Hand book of Applied Hydrology", Tata Mc Graw Hill
6. P Jayarami Reddi, "A Text Book of Hydrology", Laxmi publications (P) Ltd.
7. S.K. Garg, Hydrology and Water Resources,- Khanna Publishers
8. D.K Todd, "Ground Water Hydrology", Wiley International Ed; Toppan &Company Ltd, Tokyo, 1995.
9. S.P. Garg , "Ground Water and tube wells", Oxford &IBH Publishing Company

Question Paper:

Duration: 3 Hrs.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions covering the entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

08.604 TRANSPORTATION ENGINEERING- II

L	T	P/D	Cr
3	1	0	4

HIGHWAY ENGINEERING

Module 1

Introduction-Historical Development of Roads-Development of Roads in India, Classification of roads.

Highway Alignment- Requirements of highway alignment-factors controlling alignment. Engineering surveys for highway location, preparation of project reports. Highway aesthetics.

Geometric Design: Design controls and criteria, design speed, camber, sight distance, super elevation, widening of pavements on curves, horizontal curves, transition curve, gradient- vertical curves

Module II

Highway materials- Desirable properties of aggregates and bitumen- Tests on aggregate and bitumen

Pavement Design- types of pavement structures, Design of flexible pavements, CBR method only.

Westergaard's analysis of wheel load stresses and temperature stresses in rigid pavements.

Construction- WBM, Bituminous concrete and cement concrete roads.

Failures in flexible and rigid pavements- causes of failures- Maintenance of bituminous and cement concrete pavements.

Highway drainage- Importance, surface and sub surface drainage systems

AIRPORTS

Module III

Planning and Design of Airports- Aircraft characteristics which affect planning and design of airports- Airport site selection

Imaginary Surfaces- Approach zone, Clear Zone, and Turning zone.

Runway Design- Orientation, Wind rose diagram-Basic runway length computation, correction due to elevation, Temperature and gradient, runway geometric design features, Taxiway design requirements Terminal building, facilities required in a terminal building.

Apron: Size and gate positions-parking configurations, parking system.

Typical airport layouts-Runway configurations.

Airport Landing Aids- Airport markings- Airport lighting-Air traffic control aids- landing Aids- ILS.

References:

1. Rao,G.V, Transportation Engineering,Tata Mc-Graw Hill
2. Khanna S.K. & Justo C.E.G., Highway Engineering, Nem Chand & Bros, Roorkee.
3. Kadiayali,L R.,Traffic Engineering and Transport Planning, , Khanna Publication.
4. Khanna, S.K & Arora, M.G., Airport Planning and Design, Nemchand & Bros
5. Horonjeff,R & Francis, M., Planning and Design of Airports, Mc-Graw Hill
6. Partha Chakraborty and Animesh Das, Principles of Transportation Engineering, Prentice Hall India Private Ltd.

Question Paper:

Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.605

**PROGRAMMING AND NUMERICAL
METHODS**

L	T	P/D	Cr
3	1	0	4

Module I

C++ programming language – Character set, tokens, data types, variables, operators, expressions, Input & Output, Selection statements – if, switch statements, Looping statements - for, while, do-while statements, Jump statements – break, continue, goto exit(), Arrays - single and multi-dimensional arrays, initializing array elements, Functions – Arguments, returning function results, call by value, call by reference, functions calling functions, functions and arrays - Global variables, automatic, static and register variables, pointers & arrays ,recursive functions, function overloading.

Module II

Character arrays, Unformatted console I/O functions, Unformatted Stream I/O functions, string functions. Structures - functions and structures - Arrays of structures - structures within structures, Structures containing arrays
Files - Input & Output, sequential & random access
Basic concepts of object oriented programming, advantages of object oriented programming, Implementation of object oriented programming concepts in C++, Definition of a class, members of a class, data members and member functions, Declaration of objects, array of objects, Constructors and Destructors, Inheritance.

Module III

Roots of transcendental equations - Successive approximations, Regular - falsi , Newton Raphson Methods, Functional approximation - Fitting straight line & parabola , Numerical Integration - Trapezoidal, Simpson's rule & Gauss quadrature. Solution of simultaneous linear equations – Gauss elimination method, Gauss - Siedel Iteration method

Note: Programs & Numerical Problems may be included in the question paper.

References:

1. Programming in ANSI C – S. Balaguruswamy, Tata McGraw Hill
2. Programming in C - Stephen J Kochan, Macmillan Computer Pub
3. Programming in C - Byron Gottfried, McGraw-Hill
4. Programming with ANSI & TurboC- Kamthane ,Pearson Education
5. C++ Programming - Robert Lafore, Sams publishers
6. Programming in C++ - Maria Lithian
7. Introduction to Computers - Jose S
8. Applied Numerical Analysis- Gerald, Pearson Education
9. Object Oriented programming with ANSI & TURBO C++ - Kamthane, Pearson Education
10. Object Oriented programming with C++ - . Balaguruswamy, Tata Mcgraw Hill

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.606.1 ElectiveII**SOIL EXPLORATION**

L	T	P/D	Cr
3	1	0	4

Module I

Objectives of soil exploration – Planning of a sub-surface exploration programme –Collection of existing information – Reconnaissance – Detailed investigation - Number, size, spacing and depth of boreholes – Different methods of exploration - Open pits and borings – Methods of boring – Auger boring, auger and shell boring, wash boring, percussion drilling, rotary drilling – Comparison of the methods

Geophysical methods – Seismic refraction method – Procedure, uses, limitations – Electrical resistivity method – Electrical profiling and electrical sounding – Procedure, uses - Field determination of permeability by pumping out test[no derivation required]

Module II

Sounding methods – Standard Penetration Test – Procedure –Various corrections to be applied to observed N values – Factors influencing the SPT results and precautions to obtain reliable results – Merits/drawbacks of the test – Correlations of N value with various engineering and index properties of soils

Static Cone Penetration Test – Procedure – Merits/drawbacks – Correlation of static CPT results with various soil properties - Dynamic Cone Penetration Test – Procedure – Merits/drawbacks – Critical comparison of SPT, static CPT and dynamic CPT

Plate load test – Procedure, uses and limitations - Pressure meter test - Procedure –Uses

Module III

Soil sampling – Undisturbed, disturbed, and representative samples – Chunk and tube samples – Factors affecting sample disturbance and methods to minimize them – Area ratio – Inside clearance – Outside clearance – Recovery ratio – Ball check valve – Handling and transportation of samples – Extrusion of samples

Types of samplers – Thin walled sampler – Piston sampler – Split spoon sampler - Core retainers – Liners – Rock cores – Types of drill bits – Rock Quality Designation –Bore log – Soil profile – Sub-soil investigation report

References:

1. Gopal Ranjan & A.S.R Rao, 'Basic and Applied Soil Mechanics', New Age International (P) Limited, New Delhi, 2002
2. K.R. Arora, 'Geotechnical Engineering', Standard Publishers Distributors, New Delhi, 2006
3. Venkatramaiah, 'Geotechnical Engineering', Universities Press (India) Limited, Hyderabad, 2000
4. Joseph E. Bowles, 'Foundation Analysis and Design', Mc. Graw Hill Inc., New York, 1988

Question Paper:

Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

08 606.2 ElectiveII SOLID WASTE MANAGEMENT

L	T	P/D	Cr
3	1	0	4

Module I

Definition-Sources- Categories of wastes-Municipal, Industrial, Medical, Universal, Construction and demolition debris, Radioactive, Mining, Agricultural waste Generation rate- Measure of quantities, methods used to generation rate. Composition- Physical and chemical (simple problems). storage of solid waste- Container location.

Module II

Collection. – collection services- collection systems, collection routes-Need for transfer operation. Processing techniques- Mechanical volume reduction mechanical size reduction- chemical volume reduction -component separation Drying (simple problems) Resource conservation and recovery.

Module III

Disposal of solid waste; Sanitary land fill- area method, trench method-advantages and disadvantages. Incineration- types of incinerators -parts of an incinerator-incinerator effluent gas composition- advantages and disadvantages .

Composting- types of composting-Indore process, Bangalore process(advantages and disadvantages).

References;

1. George Tchobanoglous, Frank Kreith et al “Hand book of solid waste management.” Mc Graw hill publications -Newyork.
2. John Pichtel “ Waste management Practices” Taylor& Francis publishers
3. David . A . Cornwell, Mackenzie . L .Davis “Introduction to Environmental Engineering” Mc Graw Hill International Edition .
4. Daniel . B. Botkin, Edward .A. Keller “Environmental Science” (Earth as a living plant) IV Edition ,John wiley& Sons Inc.
5. Robert . A. Corbitt “Hand Book of Environmental Engineering” Mc Graw hill publishing Company .
6. Arcadio .P.Sincero “ Environmental Engineering” -A design approach Prentice Hall of India Private Limited – New Delhi.

Question paper:

Duration : 3 Hrs

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be 2 questions form each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

08.606.3 ElectiveII**WAVE HYDRODYNAMICS**

L	T	P/D	Cr
3	1	0	4

Module I

Review of fundamental principles and its relative significance – (no questions to be asked). Classification of ocean waves, Definition of wave parameters (wave length, period, Celerity). Regular and irregular waves. Linear Wave theory (Airy's theory)-Assumptions- Boundary Conditions, solution of Laplace equation with Boundary Conditions - Derivation of wave surface profile, wave length, wave celerity, orbital motion of water particles and orbital displacement of water particles in shallow water condition, transitional water condition and deep water conditions-related problems.

Module II

Wave kinematics, pressure field under wave system, wave energy, Energy propagation (Energy flux or wave power), group velocity in deep and shallow water conditions-related problems.

Wave Transformations- Shoaling, refraction – refraction patterns on different bed configurations- problems considering shoaling and refraction effects, wave reflection wave diffraction, wave breaking in deep water, transitional water and shallow water, types of breakers.

Module III

Finite amplitude theory-Stokes theory, Trochoidal theory and solitary wave theory, Region of validity of various theories.

Wave loads on vertical walls and Caissons - Sainflou method (problems) - Brief study of Minikin Method and Goda's method (Problems not required).

Wave measuring techniques-pressure wave gauge, Rider buoys, Wave direction measuring techniques.

References:

1. Turgut Sarpkaya & Michael Issacson , Mechanics of Wave forces on offshore structures , Van Nostrand Reinhold Company, 1981
2. Robert G. Dean & Darlymole, Water wave mechanics for engineers and scientists, Prentice Hall Publishers-New Jersey
3. A.T.Ippen ,Estuary & Coastline hydrodynamics, Mc Graw Hill publication
4. U.S Army Corps of Engineers, Shore protection manual (Vol. I & II),1984 Coastal Engineering Research Centre
5. Robert M Sorenson, Basic Coastal Engineering, Springer,2005
6. Harbour and Coastal Engineering-NIOT Chennai
7. S.K Chakrabarathi ,Hydrodynamics of offshore structures, Computational Mechanics Publications,1987
8. U.S Army Corps of Engineers, Coastal Engineering Manual, 2006, U.S Army Engineer Research and Development Centre.
9. Baba M and Kurian N.P (ed), Ocean Wave Mechanics for Engineers and Scientists, Allied publishers Ltd

Question Paper:

Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter

08 606.4 ElectiveII

**ADVANCED COMPUTATIONAL
METHODS**

L	T	P/D	Cr
3	1	0	4

Module I

Errors in numerical computation – System of linear algebraic equations –factorization methods – Multiple right hand sides - Ill-conditioned systems – Symmetric and Banded systems .
Eigen value problems – Power method – Jacobi Method – Practical examples.
System of non linear equations – Newton-Raphson Method.

Module II

Lagrangean and Hermitian interpolation – Quadratic splines - cubic splines (Examples with equal intervals only) - Data smoothing by least squares criterion – Parabolic and non-polynomial models like exponential model and power equation – Multiple linear regression.

Taylor series expansion of functions – Solution of first-order ordinary differential equations by use of Taylor series – Euler’s method and its modifications – Runge-Kutta method.- – Predictor-corrector methods – Milne’s method and Hamming’s method – Stability of solution.
Higher-order equations of initial value type.by Runge-Kutta method.

Module III

Ordinary differential equations of the boundary value type – Finite difference solution.
Weighted residual methods for initial value problems and boundary value problems – Collocation method – Subdomain method – Method of least squares – Galerkin’s method.
Partial differential equations in two-dimensions – Parabolic equations – Explicit finite difference method – Crank-Nicholson implicit method.
Elliptic equations – Finite difference method – Problems with irregular boundaries.

**Note: Importance must be given to structural engineering problems wherever possible.
Assignments must be computer oriented.**

References :

1. Chapra S. C. and Canale R. P, Numerical Methods for Engineers,Mc Graw Hill
2. Smith G. D, Numerical Solution to Partial Differential Equations, Oxford University Press.
3. Ketter and Prawel, Modern methods of Engineering Computation Mc Graw Hill .
4. Rajasekharan S , Numerical Methods in Science and Engineering. S.Chand.
5. Numerical Methods for Initial and Boundary value Problems, Rajasekharan S,A.H.Wheeler & Co. Pvt. Ltd.
6. Terrence J. Akai , Applied Numerical Methods for Engineers, John Wiley & Sons
7. B.S Grewal, Numerical methods for Engineers & scientists, Khanna Publishers

Question paper:

Duration: 3 Hrs.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus .

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

L	T	P/D	Cr
3	1	0	4

Module I

Traffic Engineering: Definition, Functions.

Road User, Vehicle and The Road: Human factors governing road user behaviour - Vehicular characteristics.

Traffic Surveys: Speed, Journey time and delay study – Methods-Moving observer method, Presentation of data- grouping of speed data, cumulative frequency curve, problems. Vehicle volume counts and classifications - methods Parking surveys. Uses of photographic techniques in traffic survey.

Origin- Destination Surveys- methods, zoning and presentation of results.

Module II

Traffic Controls: Different types of traffic signs and markings. Traffic signals - design, coordinated signals-time-distance diagram -area traffic control-Other traffic control aids and street furniture.

Intersections And Interchanges –Types-Planning and layout

Traffic Safety: Accidents-causes and prevention.

Parking: Zoning and parking space requirements-On street and off street parking.

Traffic Management-Concept and techniques.

ITS, GIS And GPS- Introduction to Intelligent Transportation Systems, Geographic Information System and Global Positioning System

Street Lighting- Necessity, methods, arrangement- at carriageways, T, rotary, bend, bridge, tunnels.

