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शिवाजी विद्यापीठ, कोल्हापूर — 416004.
दुरध्वनी (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग— २६०९०९४)
फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

Estd. 1962
NAAC 'A' Grade
MHRD-NIRF- 28th Rank

SU/BOS/Sci. & Tech/7400   Date: 21/07/2018

To,

> **The Principal/ Director,**
> All affiliated Engineering Colleges/ Institute,
> Shivaji University, Kolhapur.

Subject : Regarding Guidelines, structure, of CBCS B. Tech. Program and syllabus of First Year B. Tech. Program under Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the University Authorities have accepted and granted approval to Guidelines, structure of CBCS B. Tech. Program and syllabus of First Year B. Tech. Program to following branches under Faculty of Science and Technology:

B. Tech. Programme (Branch)

1.	Civil Engineering & Technology
2.	Mechanical Engineering & Technology
3.	Production Engineering & Technology
4.	Automobile Engineering & Technology
5.	Electrical Engineering & Technology
6.	Chemcial Engineering & Technology
7.	Electronics Engineering & Technology
8.	Electronics and Telecommunication Engineering & Technology
9.	Biotechnology Engineering & Technology
10.	Information Technology Engineering & Technology
11.	Environmental Engineering & Technology
12.	Computer Science Engineering & Technology

The revised syllabi shall be implemented from the academic year 2018-19 (i.e. from July 2018) onwards. A soft copy containing CBCS Guidelines, structure, and syllabus of First Year B. Tech. is enclosed herewith. The syllabus is also made available on university website www.unishivaji.ac.in.

Further, it is hereby informed that the question papers on the pre-revised syllabi shall be set for the examination to be held in October/November 2018 and April/May 2019. These chances are available for repeater students, if any.

You are therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy. Registrar

Encl-: as above.
Copy to-
1) I/c Dean, Faculty of Science & Technology
2) Director, Examination and Evaluation   }— For information
3) The Chairman, respective BOS / Co-ordinating Committee
4) O.E. 4 Section
5) Appointment Section
6) Eligibility Section   } For information & necessary action .
7) Meeting Section

SHIVAJI UNIVERSITY, KOLHAPUR

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Accredided by NAAC 'A' Grade

Syllabus for

Bachelor of Technology

(B. Tech.) Program

(To be implemented from June, 2018 onwards)

SHIVAJI UNIVERSITY, KOLHAPUR

FIRST YEAR ENGINEERING AND TECHNOLOGY

Structure and Syllabus

(From the Academic Year 2018-2019)

(Course common to all branches except Architecture and Textile Engineering)

INSTRUCTIONS:

There are two groups in each semester:

1. Physics Group and
2. Chemistry Group

Allotment of groups to students:

a) **Semester I:** 50% students from each college will be admitted to Physics Group and remaining 50% will be admitted to Chemistry Group. The concerned College will decide the number and names of the students to be admitted in physics and chemistry groups and inform the same to the University.

b) **Semester II:** The students for Physics group in semester-I will be admitted to Chemistry Group in semester-II. The students for Chemistry Group in semester-I will be admitted to Physics Group in semester-II.

First Year Engineering and Technology – CBCS PATTERN (All Branches) (Sem I & II)

Sr. No		TEACHING SCHEME									EXAMINATION SCHEME							
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL (Term wok)		
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	%Min	Hours	Max	%Min
SEMESTER – I																		
1	BSC-P-101	3	3	3	-	-	-	1	2	2		CIE	30	100	40%	As per BOS Guidelines	25	40%
	BSC-C-101											ESE	70					
2	BSC-M-I-102	3	3	3	1	1	1	-	-	-		CIE	30	100	40%		25	40%
												ESE	70					
3	ESC-103	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
4	ESC-104	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
5	ESC-105	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
6	HM-I-106	1	1	1	-	-	-	1	2	2		-	-	-	-		25	40%
7	ESC-W-I-107	1	1	1	-	-	-	1	2	2		-	-	-	-		50	40%
	TOTAL	17	17	17	1	1	1	6	12	12				500			200	
SEMESTER –II																		
1	BSC-P-201	3	3	3	-	-	-	1	2	2		CIE	30	100	40%	As per BOS Guidelines	25	40%
	BSC-C-201											ESE	70					
2	BSC-M-II-202	3	3	3	1	1	1	-	-	-		CIE	30	100	40%		25	40%
												ESE	70					
3	ESC-203	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
4	ESC-204	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
5	ESC-205	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
6	HM-II -206	1	1	1	-	-	-	1	2	2		-	-	-	-		25	40%
7	ESC-W-II-207	1	1	1	-	-	-	1	2	2		-	-	-	-		50	40%
	TOTAL	17	17	17	1	1	1	6	12	12				500			200	
	TOTAL	34	34	34	2	2	2	12	24	24				1000			400	

CIE – Continuous Internal Evaluation ESE – End Semester Examination

Candidate contact hours per week : 30 Hours(Minimum)
Total Marks for B.Tech I. Sem I & II :**1400**
Theory and Practical Lectures : 60 MinutesEach
Total Credits for B.Tech.-I (Semester I & II) :**48**
IntheoryexaminationtherewillbeapassingbasedonseparateheadofpassingforexaminationofCIEandESE
There shall be separate passing for theory and practical (term work)courses
Non-Credit Self Study Course : Compulsory Civic Courses(CCC) **For Sem I: CCC – I :** Democracy, Elections and Good Governance
Non-Credit Self Study Course : Skill Development Courses (SDC) For Sem II: SDC – I : Any one from following (i) to(v) i) Business Communication & Presentation ii) Event management iii) Personality Development, iv) Yoga & Physical Management v) Resume, Report & proposal writing

Note:
1.BSC : Basic Science Course arecompulsory.
2.HM : Humanities and Management arecompulsory.
3.ESC : Engineering Science Course **: ESC- P**for courses (subjects) are mandatory**Physics** group, while **ESC – C** courses (subjects) are mandatory for **Chemistry**group.
4.There will be two groups for Sem I & II Physics and Chemistry. The Candidate's those opting Physics group in Sem I shall appear for Chemistry group in Sem II andVice-versa.
5.ESC-W: Engineering Science Course-Workshop arecompulsory.

Course List

Semester – I

Physics Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-P-101	Engineering Physics	4
2.	BSC-M-I-102	Engineering Mathematics-I	4
3.	ESC-P-103	Basic Electrical Engineering	4
4.	ESC-P-104	Basic Civil Engineering	4
5.	ESC-P-105	Engineering Graphics	4
6.	HM-I-106	Professional Communication-I	2
7.	ESC-W-I-107	Workshop Practice-I	2
		Total	24

Chemistry Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-C-101	Engineering Chemistry	4
2.	BSC-M-I-102	Engineering Mathematics-I	4
3.	ESC-C-103	Fundamentals of Electronics and Computer Programming	4
4.	ESC-C-104	Applied Mechanics	4
5.	ESC-C-105	Basic Mechanical Engineering	4
6.	HM-I-106	Professional Communication-I	2
7.	ESC-W-I-107	Workshop Practice-I	2
		Total	24

Semester II

Chemistry Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-C-201	Engineering Chemistry	4
2.	BSC-M-II-202	Engineering Mathematics-II	4
3.	ESC-C203	Fundamentals of Electronics and Computer Programming	4
4.	ESC-C204	Applied Mechanics	4
5.	ESC-C205	Basic Mechanical Engineering	4
6.	HM-II-206	Professional Communication-II	2
7.	ESC-W-II-207	Workshop Practice-II	2
		Total	24

Physics Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-P-201	Engineering Physics	4
2.	BSC-M-II-202	Engineering Mathematics-II	4
3.	ESC-P-203	Basic Electrical Engineering	4
4.	ESC-P-204	Basic Civil Engineering	4
5.	ESC-P-205	Engineering Graphics	4
6.	HM-II -206	Professional Communication-II	2
7.	ESC-W-II-207	Workshop Practice-II	2
		Total	24

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester I and II
EngineeringPhysics

SECTION – I
Unit 1.Diffraction and Polarization of Light :(12 Marks)(7)
Diffraction : Diffraction- Concept and types (Fresnel and Fraunhofer diffraction), Diffraction grating – construction and theory, resolving power of planetransmission grating.
Polarization:
Introduction, double refraction, Huygens' theory (positive and negative crystals), Optical Activity, Specific Rotation, Laurent's half shade polarimeter.

Unit 2. Laser and FibreOptics:(12 Marks)(7)LASER :
Absorption, spontaneous emission, stimulated emission, pumping, population inversion, Ruby laser, characteristics of laser, Holography (construction and reconstruction)
Fibre Optics:
Total Internal Refection, structure of opticalfibre, acceptance angle, acceptance cone, numerical aperture and fractional refractive index change (noderivation), fibre optic communication system, advantages of optical fibres.

Unit 3. Sound: (11 Marks)(7)
Conditions for good acoustics, Reverberation, Reverberation time, Sabine's formula for reverberation time (no derivation), Absorption coefficient, Factors affecting architectural acoustics and their remedy.

SECTION – II

Unit 4.Crystal Physics: (12 Marks)(7)
Space Lattice, Basis and Crystal structure, Unit cell, Seven crystal system, number of atoms per unit cell, coordination number, atomic radius, packing fraction, relation between density and lattice constant, Miller indices - procedure, features and sketches for differentplanes, symmetry elements of cubic crystal,Bragg's law for X-ray diffraction.

Unit 5. Physics of Nano-materials: (12 Marks)(7)
Concept- Nanomaterial, Nanoscience and Nanotechnology, production techniques(Top down and bottom up), Ball milling and Colloidal technique for synthesis of nano particles, Types of Nanomaterial, Tools- Scanning Tunneling Microscope and Atomic Force Microscope,   properties and applications of nano-materials.

Unit 6.QuantumMechanics   (11 Marks)(7)
Wave-particle duality of light, dual nature of matter (De-Broglie's concept of matter waves) Wavelength of matter wave in terms of K.E. and P. D., Properties of matter waves, Heisenberg's uncertainty principle for position and momentum, Compton Effect (Statement, explanation and experimental verification).

List of Experiments;
Minimum 8 experiments should be performed from the following list.

01. Bi-prism experiment
02. Diffraction at Cylindrical obstacle.
03. Calculation of divergence of LASER beam.
04. Determination of wavelength of LASER using diffraction grating.
05 Wavelength of different spectral lines of mercury using grating.
06. Polarimeter.
07. Verification of inverse square law of intensity of light.
08. Resolving power of Telescope
09. Measurement of band gap energy.
10. Study of crystal structure.
11. Study of symmetry elements of cubic crystal.
12. Determination of 'd' (interplaner distance) using XRD pattern.
13. Study of Planes with the help of models related Miller Indices.
14. Determination of e/m of an electron
15. R. P. of grating

References :

1. R. K. Gaur & Gupta S. L, Engineering Physics -DhanapatRai Publication.
2. M. N. Avadhanulu& P. G. Kshirsagar - A Text Book of EngineeringPhysics -S. Chand Publication.
3. B. L. Theraja -Modern Physics - S. Chand & Company Ltd., Delhi.
4. Subramanyam&BrijLal, A Text Book of Optics –S. Chand & Company (P.) Ltd.
5. B. K. Pandey and S. Chaturvedi- EngineeringPhysics, Cengage Learning-2012
6. S. O. Pillai, Solid State Physics : Structure & Electron Related Properties,Eastern Ltd,, New Age International Ltd.
7. Charles Kittle, Introduction to Solid State Physics - Wiley India Pvt. Ltd.(8th Edtion).
8. V. Rajendran – Engineering Physics- Mc. Graw Hills
9. Alan Giambattista and others- Fundamentals of physics, Tata Mc. Graw Hills
10. Vijay Kumari- Engineering Physics, Vikas Publications
11. ResnickHalliday, Physics Volume-I, Krane -John Wiley & Sons Pub.
12. ResnickHalliday, Physics Volume-II, Krane -John Wiley & Sons Pub.
13. Hitendra K. Malik, A. K. Singh – Engineering Physics - Tata Mc. Graw Hills Education Private Ltd.

14. A. Beiser – Concepts of Modern Physics - Tata Mc. Graw Hills

15. L. J. Schiff – Quantum Mechanics - Tata Mc. Graw Hills

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I

EngineeringMathematics-I

SECTION I
Unit 1: Matrices and Solution of Linear System Equations(8)(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)
1. Rank of matrix: definition, normal form and echelon form
2. Consistency of linear system equations
3. System of linear homogeneous equations
4. System of linear Non-homogeneous equations

Unit 2: Eigen Values and Eigen vectors   (7)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. Eigen Values
2. Properties of Eigen Values
3. Eigen vectors
3. Properties of Eigen vectors
4. Cayley-Hamilton's theorem (Without proof)
Unit 3: Complex Numbers   (6)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1. De Moivre's Theorem (Without proof)
2. Roots of complex numbers by using De Moivre's Theorem
3. Expansion of $\sin n\theta$ and $\cos n\theta$ in powers of $\sin\theta$ and /or $\cos\theta$.
4. Circular functions of a complex variable - definitions
5Hyperbolic and Inverse Hyperbolic Functions- definitions .