Module III

Highway Capacity And Level Of Service: Definitions - PCU-LOS concept, Factors affecting capacity and LOS. Capacity of highways, urban streets, rotary, weaving sections and intersections.

Theory Of Traffic Flow: Fundamental diagram of traffic flow-Relationship among the variables.

Reference:

1. Traffic Engineering & Transport Planning- Kadiyali L R, Khanna Publishers.
2. Traffic Planning and Engineering- Hobbs, F.D., Pergamon Press
3. Traffic Engineering- Mc. Shane, William R., Roess, Roger P., Prentice Hall ,New Jersey.
4. An Introduction Transportation Engineering - Jotin Khisty C., Kent Lall B., Prentice Hall.
5. Principles of Transportation Engineering - Partha Chakraborty, Animesh Das, Prentice Hall India.
6. Recommended Practice for Traffic Rotaries - IRC 65-1976
7. Guidelines for capacity of roads in rural areas -IRC 64-1990
8. Traffic studies for planning By-passes around towns -IRC 102-1988
9. Guidelines for Capacity of Urban roads in plain areas- IRC 106-1990
10. Guidelines for design and installation of Road Traffic Signals -IRC 93- 1985
11. Road accident forms- IRC 53-1982.
12. Traffic Census on Non-urban roads -IRC 9-1972.

Question paper:

Duration: 3 Hrs.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus .

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08 606.6 Elective II VALUATION OF REAL PROPERTIES

L	T	P/D	Cr
3	1	0	4

Module I

Basic principles of valuation- Cost price and value- kinds of properties-Different purposes of valuation- kinds of values and definition-Factors affecting the value in general-Sources of valuation-Procedure to become a valuer-Report writing.

Different methods of Valuation- Valuation by land and building method- Valuation of flats- Composite rate method- Valuation of commercial complex-Rent capitalization method.

Module II

Valuation of land-Market value-Guideline value-FSI and plot coverage- Land locked land-Recess land-Valuation by belting method-Land measurement units- case studies.

Depreciation –Types, Methods of calculating depreciation- Obsolescence- Valuation of buildings-Replacement value- Depreciation value- case studies.

Module III

Valuation for banks- Different purposes-Collateral security and primary security- Valuation formats- Legal aspects of valuation.

Valuation for taxation-Income tax, wealth tax, capital gain-Probate.

Reference:

- 1 S.C Rangwala, 'Valuation of Real properties', Charotar publishing House Pvt.Ltd.
- 2 Chakrabarthy.M, 'Estimating costing and specifications in Civil Engineering, USB publishers and distributors Ltd.New Delhi
- 3 Douglas Scarett, 'Property valuation-The 5 methods, Spon press,Taylor and Francis
- 4 D.N.Banerjee, 'Parks valuation'-5th Edition(1998),Eastern Law House,Calcutta
- 5 Roshan H Namavati,'Theory and practice of valuation'Lakhani Book Depot,Bombay
- 6 Asok Nain,'Professional Valuation Practice'Tata Mc. Graw Hill,New Delhi

Question paper:

Duration: 3 Hrs.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus .

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

L	T	P/D	Cr
3	1	0	4

08 606.7 Elective II SUSTAINABLE DEVELOPMENT

Module I

Concepts of sustainability : Energy and Global environment, Energy use and Climate change – Its impact, Types of Energy systems, Concept of Sustainability - Principles of conservation -synergy with nature, Bioregionalism - community basis shelter technology within bioregional patterns and scales, Ethical-environmental degradation.

Module II

Sustainable Building Materials and Construction : Properties, Uses and Examples of -Primary, secondary and Tertiary Sustainable Materials, Principles to improve the energy efficiency - siting and vernacular design, shade, ventilation, earth, shelter, thermal inertia and air lock entrances. Techniques of sustainable construction - technologies, methods of effectiveness, and design synthesis – Green buildings - alternative materials and construction methods: solar water heating panels; photovoltaic electricity generation; use of local materials and on site growth of food, fuel and building materials.

Module III

Recycling and Reuse : Pre building, Building, Post building stages - Architectural Reuse, Waste prevention, Construction and Demolition recycling- Conservation of natural and building resources- Energy and material savings – types of wastes - Elimination of waste and minimize pollution- various Decomposing methods – Innovative reuse of various wastes.

References :

- 1) B.C.Bose, “Integrated approach to sustainable Development”, Rajat Publications, Delhi
- 2) Laurie Baker’s, “Chamoli Earthquake hand book”, Costford, Centre of science and technology for rural development.
- 3) Fuller Moore, “Environmental control systems Heating, Cooling, Lighting”. McGraw Hill, Newyork.
- 4) Caring A.Langston, Grace K.C.Ding, “Sustainable practices in built environment”, second edition, Butterworth-Heinmann Linacre House Jordan hill Oxford.
- 5) R.N.Trivedi, “Environmental Sciences”, Anmol Publications Pvt Ltd, New Delhi.

Question paper:

Duration: 3 Hrs.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus .

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

08.606.8 Elective II HYDROLOGY AND WATER RESOURCES

L	T	P/D	Cr
3	1	0	4

Module I

Basic concept of Hydrology and Hydrology cycle- Graphical representation of rainfall data- Analysis of rain fall data- Correlation of rainfall records- intensity duration and frequency relation ship-DAD curves-Design storm and PMP –Consistency of rainfall data- double mass analysis. Water losses-interception-evaporation-method of estimation-Evapotranspiration- method of estimation-infiltration-method of estimation.

Module II

Runoff – stream network-ordering, characteristics – estimation of runoff- Rational method SCS method - Unit hydrograph analysis(Sherman&Bernard distribution graph)- S hydrograph-unit hydrograph from Complex storms- synthetic unit hydrograph- instantaneous unit hydrograph-Linear reservoir model.
Stream gauging- Area velocity method- current meter- rating of current meter- Stage discharge rating curve-Extension of stage discharge rating curve- Adjustment of stage discharge rating curve- selection of site for a stream gauging station.

Module III

Floods and their estimation- definition, causes, design flood, chance flood, estimation of design flood, and flood frequency- empirical formula such as Dicken's, Ryves- statistical method – California method- Gumbel's method

Flood routing-Hydraulic and hydrologic routing (concepts only)-reservoir routing- I-S-D method -channel routing- Muskingum method.

Flood control methods- Flood control reservoirs- retarding basins – construction of levees- channel improvement- soil conservation method- flood forecasting and warning.

Reference:

1. E. Subrahmanya Engineering Hydrology'', Tata McGraw-Hill publishing Company Ltd, New Delhi.
2. H. M. Reghunath, ''Hydrology'', Wiley Eastern Ltd, New Delhi.
3. Hydrology & Water resources engineering, S. K. Garg, Khanna Publishers
4. Ven. Te Chow, ''Hand book of applied Hydrology'', Tata Mc Graw Hill
5. Linsley R. K., Kohier, M. A. and Paullus, J. L., '' Applied Hydrology'', Mc Graw Hill.
6. B. C. Punmia, ''Irrigation and Power Engineering'', Laxmi publications (P) Ltd

Question Paper:

Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter

08.606.9 Elective II NANO SCIENCE & NANO TECHNOLOGY

L	T	P/D	Cr
3	1	0	4

Module I

Definition of Nanoscience and Nanotechnology -Historical development of nanotechnology - Nano and nature-Nanoscale investigation methods:

Electron microscopies-Scanning Electron Microscopy and Transmission Electron Microscopy.

Scanning Probe Microscopies-Scanning Tunneling Microscopy, Atomic Force Microscopy and Scanning Probe Lithography.

Optical Microscopies-Confocal Microscopy and Scanning Nearfield Optical Microscopy.

Module II

Photoelectron Spectroscopy and X-Ray Diffraction methods-

Nanomaterials: Synthesis , properties and uses of Fullerenes, Carbon Nanotubes , Semiconductor Quantum Dots , Core-shell Nanoparticles and Nanoshells - Nanomanufacturing: Bottom Up and Top Down methods

Module III

Nanointerfaces: Nanosensors, Molecular Nanomachines and Nanotribology-

Nanotechnology in Construction- Nanotechnology in Aerospace-Nanotechnology and Environment-Nanotechnology in Water treatment and Air purification-

Societal Implications of Nanoscience and Nanotechnology- Basic concepts of Nanoethics and Nanoeconomics-Nanotechnology in Development- Health effects of Nanoparticles.

References:

1. Pradeep.T (2007)- 'NANO : The Essentials'. McGraw-Hill Education, New Delhi
2. David Rickerby and Mark Morrison(2007)-Report from the Workshop on Nanotechnologies for Environmental Remediation,<http://nanoforum.org/>
3. Ineka Malsch (Ed.)(2007)- Nanotechnology in Aerospace; Nanoforum Report,<http://nanoforum.org/>
4. Nanoscience and Nanotechnologies: Opportunities and Uncertainties.(2004)-Report of the Royal Society& The Royal Academy of Engineering, <http://www.nanotech.org.uk>
5. Surinder Mann (2006)- Nanotechnology and Construction; Nanoforum Report,<http://nanoforum.org/>

Question Paper:

Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

**08.606. 10 Elective II NATURAL DISASTER
MANAGEMENT**

L	T	P/D	Cr
3	1	0	4

Module I

Earth processes and natural disasters-significance of earth processes, natural hazards, risks and disasters. Basic principles of disaster management. Case histories of important natural disasters. Vulnerability assessment for earthquakes, floods, tsunamis, landslides and volcanoes. Human induced disasters.

Module II

Preparedness and mitigation measures for earthquakes, floods, tsunamis, landslides and volcanoes with special reference to construction of residential buildings and public utility buildings. Disaster mitigation planning of human settlements and townships for earthquakes, floods, tsunamis, landslides and volcanoes.

Module III

Issues in the prediction of natural disasters, land use practices and disaster mitigation. Integration of rural development programmes with natural disaster mitigation and planning. Information systems and decision making tools in disaster management. Disaster management in India.

References

- 1.Abbott, P.L(2001) Natural Disasters. 3rd Ed., McGraw Hill Company
- 2 Bryant,E.A(1991) Natural hazards. Cambridge University Press.
- 3.Murty, C.V.R. IITK-BMTPC Earthquake Tips, National Information centre of Earthquake Engineering, IIT-Kanpur ,P.56
- 4 Ramakant G aur(2008) Disaster management. GNOSIS, New Delhi, P. 172.

Question paper:

Duration: 3 Hrs

The Question paper consists of Part A and Part B.

Part A carries 8 compulsory questions (short answer questions) covering the entire syllabus and is for 40 marks.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question out of two.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.606. 11 COMMUNICATIVE ENGLISH AND TECHNICAL WRITING

L	T	P/D	Cr
3	1	0	4

Module-I

Listening, Reading, Speaking and Writing skills.

Listening Skills: Listening for general content- Intensive listening-Listening for specific information.

Speaking Skills: Oral practice-Describing objects/situations/people-Role play-Just A Minute/Group Discussion-informal letters-essentials of telephonic conversation-invitations-minutes of a meeting.

Reading Skills: Skimming the text- exposure to a variety of technical articles, essays, graphic representation, and journalistic articles.

Writing Skills: Skills to express ideas in sentences, use of appropriate vocabulary -sentence construction-paragraphs development-note making-editing a passage and essay writing.

Basics of Technical Communication.

Technical communication- features, Distinction between general and technical communication- language as a tool of communication- levels of communication-interpersonal, organizational, mass communication-the flow of communication: upward, downward and lateral-importance of technical communication- barriers to communication.

Module-II

Forms of Technical communication.

Business letters-sales and credit letters, letter of enquiry, letter of quotation, placing order. Job application and resume. Official letters-govt. letters, letter to authorities. Reports-types, significance, structure and style, writing reports, condensing .Technical proposals-writing a proposal –the steps involved. Technical papers- projects-dissertation- thesis writing. Preparing audio-visual aids.

Module III

A non-detailed study of the autobiography: “Wings of Fire-an autobiography by APJ Abdul Kalam”. Students should read the book on their own and selected topics may be discussed in the class.

References.

1. Basic Communication Skills for Technology-Andrea J Rutherford. Pearson Education.
2. Business Correspondence and Report Writing- Mohan K and Sharma R C, TMH New Delhi.
3. Effective Technical Communication-Barun K Mitra. Oxford University Press, New Delhi.
4. Everyday Dialogues in English-Robert J Dixon, PHI.
5. English For Technical Communication, Vol. I &II. K R Lakshmi Narayanan-Sci Tech Publications.
6. Wings of Fire-an autobiography APJ Abdul Kalam.- Universities Press (2004)

University Examination:

Six short questions to be answered out of 8 questions from Module I. Each answer carries 5 marks. (30 marks). Questions to be limited to the topics **Writing Skills& Basics of Technical Communication**. 2 questions out of 4 has to be answered from Module II. Each answer carries 15 marks. (30 marks).Two essays out of Four has to be answered from module III.. Each answer carries 20 marks. (40 marks).

08.607

TRANSPORTATION ENGINEERING LAB

L	T	P/D	Cr
0	0	2	2

1. Tests on Aggregates

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

2. Tests on Bitumen

- (vii) Viscosity Test with BrookField viscometer
- (viii) Ductility Test
- (ix) Softening Point Test
- (x) Specific Gravity
- (xi) Flash Point Test

3. Tests on Soil

- (xii) Modified Proctor Compaction Test
- (xii) CBR Test

Reference:

Khanna S. K. & Justo C. E. G ,Highway Engineering, Nem Chand & Bros., Roorkee.

Examination: - Duration: - 3 hrs. Max.Marks – 100

08.608

**COMPUTER AIDED DESIGN AND
DRAFTING LAB**

L	T	P/D	Cr
0	0	2	2

1. Preparation of Civil Engineering Drawings – plan, section and elevation of buildings.
2. Application of spreadsheets in Civil Engineering:
 - (i) BM and SF diagrams of cantilever, simply supported and overhanging beams.
 - (ii) Analysis of continuous beams by moment distribution method.
 - (iii) Design of singly/doubly reinforced sections by limit state method.
3. Use of structural analysis software for analysis of simple two dimensional structures like continuous beam, portal frame and plane truss. (Not to be included for examination)
4. Application of GIS in Civil Engineering – preparation of database and GIS analysis. (Not to be included for examination)

Any standard software packages can be used for drafting, spreadsheet, structural analysis and GIS.

References:

The manuals of the software packages used.

Examination: - Duration: - 3 hrs. Max.Marks-100

Question for examination:

Question on Civil Engineering Drawing is compulsory.