SECTION II

Unit 4: Numerical Solution of linear simultaneous equations: (6)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1. Gauss elimination method
2. Gauss-Jordan method
3. Jacobi's iteration method
4. Gauss-Seidel iteration method

Unit 5: Expansion of Functions and Indeterminate forms: (7)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1. Maclaurin's theorem
2. Standard expansions
3. Taylor's theorem
4. Indeterminate forms and L' Hospital's rule

Unit 6: Partial Differentiation:(8)(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)
1. Partial derivatives: Introduction
2. Total derivatives
3. Differentiation of implicit function
4. Euler's theorem on homogeneous function of two variables
5. Jacobian and its Properties .
6. Maxima and Minima of functions of two variables

General Instructions:
1. Batch wise tutorials are to be conducted. The number of students per batch should be as per the university pattern for practical batches.
2. Minimum number of assignments should be 8 covering all topics.

Recommended Books:
1. A text book of Applied Mathematics, Vol.I by P. N. Wartikar& J. N. Wartikar, Pune VidyarthiGrihaPrakashan, Pune.
2. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers, Delhi.
Reference Books:
1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
2. Advanced Engineering Mathematics by H. K. Dass, S. Chand, New Delhi.
3. A text book of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K.Sengar, Cengage Learning.
4. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
5. Numerical methods by Dr. B. S. Grewal, Khanna Publishers, Delhi.
6. A text book of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd.,NewDelhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II
Basic Electrical Engineering

SECTION I

Unit 1: Analysis of D.C. circuits: (8)

 (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Concept of E.M.F, Potential Difference, Current, Resistance, Ohm's Law Kirchhoff's laws, mesh and node analysis

 (Numerical on Mesh and Nodal Analysis of Two loops)

Unit 2:Magnetic circuits:(8)

   (Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

   Concept of mmf, reluctance, magnetic flux, Magnetic Flux density, Magnetic field strength, BH curve, magnetic leakage, fringing, Comparison of Electric and Magnetic circuit, series magnetic circuits (Theoretical Concepts only).

Unit 3: Single phase AC Circuits: (8)   (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

   Fundamentals of Alternating quantities, Faraday's Law, Types of Induced E.M.F ,Generation of sinusoidal voltage, concept of R.M.S. & Average value, form factor, Peak Factor, Pure Resistive, Inductive, Capacitive , R-L,   R-C, R-L-C series circuits, powers, Significance of power factor.
(Numerical Treatment on Series R-L, R-C, R-L-C circuits)

SECTION II

Unit 4: Three phase A.C. Circuits (7)   (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Advantages of 3 phase system, Generation of 3 phase AC supply, balanced 3 phase load, relation between line and phase quantities for star connected circuit and delta connected circuit.

Unit 5:Earthing and lamps: (7)   (Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Necessity of Earthing, Earthing methods, Fuse (rewireble and HRC). MCB, Incandescent Lamp, Fluorescent tube, CFL, LED lamp, Mercury vapour lamp, single line diagram of electrical systems.

Unit 6: Single phase Transformer: (8)   (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Construction, operating principle, Types, emf equation, Ratios of voltage and current, operation on no load and with load, power losses, efficiency, voltage regulation, applications.

(Numerical Treatment on E.M.F Equations &Transformer losses and Efficiency)

List of Experiments
Minimum 8 experiments should be performed from the following list.

1. Laboratory Sessions covering,General Introduction to Electrical Engineering laboratory, Experimental Set ups, Instruments etc.. Electrical Symbols.
2. Electric Shocks and precautions against shocks(Do's and Don'ts) .
3. Study of Ohm's Law.
4. Verification of Kirchhoff's Voltage Law and Kirchhoff's Current Law.
5. B-H curve of magnetic material.
6. Study of Faraday's law.
7. Determination of Reactance's for Series R-L- C Circuit.

8. Measurement of active and reactive power in balanced 3-phase circuit using Two-watt meter method.

9. Study of Basic methods of Earthing. Use of Fuse and Miniature Circuit breaker.

10. Study of different luminaries including Incandescent lamp, Mercury vapor lamps, fluorescent tube, CFL, and LED lamps.

11. Polarity and Ratio Test for single Phase Transformer.

12. Pre-determination of efficiency and regulation by Open Circuit and Short circuit tests on single phase transformer.

13. Determine the Efficiency of single Phase Transformer by Direct Loading Test

Reference books:

1. P.V.Prasad and S.Shivan Raju – Electrical Engineering concepts and Applications – Cengage learning.
2. B.L.Theraja – Electrical Technology vol.1. – S.Chand.
3. B.L.Theraja – Electrical Technology vol.2. – S.Chand.
4. NagrathI.J. and D.P.kothari – Basic Electrical Engineering(2001) – Tata McGraw Hill.
5. .BharatiDwivedi and AnurasgTripathi – Fundamentals of Electrical Engineering – Willey Precise

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II
Basic Civil Engineering
SECTION I

Unit 1: Relevance of Civil Engineering and Building Planning(7)
Introduction, branches of civil engineering, application of civil engineering inother alliedfields.Principles of planning, introduction to Bye-Laws regarding building line, height of building, open space requirements, F.S.I., setbacks, ventilation, sanitation as per municipal corporation area requirement.

Unit 2: Components of Building (7)
A) Sub-structure: Types of soil and rocks as foundation strata, concept of bearing capacity,types of foundations i.e. shallow and deep and their suitability. Shallow foundation such as wall foundation, isolated foundation, deep foundation such as pile foundation.
B) Super-structure: Elements of super-structures and their functions

Unit 3: Building Materials and Design (7)
Use and properties of the following materials--Concrete – ingredients and grades, plain and reinforced cement concreteand ready mixconcrete, bricks, steel, timber, roofingmaterials etc.
Introduction to types of loads, load bearing and framed structures.

SECTION II

Unit 4: Linear and Angular Measurements(7)
Principles of surveying, Classification of surveys, Chain Surveying, Introduction to metricchain and tapes, error in chaining, nominal scale and R.F., ranging, chaining and offsetting, index plan, location sketch and recording of field book, Chain and compass survey, Meridian, bearing and its types, system of bearing, Types of compass: prismatic and surveyor's compass. Calculation
Ofincluded angles, correction for local attraction.

Unit 5: Leveling (7)
Terms used in leveling, use of Dumpy level and Auto Level, temporary adjustments.Methodsof reduction of levels, types of leveling, Contours, characteristics of contours, use of contour maps.Introduction and use of EDM's with special reference to Total Station.Measurement of area by planimeter – mechanical and digital.

Unit 6: Introduction to Transportation, Environmental and Irrigation Engineering (7)
Components of rigid and flexible pavement, components of railway track (Broad Gauge)Components of water supply scheme (flow diagram), Necessity of Irrigation, Types of Dams (Earthen and Gravity Dam)

Term work:
Student can choose either Model A or Model B for performing practical
Model A
List of Experiments: Minimum 8 experiments should be performed from the following list-Practicalexercises given be carried out and drawing sheets be plotted wherever necessary.
1. Introduction to Measurement of Distances.
2. Plotting the outlines of building by chaining, ranging and offsetting.

3. Plotting of closed traverse by prismatic compass.
4. Reduction of levels by rise and fall method.
5. Finding out gradient of line by rise and fall method
6. Measurement of area by mechanical
7. Study of total station for various measurements.
8. Site visit to study various construction processes and principles of planning.
9. Drawing sheet showing various building elements.
10. Drawing sheet showing various sign conventions

Model B
List of Experiments: Minimum 8 experiments should be performed from the following list-Practicalexercises given be carried out and drawing sheets be plotted wherever necessary.
1. Introduction to Measurement of Distances.
2. Plotting the outlines of building by chaining, ranging and offsetting.
3. Plotting of closed traverse by surveyor's compass.
4. Reduction of levels by collimation plane method.
5. Finding out gradient of line by collimation plane method.
6. Measurement of area by digital planimeter
7. Study of total station for various measurements.
8. Site visit to study various construction processes and principles of planning.
9. Drawing sheet showing various building elements.
10. Drawing sheet showing various sign conventions

Reference Books:
1. Basic Civil Engineering by S. S. Bhavikatti, New Age International Publications.
2. Civil Engineering Materials - Technical Teacher's Training Institute, Chandigarh
3. Surveying by N. Basak, Tata Mc-Graw Hill Publication.
4. Basic Civil Engineeringby G. K. Hiraskar, DhanpatRai Publication.
5. Surveying Vol.I, Vol.II, Vol.III by B.C. Punmia, Laxmi Publication.
6. Irrigation Engineering by B. C. Punmia, DhanpatRai Publications

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II
EngineeringGraphics

SECTION I

Unit1: Fundamentals of Engineering Graphics& Engineering Curves   **(6)**

A) Fundamentals of Engineering Graphics: Introduction to Drawing instruments and their uses. Layout of drawing sheets, different types of lines used in drawing practice, Dimensioning system as per BIS (Theoretical treatment only)

B) Engineering curves: Construction of regular polygons (up to hexagon). Construction of Ellipse – (Directrix-Focus & Arcs of circle Method) Parabola-(Directrix-Focus & Rectangle Method) , Hyperbola-(Directrix-Focus & Rectangular Method), Involutes, Archimedian spiral and Cycloid only. (10 marks)

Unit 2: Projections of lines & Planes   **(9)**

A) Projections of lines: Introduction to First angle and third angle methods of projection.
Projections of points on regular reference planes. Projections of horizontal, frontal and Profile lines on regular and auxiliary reference planes. Projection of oblique lines it's True length and angle with reference planes by rotation and auxiliary plane method. Concept of grade and bearing of line.

B) Projections of planes: Projections on regular and on auxiliary reference planes. Types of planes (horizontal, frontal, oblique and Profile planes). Edge view and True shape of a Plane. Angles made by the plane with Principle reference planes. Projections of plane figures inclined to both the planes. (Circle and regular polygon) (15 marks)

Unit 3: Projections of solids   **(5)**

Projections of Prisms, Pyramids, Cylinder and Cones inclined to both referenceplanes(Excluding frustum and sphere)(10 marks)

SECTION- II

Unit 4: Orthographic Projections   **(7)**

Orthographic views: lines used, Selection of views, spacing of views, dimensioning and sections. Drawing required views (any two views) from given pictorial views (Conversion of pictorial view into orthographic view) including sectional orthographic view. (15 marks)

Unit 5: Isometric projections   **(6)**

Isometric projections: Introduction to isometric, Isometric scale, Isometric projections and Isometric views / drawings. Circles in isometric view. Isometric views of simple solids and objects. (10 marks)

Unit 6: Development of plane and curved surfaces   **(7)**

Development of plane and curved surfaces: of the solids, Prisms, Pyramids, Cylinders and Cones along with cutting planes (Solids in simple position only). (10 marks)

Note: The above syllabus is to be covered according to the first angle method of projection.
Self-Study: Geometrical constructions and free hand sketches**,** Missing Views

Term work:
The following six sheets are to be drawn based on the above topics. All these sheets should be drawn on half imperial (A3 size) drawing sheets only.

1. Engineering curves   01
2. Projections of lines and planes   01
3. Projections of solids   01
4. Orthographic projections   01
5. Isometric projections   01
6. Sections of solids and development of surfaces   01

Reference Books:
1. Engineering Drawingby N. D. Bhatt, Charotor Publication House, Bombay
2. Fundamentals of Engineering by W. J. Luzadder, Drawing, Prentice Hall of India.
3. Engineering Design and Visualization by Jon M.Duff,William A. Ross, CENGAGE Learning
4. Machine Drawing by N. D. Bhatt, Charotor Publication House, Bombay.
5. Graphic Science by French and Vierck, Mc-Graw Hill International.
6. Engineering Drawing and Graphics by K. Venugopal, New Age Publication
7. A text book of Engineering Drawing by R. K. Dhawan, S. Chand and Co.
8. Machine Drawing by K. L. Narayana, New Age Publication
9. Engineering Drawing by N. B. Shaha and B. C. Rana, Pearson Education.
10. Engineering Drawing and Graphics Using AutoCAD by T. Jeyapoovan, Vikas Publication.
11. Engineering Drawing by Prof. Amar Pathak, WIELY India Publication.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I
Professional Communication-I

Unit 1: Understanding Communication (3)
1. Introduction, nature and importance
2. Process of communication
3. Basic types of communication- Verbal and Non- verbal
4. Barriers and filters of communication

Unit 2: Grammar and Vocabulary (2)
1. Forms of Tenses
2. LSRW skills
3. Developing vocabulary (synonyms, antonyms, confused words etc.)

Unit 3: Phonetics (2)

1. Understanding Phonetics and its alphabets
2. Transcription practices

Unit 4: Developing Oral Skills (3)
1. Importance and techniques of spoken language.
2. Techniques of formal speech, meetings, Elocution, Extempore etc.