One full question on CAD drawing or a CAD drawing (simple figures) and a Spread sheet analysis may be asked.

In Evaluation 50% credit may be given to the output.

Note:- The printouts of the drawings and spreadsheets should be attached in the lab record maintained by the students.

Syllabus for VII Semester

08.701

ADVANCED STRUCTURAL ANALYSIS

L	T	P/D	Cr
3	2	0	5

Module I

Introduction to matrix analysis of structures – Concept of flexibility and stiffness influence coefficients – Concept of development of flexibility matrix by physical approach – Equivalent joint loads – Concept of element approach – Development of equilibrium matrix – Element flexibility matrices for truss, beam and plane frame elements - Development of structure flexibility matrix by element approach – Evaluation of displacements in statically determinate beams, rigid jointed and pin-jointed plane frames by flexibility matrix approach – Analysis of statically indeterminate beams, rigid jointed and pin-jointed plane frames by flexibility matrix approach.

Module II

Concept of development of stiffness matrix by physical approach – Concept of element approach – Development of compatibility matrix – Element stiffness matrices for truss, beam and plane frame elements - Development of structure stiffness matrix by element approach– Analysis of statically indeterminate beams, rigid jointed and pin-jointed plane frames by stiffness matrix approach – Concept of direct stiffness method – Transformation of element stiffness matrices from local to global co-ordinates – Application of direct stiffness method to two span continuous beams- Advantages of direct stiffness method – Comparison of flexibility matrix and stiffness matrix methods.

Module III

Introduction to finite element analysis – Concept of discretization of continuum-Finite element analysis procedure – Relevant basics of elasticity – Stress-strain relation(Constitutive relation)- Strain-displacement relation – Concept of strain-displacement matrix – Types of 1-D, 2-D and 3-D finite elements – Plane stress and plane strain problems – Displacement function – Convergence and compatibility requirements - Development of shape functions for truss element (2-noded and 3-noded), beam element and CST element – Derivation of expressions for element stiffness matrix and nodal load vector (Derivation of equilibrium equation) – Development of stiffness matrix for truss element alone.

References

1. William Weaver Jr. and James M. Gere, Matrix analysis of framed structures, CBS Publishers, New Delhi.
2. Pandit G. S. and Gupta S. P., Structural analysis – A Matrix Approach , Tata McGraw Hill, New Delhi.
3. Rajasekharan S. and Sankarasubramanian G., Computational Structural Mechanics, Prentice Hall of India, New Delhi.
4. Hibbeler R. C., Structural Analysis, Pearson Education, New Delhi.
5. Ghali A., Neville A. M. And Brown T. G., Structural Analysis – A unified classical and matrix approach, Spon Press, London and Newyork.
6. Cook R.D. et al., Concepts and applications of Finite Element Analysis, John Wiley & Sons.
7. Krishnamoorthy C. S., Finite Element Analysis – Theory and programming, Tata McGraw Hill, New Delhi.
8. Rajasekharan S., Finite Element Analysis in Engineering Design, Wheeler Publishers.
9. Chandrapatla T. R. and Belegundu A. D., Introduction to Finite Elements in Engineering, Prentice Hall of India, New Delhi.

Question Paper: Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

08.702 DESIGN OF HYDRAULIC STRUCTURES

L	T	P/D	Cr
3	0	2	5

Module I

Dams-Gravity dams, arch dams, buttress dam, forces acting on dam-theoretical and practical profiles of gravity dam-low dam, high dam-stability of dam-stress in elementary profile of gravity dam. Function of shafts, galleries, keys and water seal.

Arch dams-types, forces acting-design methods (Thin cylinder theory only)-Earth dam-Types-criteria for safe design-causes of failure. Spillways-Different types (Design not necessary).

Module II

Diversion head works, layout, functions of components-cause of failure of weirs on permeable soils- Bligh's theory-design of vertical weir-Khosla's theory of independent variables-use of Khosla's charts and Blench curves.

Cross drainage works-different types-Canal falls-classification (brief description only).

Module III

Design and drawing emphasizing the hydraulic aspects of the following structures:

1. Aqueduct 2. Syphon aqueduct 3. Canal Syphon 4. Notch type canal fall 5. Sarda type fall 6. Canal regulators (Khosla's theory)

References:

1. L.W.Mays, "Water Resources Engineering", McGraw Hill Co.
2. B.C.Punmia & B B Pande, "Irrigation and Power Engineering" Laxmi publications (P) Ltd.
3. S.K. Garg, "Irrigation Engineering", Khanna publishers, Delhi.
4. P.N.Modi and S.M.Seth, "Irrigation Engineering", S.B.H Publishers and Distributors, New Delhi.
5. Priyani, "Irrigation Engineering". Charotar Books, Anand, India, 1967
6. Varshney, "Theory & Design of Irrigation Structures Vol III" Nem Chand & Bros., Roorkee, 1982
7. Sathyanarayana Murty Challa 'Water Resources Engineering-Principles and Practice' New age international publishers.

Question paper: Duration: 4 hrs

The question paper consists of Part A, Part B and Part C

Part A (Compulsory) is for 20 marks (4x5) covering the entire syllabus

Part B is for 20 marks covering modules I and II. There will be 2 questions from each module. The candidate has to answer one question of 10 marks from each module

Part C is for 60 marks covering module III. Candidate has to answer one out of two questions from this part.

The question consists of design and drawing parts.

In the drawing part maximum of two views only be asked.

Khosla's charts and Blench curves are permitted.

Note: No other charts, tables, codes are permitted in the Examination hall. If necessary the same shall be given along with the question paper by the question paper setter.

08.703 GEOTECHNICAL ENGINEERING-II

L	T	P/D	Cr
3	1	0	4

Module I

Stresses in soil due to loaded areas - Boussinesq's and Westergaard's formulae for point loads – assumptions [no derivation required] – Comments - Vertical stress beneath loaded areas of strip, rectangular and circular shapes - Newmark's charts - Isobars - Pressure bulbs

Earth pressure – At-rest, active and passive earth pressures – Practical examples - Rankine's and Coulomb's methods - Comparison[no derivation required] - Influence of surcharge, inclined backfill and water table on earth pressure - Earth pressure on layered soils

ModuleII

Bearing capacity of shallow foundations – Ultimate, safe and allowable bearing capacity. - Terzaghi's formula[no derivation required] for isolated strip, circular and square footings - Bearing capacity factors - Local and general shear failure - Factors affecting bearing capacity – Influence of water table

Settlement - Total and differential settlement - Causes - Methods of reducing differential settlement - Soil improvement through installation of vertical drains and preloading - Use of compaction piles

Brief introduction to site investigation – Guidelines for choosing spacing and depth of borings [brief discussion only] - Auger boring and wash boring methods - Standard Penetration Test- - Soil investigation report

ModuleIII

Combined footings- Rectangular and Trapezoidal combined footings – Raft foundations - Allowable Bearing capacity of Rafts on sands and clays - Floating foundation.

Pile foundations - Point bearing and friction piles - Bearing capacity of single pile in clay and sand[I.S. Static formulae] - Dynamic formulae(ENR and Modified Hiley only) - I.S. Pile load test [conventional]- Negative skin friction. on a single pile - Capacity of Pile groups - Group action

Brief introduction to well foundations - Elements of a well foundation – Problems encountered in well sinking – Methods to rectify tilts and shifts - Brief introduction to Machine foundation –Mass spring model for undamped free vibrations - Natural frequency of foundation-soil system – Coefficient of uniform elastic compression – Methods of vibration isolation

References:

1. Gopal Ranjan & A.S.R Rao ,Basic and Applied Soil Mechanics , New Age International (P) Limited, New Delhi, 2002
2. K.R. Arora ,Geotechnical Engineering , Standard Publishers Distributors, New Delhi, 2006
3. Venkatramaiah,GeotechnicalEngineering, Universities Press (India) Limited,Hyderabad, 2000
4. Peck ,Hansen and Thornborn ,Foundation Engineering ,John Wiley & Sons, New York, 1947
5. W.E.Teng, Foundation Design, Prentice Hall , New Jersey, 1962
6. P.Purushothamaraj, Soil Mechanics and Foundation Engineering,Pearson Education, Delhi, 2008

Question Paper: Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

08.704

ENVIRONMENTAL ENGINEERING- I

L	T	P/D	Cr
3	1	0	4

Module I

Introduction of environment- sources of water supply-quantification of water demand through population forecasting –Factors affecting consumption-Fluctuations in demand-Types of intakes-Conveyors, pumps and location of pumping station-Quality of water-Drinking water standards-Physical, chemical and biological analysis.

Module II

Treatment of water-Theory and principles of Sedimentation tanks-Stoke’s law-Types of settling (Type I & Type II only)-Coagulation-Mixing-Flocculation, Clariflocculator-Filtration-Types of filters-Rapid sand, Slow sand, and Pressure filters-Design of Sedimentation tanks (circular and rectangular)-Clariflocculators-Rapid sand filter-Slow sand filter

Module III

Disinfection of water-Methods of Disinfection, Chlorination-Types of Chlorination, Factors affecting Chlorination-Chlorine demands-Miscellaneous treatment-Ion exchange, Lime-soda process, Electro dialysis-Colour, Taste and Odour removal-Adsorption-Aeration-Fluoridation-Defluoridation-Lay out of water distribution network-Methods of distribution-Hardy cross method-Equivalent pipe method-Pipe appurtenances.

References:

1. S.K.Garg, “Water Supply Engineering”, Khanna Publishers.
2. Dr. B.C Punmia, “Water Supply Engineering”, Laxmi Publications Pvt. Ltd.
3. Dr. P.N. Modi, “Water Supply Engineering”, Standard Book House, NewDelhi.
4. Metcalf & Eddy , “Waste Water Engineering”, Tata Mc Grawhill Publishing Co Ltd

Question Paper: Duration: 3hrs

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be 2 questions form each module. The candidate has to answer one question from each module.

03.705.1 Elective III**THEORY OF ELASTICITY**

L	T	P/D	Cr
3	1	0	4

Module I

Analysis of stress and strain in three dimensions –stress at a point, transformation, principal stress, surface force and body forces, equations of equilibrium. Homogeneous deformation, strain at a point, principal axes of strain, compatibility equations. Invariants of stress and strain. Equation of theory of elasticity, Generalised Hook’s law-reduction in number of elastic constants for orthotropic, transversely isotropic and isotropic media. Stress strain relations.

Module II

Equations of equilibrium in terms of displacements conditions of compatibility in terms of stresses. Method of solution of the elasticity problems. Stress displacement and mixed methods. The principle of superposition. St. Venant’s principle.

Two-dimensional problems in rectangular coordinates Generalized plane stress and plane strain, Basic equations, stress functions, solutions by polynomials, Bending of a cantilever loaded at free end and bending of a beam by uniform load. Solution in the form of Fourier series for a simply supported beam subjected to continuous loads.

Module III

Two-dimensional problems in polar co ordinates, Basic equations in polar co ordinates, Axi-symmetric stress distribution curved beams, thick cylinders, rotating disc. General solution bending of a curved bar by a force at the end, effect of circular holes on stress distribution in plates. Concentrated force at a point of a straight boundary, circular disc subjected to diametrical compression.

Torsion of prismatic members, circular cross section, non-circular rectangular and elliptic section, membrane analogy.

References:

- 1 S. P. Timoshenko and J.N. Goodier, “Theory of elasticity”-, McGraw-Hill
- 2 I.N. Sokolnikoff, “ Mathematical theory of elasticity”, McGraw-Hill Inc.,US
- 3 Ernest E Sechler, “Elasticity in Engineering” - Wiley: Chapman & Hall, New York

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.705.2. Elective-III**EARTH DAM ENGINEERING**

L	T	P/D	Cr
3	1	0	4

Module I

Earth dam – types – selection – requirements of foundation – materials of construction - seepage through dams – determination of phreatic line – Casagrande’s solution – Kozheny’s parabola - entrance and exit corrections – flow nets for homogeneous earth dams .

Module II

Stability analysis – method of slices - pore pressure during construction, steady seepage and sudden drawdown – approximate analysis for the above conditions using Taylor’s stability charts
Embankment construction – compaction control – placement water content

Module III

Failure of earth dams – types of failure and damages – embankment compressibility and swelling – settlement of foundations – movement of crest –Adverse effects of seepage – liquefaction and its prevention - instrumentation in earth dams -

Control of seepage – cut off trenches – grout curtains – sheet pile walls – upstream blankets – relief wells

References:

1. Sherard, Woodward, Gizienzki and Clevenger --- Earth and Earth-Rock dams, John Wiley & Sons, New York, 1963
2. Bharat Singh & Punmia --- Earth and Rockfill dams - Standard Publishers Distributors, New Delhi, 1988

Question Paper: Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

08.705.3 Elective-III**DEEP FOUNDATIONS**

L	T	P/D	Cr
3	1	0	4

Module I

Classification of piles based on mechanism of load transfer, method of installation, material used – Concrete piles - Ultimate skin friction and end bearing capacity of single pile in clay and sand by the I.S.code method – Critical depth concept - Ultimate skin friction and end bearing capacity of single pile installed in granular soils based on SPT and CPT values – Basis of dynamic formulae - The rational pile formula –Modified Hiley formula – General comments on the reliability of dynamic formulae - Pile driving stresses - Conventional and cyclic pile load tests –Piles for resisting uplift - Tension piles of uniform diameter in clays and sands - Tension piles with enlarged base in clays.

Module II

Single pile versus pile groups – Pile group configurations - Group action – Efficiency of pile groups - Group capacity – Minimum spacing of piles in a group – Negative skin friction of pile groups – Settlement of pile groups in clays – Equivalent raft approach - Settlement of pile groups in sands - Skempton's and Meyerhof's methods - Brief discussion on drilled piers.

Module III

Well foundations – Components of a well foundation– Procedure for construction and sinking of wells – Thickness of well steining for sinking under self weight - Grip length - Problems encountered in well sinking – Tilts and Shifts – Causes – Permissible tilts and shifts - Methods to rectify tilts and shifts – Forces acting on a well foundation –Allowable bearing pressure – Lateral stability of well foundations - Terzaghi's analysis.