Unit 5: Professional Correspondence (4)

1. Importance, language and style, formats (British & American)
2. Letter Writing – Simple letter (seeking permission regarding absence etc.),
3. Preparation of technical events information broacher and manuals.

Term Work: Minimum 8 should be performed from the following list.
1. Elocution
2. Vocabulary building
3. Phonetic Alphabets (Listen & repeat)
4. Pronunciation
5. Fluency Tips
6. Extempore
7. Teamwork- story making
8. Effective reading (newspaper articles)
9. Active listening (memorizing)
10. Letter writing
11. Situational conversation

Instructions:
1. Minimum 7 assignments should be covered.
2. Use of language lab is mandatory for both the semesters.

Reference Books:
1. Handbook for Technical Writingby David A. McMurrey, Joanne Buckley, Cengage.
2. A Course in Englishby J.D. O'Connor.
3. Better English Pronunciation by J.D. O'Connor.
4. Communication Skills Handbook: How to succeed in written and oral communication by Jane Summers, Brette Smith, Wiley India Pvt.Ltd.
5. Personal Development for Life and Work by Masters, Wallace, Cengage.
6. Soft Skills for Managers by Dr. T. KalyanaChakravarthi, Dr. T. LathaChakravarthi, Biztantra.
7. Soft Skills for every one by Jeff Butterfield, Cengage.
8. Behavioural Science by Dr.Abha Singh, Wiley India Pvt.Ltd.
9. An Introduction to Professional English and Soft Skills by Bikram K. Das, KalyaniSamantray, Cambridge University Press New Delhi.
10. Speaking Accurately, K.C. Nambiar, Cambridge University Press New Delhi.
11. Speaking Effectivelyby Jeremy Comfort, Pamela Rogerson, Cambridge University Press New Delhi.
12. Cambridge English for Job Hunting by ColmDownes, Cambridge University Press New Delhi.
13. Body Language by Allen Pease.
14. The Ace of Soft Skills by Gopalswami Ramesh, Mahadevan Ramesh, Pearson Publication, Delhi.
15. Decision Making Skills by Khanka S.S.
16. Business Ethics and Communication by C.S. TejpalSheth.
17. Write Right by Syed AbdurRaheem.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II
Workshop Practice-I

Unit 1: Safety (3)
Concept of accidents, causes of accidents, safety precautions while working in shop, safetyequipments and their use.

Unit 2: Measuring Instruments (3)
Brief introduction to instruments like – Steel rule, Calipers, Vernier Caliper, Micrometer, DialGauge, Vernier height Gauge etc. Least counts, common errors and care while using them, Use ofmarkinggauge, 'V'block and surface plate.

Unit 3: Smithy (4)
Introduction to smithy operations like- bending, forming, upsetting, drawing. Smithy toolshammer,hot & cold chisel flatters, tongs, anvil etc.

Unit 4: Fitting (4)
Study of various tools like- files, drills, taps, dies. Fitting operations.

Term work:

The term work consists of assignment on safety, measuring instruments, Smithy and fitting.
Every student should perform,

1. Smithy
One job in smithy involving upsetting, Drawing, bending such as- Hook, peg, square headedbolt etc.

2. Fitting
One job Male/Female fitting with operations- Marking, cutting, drilling, tapping filing etc.

Reference Books:
1. A Course in Workshop Technology, Vol – I by B. S. Raghuvanshi, Dhanapat Rai and Sons.
2. Elements of Workshop Technology, Vol – I by HajaraChaudhari, Media Promoters.
3. Workshop Technology, Vol – I by Gupta and Kaushik, New Heights.
4. Workshop Technology, Vol – I by Chapman, The English Language Book Society.
5. Workshop Technology, Vol.-I by H.S. Bawa, TMH Publications, New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II
EngineeringChemistry

Unit 1: Water (7)

Introduction, impurities in natural water, water quality parameters total solids, acidity, alkalinity, chlorides, and dissolved oxygen (definition, causes, significance), hardness of water types of hardness, units of hardness, ill effects of hard water in steam generation in boilers (scale & sludge formation), numerical on hardness, treatment of hard water (ion exchange and reverse osmosis).

Unit 2: Instrumental methods of chemical analysis (7)

Introduction, advantages and disadvantages of instrumental methods-----

A)Spectrometry: Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's law),Single beam spectrophotometer (schematic, working and applications).

B)Chromatography: Introduction, types, gas-liquid chromatography (GLC), basic principle, instrumentation and applications.

Unit 3: Advanced materials (7)

A)Polymers: Introduction, plastics, thermo softening and thermosetting plastics, industrially important plastics like phenol formaldehyde, urea formaldehyde and epoxy resins, Conducting polymers and Biopolymers(Introduction, examples and applications.)

B)Composite materials: Introduction, Composition, properties and uses of fiber reinforced plastics (FRP) and glass reinforced plastic (GRP).

SECTION II

Unit 4: Fuels(7)

Introduction, classification, calorific value, definition, units (calorie, kcal, joules, kilojoules), characteristics of good fuels, comparison between solid, liquid and gaseous fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numericalproblems on Bomb and Boy's calorimeter.

Unit.5: Corrosion: (7)

Introduction, causes, classification, atmospheric corrosion (oxidation corrosion), electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism), factors affecting rate of corrosion. Prevention of corrosion by proper design and material selection,cathodic protection, Protective coatings- hot dipping (galvanizing and tinning,), electroplating.

Unit 6: Metallic materials & Green Chemistry (7)

A)Metallic materials: Introduction, Alloy- definition and classification, purposes of making alloys. Ferrous alloys: Plain carbon steels (mild, medium and high), stainless steels. Nonferrous alloys: Copper alloy (Brass), Nickel alloy (Nichrome), Aluminum alloy (Duralumin and Alnico).

B)Green Chemistry: Definition, Twelve principles of Green Chemistry.

Term work:

List of Experiments:

Minimum 8 experiments should be performed from the following list out of which two experiments should be demonstrative on instrumental methods.

1. Determination of acidity of water.
2. Determination of alkalinity of water.
3. Determination of chloride content of water by Mohr's method.

4. Determination of total hardness of water by EDTA method.
5. Determination of moisture, volatile and ash content in a given coal sample by proximate analysis.
6. Preparation of urea-formaldehyde resin.
7. Preparation of phenol-formaldehyde resin.
8. Determination of percentage of copper in brass.
9. Estimation of zinc in brass solution.
10. Determination of rate of corrosion of aluminium in acidic and basic medium.
11. Demonstration of pH meter.
12. Demonstration of photo-colorimeter / spectrophotometer.
13. Demonstration of paper chromatography.

Reference books:
1. Engineering Chemistry by Jain and Jain, DhanpatRai Publishing Company Ltd., New Delhi.
2. A Textbook of Engineering Chemistry by S. S. Dara and S. S. Umare, S. Chand & Company Ltd., New Delhi.
3. A Textbook of Engineering Chemistry by C. P. Murthy, C. V. Agarwal and A. Naidu, BS Publications, Hyderabad.
4. Chatwal and Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House, New Delhi.
5. Engineering Chemistry by Dr. A. K. Pahari and Dr. B. S. Chauhan, Laxmi Publications (P) Ltd, New Delhi.
6. A text Book of Engineering Chemistry by ShashiChawla, DhanpatRai& Co. (Pvt.) Ltd, Delhi.
7. Engineering Chemistry by Wiley India.
8. Engineering Chemistry by RenuBapna and Renu Gupta, MacMillan Publishers (India) Ltd, Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II

Fundamentals of Electronics and Computer

Unit 1: Semiconductor Devices and Applications (7)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Semiconductor Diode, Half wave, Full wave, Bridge rectifier, Voltage Regulator Using Zener Diode,BJT: characteristics, CE configuration, CE as an amplifier. Load Line, Operating Point, Leakage Currents, Saturation and Cut off Mode of Operations.

Unit 2: Digital Electronics (7)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Logic Gates, Boolean algebra, Comparison of Specifications of Logic Families, Combinational Logic, Half Adder, Full Adder, Multiplexer, De-Multiplexer.

Unit 3: Applications (7)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Transducers: for Displacement (LVDT), Temperature (RTD), Pressure (Strain Gauge), Speed (Shaft Encoder), Range, Specifications and Limitations.

B) Appliances: Operation of Appliances: Digital Thermometer, Weighing Machine, Washing Machine, Microwave Oven and Tachometer.

SECTION II

Unit 4: Computer Basics and Hardware (5)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Generations & Classification of Computers.

B) Computer System Architecture– CPU, Input Unit, Output Unit, Storage Unit.

C) Applications of Computers.

Unit 5: Data Representation and Computer Software (8)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

A) Data Representation In Computer: Types Of Number System – Binary, Octal, Decimal, Hexadecimal & Their Conversions, Coding Schemes – ASCII, Unicode.

B) Computer Software:

A) Operating System: Types Of Operating System, Functions, Unix/Linux Commands: Listing, Changing, Copying, And Moving Files & Directories (ls, cd, cat, mkdir, rmdir)

B) System Software: Assembler, Interpreter, Compiler.

C) Application Software's: Word Processor, Spreadsheets, Presentation andtheir Applications.

Unit 6: Computer Programming and Networks **(8)**

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Computer Programming: Program Development Cycle, Algorithm, Flowchart,

Programming Control Structures – Sequence, Selection, and Repetition.

B) Introduction to Computer Networks: Definition Of Computer Network, Need, Standards: OSI, TCP/IP, Types of Networks: LAN, WAN, MAN, Network Topologies.

Term work: FUNDAMENTAL OF ELECTRONICS

List of Experiments: Minimum 4 experiments should be performed from the following list.

1. Testing of Electronic components- resistors, capacitors, inductor, diode, transistor, LED and Switches using multi-meter &C.R.O.

2. V-I Characteristics of PN junction diode and Zener diode.

3. Study of Half and Full wave rectifiers and their comparison.

4. Study of Frequency response of CE amplifier.

5. Study of truth tables of logic Gates: OR, AND, NOT, NAND, NOR, EXOR.

6. Study of MUX/DEMUX.

7. Measurement of Displacement using LVDT/strain Gauge.

8. Measurement of Temperature using any transducer.

Self-Learning Activities: Different types of Communication systems & Communication Media.

Term work: FUNDAMENTAL OF COMPUTER

List of Experiments: Minimum 4 experiments should be performed from the following list.

1. Study of computer system – Internal Components & peripherals.

2. Use of Unix/Linux commands & create a file using any editor in Linux.

3. Create a document using any word processor (In Linux (open office) /Windows (Microsoft office).

4. Use any spreadsheet application to manipulate numbers, formulae and graphs (In Linux/Windows).

5. Use any power point presentation application and create a professional power point presentation using text, image, animation etc. (In Linux/Windows).

6. An assignment based on use of Internet and Web for searching and downloading Technical information.

7. Study of Tablet and Android Operating System Features and applications.

Text Books:
1. A Text Book of Applied Electronics by R S Sedha, S. Chand

2. Basic Electronics Engineering by Vijay Baru, RajendraKaduskar, S T Gaikwad (Wiley/ DREAMTECH)

3. Digital Principles & Applications by Albert Malvino, Donald Leach, TMGH Publication.

4. Principle of Electronics by V.K. Mehata, S. Chand

5. Electronic Instrumentation by H. S. Kalasi, Tata McGraw Hills Publication

Reference Books:
1) Electronics Devices and Circuit Theory by Robert L. Boylestad and Louis Nashelsky (Pearson Education Publication)

2) Fundamental of Digital Circuits by A. Anand Kumar (PHI- Publication)

3) Fundamental of Electronics Engineering by R.Prasad(CENGAGE- Learning)

4) Introduction to Information Technology, ITL Education Solutions LTD. Pearson Education

5) Fundamentals of Computers by V. Rajaram, PHI Publications.

6) UNIX concepts and applications by Sunitabha Das, TMGH.

7) Computer FundamentalsArchetucture and Organization by B.Ram New Age International Publishers.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II
Applied Mechanics

Unit 1: Fundamentals of Statics   **(7)**
Basic Concepts and Fundamental Laws, Force, Moment and Couple, System of Forces, Resultant, Resolution and Composition of Forces, Varignon's Theorem, Law of Moments.

Unit 2: Equilibrium   **(7)**
Lami s' Theorem, Free Body Diagram, Equilibrium of Forces, Equilibrium conditions, Surface friction for bodies on horizontal and inclined planes.
Beams: Types of Loads, Types of supports, Analysisof Simple beams, Virtual work method for support reactions.

Unit 3: Centroid and Moment of Inertia   **(7)**
Centroid and Center of Gravity, Moment of Inertia of Standard shapes from first principle, Parallel and perpendicular axis theorem, Moment of Inertia of plain and composite figures, Radius of Gyration.

SECTION II
Unit 4: Kinetics of Linear   **(8)**
Introduction to Kinematics of Linear motion (no numerical on kinematics), Kinetics of linear motion, Newton's Laws, D'Alembert's Principle, Work- Energy Principle, Impulse Momentum Principal

Unit 5: Kinetics of Circular Motion   **(8)**
Introduction to Kinematics of Circular motion (no numerical on kinematics), Rotation with constant and variable angular acceleration, centripetal and centrifugal force, condition of skidding and overturning.

Unit 6: Impact and Collision   **(5)**
Impact, Types of Impact, Law of conservation of Momentum, Coefficient of Restitution,Numerical on Direct central Impact.

Term work:
 Student can choose either Model 1 or Model 2 for performing practical

Model 1	Model 2
A) Experiments:	
1. Law of polygon of forces	**1.** Law of polygon of forces
2. Jib crane	**2.** Jib crane
3. Bell crank lever	**3.** Bell crank lever
4. Support Reactions of Beam	**4.** Support Reactions of Beam
5.Fleture's Trolley	**5.** Centrifugal force
B) Graphics Statics: (To be solved on A3 sheet)	
1. To find Resultant - 3 problems	1. To find Resultant - 3 problems
2.To find support reactions - 3 problems	**2.**To find support reactions - 3 problems
C) Home Assignments	
At least one assignment on each unit with minimum 5 numericals	At least one assignment on each unit with minimum 5 numericals

Reference Books:
1.Engineering Mechanics by S. S. Bhavikattis, New Age International Pvt. Ltd.
2.Engineering Mechanics by R. K. Bansal and Sanjay Bansal.
3.Vector Mechanics for Engineers Vol.I and II by F. P. Beer and E. R. Johnston, Tata Mc-Graw Hill Publication.
4.Engineering Mechanics by Manoj K Harbola, Cengage Learning
5.Engineering Mechanics by K. I. Kumar, Tata Mc-Graw Hill Publication
6.Engineering Mechanics by S. B. Junnerkar.
7.Engineering Mechanics by Irving H. Shames, Prentice Hall of India, New Delhi.
8.Applied Mechanics by S. N. Saluja, Satya Prakashan, New Delhi.
9.Engineering Mechanics by Statics and Dynamics by Ferdinand Singer, Harper and Row Publications
10.Engineering Mechanics by R. S. Khurmi, S. Chand Publications
11.Fundamentals of Engineering Mechanics by S. Rajasekaran, G. Sankarasubramanian,VikasPublishing House
12) "Applied Mechanics- Dynamics &Statics " by I.B.Prasad, Khanna Publisher, Delhi

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II
Basic Mechanical Engineering

Unit1:Thermodynamics(7)
Thermodynamic State, Process, Cycle, Thermodynamic System, Heat, work, Internal Energy,First Law of Thermodynamics, Application of First Law to steady Flow processes,Limitations of First Law (Numerical Treatment) Statements of Second Law of Thermodynamics.(12 marks)

Unit 2: Introduction to I C Engine (7)
Carnot Engine, Construction and Working of C.I. and S.I., Two stroke, Four Stroke Cycles,Air standard cycles- Carnot Cycle, Joule Cycle, Otto Cycle, Air Standard efficiency (DescriptiveTreatment only) (12 marks)

Unit 3: Introduction to Refrigeration and Air Conditioning (6)
Carnot refrigerator, Refrigerant types and properties, Vapour compression and vapourabsorption system, solar refrigeration, Window Air Conditioning, Psychometric properties ofmoistair, Applications of refrigeration and air conditioning (Descriptive Treatment only).(11 marks)

Unit4:EnergySources and power plants (7)
Renewable and nonrenewable, Solar-flat plate collector, concentric collector–Parabolic andcylindrical, Photovoltaic cell, Wind, Hydropower plant, Steam Power plant,Bio-gas, Bio-Diesel (Descriptive Treatment only). (12 marks)

Unit 5: Mechanical Power Transmission and Energy conversion devices(7)
Type of Belt and belt drives, chain drive, Types of gears and gear Trains, (Numerical Treatment on belt drive), Construction, workingand applications of centrifugal Pump, Reciprocating compressor and Peloton wheel Turbine.(12 marks)

Unit 6: Manufacturing Processes (6)
Introduction to manufacturing processes - Casting Process, Steps involved in castingprocesses, and their applications, Metal removing processes (Lathe, milling & drilling operations) Metal JoiningProcesses – Arc welding, soldering and brazing and their applications.(11 marks)

Term Work:
List of experiments: Minimum 8 experiments should be performed from the following list--
1. Demonstration of I.C. engine
2. Demonstration of Two stroke and four stroke engine
3. Demonstration of vapor compression refrigeration system and window airconditioner.
4. Demonstration of Solar water heating system.
5. Demonstration of Steam or Hydroelectric Power Plant
6. Demonstration of Diesel power plant
7. Demonstration of types of Gears and gear trains.
8. Demonstration of pumps and compressor.
9. Demonstration of hydraulic turbine
10. Demonstration of metal joining processes.
11. Demonstration of metal removal processes
12.Industrial visit based on syllabus.

Reference Books:
1. Solar Energy by Dr.S.P. Sukathame,Tata Mc-Graw Hill Publication
2. Non-Conventional Sources of Energy by G.D. Rai, Khanna Publication
3.Engineering Thermodynamics by R.Joel, The English Language Book Society.
4.Engineering Thermodynamics by Achultan, Prentice Hall of India.
5.Thermal Engineering by R.K. Rajput, Laxmi Publication, Delhi.
6.Elements of Heat Engine Vol.I,II,III by Patel and Karamchandani, Acharya Book Depot.
7.Power Plant Engineering by Arora and Domkunwar, Dhanpat Rai and Sons.
8. Manufacturing Technology Volume I and II by P. N. Rao, Tata Mc-Graw Hill Publication
9. Elements of Workshop Technology, Vol.I and II by HajaraChoudhari, Media Promoters
10. Basic Mechanical Engineering by Basant Agrawal & C. M. Agrwal, Wiley India Pvt. Ltd.
11.Energy Technology by S. Rao and Dr.B.B. Parulekar, Khanna Publication.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -II
EngineeringMathematics-II
SECTION-I
Unit 1: Ordinary Differential Equations of First Order and First Degree (7)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1. Linear differential equations
2. Reducible to Linear differential equations
3. Exact differential equations
4. Reducible to Exact differential equations

Unit 2: Applications of Ordinary Differential Equations of First Order and First Degree **(6)**
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1.Applications to Orthogonal trajectories (Cartesian and Polar equations)
2. Applications to Simple Electrical Circuits
3. Newton's law of cooling

Unit 3: Numerical Solution of Ordinary Differential Equations of First Orderand First Degree(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)**(8)**
1. Taylor's series method
2. Euler's method
3. Modified Euler's method
4. Runge-Kutta fourth order formula

SECTION-II

Unit 4:Numerical Solutions Of Algebraic and Transcendental Equations   **(6)**(Weightage
10 Marks in Shivaji Uni Exam of 70 marks)
1. Bisection Method
2. Secant Method
3. Newton Raphson Method
Unit 5: Special Functions   **(7)**
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)   1. Gamma
function and its properties
2. Beta function and its properties
3. Error function and its properties

Unit 6: Multiple Integration and its applications: **(8)**
(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)
1. Double Integrals and evaluation
2. Change of order of integration
3. Change into Polar Coordinates
4. Area enclosed by plane curves
5. Mass of a plane lamina

General Instructions:
1. Batch wise tutorials are to be conducted. The number of students per batch should be asperthe
Universitypattern for practical batches.

2. Minimum number of assignments should be 8 covering all topics.

Recommended Books:

1. A text book of Applied Mathematics, Vol.-I by P. N. Wartikar& J. N. Wartikar, PuneVidyarthiGrihaPrakashan, Pune.

2. A text book of Applied Mathematics, Vol.-II by P. N. Wartikar& J. N. Wartikar, PuneVidyarthiGrihaPrakashan, Pune.

3. Dr. B. S. Grewal - Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers,Delhi.

Reference Books:

1. Higher Engineering Mathematics by B.V.Ramana, Tata McGraw-Hill Publications, NewDelhi

2. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.

3. Advanced Engineering Mathematics by H. K. Dass.

4. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.

5. A textbook of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K. Sengar, Cengage Learning.

6. A textbook of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd.,New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II
Workshop Practice-II
Unit 1: Welding (4)
Types of welding – gas welding, arc welding, resistance welding, Welding equipment's,welding of various metals, electrode classification and coding, welding joints.

Unit 2: Carpentry (4)
Introduction, Classifications of wood, common varieties of Indian timber, carpentry toolslike- Marking tools, cutting tools, planes, striking tools, holding tools. Carpentry operations- marking,sawing,chiseling, grooving etc. carpentry joints.

Unit 3: Sheet metal work (4)
Specifications of metal sheets, working tools, sheet metal operations like-cutting, bending,folding, punching, reverting and joining by brazing and soldering.
Unit 4: Air pollution: (2)
Air pollution due to automobiles, causes, PUC testing.
Term work:
The term work consists of assignment on Welding, Carpentry, Sheet metal work, Airpollution.
Every student should perform---
1. Welding: One job on Arc welding- Lap / Butt Joint etc. (For individual student)
OR
Table, Shoe stand, Bag stand etc. (For 4-6 students)
2. Carpentry :One composite job involving dovetail joint, T joint, cross halving joint, pen stand etc.(Forindividual student)
OR
Table, Teapot, Stool etc. (For 4-6 students)
3. Sheet metal Work:
One job on commercial items such as Dust bin, funnel, tray etc.
Reference Books:
1. A Course in Workshop Technology, Vol – I by B. S. Raghuvanshi, Dhanapat Rai and Sons.
2. Elements of Workshop Technology, Vol – I by HajaraChaudhari, Media Promoters.
3. Workshop Technology, Vol – I by Gupta and Kaushik, New Heights.
4. Workshop Technology, Vol – I by Chapman, The English Language Book Society.
5. Workshop technology, Vol.-I by H.S. Bawa, TMH Publications, New Delhi.
6. I.C. Engines by Mathur& Sharma, Dhanpat Rai Publications, New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -II
Professional Communication-II

Unit 1: Developing Writing Skills(3)
1. Importance of technical writing
2. Report Writing:
a) Techniques of Report Writing
b) Methods of data collection
c) Types of Report Writing- Survey, Inspection and Investigation

Unit 2: Behavioral Skills(5)
1. Understanding Self (SWOT analysis)
2. Attitude Building/ Developing Positive attitude
3. Decision Making Skills
4. Leadership Skills
5. Stress Management
6. Time Management
7. Team Work

Unit 3: Presentation Skills(2)
1. Importance & techniques
2. Presenting yourself professionally
Unit 4: Career skills (4)
1. Corporate Manners and Etiquettes
2. Planning and Managing Career
3. Job Application and Resume
4. Interview: Techniques& skills
5. Group Discussion
6. Debate

Term Work: Any 8 out of the following should be conducted
1. Group Discussion (lab session/class room activity)
2. Mock Interview
3. Report writing (lab session/class room activity)
4. Paragraph writing on current technical writing
5. Presentation on current affairs
6. Developing Professional Telephonic skills
7. Exercise of Application writing and Resume writing
8. Practice of Case Study
9. Team building activities
10. Report writing (3 types)
11. Introduction and use of modern communication techniques
12. Computer aided presentation of a project report (PPT)

Instructions:
1. Minimum 7 assignments should be covered.
2. Use of language lab is mandatory for both the semesters.

Reference Books:
1. Handbook for Technical Writingby David A. McMurrey, Joanne Buckley, Cengage.
2. A Course in Englishby J.D. O'Connor.
3. Better English Pronunciation by J.D. O'Connor.
4. Communication Skills Handbook: How to succeed in written and oral communication byJane Summers, Brette Smith, Wiley India Pvt.Ltd.
5. Personal Development for Life and Work by Masters, Wallace, Cengage.
6. Soft Skills for Managers by Dr. T. KalyanaChakravarthi, Dr. T. LathaChakravarthi,Biztantra.
7. Soft Skills for every one by Jeff Butterfield, Cengage.
8. Behavioural Science by Dr.Abha Singh, Wiley India Pvt.Ltd.
9. An Introduction to Professional English and Soft Skills by Bikram K. Das, KalyaniSamantray, Cambridge University Press New Delhi.
10. Speaking Accurately, K.C. Nambiar, Cambridge University Press New Delhi.
11. Speaking Effectivelyby Jeremy Comfort, Pamela Rogerson, Cambridge University PressNew Delhi.
12. Cambridge English for Job Hunting by ColmDownes, Cambridge University Press NewDelhi.
13. Body Language by Allen Pease.
14. The Ace of Soft Skills by Gopalswami Ramesh, Mahadevan Ramesh, PearsonPublication, Delhi.
15. Decision Making Skills by Khanka S.S.
16. Business Ethics and Communication by C.S. TejpalSheth.
17. Write Right by Syed AbdurRaheem.