References:

1. Gopal Ranjan & A.S.R Rao, Basic and Applied Soil Mechanics, New Age International (P) Limited, New Delhi, 2002
2. K.R. Arora, Geotechnical Engineering, Standard Publishers Distributors, New Delhi, 2006
3. Venkatramaiah, Geotechnical Engineering, Universities Press (India) Limited, Hyderabad, 2000

Question Paper: Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

08.705.4 Elective-III**STRUCTURAL ANALYSIS FOR
DYNAMIC LOADS**

L	T	P/D	Cr
3	1	0	4

Review: Dynamic Systems - parameters, Single degree of freedom (SDOF) systems, Equation of motion, Natural frequency, Free and forced vibration.

Module I

SDOF system subjected to harmonic loading - steady state amplitude, Dynamic magnification factor, Resonance.

Impulse response function, Response of SDOF system subjected to general dynamic loading – Duhamel integral, Response of SDOF system to rectangular and triangular loads.

SDOF system subjected to support motion, Vibration isolation, Transmissibility.

Module II

Multi-degree of freedom (MDOF) systems, Lumped mass systems, Shear building frames, Equation of motion of MDOF systems, Natural frequencies and mode shapes, Orthogonality of mode shapes, Free and forced vibration analysis - Mode superposition method.

Module II

Systems with distributed parameters – equation of motion for beam flexure (elementary case), Natural frequencies and mode shapes of simply supported beams.

Earthquake analysis – response spectrum, Response spectrum analysis of MDOF system subjected to support motion.

Calculation of design lateral forces due to earthquake – IS code method (IS:1893-2002).

References:

1. M. Mukhopadhyay, Structural Dynamics - Vibrations & Systems, Ane Books India, New Delhi.
2. R.W. Clough and J. Penzien, Dynamics of Structures, McGraw-Hill Inc., New York.
3. Mario Paz, Structural Dynamics - Theory and Computation, CBC Publishers and Distributors, New Delhi.
4. A.K. Chopra, Dynamics of Structures- Theory and Applications to Earthquake Engineering, Prentice Hall of India Pvt. Ltd., New Delhi
5. J.W. Smith, Vibration of Structures, Chapman and Hall, London.
6. IS:1893-2002, Criteria for earthquake Resistant Design of structures.

Question Paper: Duration: 3 hours

The Question paper contains Part A and Part B.

Part A carries 8 compulsory questions (short answer questions) covering the entire syllabus and is for 40 marks.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question out of two.

Note: IS:1893-2002 is permitted in the examination hall. No others charts, tables and codes are permitted. If necessary relevant data shall be given along with the question paper by the question paper setter.

08.705.5 Elective-III WIND LOADING ON STRUCTURES

L	T	P/D	Cr
3	1	0	4

Module I

Wind and its characteristics-nature of winds-types of winds-Extreme wind conditions-aerodynamics of civil Engineering structures.

Characteristics of wind-gradient wind speed-maximum Windspeed, mean wind speed, wind as a random process

Module II

Static wind effects-drag coefficient ,lift coefficient.

Dynamic wind effects-along wind load-across wind load,flutter,galloping,buffeting,other wind effects

Various national codes on wind engineering-comparison.

Module III

Examples on wind load calculations as per IS 875 (part 3)-wind load calculation on special structures such as cooling towers,rail/roadsbridges and tall chimneys

References

- 1 J.D.Holmes,"Wind loading of structures",Spon, Press,London , 2001
- 2 .IS 875 (Part3)
- 3 Other relevant IS codes

Question Paper: Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

Use of IS 875 (Part 3) is permitted in the examination hall.

08.705.6 Elective-III AIR QUALITY MANAGEMENT

L	T	P/D	Cr
3	1	0	4

Module I

Introduction- Components of Environment- Definition –Air Pollution- Scales of air pollutant measurement - Sources of Air pollution – Definition- Air Pollutant- Types of Air Pollutant- Industrial Processes causing Air Pollution - Effect of air pollutants on health, vegetation, animals and materials - Indoor Air Pollution (Definition)

Module II

Meteorological aspects of Air Pollutant Dispersion - Temperature and Pressure relationships-Atmospheric Stability- Temperature Lapse Rate- Inversions- Effect of Wind velocity and turbulence-Plume behaviour Dispersion of Air pollutants-Plume dispersion theory- Gaussian plume model (Derivation not required)- Assumptions-Advantages and Disadvantages- Pasquill's stability curves - -Application of specific dispersion problems involving point source and line source - Estimation of plume rise.

Module III

Air Quality monitoring - Ambient air sampling - Collection of gaseous air pollutants-Collection of particulate Pollutants- Ambient Air Quality standards- Control of Air Pollutants- Particulate emission control-Scrubbing- Cyclones- Filtration- Electrostatic Precipitation-Gaseous emission control- Adsorption- Absorption- Condensation -Air pollution disasters

References:

1. Stern.A, “Air Pollution” (Volume I ,II & III) ,Academic Press Newyork
2. Wark Kenneth and Warner C F, “Air Pollution it’s Orgin and Control – Harper and Row Publishers, Newyork
3. C.S.Rao, “Environmental Pollution Control Engineering” Wiley Eastern Ltd, Delhi
4. Perkins H.C, “Air Pollution” Mc GrawHill
5. Peavy H S, Rowe, D.R. Tchobanaglou “Environmental Engineering” Mc GrawHill

Question paper : Duration : 3 Hrs

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be 2 questions form each module. The candidate has to answer one question from each module

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

08.705.7 Elective-III PERSONNEL MANAGEMENT

L	T	P/D	Cr
3	1	0	4

Module 1

Definition of management – managerial functions – inter relationship between managerial functions - managerial skills – roles of managers.

Personnel management in organizations – definition – functions - role and functions of personnel manager

Staffing process – recruitment and selection – induction and placement – training and development.

Module II

Work and productivity analysis – factors influencing productivity – benefits from increased productivity – data gathering for on-site productivity-improvement studies – questionnaires, interviews, activity sampling, recording of work-face practices like still photographs, time studies, video techniques – presenting and implementing productivity-improvement findings – crew balance charts, flow diagram, process charts. Performance rating – allowances.

Module III

Behavioural science aspects – Motivation of individuals – definition – theories of motivation - Maslow's theory – Herzberg's model – McClelland's three need model – Vroom's expectancy theory – Mc Gregor's theory.

Leadership – definition – leaders vs. managers – styles of leadership - Theories of leadership – Personality theories – behavioural theories – situational theories.

Communication – importance and process – directions of communication – media and types of communication - factors affecting communication – barriers to communication – improving interpersonal and organizational communication.

References:

1. Personnel , Human Resource Management , Robert L Mathis,John H Jackson,Tata Mc -GrawHill Publishing Company Limited,New Delhi.
2. Productivity Improvement in Construction, Clarkson Oglesby, Henry Parker, Gregory Howell
3. Organizational Behaviour,Stephen P Robbins , Prentice Hall of India Pvt Ltd,NewDelhi.
4. Human Resources Management,saiyadain, Tata Mc -GrawHill Publishing Company Limited,New Delhi.
5. Management of Organizational Behaviour,Paul Hersey,Kenneth H,Blanchand, Prentice Hall of India Pvt Ltd,NewDelhi.

Question paper : Duration : 3 Hrs

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be 2 questions form each module. The candidate has to answer one question from each module

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

08.705.8 Elective III**DESIGN OF OFFSHORE
STRUCTURES**

L	T	P/D	Cr
3	1	0	4

Module I

Introduction to Ocean oil gas and other resources – near shore structures - Different types of ocean structures and systems - Gravity, fixed, floating semi submersibles, compliant structure-Tension legged platform and guyed tower. Design of fixed offshore Jacket Platform-Steps in design. Environmental load calculation (wind, wave, current and tidal) and design parameters. Problems on checking the sufficiency of tubular members under different loading conditions in conformity with the API-Code. Tubular Joints-different types. Analysis of Joints, Stress concentration factor, fatigue failure-SN curves

Module II

Basic principles of design of concrete offshore platforms - Jack up platforms, Wave forces on large structures-Froude-Krylov Forces-General theory. Design of compliant structures forces & bending moments in floating platforms Design principles of - Tension leg platform Sizing and mechanics –weight estimate of TLP.

Module III

Mechanics of mooring lines-steady state forces in mooring line due to current. Equation of static equilibrium. Integration of equilibrium equations –heavy and short cables-neutrally buoyant cables, Profile of cable line under all forces considered- Critical angle.

Sub sea pipeline-pipeline safety .Design Process –internal pressure-external pressure. On bottom stability-objective- static analysis. Laying Pipe line - different methods

References:

1. Thomas H. Dawson. , “Offshore structural Engineering”
2. Subrata K *Chakrabarti*, “Wave Hydrodynamics”.
3. Subrata K *Chakrabarti*, “Hand book of Offshore Engineering (Vol. I & II)”. Elsevier Science, 2005. , Prentice Hall Inc. Englewood Cliffs, N.J. 1983
4. Hsu Teng H., “Applied offshore Structural Engineering”, Gulf Publishing Company Book Division, Houston, Texas, 1984.
5. Henri O. Berteaux. , “Buoy Engineering”. Umi Research Pr., 1976.
6. George A Antaki, “Piping and pipeline Engineering”, CRC Press / Marcel Dekker Inc., 2003.

Question paper:Duration: 3 Hrs.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5marks each covering the entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

08.705.9 Elective-III URBAN WATER MANAGEMENT AND ENVIRONMENTAL HYDRAULICS

L	T	P/D	Cr
3	1	0	4

Module-I

Urban hydrology –urban flooding-causes of flooding-remedial measures-Design of urban storm water collection system-Gutters, inlets and sewers-rational formula-limitations-Storm water pollution and control (basic concepts)-Best management practices for urban drainage-constructed treatment wetlands(No design).

Module –II

Role of fluid mechanics in environmental planning-turbulent flow-momentum equations-dispersion-diffusion-advection-Fick’s law-Classical solutions of pollutant transport-determination of down stream concentration-estimation of width of plume and length required for complete mixing-simple problems-Theory of jets and plumes-Richardson number-Types of jets-density stratification in lakes and reservoirs-Densimetric Froude number.

Module-III

Contaminant propagation through soil-different mechanisms-hydraulic aspects of pollutant transport (basic ideas only)-introductory knowledge about groundwater contamination-sources and remedies. Brief discussion on environmental impacts of different types of water resources projects such as irrigation, flood control, dams. Environmental impact assessment-Onsite and offsite impacts-Matrix, networks and other techniques-index methods for environmental impacts on groundwater –simple quantitative approaches for watershed impacts-soil loss equation.

References:

1. Akan A O, ‘Urban storm water hydrology:A Guide to Engineering calculations’, Lancaster Technomic,1993.
2. Canter L W Environmental Impact assessment, McGraw Hill, New York, 1977.
3. Hari D Sharma and Krishnan R Reddy-Geo environmental Engineering, John wiley and Sons, 2004.
4. Hitel Rubin and Joseph Atkinson, Environmental Fluid Mechanics,CRC Press, London
5. Jain R K,L V Urban and G S Stacey, Environmental Impact analysis-A new dimension in decision making, Van Nostrand Reinhold, New York.
6. Johnathan Parkinson and Mark Ole, Urban Storm water management5 in developing Countries, IWA, London, 2005.
7. Larry Mays, Storm water collection systems design Handbook, McGraw Hill, New York.
8. Streeter V L,Wylie E B and Bedford K W,Fluid Mechanics,WCB/McGraw Hill,1998.
9. Liggett j A, Fluid Mechanics,McGraw Hill international, Singapore,1994.

Question Paper: Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

08.705.10 Elective-III**PRESTRESSED CONCRETE**

L	T	P/D	Cr
3	1	0	4

Module 1

Introduction to basic concepts and principles of prestressing systems – Introduction to the IS code- losses in prestress- Limit state of collapse and serviceability, comparison of IS codes with other codes.

Analysis and design of prestressed concrete sections in flexure – pretensioned and post tensioned beams- cable profile – shear – bond – deflection – analysis and design of end block .

Analysis and design of prestressed concrete slabs, economic span, load balancing, serviceability requirement, deflection and cracking

ModuleII

Analysis and design of statically indeterminate structures – Simple cases of cantilever beams and slabs-

Concordancy and linear transformation – continuous beams and portal frames

Composite construction - Elementary idea – analysis of sections – effect of shrinkage strain in composite sections.

ModuleIII

Uniformly prestressed members - design of poles, pipes and water tanks .Design of prestressed concrete bridges.Design criteria and manufacturing methods of railway sleepers – Introduction to partial prestressing.

References:

1. IS 1343: 1980 Code of practice for Prestrssed Concrete
2. IS 456 : 2000 Code of practice for Plain and Reinforced Concrete
3. Prestressed Concrete Structures-Collins, P. C., and D. Mitchell, Prentice-Hall, 1991.
- 4.Design of Prestressed Concrete Structures, Lin, T. Y., and N. H. Burns, Wiley, 1981.
5. Prestressed Concrete by N. Krishna Raju- Tata Mc Graw Hill Publication Co.
6. Reinforced concrete structures Vol II-B. C. Purnia, Ashok K. Jain, Arun K. Jain, Laxmi Publications, New Delhi.
7. Fundamentals of Reinforced Concrete- C. Sinha, S. K. Roy, S. Chand and Co. Ltd., New Delhi
8. Advanced reinforced Concrete Design- P.C. Varghese, Prentice Hall of India Pvt. Ltd., New Delhi

Question paper:Duration : 3hrs

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module. Use of IS 1343: 1980 and IS 456:2000 is permitted.

Note: No charts, tables or other codes are permitted in the examination hall. If necessary, relevant data shall be given along with the question paper by the question paper setter.

08.705.11 Elective-III**HIGHWAY AND AIRFIELD
PAVEMENT MATERIALS**

L	T	P/D	Cr
3	1	0	4

Module - I

Properties of component layers; different types and role played by them in flexible/rigid pavement.
Mechanical response of soil and the different constitutive models, different laboratory procedures for evaluating the mechanical properties of soils.
Road making aggregates - classification, properties of aggregates, design of aggregate gradation.

Module - II

Bituminous road binders - penetration grading, viscosity grading, emulsions, cut backs and modified binders.
Rheology of bituminous binders, modified binders, aging of bitumen.

Bituminous mixtures, Mix design- Marshall method and Superpave procedure, Design of emulsified mixes, requirements, properties, tests for characterization, Influence of aggregate, binder type on bituminous mixtures, mechanical properties.

Issues in constitutive modelling of binders, Introduction to linearized viscoelastic behaviour, behaviour during fatigue, creep loading conditions, resilient modulus of pavement materials.

Module -III

Portland cement and cement concrete for use in road works, Requirements of paving concrete.
Design of mixes for recycling of bituminous and concrete pavement surfaces. Soil stabilization techniques.