SHIVAJI UNIVERSITY, KOLHAPUR

REVISED SYLLABUS

SECOND YEAR (B. Tech) CBCS

CIVIL ENGINEERING

To be introduced from the academic year 2019-20

(i.e. from June 2019) onwards

SHIVAJI UNIVERSITY, KOLHAPUR

SECOND YEAR B. TECH. (CIVIL) SEMESTER –III

ENGINEERING MATHEMATICS-III

Course	Teaching Scheme					Evaluation Scheme			
						Theory (Marks)		Practical(Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for Passing	Max.	Min. for Passing
Engineering Mathematics-III (BSC-CV301)	03	01	-	04	ISE	-	-	25	40%
					CIE	30	40%	-	-
					ESE	70	40%	-	-

ISE: In semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To introduce the concept of linear differential equations of higher and their applications.
2. To introduce concept of vector calculus.
3. To learn the concept of Probability.
4. To familiarize the students with concepts and applications of Laplace Transforms.
5. To understand the concept of Complex variable.

Course Outcomes:
After completion of this course students will be able to:
1. Solve Liner differential equations and problems related to applications of differential equation.
2. Perform vector differentiation.
3. Find probabilities by using probability distributions.
4. Find Laplace transform, Inverse Laplace transform of various functions and applications.
5. Find analytic function.

SECTION I

Unit 1: Linear Differential equations with constant coefficients: **(7)**
   1.1 Linear Differential equations with constants coefficients and their methods of solutions
   1.2 Applications of Linear Differential equations with constants coefficients to Civil engineering problems (Beam, Cantiliver and strut)

Unit 2: Vector differential calculus: **(5)**
   2.1 Differentiation of vectors Consistency of linear system equations
   2.2 Gradient of scalar point function and directional derivative
   2.3 Divergence of vector point function and solenoidal vector fields
   2.4 Curl of a vector point function and irrotational   vector field

Unit 3: **Probability Distribution:** (6)
   3.1 Random Variable
   3.2 Binomial Distribution
   3.3 Poisson distribution.
   3.4 Normal distribution

SECTION II

Unit 4: Laplace Transform: (7)
   4.1 Definition and transforms of elementary functions.
   4.2 Properties of Laplace transform.

Unit 5: Inverse Laplace Transform: (6)
   5.1 Inverse Laplace Transform Formulae.
   5.2 Inverse Laplace Transform by using partial fraction and convolution theorem.
   5.3 Solution of Linear Differential equations with constants coefficients.

Unit 6: Complex Variable: (5)
   6.1. Functions of complex variable.
   6.2 Analytic function.
   6.3 Necessary and sufficient condition for f(z) to be analytic.
   6.4 Cauchy –Riemann equations in Cartesian and polar coordinates.
   6.4 Milne- Thomson method.
   6.5 Harmonic function.

Term work:
   1. Batch wise tutorials are to be conducted. The number of students per batch should be as per the university pattern for practical batches.
   2. Minimum number of assignments should be 6 covering all topics.

Text Books:
   1. A text book of Applied Mathematics, Vol.I by P. N. Wartikar & J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.

   2. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers, Delhi.

   3. A text book of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd., New Delhi.

   4. A text book of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K. Sengar, Cengage Learning.

Reference Books:
   1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
   2. Advanced Engineering Mathematics by H. K. Dass, S. Chand, New Delhi.
   3. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.

Guidelines regarding the question paper setting

It will be two sections. Each will include four questions having weight age 12, 11, 11, and 12. Out of four questions of each section attempt any three.

First three questions should be on each unit separately and **question no. 4** should be on all the three units (**out of three solve any two**)

End Semester Examination

Question No.	Unit Number	Marks
1	1	12
2	2	11
3	3	11
4	1,2,and 3	12
5	4	12
6	5	11
7	6	11
8	4,5,and 6	12

SHIVAJI UNIVERSITY, KOLHAPUR

SECOND YEAR B. TECH. (CIVIL) SEMESTER -III

SURVEYING-I

Course	Teaching Scheme					Evaluation Scheme			
						Theory (Marks)		Practical(Marks)	
	L	T	P	Credit	Scheme	Max	Min. for Passing	Max	Min. for Passing
Surveying-I (PCC-CV302)	03	-	02	04	ISE	-	-	50	40%
					CIE	30	40%	-	-
					ESE	70	40%	25	40%

ISE: In semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To obtain a full understanding of the methods of measurement, errors to be expected, and their control.
2. To know the basics of levelling and theodolite survey in elevation and angular measurements.
3. To find out area and volumes using various instruments.
4. To study the significance of plane table surveying in plan making.
5. To be able to use minor instruments with efficiency.
6. To understand the importance of surveying in the field of civil engineering.

Course Outcomes: After completing of this course, student will be able to:
1. Determine linear and angular measurements.
2. Record various measurements in the field book.
3. Find areas of irregular figures.
4. Prepare plans and sections required for civil engineering projects.

SECTION I

Unit 1: Levelling and Contouring: (8)
a) Introduction to levelling.
b) Permanent Adjustments of dumpy level.
c) Reciprocal levelling, Sensitivity of bubble tube, Corrections – curvature and refraction.
d) Contouring – methods and applications.

Unit 2: Areas and volumes: **(5)**
   a) Planimeter – Area of Zero Circle and Numerical.
   b) Area- Trapezoidal, Simpsons rule, Mid - ordinate rule, Average ordinate.
   c) Volume- Trapezoidal and Simpsons Rule, Capacity contouring.

Unit 3: Plane Table Surveying: **(5)**
   a) Principles, accessories, significance and adjustments.
   b) Methods and applications of plane table survey.

SECTION - II

Unit 4: Theodolite: **(6)**
   a) Vernier theodolite – components, uses and adjustments.
   b) Applications – Trigonometrical levelling.

Unit 5: Theodolite Traversing: **(7)**
   a) Objectives, traverse table, plotting.
   b) Omitted measurements.

Unit 6: Applications: **(5)**
   a) Usage of minor instruments- Hand Level, Abney Level, Ghat Tracer and Box Sextant.
   b) Hydrographic survey.
   c) Tunnel survey.

Term Work:
   1. Differential and reciprocal levelling, by Auto or Dumpy Level.
   2. Two Peg Method.
   3. Sensitivity of bubble tube.
   4. Methods of plane table survey – any two methods.
   5. Measurement of horizontal angles by any two methods.
   6. Trigonometrical levelling- when base is accessible.
   7. Project drawings

Survey Projects:
   1. Block contouring project for at least 100m x 100m- By Auto Level.
   2. Theodolite traverse – Pentagon.

Textbooks:
   1. Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S.V.Kulkarni, Pune
   1. Vidyarthi Griha Prakashan.
   2. Surveying and Levelling by Subramanian, Oxford University Press.
   3. Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, ArunK.Jain, Laxmi
   4. Publications.
   5. Surveying and Levelling by N. N. Basak, Tata McGraw Hill.
   6. Surveying, Vol. I & II by S. K. Duggal, TataMc-Graw Hill.
   7. Surveying and Levelling - R. Agor, Khanna Publishers, New Delhi.

Reference Books:
1. Principles of Surveying. Vol. I by J. G. Olliver, J. Clendinning - Van Nostrand Reinhold.
2. Plane Surveying by A. M. Chandra, New Age International Publishers.
3. Surveying Vol. I & II by Dr. K. R. Arora, Standard Book House.
4. Plane surveying – David Clark.

Guidelines for Question Paper Setting:
1. It will include two sections. Each section will include 4 questions having weightage 12, 11, 11 and 12. **Attempt any three out of 4 Questions from each section.**

2. First three questions should be on each unit separately and Question No.4 should be on all the three units .**Question No.4 and 8 should be of short notes** (Attempt any three out of five)

End Semester Examination

Question No.	Unit No.	Marks
1.	1	12
2.	2	11
3.	3	11
4.	1,2 and 3	12
5.	4	12
6.	5	11
7.	6	11
8.	4,5 and 6	12

SECOND YEAR B. TECH. (CIVIL) SEMESTER -III

STRENGTH OF MATERIALS

Course	Teaching Scheme					Evaluation Scheme			
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for Passing	Max.	Min. for Passing
Strength of Materials (ESC-CV303)	03	-	02	04	ISE	-	-	25	40%
					CIE	30	40%	-	-
					ESE	70	40%	25	40%

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To develop an understanding of the basic principles of Structural Analysis.
2. Study the internal effects and deformations caused by the applied loads.
3. Understand the analysis and design aspects of structural engineering.

Course Outcomes:
After completion of this course students will be able to:
1. Evaluate the response of elastic body for external actions and compute design forces.
2. Evaluate shear force and bending moment of statically determinate structure.
3. Analyze the stress, strain and deformation of elastic bodies under bending and shear actions.
4. Analyze the stress, strain and deformation of elastic bodies under external actions.

SECTION I

Unit 1: Stress & Strain: (6)

1.1 Engineering properties of different materials.
1.2 Simple stress and strain, Hooke's law, elastic behavior of the body under external actions.
1.3 Composite sections under axial loading, temperature stresses, elastic constants.
1.4 Normal stresses and strains in three dimensions.

Unit 2: Shear force diagram & bending moment diagram for determinate beams: (6)

2.1 Concept and definition of SF & BM, relation between SFD, BMD & loading.
2.2 SFD & BMD due to point load, UDL, UVL & moments/couples.

Unit 3: Analysis of trusses: (6)

3.1 Introduction to truss.
3.2 Analysis of truss using method of joints & method of sections.

Unit 4: Bending stresses: (6)

4.1 Theory of pure bending.

4.2 Derivation of flexural formula.

4.3 Bending stress for symmetrical & unsymmetrical section.

Unit 5: Shear stresses in beam: (6)

5.1 Shear stress distribution for symmetrical & unsymmetrical section.

Unit 6: Strain Energy: (6)

6.1 Strain energy due to different types of actions, suddenly applied load, gradually applied load & impact load, strain energy method for deflection of determinate beams.

6.2 Analysis of thin walled cylinder.

Term Work:
Term work shall comprise of –
   A) Perform at least any Seven from following:
  i. Study of Universal Testing Machine.
  ii. Tensile test on Mild steel and TMT steel.
  iii. Compression test on M.S. and C.I, cement bricks or paving blocks
  iv. Compression test on timber.
  v. Direct shear test on M.S. bar.
  vi. Charpy or Izod Impact test on different metals.
  vii. Bending test on Timber.
  viii. Water absorption and compression test on burnt bricks.
  ix. Hardness test on metals.
   B) At least one assignment on each unit.

Text Books:
1. "Strength of Materials" - R.K.Bansal., Laxmi Publications.
2. "Strength of Materials" - S Ramamrutham, DhanapatRai Publications.
3. "Structural Analysis" - Bhavikatti S.S, Vikas Publications house New Dehli.
4. "Strength of Materials" - R.K.Rajput., S.Chand Publications.

Reference Books:
1. "Mechanics of Materials" - Gere and Timoshenko, CBS publishers.
2. "Mechanics of Material" - Beer and Johnston, M.
3. "Strength of Material" - F. L. Singer and Pytel, Harper and Row publication.

Guidelines regarding the Question Paper Setting:

It will include two sections. Each section will include 4 questions having weightage 11, 12, 12 and 12. **Question No. 1 & 5 is and solve any 2 out of remaining 3 in each section**

Question No. 1 and 5 should compulsory be on theory

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End Semester Examination

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Question No.	Unit No.	Marks
1.	1, 2, 3 - Theory	09
2.	1 - Problem	13
3.	2 - Problem	13
4.	3 - Problem	13
5.	4,5,6 - Theory	09
6.	4 - Problem	13
7.	5 - Problem	13
8.	6 - Problem	13

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SECOND YEAR B. TECH. (CIVIL) SEMESTER -III

FLUID MECHANICS - I

Course	Teaching Scheme					Evaluation Scheme			
	L	T	P	Credit	Scheme	Theory (Marks)		Practical(Marks)	
						Max.	Min. for Passing	Max.	Min. for Passing
Fluid Mechanics-I (ESC-CV304)	03	-	02	04	ISE	-	-	25	40%
					CIE	30	40%	-	-
					ESE	70	40%	25	40%

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To study processes and science of fluid and their properties.
2. To study pressure measuring devices and pressure diagram.
3. To apply basic principles in fluid flow problems.
4. To identify the losses in pipes.

Course Outcomes:
After successful completion of this course, student will be able to:
1. Study the basic properties of fluids and their behavior under application of various force systems.
2. Discuss the basic concepts and principles in fluid statics, fluid kinematics and fluid dynamics with their applications in fluid flow problems.
3. Recognize the principles of continuity, momentum and energy as applied to fluid in motion.
4. Apply the equations to analyze problems by making proper assumptions and learn systematic engineering methods to solve practical fluid mechanics problems.

SECTION-I

Unit-1: Properties of fluid: (6)

Introduction: Physical Properties of Fluids (Density, Specific Weight, Specific Volume, Specific Gravity, Viscosity: Dynamic and Kinematic Viscosity, Compressibility, Surface tension, Capillary Effect, Vapour Pressure and Cavitation), Newton's law of viscosity, Types of Fluids. Pressure, Types of Pressure, Pascal's Law, Hydrostatic Law.

Unit-2: Fluid Statics: (7)

A. Pressure Measuring Devices, Pressure Head, Pressure Diagram, Total Pressure and Centre of Pressure, Forces on Plane and Curved Surfaces. Forces on vertical walls, gates and dams.
B. Buoyancy and Floatation: Archimedes's Principle, Metacentre, Stability of Submerged and Floating Bodies.

Unit-3: Fluid Kinematics: (5)

Types of Flows, Stream lines, Streak Line, Path Line, Stream Tube, Stream Bundle, Equipotential lines, velocity and acceleration of fluid, Stream Function and Velocity Potential Function, Flow Net- (Properties and Uses), Continuity Equation (3-D Cartesian Form).

SECTION-II

Unit-4: Fluid Kinetics: (7)

Forces Acting on Fluid in Motion, Euler's Equation along a Streamline, Bernaulies equations, Bernoulli's Theorem assumptions, Limitations and modifications.

Bernoulli's Applications: Venturimeter (Horizontal andVertical), Orificemeter, Orifices, Time required for Emptying the Tank, Concept of HGL and TEL.Therotical and Experimental determination of hydraulic coefficents of orifice. Introduction of mouthpiece and Rotameter.

Unit-5: Laminar and Turbulent Flow: (6)
A. Laminar Flow and Turbulent Flow: Reynold's Experiment, Hazen Poisulle's Equation for Viscous Flow through Circular Pipes, Prandtl Mixing Length Theory, Introduction to Moody's Chart.

B. Boundary Layer Theory: Concept, Various Thicknesses (Nominal, Displacement, Momentum, Energy), Hydraulically Smooth and Rough Boundaries, Separation of Boundary Layer, Control of Separation.

Unit-6: Losses in Pipes: (5)
A. Major and Minor Losses, Darcy-Wiesbach Equation, Concept of Equivalent Pipe, Dupit's Equation.

B. Pipes in Series, Parallel and Syphon, Two Reservoir Problems, Three Reservoir Problems Concept of Water hammer. Surge Tanks (Function, Location and Uses).

Term work:
Perform at least Eight Experiments from the Following:
1. Study of Pressure Measuring Devices.
2. Measurement of Discharge.
3. Determination of Metacentric Height for Floating Bodies.
4. Verification of Bernoulli's Theorem.
5. Calibration of Venturimeter.
6. Calibration of Orificemeter.
7. Determination of Hydraulic Coefficients of Orifice.
8. Reynold's Experiment.
9. Determination of Friction Factor for Given Pipe.
10. Determination of Minor Losses in a Given Pipe.
11. Study of Moody's Chart.

Text Books:
1. Fluid Mechanics – A.K. Jain – Khanna Pub., Delhi.
2. Fluid Mechanics – Hydraulic and Hydraulic Mechanics -Modi/Seth – Standard Book House, Delhi.
3. Fluid Mechanics – S. Nagrathanam – Khanna Pub., Delhi.
4. Fluid Mechanics – Garde-Mirajgaonkar – Nemchandand Bros., Roorkee.
5. Fluid Mechanics – Arora.
6. Fluid Mechanics through Problems – Garde R. J.
7. Fluid Mechanics and hydraulic machine-R.K.Bansal, Laxmi Pubication.

Reference books:
1. Fluid Mechanics – Streeter-McGraw-Hill International Book Co., Auckland.
2. Elementary Fluid Mechanics – H. Rouse – Toppan C. Ltd. Tokyo.
3. Fundamentals of Fluid Mechanics, Munson, Young, Okiishi, Huebesch, Wiley Publication.
4. Fluid Mechanics – Shames - McGraw-Hill International Book Co., Auckland.

Guidelines regarding the question paper setting:

It will include two sections. Each section will include 4 questions having weightage 11, 12, 11 and 12. **Out of 4 Questions of each section attempt any three.**

First three questions should be on each unit separately and Question No.4 should be on all the three units. **Question No.4 and 8 should be of short notes**.

End Semester Examination

Question No.	Unit No.	Marks
1.	1	11
2.	2	12
3.	3	11
4.	1,2 and 3	12
5.	4	11
6.	5	12
7.	6	11
8.	4,5 and 6	12

SHIVAJI UNIVERSITY, KOLHAPUR

SECOND YEAR B. TECH. (CIVIL) SEMESTER -III

BUILDING CONSTRUCTION AND MATERIALS

Course	Teaching Scheme					Evaluation Scheme			
	L	T	P	Credit	Scheme	Theory (Marks)		Practical(Marks)	
						Max.	Min. for passing	Max.	Min. for passing
Building Construction and Materials (PCC-CV305)	04	-	02	05	ISE	-	-	50	40%
					CIE	30	40%	-	-
					ESE	70	40%	-	-

ISE: In Semester Evaluation   CIE: Continuous internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To understand the properties and suitability of building materials.
2. To understand the different building components.
3. To understand the masonry work by using stones, bricks, blocks.
4. To understand the various types of doors and windows with their components.
5. To understand the requirements of good stairs and design of stairs.
6. To understand different types of roofs and floors.

Course Outcomes:
After completion of this course students will be able to:
1. Know the building Materials.
2. Describe properties and suitability of various building materials.
3. State the different building components.
4. Demonstrate different bonds in brick masonary.
5. Produce drawings of different building components.
6. Explain different types of roof coverings & types of flooring.

SECTION I

Unit 1: Engineering properties and use of following materials: **(9)**

   1.1 Stones – Requirements of good building stone, uses of building stones.

   1.2 Bricks – Manufacturing, Types (clay bricks, fly ash, cellular light weight concrete brick, aerated cement concrete brick or autoclave brick) and Engineering Properties.

   1.3 Timber – Natural and Artificial wood and their application in Civil Engineering.

   1.4 Steel – Standard structural sections, steel as reinforcement.

   1.5 Tiles - Ceramic, Vitrified, Natural Stone, Paving Blocks.

   1.6 Miscellaneous – Aluminium, Glass, Plastic.

Unit 2: **(9)**

a) **Basic requirements of a building as a whole:** Strength and stability, Dimensional stability, comfort and convenience, damp prevention, water-proofing techniques, heat insulation, day lighting and ventilation. Sound insulation and anti termite treatment.

b) **Building components and their basic requirements** : Foundations, plinth, walls and columns in superstructure, floors, doors and windows, sills, lintels and weather sheds, roofs, steps and stairs, utility fixtures.

c) **Formwork**: Materials (wooden, steel and aluminium).

d) **Foundations**: Types and their suitability (Stepped, isolated, combined, strip, raft, strap or cantilever, pile.)

Unit: 3 **(6)**

a) **Stone Masonry** – Random Rubble, Uncoursed Rubble, Coursed Rubble and Ashlar Masonry.

b) **Brickwork and Brick Bonds** - English, Flemish, Composite masonry.

SECTION II

Unit: 4 **(8)**

a) **Lintel**: Necessity, Materials: wood, stone, brick, steel, R.C.C. and reinforced brick lintels.

b) **Doors** – Classification, T.W. Paneled Door, Flush Door, Aluminum Glazed Doors, Steel Doors, fixtures and fastening.

c) **Windows** - Classification, T.W. Glazed Windows, Aluminum Glazed Windows, fixtures and fastening.

Unit: 5 **(8)**

Stairs: Technical terms, requirements of a good stair, uses, types, materials for construction. Design of stairs (Dog Legged, quarter turn and Open Well), Ramps, lifts and escalator.

Unit: 6 **(8)**

a) **Roofs and Roof coverings:** Terms used. Roof and their selection, pitched roofs and their types, Steel Trusses types and their suitability, roof covering, material, details, fixtures manglore tiles, A. C., G. I. and Precoated sheets, concept of proflex (truss less) roof and their selection.

b) **Construction of floors:** Concrete Flooring, R.C.C. slabs, R.C.C. beams and slab. Flat slab floor.

c) **Waterproofing:** Materials, methods and systems.

Term Work:
1. Drawing to a Scale, Draw on Half Imperial Drawing Sheet.

a. Foundations: - Isolated, Combined Footing, Under Reamed Piles. (With reinforcement details)

b. Stone Masonry: UCR, Course Rubble.

c. Brick masonry: English bond, Flemish bond.

d. Doors: T.W. Paneled Door.

e. Windows: T.W., Glazed and aluminium Window.

f. Stairs: Dog legged, quarter turn and Open well.

2. Sketch Book:
   a. Lettering, Symbols, Types of lines and dimensioning as per IS 962.
   b. Doors: Flush doors, Revolving door, Collapsible door and rolling shutter.
   c. Windows: Louvered window, Sliding Window, Bay window, Casement window, Dormer Window, Corner Window.
   d. Roofs: Line Sketches of steel trusses for different spans.
   e. Stairs: Quarter turn, bifurcated, Spiral, Geometrical.
   f. Lifts and Ramps.
   g. Formwork: footing, column and beam.

Text Book:
   1. Building Construction – B.C.Punmia (Laxmi Publications).
   2. Basic Civil Engineering – G. K. Hiraskar (DhanpatRai Publications).
   3. A Text Book of Building Construction – S.P. Arora, S.P. Bindra (Dhanpat Rai Publications).
   4. Construction Technology (Volume 1 to 4) – R. Chudley (ELBS).
   5. A Course in Civil Engineering Drawing – V.B.Sikka (S.K.Kataria and Sons)
   6. Civil Engineering Drawing – M. Chakraborty.
   7. Engineering Materials – R.K.Rajput (S Chand).

References Book:
   1. A to Z of Practical Building Construction and Its Management- Sandeep Mantri SatyaPrakashan, New Delhi.
   2. Handbook of Building Construction- M. M. Goyal (Amrindra Consultancy).

Codes of standards:
   1. SP 7- National Building Code Group 1 to 5- B.I.S. New Delhi.
   2. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.

Guidelines for Question Paper Setting:

End Semester Examination

Question No	Unit No	Marks	Remark
1	1	11	Solve any 3
2	2	12	
3	3	11	
4	1,2.3	12	
5	4	12	Drawing problem on Door or window
6	5	18	Drawing problem on Dog legged, Open well & quarter turn staircase
7	6	5	Solve any one
8	4,5,6	5	

SHIVAJI UNIVERSITY, KOLHAPUR

SECOND YEAR B. TECH. (CIVIL) SEMESTER -III

NUMERICAL METHODS

Course	Teaching Scheme					Evaluation Scheme			
	L	T	P	Credit	Scheme	Theory (Marks)		Practical(Marks)	
						Max.	Min. for Passing	Max.	Min. for Passing
Numerical Methods (ESC-CV306)	03	-	02	04	ISE	-	-	50	40%
					CIE	-	-	-	-
					ESE	-	-	-	-

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To introduce the concept of Numerical differentiation.
2. To introduce Numerical methods for evaluating definite integrals.
3. To learn fitting of straight lines and parabola.
4. To introduce the concept of Linear Programming Problem.
5. To understand methods of solution of partial differential equations.
6. To solve problems in civil engineering.

Course Outcomes:
After completion of this course students will be able to:
1. Identify, classify and choose the most appropriate numerical method for solving a problem.
2. Illustrate basic theory of correlation and regression.
3. Form and solve Linear Programming Problem.
4. Use methods of solutions to solve classical problems.
5. Deploy skills effectively in the solution of problems in civil engineering.

SECTION I
Unit 1: Numerical Differentiation: (6)
1.1 Finite differences and difference operators.
1.2 Newton's forward and backward formulae.
1.3 Lagrange's interpolation formula.
1.4 Sterling central difference formulas.

Unit 2: Numerical Integration: (6)
2.1 Trapezoidal Rule.
2.2 Simpson's $1/3^{rd}$ and $3/8^{th}$ rules Gradient of scalar point function and directional derivative.
2.3 Romberg integration-recursive formula.

Unit 3: Curve Fitting:
3.1 Correlation and regression. (6)
3.2 Lines of regression of bivariate data.
3.3 Fitting of curves by methods of least squares (straight-line and parabola).

Unit 4: Linear Programming: **(6)**
    4.1 Types of solutions to linear programming problems.
    4.2 Formation of L.P.P.
    4.3 Simplex method to solveLinear Programming Problem.

Unit 5: Partial Differential Equations: **(6)**
    5.1 Elliptical equation.
    5.2 Laplace equation.
    5.3 Liebmen's method.

Unit 6: Calculus of variation: **(6)**
    6.1. Introduction and definition.
    6.2 Euler's Equation, Extremal.
    6.3 Isoperimetric problem.

Term Work:
- Batch wise Practical's are to be conducted. The number of students per batch should be as per University pattern for practical batches.
- Programs on applications to civil engineering problems using C and C++ Language
  1. Trapezoidal Rule
  2. Simpson's $1/3^{rd}$ rule.
  3. Simpson's $3/8^{th}$ rule.
  4. Newton's forward formula.
  5. Least square method.
  6. Linear Programming Problem by simplex method.
  7. Solution of Laplace equation.
  8. Lagrange's interpolation formula.

Minimum number of practical should be 6 covering all topics.

Text Books:
1. A text book of Applied Mathematics, Vol.I by P. N. Wartikar & J. N. Wartikar, Pune, Vidyarthi Griha Prakashan, Pune.

2. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers, Delhi.

Reference Books:
1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.

2. Advanced Engineering Mathematics by H. K. Dass, S. Chand, New Delhi.

3. A text book of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K.Sengar, Cengage Learning.

4. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.

5. A text book of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd., New Delhi.

STRUCTURAL MECHANICS

Course	Teaching Scheme					Evaluation Scheme			
						Theory (Marks)		Practical(Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for Passing	Max.	Min. for Passing
Structural Mechanics (ESC-CV401)	03	01	---	04	ISE	-	-	25	40%
					CIE	30	40%	-	-
					ESE	70	40%	-	-

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:

1. Introduction to structural systems, and to methods of analyzing these systems under various loading conditions.
2. To understand behavior of structure.
3. To analyze the structures subjected to moving loads.

Course Outcomes:

After completion of this course students will be able to:
1. Identify the response of elastic body for external actions.
2. Distinguish engineering properties of the materials are understood.
3. Compute the design forces in the structures.
4. Analyze the stress, strain and deformation of elastic bodies under external forces.

SECTION I
Unit 1: Principal planes & stresses: (6)

1.1 Normal and shear stresses on any oblique plane.
1.2 Concept of principal planes and stresses by analytical & graphical methods (Mohr's circle of stress 2-D).
1.3 Theories of failure: Maximum normal stress, maximum shear stress and maximum strain energy theory.

Unit 2: Combined direct and bending stresses: (6)
2.1 Combined direct and bending stresses, eccentric load, core /kernel of section.
2.2 Stability analysis of gravity dam, retaining wall & chimney.

Unit 3: Influence line diagrams: (6)
3.1 Muller's Breslau's principle & its applications to statically determinate simple and compound beam.
3.2 ILD for member forces in statically determinate truss.

SECTION II

Unit 4: Buckling of long columns: **(6)**
    4.1 Effective length for various end conditions.
    4.2 Slenderness ratio.
    4.3 Euler's theory & Rankine's theory.

Unit 5: Slope and deflection of determinate beams: **(6)**
5.1 Double integration method.
    5.2 Macaulay's method.
    5.3 Moment-Area method & Conjugate beam method.

Unit 6: Torsion of circular shaft: **(6)**
    6.1. Analysis of circular shaft subjected to torsion.
    6.2 Power transmitted to circular shaft.
    6.3 Shafts subjected to combined bending, torsion & axial thrust.

Term work:
    1. One assignment per unit (minimum 4 problems per assignment)

Recommended Books:
    1. "Strength of Materials" - R.K.Bansal., Laxmi Publications.
    2. "Strength of Materials" - S Ramamrutham, DhanapatRai Publications.
    3. "Structural Analysis" - Bhavikatti S.S, Vikas Publications house New Dehli.

Reference Books:
    1**.** "Mechanics of Materials" - Gere and Timoshenko, CBS publishers.
    2. "Mechanics of Material" - Beer and Johnston, M.
    3. "Strength of Material" - F. L. Singer and Pytel, Harper and Row publication.
    4. "Strength of Materials" - R.K.Rajput., S.Chand Publications.

Discussion regarding the question paper setting:

    It will include two sections. Each section will include 4 questions having weight age 11, 12, 12 and 12. **Question No. 1 & 5 is compulsory and solve any 2 out of remaining 3 in each section Question No. 1 and 5 should be on theory**

<div align="center">End Semester Examination</div>

Question No.	Unit No.	Marks
1.	1, 2, 3	09
2.	1	13
3.	2	13
4.	3	13
5.	4,5,6	09
6.	4	13
7.	5	13
8.	6	13

SECOND YEAR B. TECH. (CIVIL) SEMESTER –IV

SURVEYING - II

Course	Teaching Scheme					Evaluation Scheme			
						Theory (Marks)		Practical(Marks)	
	L	T	P	Credit	Scheme	Max	Min. for Passing	Max	Min. for Passing
Surveying-II (PCC-CV402)	03	-	02	04	ISE	-	-	25	40%
					CIE	30	40%	-	-
					ESE	70	40%	25	40%

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To understand tacheometric surveying in distance and height measurements.
2. To get introduced to different geodetic methods of survey such as triangulation.
3. To get introduced to modern advanced surveying techniques involved such as Remote sensing, Total station, GPS, Photogrammetry etc.
4. To understand the elements of different types of curves and preliminary survey for road.

Course Outcomes:
After successful completion of this course students will be able to:
1. Adopt the principles of advanced surveying instruments.
2. Formulate triangulation stations, Flight planning and Ground control points (GCPs).
3. Apply GIS and GPS concepts to civil engineering problems.
4. Design and setout curves by different methods.

SECTION- I

Unit 1-Measurement of distances and elevations: **(7)**
    a) Tachometry – Principles, Suitability, Methods
    b) Stadia diaphragm, Stadia formulae.
    c) Tachometric contouring.

Unit 2 – Geodetic Surveying: **(7)**
    a) Triangulation Principle and Classification, system, Selection of station, Base line,
    b) Measurement, Correction and use of sub tense bar.
    c) Signals, satellite station, Reduction to center, Trilateration.

Unit 3 – Modern Surveying Equipment's and Project Surveys   **(4)**
    a) Principle of EDM, Use and applications of Total Station.
    b) Reconnaissance, Preliminary and Detailed survey for road project.

SECTION- II

Unit 4 – Curves: **(7)**
   a) Significance of curves and curve setting.
   b) Type of horizontal curve, elements of Simple, Compound curve, Transition curve
      introduction only, setting out of simple curve by linear and angular methods.
   c) Vertical curves – types, lengths of vertical curves.

Unit 5 – Photogrammetry: **(5)**
   a) Types of photogrammetry, Terrestrial Photogrammetry- introduction only.
   b) Aerial photogrammetry – Scale of vertical photographs, Flight planning.

Unit 6 – Modern methods of surveying: **(6)**
   a) Remote sensing – Definition, relevance, types, electromagnetic radiation and
      energy sources and its characteristics, applications to civil engineering.
   b) GPS – basic principles, GPS segments, receivers, applications in survey.
   c) GIS – Terminology, advantages, basic components of GIS, data types, GIS analysis,
      applications of GIS software.

Term work:
   1. Tacheometry-
        a. Determination of tacheometric constants.
        b. Determination of grade of a given line.
        c. Determination of area of polygon.
        d. Measurement of horizontal distance by Substance Bar.
   2. Experiments using total station – any two.
   3. Setting out of simple curve- one linear and one angular method
   4. Use of GPS.
   5. Project drawings.

Survey Projects:
   1. Road project – at least 1000m.
   2. Radial contouring.

Textbooks:
   1. Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S.V.Kulkarni,
      Pune Vidyarthi Griha Prakashan.
   2. Surveying and Levelling by Subramanian, Oxford University Press.
   3. Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, ArunK.Jain, Laxmi
      Publications.
   4. Surveying and Levelling by N. N. Basak, Tata McGraw Hill.
   5. Surveying, Vol. I & II by S. K. Duggal, TataMc-Graw Hill.
   6. Surveying and Levelling - R. Agor, Khanna Publishers, New Delhi

Reference Books:

1. Principles of Surveying. Vol. I by J. G. Olliver, J. Clendinning - Van Nostrand Reinhold.
2. Plane Surveying by A. M. Chandra, New Age International Publishers.
3. Surveying Vol. I & II by Dr. K. R. Arora, Standard Book House.
4. Elements of Photogrammetry - Paul R. Wolf, McGraw Hill Publication.
5. Remote sensing and Geographical Information System- A. M. Chandra and S. K. Ghosh, Narosa Publishing House.
6. Advanced Surveying -Total Station, GIS and Remote Sensing – Satheesh Gopi, R. Sathikumar and N. Madhu, Pearson publication.
7. The GIS Book, 5Th Edition, George B. Korte, PE onwards press.

Guidelines for Question paper setting:

1. It will include two sections. Each section will include 4 questions having weightage 12, 11, 11 and 12. **Attempt any three out of 4 Questions from each section.**

2. First three questions should be on each unit separately and Question No.4 should be on all the three units .**Question No.4 and 8 should be of short notes** (Attempt any three out of five)

End Semester Examination

Question No.	Unit No.	Marks
1.	1	12
2.	2	11
3.	3	11
4.	1,2 and 3	12
5.	4	12
6.	5	11
7.	6	11
8.	4,5 and 6	12

SHIVAJI UNIVERSITY, KOLHAPUR

SECOND YEAR B. TECH. (CIVIL) SEMESTER -IV

CONCRETE TECHNOLOGY

Course	Teaching Scheme					Evaluation Scheme			
						Theory (Marks)		Practical(Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for Passing	Max.	Min. for Passing
Concrete Technology (PCC-CV403)	03	-	02	04	ISE	-	-	25	40%
					CIE	30	40%	-	-
					ESE	70	40%	25	40%

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To study materials used in concrete production.
2. To understand process of concrete manufacturing and to study properties of fresh concrete.
3. To study relationship between compressive strength and tensile strength.
4. To study mix design of concrete by using IS code method and ACI method
5. To study different Non Destructive Tests (NDT).
6. To study different types of special concrete and their manufacturing.

Course Outcomes:
After completion of this course students will be able to:
1. Impart knowledge of physical properties of ingredients of concrete and their effect on strength and durability.
2. Explain the fundamentals of process of making good quality concrete and its elastic properties.
3. Understand the factors affecting properties of concrete.
4. Design the concrete mix proportion as per Indian standard code of practice.
5. Demonstrate Non Destructive Testing (NDT) and evaluate quality of existing concrete.
6. Understand different types of concrete and their applications.

SECTION I

Unit 1   (7)
Ingredients of Concrete:
   Cement: Manufacturing process of cement, chemical composition, grades of cement, hydration, types of cement, Tests for cement: fineness, Standard consistency, setting time, soundness and compressive strength.

   Aggregates: classification, requirements, Tests for coarse aggregates: specific gravity, grading of aggregate, Flakiness index, Elongation Index, Impact value, abrasion value, crushing value. Tests for fine aggregates: specific gravity, sieve analysis, fineness modulus. Alkali aggregate reaction, bulking of sand, Artificial and Recycled aggregate.

   Water: general requirements, quality of water.

Unit 2 (6)
Fresh Concrete:

Workability: factors affecting, different tests for measurement of workability. Segregation, bleeding. Manufacturing process of concrete: batching, mixing, transportation, compaction, curing of concrete, curing methods.

Unit 3 (8)
Hardened concrete:

Strength of concrete: w/c ratio, gel/space ratio, gain of strength with age, maturity concept of concrete, effect of maximum size of aggregate on strength. Test on hardened concrete: compressive strength, comparison of compressive strength between cube test and cylinder test, flexural strength. Relation between compressive and tensile strength. Elastic constants, factors affecting modulus of elasticity, definition and factors affecting creep and shrinkage. Nondestructive testing: Schmidt's rebound hammer, Ultrasonic pulse velocity method.

SECTION II

Unit 4 (8)
Concrete Mix Design:

Objectives of mix design, different methods of mix design, factors affecting mix proportions, quality control of concrete, statistical methods, acceptance criteria, Numerical on mix design by ACI 211.1-1991, IS 10262- 2009andIS 456 -2000. Mix design of fly ash concrete by IS 10262 – 2009.

Unit 5 (5)
Admixtures in concrete:

a) Chemical Admixtures: Plasticizers, Super plasticizers, Retarders, Air entraining agents, IS 9103Specifications
b) Mineral Admixtures: Fly ash, Silica Fume, GGBS, Rice husk ash, metakaolin

Unit 6 (6)
Special Concretes and Durability of concrete:

a. Special Concretes: Light weight concrete, Polymer modified concrete, concept of fibre reinforced concrete, High performance concrete, Pumpable concrete, Roller compacted concrete, Self compacting concrete.

b. Durability of concrete: Significance, Permeability and Durability, Chemical Attack, Sulphate attack, Attack by Seawater, Acid attack, Chloride attack, Carbonation of concrete and its determination.

Term work:
Perform At least any 12 experiments from following:
1. To determine fineness of cement by Sieve analysis and/or Blaine's air permeability method.
2. To determine the standard consistency of cement using Vicat's apparatus.
3. To determine initial and final setting time of cement.
4. Determination of soundness of cement by Le-Chatelier's apparatus and/or Auto Clave test.
5. To determine compressive strength of cement.

6. Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis (grading of aggregate).
7. Determination of specific gravity of fine aggregates.
8. Determination of specific gravity and water absorption of coarse aggregates.
9. To determine flakiness and elongation index of coarse aggregates.
10. To determine workability of fresh concrete by using slump cone.
11. To determine compaction factor for workability of fresh concrete.
12. To determine workability of fresh concrete by using Vee Bee Consitometer.
13. Nondestructive test on concrete by: Rebound Hammer Test, Ultrasonic Pulse Velocity Test.
14. Tests for compressive strength of concrete cubes for M20 or M30 (ACI 211.1-91, IS 10262- 2009 and IS 456 2000).