References:

1. A. G. Correia, Flexible Pavements, A. A. Balkema Publishers, 1996.
2. P. H. Wright, Highway Engineering, John Wiley & Sons, 1996.
3. S. K. Khanna and C. E. G. Justo, Highway Material Testing, New Chand & Bros., 1999.
4. Huang, Y.H. (2004). "Pavement Analysis and Design." Pearson Prentice Hall, USA.
5. G. N. Durhan, W. A. Marr, and W. L. DeGroff, Resilient Modulus Testing for Pavement Components, ASTM International, U.S.A., 2003.
6. S. E. Zoorob, A. C. Collop, and S. F. Brown, Performance of Bituminous and Hydraulic Materials in Pavements, A. A. Balkema Publishers, 2002.
7. R. N. Hunter, Bituminous Mixtures in Road Construction, Thomas Telford Services Ltd., 1995.
8. ASTM, Annual Book of ASTM Standards – Section IV, Vol. 04.03, ASTM International, 2002.
9. D. Croney, and P. Croney, Design and Performance of Road Pavements, McGraw-Hill, 1998.

Question paper:Duration : 3hrs

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module. Use of IS 1343: 1980 and IS 456:2000 is permitted.

Note: No charts, tables or other codes are permitted in the examination hall. If necessary, relevant data shall be given along with the question paper by the question paper setter.

08.705.12.Elective-III

**ARTIFICIAL INTELLIGENCE
METHODS**

L	T	P/D	Cr
3	1	0	4

Module I

Introduction to Artificial Intelligence – Definition – Typical AI Problems – Knowledge representation and search – philosophical issues – Requirements of knowledge representation languages – semantic Networks – Frames – Predicate Logic – Rule Based Systems – Forward and Backward chaining – Comparison of different – representation methods.

Module II

Expert system & Search – Heuristic – Knowledge Engineering – Expert System – Designing an Expert System – Backward chaining – Rule based Expert systems – Expert systems for Civil Engineering problems. Explanation facilities – Bayers’s theorem – case study of MYCIN .

Search techniques, Breadth first search, depth first search, Heuristic search – Hill climbing, Best – first – search, A* algorithm, Problem solving as search, Planning, Game planning – Minimax and alpha – beta proving . Different – problems in NLP, Speech Recognition, Syntactic Analysis – Grammars and Parsing, Semantics, Pragmatics, Amingnity in NL, NL Generation.

Module III

Computer Vision – Different levels of vision processing – Low level processing edge deletion line filling – depth & Orientation information – Object recognition – Practical vision system.

Advanced Topics – Machine Learning – Introduction – Genetic Algorithm – Neural Networks – Back propagation – Multi layer network – Applications to Civil Engineering Problems.

References:

- 1 Alison Cawsey, The Essence of Artificial Intelligence, Prentice Hall Europe , 1998
- 2 Introduction to Artificial Intelligence, International Student Edition, Charniak & McDermott, Addison Wesley, 1998.
- 3 Introduction to Artificial Intelligence and Expert Systems, Dan W Patterson, Prentice Hall of India, New Delhi 1992.
- 4 Artificial Intelligence, Winston
- 5 Principles of Artificial Intelligence, Nilsson, Narosa, 1998
- 6 Artificial Intelligence, Elianc Rich, MCH
- 7 Artificial Intelligence an Engineering Approach, Robert J. Schalkoff, MCH

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.706 ENVIRONMENTAL ENGINEERING LAB

L	T	P/D	Cr
0	0	2	2

Analysis of water for any eight of the following:

1. Acidity
2. Alkalinity
3. Hardness
4. Solids
5. Dissolved Oxygen
7. Sulphates and Sulphides
8. Iron
9. Jar Test
10. Residual Chlorine
11. Nitrates
12. Chlorides

Examination: Duration: 3 Hrs. Max.marks: 100

08.707 GEOTECHNICAL ENGINEERING LABORATORY

L	T	P/D	Cr
0	0	2	2

List of Experiments

1. Specific Gravity Test
2. Field Density Test
3. Sieve Analysis
4. Hydrometer Analysis
5. Atterberg Limits Test
6. Permeability Test
7. Unconfined Compression Test
8. Direct Shear Test
9. Consolidation Test
10. Compaction Test

Examination:Duration -3 hours Max. Marks-100

08.708 (a) Seminar & Project

(b) Survey camp & Industrial Training

L	T	P/D	Cr
0	0	3	3

Survey Camp should be completed before the commencement of 7th semester. The minimum duration of the survey camp should be one week. The use of total station is compulsory for survey work. Total **100** marks for **08.708** can be distributed as **40+10+30+20** for seminar, preliminary work for the 8th semester project, survey camp and industrial training respectively.

Students have to visit at least one industry relevant to civil engineering as part of industrial training and spend a minimum of one week to understand the processes/activities. A report of the same should be submitted at the end of 7th semester and evaluation should be based on this report.

Syllabus for VIII Semester

08.801 DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

L	T	P/D	Cr
2	0	2	4

Module I

Design of retaining walls – Limit State method - cantilever and counterfort retaining walls with horizontal and inclined surcharge.

Water tanks – design of circular, square and rectangular water tanks at ground level and overhead, complete design excluding supporting structure – design of domes for circular water tanks.

Drawing and detailing of structures designed.

Module II

Road Bridges – IRC specifications – Class A, Class AA loading – Design of slab bridges, T-beam and slab bridges.

Flat slabs – analysis of flat slab – direct design method – principles of equivalent frame method – design of flat slabs for flexure and shear.

Drawing and detailing of structures designed.

References:

1. P.C.Varghese, 'LimitState Design of Reinforced Concrete', PrenticeHall of India Ltd.
2. N.Krishnaraju, 'Structural Design and Drawing - Reinforced Concrete and Steel', Universities Press Ltd.
3. Ashok K Jain, 'Reinforced Concrete Limit State Design', Nem Chand Brothers, Roorkee
4. Unnikrishna Pillai & Devadas Menon, Reinforced Concrete Design, Tata McGraw- Hill
5. S.N.Sinha, Reinforced Concrete Design Tata McGraw- Hill
6. N.Krishnaraju, Prestressed Concrete Tata McGraw- Hill
7. H. Mehra and V. N Vazirani, Limit State Design, Khanna Publishers
8. N.Krishnaraju, Design of Bridges, Universities Press Ltd.
9. S.Ramamrutham, RCC Design
10. V.Johnson, Essentials of Bridge Engineering

Question Paper: Duration : 4 hours

The question paper consists of Part A and Part B.

Part A contains 2 compulsory questions of 10 marks each covering entire syllabus.

Part B Answer one out of two questions from each module. Each question carries 40 marks; 20 marks for design and 20 marks for drawing.

Use of IS 456:2000; 3370 (parts I- IV), IRC 6 & 21 and design charts are permitted in the examination hall.

08. 802

**DESIGN AND DRAWING OF
STEEL STRUCTURES**

L	T	P/D	Cr
2	0	2	4

Module I

Water tanks- Design of rectangular steel tanks- Pressed steel tanks- Cylindrical tanks with hemispherical bottom- Design of supporting towers and its foundation.

Roofs -Design of purlins and trusses for dead load, live load and wind loads- rolled steel angle and tubular sections.

Drawings of the structures designed above.

Module II

Steel chimneys-Types of chimneys, IS Specifications-Design of self supporting chimneys.

Steel bridges –Types of bridges, Railway MBG and MMG loading -Design of plate girder bridges - Truss girder bridges (only design concept) -bracings and bearings.

Drawings of the structures designed above.

References:

1. Raghupathy, Design of Steel Structures, TMH.
2. Ramachandra, Design of Steel Structures, Standard books
3. Arya A.S. and J. L. Ajmani, Design of Steel Structures, Nemchand & Bros
4. Ramamrutham S., Design of Steel and Timber Structures, Dhanapath Rai
5. Vazirani V.N. and M.M.Ratwani, Steel Structures and Timber Structures, Khanna Publishers
6. Krishna Raju N., Structural Design and Drawing, Universities Press
7. IS. Codes 800-2007, 875 (2&3)-1987,6533-1989,1161-1979, 804-1958, 806-1968

Question paper: Duration : 4 hrs

The question paper consists of Part A and Part B.

Part A contains 2 compulsory questions of 10 marks each covering entire syllabus.

Part B Answer one out of two questions from each module Each question carries 40 marks; 20 marks for design and 20 marks for drawing.

Use of IS. Codes 800-2007, 875-1987, 6533-1989,1161-1979, 804-1958, 806-1968 and Structural Steel Tables are permitted.

Note: No other charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.803 ENVIRONMENTAL ENGINEERING - II

L	T	P/D	Cr
3	1	0	4

Module I

Waste water- Sources, Quantity-Characteristics- systems of Sewerage, Sewer appurtenances-Man holes, Catch basin, flushing devices, Inverted siphon.

Waste water disposal systems-Self purification of streams, Dilution techniques-Oxygen sag curve-Streeter Phelp's Equation and its application-land treatment

Module II

Treatment of sewage-Preliminary-Theory and design of Screen and Grit chamber, Detritus chamber, Skimming tank. Primary treatment-Sedimentation tank, Secondary treatment-Contact bed, Intermittent sand filter, Trickling filter, Activated sludge process, Design of Trickling filter(High rate, standard), Activated sludge process- Septic tank- Imhoff tank

Module III

Sludge treatment and disposal-Methods of thickening, sludge digestion-High rate, two stage digestion- factors affecting digestion, Sludge drying beds-Disposal of sludge-Lagooning- Dumping, burial. Design of sludge digestion tank, sludge drying beds, oxidation pond. Types of sewers-Design of circular sewers-Principles of house drainage-System of plumbing

References:

1. S.K. Garg , "Sewage disposal and Air pollution Engineering", Khanna Publishers.
2. Metcalf and Eddy, "Waste Water Engineering", Tata Mc Grawhill publishing Co Ltd
3. B.C Punmia , "Waste Water Engineering", Laxmi Publications Pvt. Ltd,
4. Dr. PN Modi, "Sewage Treatment & Disposal and Waste water Engineering", Standard Book House, NewDelhi

Question Paper: Duration: 3hrs

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be 2 questions form each module. The candidate has to answer one question from each module.

08.804 QUANTITY SURVEYING & VALUATION

L	T	P/D	Cr
3	0	0	3

Module I

General Introduction:-

Specifications- purposes and basic principles-general specifications.

Analysis of rates- Introduction to the use of data book and schedule of rates- cost of materials at site- cost of materials at source- conveyance charges.

Detailed specification, preparation of data and analysis of rates for various items of work connected with building construction and culverts with reference to Indian Standard Specification.

Module II

Quantity Surveying- Basic principles-Types of Estimate- Detailed estimate including quantities, abstract and schedule of rates of various items of works- residential buildings- workshop buildings- office/ school building, sanitary and water supply works- soak pits, septic tanks, overhead tanks, culverts, Retaining walls, road construction.

Bar-bending schedule-preparation of bar-bending schedule for RCC works connected with building construction, culverts and minor irrigation works.

Module III

Valuation- Principles of valuation of old buildings and apartment structure- Methods of valuation: Depreciation-current rates of depreciation and net values. Fixation of rent- Gross and net rent- methods.

References:

- 1.B N Dutta ,Estimating and costing in Civil Engineering, USB publishers and distributors Ltd.New Delhi
- 2.M Chakrabarti, Estimating and costing in Civil Engineering, USB publishers and distributors Ltd.New Delhi
- 3.V N Vazirani & S P Chandola, Civil engineering Estimating and Costing, Khanna Publishers.
- 4.Rangwala S C, Elements of Estimating, Charotar Publishing House Pvt.Ltd.
- 5.Methods of measurement of Building & Civil Engineering works, IS 1200-1968
6. D.N.Banerjee, 'Parks valuation'-5th Edition(1998),Eastern Law House,Calcutta
7. George E Deathrage, Construction Schedule & Control, Mc Graw Hill

Question Paper:Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 20 marks. There will be 4 compulsory short answer questions covering entire syllabus.

Part B is for 80 marks. There will be two questions from each module. The candidate has to answer one question from each module. Questions from module I & module III are carrying 15 marks each and questions from module II carries 50 marks each.

Note: For analysis of rate and cost estimation, unit rate and labour requirement should be given along with the questions by the question paper setter.

No other charts, tables, codes are permitted in the Examination Hall. If necessary, relevant data shall be given along with the question paper by the question paper setter.

08.805 CONSTRUCTION MANAGEMENT

L	T	P/D	Cr
3	0	0	3

Module I

Management – definition – Evolution of management thought - Scientific management - principles of scientific management advocated by Taylor and Fayol – relevance in construction industry.

Construction management –need- objectives – functions –stages- construction team – resources in construction industry - Computer capabilities in management.

Construction project management – life cycle of a construction project-data collection-techno-economic feasibility study-cost benefit analysis-rate of return analysis.

Module II

Bidding – tenders - types of tenders - tendering procedure – award of tenders – qualification of contractors – contracts – contract documents – important clauses in construction contracts - types of contracts – execution of works – methods of recording progress of work - payment for works

Module III

Construction planning and scheduling – different types of schedules – methods of scheduling – bar charts – milestone charts – networks – Critical Path Method – Programme Evaluation and Review Technique – time-cost trade-off – basic concept of resource planning (problems not needed).

References:

1. B. Sengupta and H.Guha ,Construction Management and Planning, Tata McGraw Hill Publishing Company Pvt. Ltd., New Delh
2. B. L. Gupta, Amit Gupta ,Construction Management and Accounts, Standard Publishers Distributors, Delhi.
3. L.S.Srinath ,PERT and CPM- Principles and Applications, third edition , Affiliated East-West Press Pvt. Ltd., New Delhi.
4. Jerome D. Wiest and Ferdinand K. Levy, A Management Guide to PERT / CPM with GERT/ PDM /DCPM and other networks, second edition, Prentice Hall of India Pvt. Ltd., New Delhi.

Question Paper: Duration: 3 hours.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the examination hall. If necessary, relevant data shall be given along with the question paper by the question paper setter.

**08.806.1 Elective-IV DESIGN OF STEEL CONCRETE
COMPOSITE STRUCTURES**

L	T	P/D	Cr
2	0	2	4

Module I

Introduction to Steel-concrete composite construction-Theory of composite structures-Introduction to steel-concrete-steel sandwich construction. Behaviour of composite beams-columns

Module II

Design of composite beam-concrete composite columns-Design of composite trusses-types of connections. Design of connections in composite structures-shear connections-Design of connections in composite trusses.

Module III

Behaviour of girder Bridges-Design concepts-
Case studies on steel-concrete composite construction structures in buildings-siesmic behavior of composite structures.

References:

1. 'Teaching resource material for structural steel design,' volume 2/3 jointly prepared 1) IIT, MS, 2) Anna University, SERC, MS 4 Institute for steel development and growth, Calcutta
2. OWENS G, W & Knowels, P 'Steel designs Manual,' (fifth edition) Steel concrete Institute (UK) Oxford Blackwell scientific publications, 1992
3. Johnson R.P, 'Composite structures of steel and concrete.' Vol. I Blackwell scientific publications, (second edition) U.K 1994

Question Paper: Duration: 3 hours.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the examination hall. If necessary, relevant data shall be given along with the question paper by the question paper setter.

**08.806.2 Elective IV DESIGN OF PORT, HARBOUR &
COASTAL STRUCTURES**

L	T	P/D	Cr
3	0	0	3

Module I

Design of Harbour / Port Structures - Loads on Wharfs, Jetties, Dolphins Live Load for different classes of Cargo - Dead load Wind / wave loads, Loads due to Crane Lateral loads Mooring & Berthing forces - fenders - Bollards

Module II

Shore Protection Structures - Principles of design of sea walls, dikes, Groin fields, detached breakwaters. Artificial beach nourishment. Soft methods of coastal protection Littoral drift - effect of man made structures on the natural littoral drift. Methods for overcoming imbalance of littoral drift. - Sand bypassing groins Environmental Impact studies

Module III

Breakwaters - Type and selection Criteria. Assessment of design input conditions. Environmental force. stability criteria. Design of Rubble mound, Caisson type, Vertical wall type. Different types of Armor units.

References:

1. Shore Protection Manual, Vol. I &II, Costal Engineering Research Centre
2. Hand Book of Costal& Ocean Engineering, Ed. Herbich
3. Aionzo F Quinn ,''Design and Construction of Ports and Marine Structures ''.
4. Harbour and Coastal Engineering-NIOT Chennai

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter

**08.806.3 Elective-IV DESIGN AND CONSTRUCTION
OF PAVEMENTS**

L	T	P/D	Cr
3	0	0	3

Module I

Types of pavements-Flexible, rigid and composite pavements-Functions of various layers of pavements-prime coat, tack coat, seal coat-Design factors, wheel load, equivalent single wheel load, repetition of loads, Elastic moduli, climatic variation-Comparison of Highway and Airport pavements.

Design of Flexible pavements-Analytical method-Stresses in homogeneous mass-Boussinesq's theory-Burmister's layer theory-Group index method-IRC method of design

Design of overlays as per IRC

Performance based design-AASHTO method

Module II

Rigid Pavements-Westergaard's approach-Bradbury's stress coefficients-IRC method of design.

Temperature Stresses in Concrete pavements-Warping stress-Frictional Stress-Combination of stresses.

Joints in Concrete pavements-Necessity-requirements-Types-Expansion joints-Contraction Joints-Construction joints

Design of joints-dowel bars and tie bars

Design of Airport pavements-requirements of airport pavements,overview of design methodology,design of flexible and rigid airport pavements.

Module III

Road Construction- Wet mix macadam, bituminous macadam, premix carpet, bituminous concrete.

Highway drainage-principles of surface drainage-Design of cross section of drainage channel-sub surface drainage, base drainage, sub grade drainage

Pavement evaluation-Functional and structural evaluation-Distress-Serviceability concept-Pavement management System-Components of PMS (introduction only).

References

1. Khanna S.K & Justo C E G, Highway engineering, Nem Chand & Bros,Roorkee.
2. *Yang H. Huang*, Pavement Analysis and Design, Prentice Hall
3. Partha Chakraborty and Animesh Das, Principles of Transportation Engineering, Prentice Hall India.Private Ltd.
4. IRC codes for flexible pavements; IRC: 37-2001, IRC: 109-1997, IRC: 27-1967, IRC:29-1988, IRC: 94-1986, IRC: 19-1997, IRC:81-1997.
5. IRC codes for rigid pavements: IRC 58-2002, IRC 57-1974

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter

08.806.4 Elective-IV

**ADVANCED FOUNDATION
ENGINEERING**

L	T	P/D	Cr
3	0	0	3

Module 1

Meyerhof's method for estimation of bearing capacity of isolated footings (no derivation required) – Effect of water table and inclination of loading on bearing capacity

Footings subjected to moments – eccentric loading – Solution using the two approaches proposed by Meyerhof

Module II

Graphical methods for lateral earth pressure on retaining walls – Rebhann's method – Culmann's method– Advantages – Design of gravity retaining walls

Active and passive earth pressure[for both \emptyset soils and c- \emptyset soils] on retaining walls with earthquake forces – Extension of Coulomb's theory (no derivation required)

Module III

Sheet pile walls – Types and uses – Analysis of cantilevered sheet pile wall in clays and granular soils.

Laterally loaded piles – Ultimate lateral resistance of vertical piles by Brom's approach – Methods to improve lateral stability of piles

References:

1. B.M.Das , Principles of Geotechnical Engineering, Thomson, India Edition, 2007.
2. K.R. Arora , Geotechnical Engineering, Standard Publishers Distributors, New Delhi, 2006
3. 3.Gopal Ranjan & A.S.R Rao, Basic and Applied Soil Mechanics, New Age International (P) Limited, New Delhi, 2002
4. Joseph E. Bowles, Foundation Analysis and Design, Mc. Graw Hill Inc., New York, 1988
5. N.V.Nayak ,Foundation Design Manual, Dhanpat Rai & Sons, 1996

Question Paper:Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

Use of [i] Brom's charts and [ii] Meyerhof's bearing capacity factor Table are permitted.

08.806.5 Elective IV**FINITE ELEMENTMETHODS**

L	T	P/D	Cr
3	0	0	3

Module I

Review of Matrix Structural Analysis (Direct Stiffness Method) –Element stiffness equations – Assembly of elements – Node numbering to exploit matrix sparsity – Displacement boundary conditions.

Basics of Elasticity – Strain Displacement relations – Constitutive relations. Introduction to FEM – outline of procedure – Displacement Models & Polynomial interpolations – Equilibrium and compatibility in the solution - Convergence requirements.

Potential energy of an elastic body - Principle of stationary potential energy – the Rayleigh – Ritz method – piecewise polynomial field – finite element form of Rayleigh-Ritz method - Weighted residual methods -shape functions for C0 and C1 elements –Lagrangian and Hermitian interpolation functions for one and two dimensional elements.

Module II

Displacement-based Elements for Structural Mechanics:- Formulas for element stiffness matrix and load vector – overview of element stiffness matrices – Consistent element nodal load vector - Lumped loads-Patch test - - Stress computation

Developments of shape functions for truss, beam and frame elements- Constant strain triangle -Linear strain triangle -Bilinear plane rectangular elements.

Module III

Isoparametric formulation - Line element- Plane bilinear element- Isoparametric formulation of Quadratic plane elements - Subparametric elements and superparametric elements - Gauss quadrature

Plate and shell elements. (Description only).

Solution Techniques for Linear Algebraic Equations – Storage schemes.

Discussion of Finite Element programs using ANSYS or NISA.

References:

1. Cook, R.D., ‘Concepts and Applications of Finite Element Analysis’, JohnWiley.
2. .Krishnamoorthy, C.S., ‘Finite Element Analysis – Theory and Programming’, Tata Mc Graw Hill.
3. Rajasekaran, S., ‘Finite Element Analysis in Engineering Design’, Wheeler Pub.
4. .Bathe, K.J., ‘Finite Element Procedures in Engineering Analysis’, Prentice Hall of India
5. Zienkiewicz, O.C., and Taylor, R.L., ‘The Finite Element Method’, Vol. I and II, Mc Graw Hill.
6. .Desai, C.S., ‘Elementary Finite Element Method’, Prentice Hall of India.
7. .Madhujit Mukhodhay., ‘Matrix & Finite Element Analysis of Structures’, Ane Books.

Question paper:Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

**08.806.6 Elective-IV PROBABILISTIC METHODS IN
CIVIL ENGINEERING**

L	T	P/D	Cr
3	0	0	3

Review: Probability, Sample space and events, Axioms of probability.

Module I

Uncertainties in engineering – aleatory and epistemic uncertainties. Modelling of uncertainties, Random events, Total probability and Baye’s theorem, Independence of events, Random variables, Discrete and continuous random variables, probability distribution and density functions – properties, Main descriptors of a random variable – central values, Mathematical expectation, Measures of dispersion, Measure of skewness, Kurtosis. Uniform, normal and lognormal distributions.

Module II

Moments of a random variable, moment generating functions, multi-dimensional random variables, Joint probability distribution, conditional and marginal distribution, covariance and correlation. (Problems on bivariate random variables only).

Functions of random variables – function of a single random variable, functions of two random variables, Moments of functions of random variables.

Module II

Role of probability and statistics in civil engineering, Frequency analysis – estimation of probability of exceedence, Return period of extreme events such as flood and earthquake- Weibull’s formula, Estimation of characteristic compressive strength from sample values.

Structural Reliability, Performance function and limit surface, Margin of safety, First Order Reliability methods (FORM) –Cornell’s reliability index – Limitations, Geometric interpretation of reliability index – Hasofer Lind reliability index (Concept only, no numerical problems).

Concept of Monte Carlo Simulation, Introduction to reliability based design – Determination of partial safety factors (qualitative ideas only).

References:

1. A.H.S. Ang and W.H. Tang, Probability Concepts in Engineering, John Wiley&Sons Inc.
2. R. Ranganathan, Structural Reliability- Analysis and Design, Jaico Publishing House, Mumbai.
3. A.S. Nowak, K.R. Collins, Reliability of Structures, McGraw Hill, Boston.
4. A. Papoulis and S.U. Pillai, Probability, Random Variables and Stochastic Process, Tata McGraw Hill, New Delhi.
5. Sheldon Ross, A first course in Probability, Pearson Education.
6. P. Jayarami Reddi, A text book of Hydrology, Laxmi Publiscation (Pvt) Ltd, New Delhi.

Question Paper: Duration: 3 hours

The Question paper contains Part A and Part B.

Part A carries 8 compulsory questions (short answer questions) covering the entire syllabus and is for 40 marks.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question out of two.

08.806.7 Elective IV**GROUND WATER ENGINEERING**

L	T	P/D	Cr
3	0	0	3

Module I

Vertical distribution of ground water. Types of geologic formations-properties of aquifer related to storage and transmissivity of water. Steady unidirectional flow-steady flow in a homogeneous aquifer-aquifer with recharge-Flow into infiltration galleries. Importance of groundwater modeling. Governing equations of ground water flow and boundary conditions (basic ideas only). Finite Difference discretization, Solution of partial differential equation of ground water flow for 1D steady ground water flow in homogeneous aquifers (confined and unconfined) using finite difference method (uniform mesh interval only).

Module-II

Partial differential equations governing unsteady ground water flow-unsteady radial flow towards well. Evaluation of aquifer parameters by Jacob's, Theis and Chow's method. Well flow near aquifer boundaries-Image well system. Method of images- Wells-Types. Method of constructing shallow wells- Method of constructing shallow wells -cable tool method, rotary method and reverse rotary method-well completion-design of gravel packed well-well development-different methods, well rehabilitation.

Module III

Surface investigation of ground water-different methods- electrical resistivity method, seismic refraction method-determination of aquifer thickness of horizontal aquifers. Quality of ground water- Graphical representations. Pollution of ground water-sources, distribution and evaluation of ground water pollution (Brief description only). Sea water intrusion-Ghyben- Herzberg equation-seawater fresh water interface-upconing-preventive measures. Artificial recharge of groundwater-different techniques.

References:

1. D.K Todd, "Ground Water Hydrology", Wiley International Ed; Toppan &Company Ltd, Tokyo, 1995.
2. "Ground Water Manual", A Water Resources Technical Publication..
3. Karanth , " Ground Water Assessment, Development and Management", Tata McGraw Hill publishing company Ltd.
4. S.P. Garg , "Ground Water and tube wells", Oxford &IBH Publishing Company.
5. Herman Bouwer, "Ground Water Hydrology", Mc Graw Hill Kogakusha Ltd.
6. H.M Raghunath , " Ground Water Hydrology", Wiley Eastern Limited.
7. Freeze and Cherry, "Ground Water" Prentice Hall
8. Rastogi, A K. "Numerical groundwater hydrology", Penram International Publishers, Mumbai

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

08.806.8 Elective-IV**REPAIR & REHABILITATION
OF STRUCTURES**

L	T	P/D	Cr
3	0	0	3

Module 1

Causes of deterioration in concrete structures – errors in design, construction operations, earthquakes, erosion, chemical reaction, corrosion, durability, etc.

Causes of deterioration in steel structures – corrosion, abrasion, loosening of connections, fatigue, impact, earthquakes, environmental problems, etc.

Preventive measures, maintenance and inspection

Module II

Diagnosis and assessment of deterioration, visual inspection, non destructive tests, ultrasonic pulse velocity method, rebound hammer method, pull out tests, Bremer test, Windsor probe test, crack detection techniques, etc.

Module III

Methods of repair of cracks, repairing spalling and disintegration, repairing concrete floors and pavements, repairing of corrosion damage of reinforced concrete, repair of steel structures

Strengthening of existing structures, guniting, jacketing, use of chemicals, application of polymers, ferrocement and fibre concretes, pre-stressing, surface coatings, painting, water proofing, grouting, special repairs.

References:

- 1 .Sidney M Johnson, Deterioration, Maintenance and Repairs of Structures, Mc Graw Hill Book Company, New York
2. Dovkaminetzky, Design and Construction Failures, Galgotia Publication., NewDelhi
- 3.Jacob Field and Kenneth L Carper, Structural Failures, Wiley Europe

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

08.806.9 Elective-IV**GROUND IMPROVEMENT**

L	T	P/D	Cr
3	0	0	3

Module 1

Relevance of Ground Improvement – In-situ Densification – Deep Compaction – Dynamic Compaction – Blasting – Sand piles

Pre-loading with vertical drains – Stone Columns - Lime piles

Module II

Grouting – Electro chemical Stabilization – Physical and chemical aspects of stabilization – Stabilization with cement and lime - Mechanical stabilization - Electro osmotic methods

Module III

Drainage and Ground water lowering – Well point system

Earth reinforcement – Principle of reinforced earth – Geotextiles as reinforcement – Filtration. Drainage and Erosion control.

Referemces:

1. P.Purushothamaraj, Soil Mechanics and Foundation Engineering , Pearson Education, Delhi, 2008
2. P.Purushothamaraj Ground Improvement Techniques ,Pearson Education, Delhi, 1998
3. F.G.Bell , Foundation Engineering in Difficult Ground, Butterworth, London, 1983

Question Paper: Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

08.806.10 Elective-IV**EARTHQUAKE RESISTANT
DESIGN OF STRUCTURES**

L	T	P/D	Cr
3	0	0	3

Module I

Review of structural dynamics– SDOF and MDOF systems– Free and forced vibration analysis – Base motion Earthquakes – Causes of Earthquakes – Seismic waves – Measurement of earthquakes – Seismic zoning .

Module II

Earthquake effects on masonry buildings - Earthquake resistant construction of masonry buildings- Seismic effect on RC structures – Effect of architectural features and structural irregularities Seismic design philosophy – Determination of design lateral forces – Equivalent lateral force method - Dynamic analysis

Module III

Ductility considerations in earthquake resistant design of RC buildings – Discussion of relevant clauses in IS code Earthquake resistant design of RC beams and columns

References :

1. IS 1893 (Part I) : 2002 Criteria for Earthquake Resistant Design of Structures Part I General Provisions and buildings
2. IS 13920 (Part I) : 1993 Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces-Code of Practice
3. IS 456 : 2000 Code of practice for Plain and Reinforced Concrete
4. Anil K. Chopra ,Dynamics of structures,Prentice-Hall, India
5. Pankaj Agrawal and Manish Shrinkande ,Earthquake Resistant Design of Structures, Prentice-Hall, India
6. Madhujit Mukhopadhyay , Structural Dynamics, Ane's Books India

Question Paper: Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

Use of IS 456:2000, IS 13920 (Part 1), IS 1893 (Part1) are permitted in the examination hall.

08.806.11 Elective IV ENVIRONMENTAL IMPACT ASSESSMENT

L	T	P/D	Cr
3	0	0	3

Module I

Introduction – Evolution of EIA (Global and Indian Scenario)- Key Features of National Environmental Policy Act- Elements of EIA – Purposes – Screening – Scoping - Terms of Reference - Public Consultation - Environmental Clearance process in India - Key Elements in 2006 EIA(Govt. of India) Notification

Module II

Socio-economic impacts - Impact types- Identification- Impact assessment Methodologies- Overlays, Checklist, Matrices, Fault Tree Analysis, Event Tree Analysis- Role of an Environmental Engineer- Public Participation- Introduction to latest softwares in water and air quality Modeling

Module III

Water Quality Analysis- Standards for Water, Air and Noise Quality - Impact of development on vegetation and wild life-Environmental Management Plan- EIA- Case study related to Hydro electric Project.

References:

1. Larry W Canter, “Environmental Impact Assessment”,Mc Graw Hill Inc. , Newyork.
2. Ministry of Environment & Forests, Govt. of India 2006 EIA Notification
3. Rau G J and Wooten C.D “EIA Analysis Hand Book” Mc GrawHill
4. Robert A Corbett “Standard Handbook of Environmental Engineering” McGrawHill
5. John Glasson, Riki Therivel & S Andrew Chadwick “Introduction to EIA” University College London Press Limited

Question paper :Duration : 3 Hrs

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be 2 questions form each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

**08.806.12 Elective-IV INSTRUMENTATION FOR
ENGINEERING MEASUREMENTS**

L	T	P/D	Cr
3	0	0	3

Module I

The measurement system - Purpose Structure and elements Characteristics of measurement system Accuracy, precision, repeatability Calibration Standards and evaluation. Dynamic Characteristics.

Statistical Analysis - errors in measurement - Best estimate of true value Normal Distribution - confidence level

Module II

Measurement of strain. Electrical resistance strain gauges. Vibrating wire strain gauges strain gauge bridges Force transducers Load cells different types force balance pressure gauges.

Measurement of displacement Linear Variable differential transformer, Applications - Motion measurement – Potentiometer.

Measurement of Acceleration, Accelerometers - Characteristics of Accelerometers. Integration technique for displacement from acceleration

Measurement of Distance - Principle of Laser distance meter - Applications Measurement of Velocity - Principle of Radar velocity meter.

Module III

Non Destructive Testing Methods - Ultrasonic methods - Hardness methods - Rebound Hammer - Detection of embedded reinforcement

Acoustic Measurement- Sound level meter Indicating & recording elements - Chart recorders – Cathode

Ray Oscilloscope Computer based data acquisition systems

References:

1. Bently J P, “Principles of measurement systems”, Longman 1983
2. Nakra & Chowdhry,” Instrumentation Measurement & Analysis,” , Tata McGraw Hill
3. Adams,”Engineering Measurements & Instrumentation”, English University Press 1975
4. Doblin E. A.” Measurement Systems Application & Design” , , Mc Graw Hill 1975
5. Beekwith,” Mechanical Measurements”, Pearson
6. Dally J.W & Riley W.F,”Experimental Stress Analysis, McGraw Hill

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

**08.807.1 Elective-V GEOTECHNICAL EARTHQUAKE
ENGINEERING**

L	T	P/D	Cr
3	0	0	3

Module-I

Seismology and earthquakes (basic concepts only)-Earthquake hazards related to Geotechnical engineering- Wave propagation-Soil liquefaction-Susceptibility, initiation and effects of soil liquefaction- Laboratory and Field methods for estimation of liquefaction potential-CSR and CRR.

Module –II

Measurement of dynamic soil properties-Seismic reflection and seismic refraction tests-Seismic cross hole, down hole/up hole tests-SPT-High strain element tests-Cyclic tri-axial test-shake table and centrifuge tests.

Module-III

Introduction to bearing capacity and settlement analysis under earthquake loading – Seismic design considerations- Codal Provisions - Site improvement methods for mitigation of earthquake hazards

References:

1. Geotechnical Earthquake Engineering Handbook, Mc Graw Hill Online library
2. Mike Jefferies and Ken Been-Soil Liquefaction –A critical state Approach, Taylor and Francis, London, 2006
3. Prakash Shamsher, Soil Dynamics, Mc Graw Hill, New York, 1981
4. Steven Kramer, Geotechnical Earthquake Engineering, Pearson, New Delhi, 1995
5. Richardt F E, Hall J R and Wood R D- Vibrations of soils and foundation- Prentice Hall Inc., 1970
6. Swami Saran, Soil dynamics and Machine Foundations, Galgotia, New Delhi, 2006
7. D.D. Barkan, Dynamics of Bases and Foundations, McGraw-Hill, New York, 1952
8. .E.E. S.P. Timoshenko, D.H. Young and William Weaver, Jr., Vibration Problems in Engineering, John Wiley and Sons, 1974
9. P V Lade and J A Yamamuro-Physics and mechanics of Liquefaction, Taylor and Francis, London.

Question Paper: Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

08.807.2 ElectiveV

**FOUNDATIONS ON
EXPANSIVE SOILS**

L	T	P/D	Cr
3	0	0	3

Module I

Introduction – origin of expansive soils - distribution of expansive soils – damage caused by expansive soils – recognition of expansive soils – mineralogical identification – single index method – classification method – indirect measurement – direct measurement - physical properties of expansive soils.

Module II

Mechanics of swelling – moisture migration – swelling potential – swelling pressure – mechanics of pier uplift – belled piers – friction piers – slabs on expansive soils

Module III

Moisture control – horizontal moisture barriers – vertical moisture barriers – subsurface drainage – peripheral drains – surface drainage – soil replacement - soil stabilization – lime stabilization – chemical stabilization - compaction control

References

1. F.H.Chen, Foundations on expansive soils - Elsevier Science; 2nd edition , 1988
2. Peck, Hansen and Thornborn, Foundation Engineering, John Wiley and Sons, New York, 1947
3. Tomlinson, Foundation design and Construction – English Language Book Society, Essex, 1986

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will two questions from each module. The candidate has to answer one question of 20 marks from each module.

08.807.3 Elective-V INDUSTRIAL WASTE WATER MANAGEMENT

L	T	P/D	Cr
3	0	0	3

Module I

Effect of wastes on streams. Stream quality criteria for aquatic life. Desirable wastes characteristics. Industrial waste survey - organic materials - BOD, COD, TOD.

Industrial water treatment process - Waste volume reduction, types of process for neutralization, equalization and proportioning of wastes.

Module II

Disposal into rivers - De-Oxygenation and Re-Oxygenation in rivers and streams - Development of Oxygen sag model - application of Streeter Phelp's equation. Removal of suspended and colloidal solids – Flotation– problems - theory of coagulation – Sedimentation – Filtration - Discrete particle settling - Column analysis .

Module III

Removal of inorganic dissolved solids by Dialysis and ion exchange. - Membrane process - Adsorption isotherms - breakthrough curves. Manufacturing processes and treatment of pulp and paper mill wastes - Tannery wastes - Distillery wastes.

References:

1. Nelson Leonard Nemerow., “ Theories and Practices of Industrial Waste Treatment”, Addison, Wesley Publishing Company, Inc USA.
2. Metcalf & Eddy, “Wastewater Engineering- Treatment, Disposal & Reuse”, Tata Mc Grawhill publishing Co Ltd.
3. Webber. W. J, “Physico Chemical Process for Water Quality Control”.

Question Paper: Duration: 3 Hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be 2 questions form each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary the same shall be given along with the question paper by the question paper setter.

08.807.4 Elective-V

DESIGN OF BRIDGES

L	T	P/D	Cr
3	0	0	3

Module I

Definition: Classification, Historical developments, planning and economic aspects related to choice of bridge type.

Standard specification for Rural and Railway Bridges: Clearances, live loads and impact allowances- wind loads - Longitudinal forces- Centrifugal forces- Earth pressures - Temperature effects - Secondary stresses- Erection stresses - Seismic forces.

Foundation and substructure: Scour depth - Types of Foundation - Shallow foundations - Pile foundation. Pneumatic caissons, Design of piers and abutments - bed blocks.

Module II

Bearings: Concrete, steel and Neoprene bearing, Design of elastomeric pad bearings, Load distribution on Bridge Decks – Grid analysis- Courbon's method - Orthotropic plate theory.

Reinforced Concrete Bridges: Review of the design of slab, T- beam - Principle of design of balanced cantilever and continuous girder bridges.

Module III

Pre-stressed Concrete Bridges: Principle of design of single span bridges- composite construction.

Steel Bridges: Design of plate girders, Principles of design of trussed bridges and cable stayed bridges.

Construction: Present construction- handling and erection, connection formwork for in situ construction. Construction joints.

References:

1. N. Krishna Raju ,Design of bridges,Oxford and IBH
2. Rowe R. E ,Concrete Bridge Design, J.W. and Sons Publishers.
3. Raina,Concrete, Bridge Practice Analysis Design Economics, TMH
4. Johnson Victor. D ,Essentials of Bridge Engineering, Oxford and IBH.
5. Vazirani V.N., Design of concrete Bridges, Khanna Publishers.
6. Jagadeesh T. R and Jayaram M. A, Design of Bridge Structures, PHI
7. IRC 6-2000,IRC 21-2000, IS 800-2007,IRC 18-1985, IRC 24-2001, IRC-83-1987 and Structural steel Tables.

Question paper:Duration: 3 Hrs.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

Use of IRC 6-2000,IRC 21-2000, IS 800-2007, IRC 18-1985 , IRC 24-2001, IRC-83-1987 Structural steel Tables and design Charts are permitted in the Examination hall.

08.807.5 Elective-V**TRANSPORTATION PLANNING**

L	T	P/D	Cr
3	0	0	3

Module I

Transportation Planning Process- Approaches to Transportation Planning Process-System approach–Cyclic approach-Elements of transportation planning process-Formulation of goals, objectives- collection of data - Analysis of existing condition- prediction techniques and analysis of future condition

Collection of basic data - Study area-Zoning-sampling-Travel pattern data-Origin-destination survey-Home interview survey, Cordon surveys, Internal cordon or screen line counts, Commercial vehicle survey –Survey of existing transport facility-Survey accuracy.

Module II

Travel demand –concept of travel demand and its modelling based on consumer behaviour of travel choices-independent variables –travel attributes- Assumptions in demand estimation- sequential-recursive and simultaneous process.

Urban Transportation Planning practice- Four stage planning –Trip generation-classification of trips- Factors influencing trip generation-Methods of forecasting trip generation rates –Multiple linear regression analysis-Statistical validity of regression equation- Cross classification and Category analysis.

Trip Distribution - Growth factor methods- Average factor method, Fratar, Furness method- Synthetic methods- Gravity model only.

Module III

Network Planning and Traffic Assignment-purpose, Types-All or nothing- Diversion curves, Capacity restraint Assignments. Assignment of public transport systems.

Modal split – Factors influencing modal choice, characteristics of journey, traveller, transportation system. Trip end modal split model –Trip interchange modal split models- Discriminant analysis.

Traffic And Environment- Detrimental effects of traffic on environment - Noise - Air pollution -Visual intrusion and degrading aesthetics.

Introduction to Intelligent Transportation Systems and Planning softwares

References:

1. Hutchinson, B.G., Principles of Urban Transportation System Planning, Mc-Graw Hill 1974
2. Kadiyali, L R., Traffic engineering and Transport planning, , Khanna Publication.
3. Dickey, J W., Metropolitan Transportation Planning,-Tata Mc- Graw Hill Publishing Company Ltd.
4. Jotin Khisty ,C.and Kent Lall,B, Transportation Engineering An Introduction,Prentice Hall International Inc.
5. Michael D. Mayer & Eric J. Miller,Urban Transportation Planning-A Decision Oriented Approach, Mc Graw Hill.
6. Partha Chakraborty and Animesh Das, Principles of Transportation Engineering, Prentice Hall India Private Ltd.
7. Vuchic, Vukan R,Urban Public Transportation Systems andTechnology,Prentice Hall.

Question Paper:Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.807.6 Elective-V**MATERIALS MANAGEMENT**

L	T	P/D	Cr
3	0	0	3

Module I

Importance of material management-objectives-Materials-categories-costs involved.

Purchasing principles - six rights – Organisation - Centralised - decentralised. Standardisation-Forms of specification-different levels - How an Indian standard is born - Advantages of standardisation.

Module II

Store-coding system - benefits - store function-responsibilities and functions - stores records and stores accounting.

Cost reduction through materials management-standardisation and variety reduction-value analysis-value function-cost and worth-selection of items for value analysis-techniques-value analysis job plan.

Computer application in material management - ideal areas for computerisation.

Module III

Inventory management-types of inventory-aims of inventory control - inventory turn-over ratio - costs associated with inventory-ordering cost - carrying cost - under-stocking cost - overstocking cost.

Selective control - ABC analysis - Economic order quantity-order point - lead time forecast usage per unit of time - safety stock-stock order point.

Replenishment systems - Perpetual Review system-periodic review system - Quantity to be recouped.

References:

1. Purchasing and materials management - Gopalakrishnan, TMH
2. An Integrated Concept of Materials Management - N.N. Shaw
3. Materials management and inventory control - A.K. Datta

Question paper: Duration: 3 Hrs.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.807.7 Elective-V OPTIMIZATION TECHNIQUES IN ENGINEERING

L	T	P/D	Cr
3	0	0	3

Module I

General Optimisation procedures - and features of mathematical programming as applicable to Civil engineering problems. Unconstrained and constrained optimization problems - Formulation of objective function and constraints.

Module II

Non- Linear Programming problems – one dimensional minimisation. Unconstrained optimization Techniques Direct search method. Random search Univariate pattern search. Descent methods. Fletcher & Reeves method. Quasi Newton methods Constrained optimization Techniques method of feasible directions Penalty function

Module III

Linear Programming - Simplex method standard form - Simplex algorithm - Two phase solution by simplex method - Duality of linear programming Formulation of geometric programming - Dynamic programming and integer programming problems-Minimum weight design of trusses and frames.

References:

1. Optimisation methods in Engineering Design, R.L. Fox Addison Wesley.
2. Optimisation Theory and applications , S.S. Rao ,Wiley Eastern.
3. Optimisation concepts and Applications Engineering, Belegundu.
4. Civil Engineering Systems, Andrew B Templeman.

Question Paper:

Duration: 3 hours

The question paper consists of Part A and Part B. Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.807.8 Elective V. IRRIGATION AND DRAINAGE ENGINEERING

L	T	P/D	Cr
3	0	0	3

Module 1

Soil Plant Water relationships-soil physical properties influencing irrigation-kinds of soil water-movement of water into soils-infiltration and measurement-soil moisture retention and movement-soil moisture tension-total soil water potential-soil moisture characteristics-soil moisture constants-measurement of soil moisture-tensiometer, neutron moisture probe (only concepts).

Plant water relationships- Crop response to water-moisture stress and plant response-drought tolerance-root characteristics and moisture use-evaporation, transpiration and consumptive use-measurement of evapotranspiration-Estimating evapotranspiration from evaporation and climatological data-methods (Blaney criddle, Thornthwaite, Penman and Christiansen only)-Crop co-efficient and evapotranspiration of a crop.

Module II

Measurement of irrigation water-methods-velocity area method-measuring structures like weirs, parshall flumes, orifices, and meter gates-tracer methods.

Irrigation-selection of irrigation water application methods-irrigation requirement-surface irrigation methods-details and hydraulics design aspects of border, check basin and furrow methods

Quality of irrigation water-problems, criteria, classification-Salt problems in irrigated agriculture-influence of salts on physical properties of soil-salt balance-leaching requirement-methods.

Module III

Drainage of irrigated land-Surface drainage and land forming- different systems for surface drainage (layout and description only).

Subsurface drainage –benefits-drainage requirements-pipe drains, mole drains-types of system (layout and description only)-Outlets, types-depth and spacing of drains (Design for steady state condition only)- size of pipe drains-design flow -hydraulic design for drain size.

Drainage Surveys-Data to be monitored, Preliminary surveys, Detailed Surveys

Reference:

1. W.R. Walker and G.V. Skogerboe, "Surface Irrigation: Theory and practice", Prentice Hall Inc.
2. Michael, A.M, 'Irrigation- Theory and practice', Vikas Publishing house.
3. Schwab.G.O and Frevert, 'Soil and water conservation engineering', John Wiley and Sons, Inc.
4. Drainage principles and applications- ILRI publication 16

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering entire syllabus.

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.807.9 Elective-V**TRANSPORTATION SYSTEM
MANAGEMENT**

L	T	P/D	Cr
3	0	0	3

Module –1

Transportation System Management-objectives and scope-Need for TSM, TSM Process outline, TSM Strategies –Performance Measures.

Traffic Operations Improvement: On-street parking ban, one-way streets, reversible lanes, traffic calming, Right turn phase, right turn lanes, reroute turning traffic, Auto Restricted Zones-Traffic Diverters

Module – 2

Study of TSM actions with respect to problems addressed, conditions for applications, potential implementation problems, evaluation & impact analysis- park and ride, Ridesharing, exclusive lanes, priority at ramp terminals, bus transfer stations, limited and skip-stop bus services, Public transportation & HOV treatment

Demand Management: Staggered work hours, flexible work hours, high peak period tolls, shuttle services, circulation services, extended routes.

Module-3

Local Area Traffic Management-Data Requirements-pedestrian Facilities-Planning for pedestrians, Bicycle Facilities-Design .Non Motorized Transport: pedestrian only streets, Dial a ride for elderly & handicapped
Parking Management: Benefits of good parking management, curb parking, off street parking, Parking supply and demand. , Parking and Terminal Facilities.

References:

- 1 D.Arlington, Transportation System Management in 1980: State of the Art and Future Directions, Transportation Research Board, 1980.
- 2 Institute of Transportation Engineers, Transportation and Traffic Engg. Hand Book, Prentice Hall, 1982
- 3 Nicholas.J. Garber and Lester.A. Hoel,'Traffic and Highway Engineering', PWS Publishing 4Jotin Khisty.CandKentLallB,'Transportation Engineering-AnIntroduction',PrenticeHallInternational Inc.

Question paper:Duration: 3 Hrs.

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions of 5 marks each covering the entire syllabus .

Part B is for 60 marks. There will be two questions from each module. The candidate has to answer one question from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.807.10 Elective-V**REINFORCED EARTH**

L	T	P/D	Cr
3	0	0	3

Module I

Introduction-history –ancient and modern structures-application areas

General theory - Stress strain relationship of reinforced soil – Preferred pattern of reinforcement - Factors affecting the performance and behaviour of reinforced soil –Properties of reinforcement, reinforcement distribution, soil properties, soil state, construction procedure - Action and relevance of reinforcement in soils

Materials - Cohesionless fill – Cohesive frictional fill - Cohesive fill

Reinforcement - Types of reinforcing materials – Properties - Facings

Module II

Design - Conceptual design-General aspects - Overall stability of vertically faced structures - Different Methods

Analysis and design of reinforced retaining structures with metallic reinforcement - Simple problems

Bearing capacity of reinforced earth foundation-Brief discussion of Binquet and Lee's Method

Module III

Construction methods of reinforced retaining walls - Concertina Method - Telescope method - Sliding method

Geotextiles – Functions – Separation – Filtration – Drainage – Reinforcement - Natural geotextiles

References:

1. Earth Reinforcement and Soil Structures --- C.J.F.P. Jones – Butterworth, London, 1985
2. G.L.Sivakumar Babu --- An Introduction to Soil Reinforcement and Geosynthetics - 2007

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

08.807.11 Elective-V INDUSTRIAL STRUCTURES

L	T	P/D	Cr
3	0	0	3

Module I

Classification of Industrial structures-Layout requirements-lighting, ventilation and fire safety-protection against noise and vibration-factories act.

Roofing configuration-types of trusses-beams and lattice trusses-purlins-ferrocement-detailed design-spacing – Concrete roofs-Grid floors, shells and folded plates.

Module II

Storage structures-silos and bunkers-Shape of hopper for different materials-design of vertical sides-hopper bottom-stiffening gorder-staging-design-conveyors and supporting structures.Intz type water tanks.

Module III

Rigid industrial frames-gable frames of uniform cross sections-varying depth-pin jointed knee bracings-design-design of joints-analysis by various methods. Power transmission lines-Load Analysis and design of transmission line towers-substation structures-Foundation analysis-Design principle only.

References:

1. Lothers: "Advance Design in steel structure", Prentice Hall,USA,1980
2. Salmon.C,G and Johnson J.E,"Steel structure-Design and Behaviour",Harpr and Row-1980
3. Wiliam McGuire," Steel Structures,"PrenticeHall of India New Jersey,1968
4. Steel designers Manual published in UK
5. Arya and Ajmani,"Design of steel structures"Netrichand Bros,Roorkee,1990
6. Dayaratnam P,"Design of steel structures"Wheele &Co.,NewDelhi Second Edition 1999

Question Paper: Duration: 3 hours

The question paper consists of Part A and Part B.

Part A is for 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will two questions from each module. The candidate has to answer one question of 20 marks from each module.

Note: No charts, tables, codes are permitted in the Examination hall .If necessary relevant data shall be given along with the question paper by the question paper setter.

**08.807.12. Elective-V GEO-ENVIRONMENTAL
ENGINEERING**

L	T	P/D	Cr
3	0	0	3

Module I

Waste Generation – source, type, quantity, characteristics and management of waste;
Geotechnical properties of solid waste - density, particle size, temperature, pH, moisture content, compressibility, permeability, shear parameters; geotechnical reuse of waste materials;
Waste dump - changes occurring in waste dump, impact on environment, remedial measures for waste dump

Module II

Engineered landfill – types, selection and ranking of landfill sites based on sensitivity index – landfill planning- components of landfill –land fill capacity-
Liner and cover system - compacted clay liner ,geomembrane liners, geosynthetic clay liner - insitu permeability measurement of clay liners,
Leachate quality and quantity collection pipes, drainage Materials; leachate recirculation and Treatment; Gas management and collection facilities.

Module III

Soil waste interaction; contaminant transport - advective, diffusive, dispersive and combined process - attenuation capacity- change in engineering properties; permeability, shear strength, atterbergs limit, compressibility and swell.
Soil remediation- soil washing, fixation, electrokinetic remediation, biological treatment, thermal treatment and containment

References:

1. Datta M, Waste disposal in engineered landfills, Narosha publication New Delhi, 1997
2. Ramanatha Ayyar T. S, Soil in relation to Environment, L B S centre for Science and Technology, Trivandrum, 2000, .
3. Gulathi S. and Datta M, Geotechnical Engineering ,Tata MC Graw-Hill Publishing Company Ltd. New Delhi, 2005
4. Sharby R, Environmental geotechnology, Chapman and Hall London, 2000
5. Daniel D. E, Geotechnical Practice of waste disposal, Chapman and Hall London, 1993
6. Bachi, Design Construction and monitoring of landfills” ,John Wiley and Sons New York, 1993

Question Paper:Duration:3 hours

The question paper consists of Part A and Part B.

Part A carries 40 marks. There will be 8 compulsory short answer questions covering entire syllabus.

Part B is for 60 marks. There will be 2 questions from each module. The candidate has to answer one question of 20 marks from each module.

08.806.13. Elective V.**SYSTEMS ENGINEERING
FOR CIVIL ENGINEERS**

L	T	P/D	Cr
3	0	0	3

Module I

Systems engineering- System-definition and examples of civil engineering systems, system analysis, system design and system synthesis. Steps in analysis of systems- Mathematical modeling of systems- Optimization problems-Objective function and constraints.

Formulation of the following optimization problems for civil engineers-minimum weight design of trusses and frames, minimum cost design of beams, Column design based on Euler's theory of buckling load, Optimal design of water distribution systems, single reservoir operation, Minimum cost design of lined irrigation canals. Traffic signal time optimization, Effluent disposal to rivers.

Concavity and convexity of optimization problems- Solution of single variable optimization problems-Calculus based methods, Newton, bisection and secant method

Module- II

Solution of multi variable optimization problems- Lagrange multiplier method-KKT conditions. Unconstrained optimization techniques for multi variable problems-direct search methods, Random search, uni-variate and pattern search-Hook and Jeeve's method, Descent methods-Fletcher and reeves method, Quasi-Newton methods (conceptual idea only),

Constrained optimization and constraint handling - penalty function approach (conceptual idea only).

Module- III

Dynamic programming (DP) - Bellman's principle of optimality, Application of DP to a pipe network problem. Basic ideas of integer programming and multi-objective optimization (Descriptions only).

Evolutionary algorithms for optimization- Basic principles of Genetic Algorithms, Simulated Annealing and Swarm Intelligence Techniques (Ant colony optimization and particle swarm optimization) (conceptual ideas only).

Simulation-Concept of Monte Carlo Simulation (No numerical problem).

References/ Text Books

1. Fox R L -Optimization methods for engineering design – Wiley
2. Rao S S -Engineering Optimization-theory and practice-, New Age International
3. Belegundu and Chandrapatla-Optimization concepts and applications in engineering-, Prentice Hall India Ltd
4. Deb K -Optimization for engineering design- Algorithms and Examples-, Prentice Hall India Ltd
5. Haftka R T and Gurdal Z -Elements of structural optimization-Springer
6. Goldberg DE-Genetic Algorithms in search, optimization and machine learning.
7. Engelbrecht A P -Fundamentals of computational swarm Intelligence- Wiley
8. Kennedy J and Eberhart R C-Swarm Intelligence- Morgan Kaufaman
9. Arora J S-Introduction to optimum design- Elsevier
10. Vedula P and Mujumdar P P-Water resources systems- TMH

Question paper: Duration: 3 Hrs

The question paper consists of part A and part B.

Part A consist of 8 questions of 5 marks each. Candidate has to answer all questions.

Part B is for 60 marks. Part B is divided into three modules. Candidate has to answer one full question out of two, from each module.

Note: At least one assignment should be computer oriented. The candidate should practice to solve simple optimization problems from civil engineering field using any commercial software.

08.808 PROJECT, VIVA & INDUSTRIAL VISIT

L	T	P/D	Cr
0	0	5	5

Sessional marks 100 for **08.808** can be awarded as **80 + 20** for project and industrial visit respectively. **80** marks for project can be distributed as **40 + 40**, where **40** marks will be awarded by the guide of the project and **40** marks by the evaluation team comprising of guide and not less than two staff members. The students have to present their work before the evaluation team and appear for a close-in examination. The marks given by the evaluation team must be based on the quality of project, performance of the students in the presentation and close-in examination.

Industrial visit should be completed before the commencement of 8th semester and a detailed report of the same has to be submitted. The report should be evaluated for **20** marks.