Text books:
1. Shetty, M.S., Concrete Technology, S. Chand Publication.
2. Gambhir, M.L., Concrete Technology, Tata McGraw Hill.

Reference books:
1. A. M. Neville, J. J. Brooks, "Concrete Technology" Pearson Education India
2. A. M. Neville, "Properties of Concrete", Pearson Education India.
3. R.S. Varshney, "Concrete Technology", Oxford and IBH.
4. P. Kumar Mehta, "Microstructure and properties of concrete", Prentice Hall.SP-26..

IS codes:
1. IS: 10262 - 2009, Recommended guidelines for Concrete Mix Design.
2. IS: 456- 2000, Indian Standard Plain and Reinforced Concrete.

Guidelines for Paper Setting:
1. One question on each unit.
2. Optional question should be given on Unit 3 and 6. (Weightage of optional question should not be more than 30% of total marks ie. 21 marks out of 70 marks).
3. Compulsory Numerical on mix design should be asked with required table and chart in question paper (ACI 211.1-91, IS 10262 - 2009).

End Semester Examination

Question No.	Unit No.	Marks
1	1	12
2	2	11
3	3	12
4	4	15
5	5	08
6	6	12
Total		70

SECOND YEAR B. TECH. (CIVIL) SEMESTER –IV

FLUID MECHANICS - II

Course	Teaching Scheme					Evaluation Scheme				
						Theory (Marks)		Practical(Marks)		
	L	T	P	Credit	Scheme	Max.	Min. for Passing	Max.	Min. for Passing	
Fluid Mechanics-II (ESC-CV404)	03	-	02	04	ISE	-	-	25	40%	
					CIE	30	40%	-	-	
					ESE	70	40%	-	-	

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To study uniform and non-uniform flow in open channel.
2. To apply basic principles in fluid flow problems.
3. To study velocity and discharge measurement devices.
4. To study impact of jet, Pumps and turbines.

Course Outcomes:
After successful completion of this course, student will be able to:
1. Provide students with basic knowledge of fluid properties and utilizing principles developed in fluid mechanics.
2. Develop the principle and equation for pressure flow and momentum analysis.
3. Provide the students with the analytical knowledge of pressure and velocity distribution in an open channel in order to solve practical problems.
4. Illustrate and develop the equations and design principles for open channel flows, including sanitary and storm sewer design and flood control hydraulics.

SECTION I

Unit-1: Uniform Flow in Open Channel: (**6**)

    A. Introduction, Difference between Pipe Flow and Open Channel Flow. Types of Open Channels, Types of Flows in Open Channel, Geometric Elements, Velocity Distribution, Measurement of Velocity- (Pitot tube, Current Meter)

    B. Steady and Uniform Flow: Characteristics of uniform flow, Chezy's and Manning's Formula, Uniform Flow Computations, Hydraulically Efficient Section (Rectangular, Triangular, Trapezoidal)

Unit -2: Gradually Varied Flow (GVF):   (**6**)

    A. Depth Energy Relationship in Open Channel Flow: Specific Energy (Definition and Diagram, Critical, Sub-Critical, Super-Critical Flow), Specific Force (Definition and Diagram)

B. Gradually Varied Flow (GVF): Definition, Classification of Channel Slopes, Dynamic Equation of GVF (Assumption and Derivation), Classification of GVF Profiles- Practical Examples, Direct Step Method of Computation of GVF Profiles.

Unit-3: Rapidly Varied Flow (RVF): (6)

A. Rapidly Varied Flow (RVF): Definition, Hydraulic Jump- Phenomenon, Conjugate Depth Relationship, Characteristics, Hydraulic Jump (uses, types, location and application) ,Hydraulic Jump as an Energy Dissipater, Surges in open channel- Positive and Negative Surge.
B. Spatially Varied Flow: Introduction, Basic Principles and Assumptions.

SECTION II

Unit-4: Notches and Weirs: (7)

Types, Derivation of Discharge Equation, Velocity of Approach, Francis Formula, Calibration of Notches, Errors in Measurement of Discharge, Sharp, Broad and Round Crested Weirs, Calibration of Weir, Time of Emptying Tank with Weir.

Unit-5: Impact of Jet: (6)

Impulse Momentum Principle, Impact of Jet on Vanes- Flat, Curved (Stationary and Moving), Inlet and Outlet Velocity Triangles, Series of Flat, Curved Vanes Mounted on Wheel.

Unit-6: Pumps and Turbines: (5)

A. Hydraulic Turbines: Importance of Hydro-Power, Classification of Turbines- Pelton,Francis and Kaplan Turbine (Detailed Design Need Not To Be Dealt With), Unit Quantities, Specific Speed, Performance Characteristics, Selection of Type of Turbine, Concept of Draft Tube.
B. Centrifugal Pump: Classification, Component Parts, Working of Centrifugal Pump, Performance Characteristics, Common Pump Troubles and Remedies, Net Positive Suction Head (NPSH).

Term Work:
A. Perform at least three experiments from the Following:
     1. Study of Specific Energy Curve for Different Discharges.
     2. Calibration of V-Notch / Rectangular Notch.
     3. Study of Hydraulic Jump.
     4. Study of Flow over Weirs.
     5. Impact of Jet.
B. Study of Turbines (Demonstration).
C. Test on Centrifugal Pump.
D. Visit report of Hydropower Plant.
E. Assignments on GVF and SVF.

Text Books:
1. Fluid Mechanics – A.K. Jain – Khanna Pub., Delhi.
2. Open Channel flow – Rangaraju – Tata McGraw-Hill Pub. Co., Delhi.
3. Fluid Mechanics – K. Subramanyam – Tata McGraw-Hill Pub. Co., Delhi.
4. Fluid Mechanics – Hydraulic and Hydraulic Mechanics -Modi / Seth – Standard Book House, New Delhi.
5. Flow in open channel - K. Subramanyam – Tata McGraw-Hill Pub. Co., Delhi.
6. Fluid Mechanics and hydraulic machine-R.K.Bansal, Laxmi Pubication.

Reference Books:
1. Fluid Mechanics – Streeter-McGraw-Hill International Book Co., Auckland.
2. Flow in open channel – V. T. Chaw - McGraw-Hill International Book Co., Auckland.
3. Fluid Mechanics – K. L. Kumar – Eurasia Publication House, Delhi.

Guidelines regarding the question paper setting:

It will include two sections. Each section will include 4 questions having weightage 11, 12, 11 and 12. **Out of 4 Questions of each section attempt any three.**First three questions should be on each unit separately and Question No.4 should be on all the three units. **Question No.4 and 8 should be of short notes**.

End Semester Examination

Question No.	Unit No.	Marks
1.	1	11
2.	2	12
3.	3	11
4.	1,2 and 3	12
5.	4	11
6.	5	12
7.	6	11
8.	4,5 and 6	12

SHIVAJI UNIVERSITY, KOLHAPUR

SECOND YEAR B. TECH. (CIVIL) SEMESTER –IV

BUILDING DESIGN AND DRAWING

Course	Teaching Scheme					Evaluation Scheme			
						Theory (Marks)		Practical(Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for Passing	Max.	Min. for Passing
Building Design and Drawing (PCC-CV405)	03	-	04	05	ISE	-	-	50	40%
					CIE	30	40%	-	-
					ESE	70	40%	50	40%

ISE: In Semester Evaluation   CIE: Continuous internal   ESE: End Semester Examination

Course Objectives:
1. To understand Principles of Building planning and building planning bye laws.
2. To understand planning of residential buildings with procedure.
3. To understand Low cost housing and Maintenance, Repairs, Rehabilitation of Structures Per IS 1893.
4. To understand various systems such as plumbing, electrification, Air conditioning, fire resistance, thermal insulation Per IS 13920.
5. To understand various building finishes.

Course Outcomes:
After completion of this course students will be able to:
1. Know principles of building planning.
2. Describe Building Bye-Laws and regulations.
3. Plan and draw residential building considering principle of planning and Building Bye-Laws and regulations.
4. Explain techniques of maintenance, repair and rehabilitation of structure.
5. Draw the working drawing of foundation detail, plumbing and electrification of building.
6. Illustrate the concept of ventilation, air conditioning and thermal insulation.
7. Describe different types of building finishes.

SECTION I

Unit: 1   **(4)**

Site Selection criteria: Principles of Building planning, Significance Sun path diagram, Wind Diagram, Orientation, Factors affecting, criteria under Indian condition.

Unit: 2   **(9)**

Building Planning Byelaws and regulations: As per SP-7, 1983 National Building code of India group 1 to 5.

Planning of Residential Building: (Bungalows, Row Bungalows, Apartments and Twin Bungalows) Procedure of Building Permission, significance of commencement, plinth completion or occupancy certificate.

Unit: 3 (5)

Low cost Housing: Materials and Methods (conceptual introduction only)
Maintenance, Repairs, Rehabilitation of Structures: (Conceptual introduction only)
Green building: Concept and rating.

SECTION II

Unit: 4 (6)

Plumbing system: Various Materials for system like A-PVC, C-PVC, GI, and HDPE. Various types of traps, Fittings, Chambers, Need of Septic Tank, Concept of Plumbing and Drainage plan, introduction to rainwater harvesting.

Electrification: Concealed and Open Wiring, Requirements and Location of various points, Concept of Earthing.

Fire resistance in building: Fire protection precautions, confining of fire, fire hazards, Characteristics of fire resisting materials, building materials and their resistance to fire.

Unit: 5 (7)

Ventilation: Definition and necessity of Ventilation, functional requirement, various system and selection criteria.

Air conditioning: Purpose, Classification, Principles, Systems and Various Components of the same.

Thermal Insulation: General concept, Materials, Methods.

Introduction to Acoustics: Absorption of sound, various materials, conditions for good acoustics.

Sound Insulation: Methods of noise control.

Unit: 6 (5)

Paints: Different types and application methods.
Plastering: Pointing and various techniques.
Wall cladding: Skirting, dado work with various materials.
Miscellaneous finishes: POP, Gypsum plaster.

Term Work:
1. Imperial size sheet based on actual measurement of existing residential building consisting of plan, elevation, section passing through staircase, Site plan, Area statement and brief Specifications (G+1 building and minimum 5 rooms, Measurement drawing should be done in group of maximum 5 students).

Note: The center line plan drawn expected to be transferred on ground as an exercise.

2. Planning and design of residential building (G+1).

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3. Full set of drawings for the building planned in 2- (a) Municipal Submission drawing.
   (b) Working Drawings (Max. 2 student group).
   - Foundation / Center Line Drawing.
   - Furniture layout plan.
   - Electrification plan.
   - Water supply and drainage plan.
4. Project report giving details of following systems
   - Stair Case
   - Drainage System
   - Water Supply System
   - Water Tank
   - Septic Tank
   - Design of terrace Drainage System.
5. Site visit along with report.

Text Book:
1. Building Construction – B.C.Punmia (Laxmi Publications).
2. Basic Civil Engineering – G. K. Hiraskar (DhanpatRai Publications).
3. A Text Book of Building Construction – S.P. Arora, S.P. Bindra (Dhanpat Rai Publications).
4. Construction Technology (Volume 1 to 4) – R. Chudley (ELBS).
5. A Course in Civil Engineering Drawing – V.B.Sikka (S.K.Kataria and Sons).
6. Civil Engineering Drawing – M. Chakraborty.
7. Engineering Materials – R.K.Rajput (S. Chand).

References Books:
1. A to Z of Practical Building Construction and Its Management- Sandeep Mantri (SatyaPrakashan, New Delhi).
2. Handbook of Building Construction- M. M. Goyal (Amrindra Consultancy (P. Ltd.).
3. Form follows feelings, the Architectural Pramod Beri, Anjali Prakashan.

Code of Standards:
1. SP 7- National Building Code Group 1 to 5- B.I.S. New Delhi.
2. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.

Guidelines regarding the question paper setting:

End Semester Examination

Question No.	Unit No.	Marks	Remark
1	1	07	Solve any 2 from Q. 1.3.4. Q2 Compulsory
2	2	21	
3	3	07	
4	1,3	07	
5	4	12	Solve any 3
6	5	12	
7	6	11	
8	4,5,6	11	

SHIVAJI UNIVERSITY KOLHAPUR

REVISED SYLLABUS AND STRUCTURE

THIRD YEAR (B. Tech.)

Civil Engineering

To be introduced from the academic year 2020-21

(i.e. from June 2021) onwards

(Subject to the modifications will be made from time)

Third Year CIVIL ENGINEERING – CBCS PATTERN

SEMESTER – V

Sr. No	Course (Subject Title)	TEACHING SCHEME — THEORY			TUTORIAL			PRACTICAL			EXAMINATION SCHEME — THEORY					PRACTICAL			TERM WORK		
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	Min	Hours	Max	Min	Hours	Max	Min
1	PCC-CV501	3	3	3	-	-	-	1	2	2		CIE	30	100	40	As per BOS Guidelines	25	10	2	50	20
												ESE	70								
2	PCC-CV502	4	4	4	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10
												ESE	70								
3	PCC-CV503	3	3	3	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10
												ESE	70								
4	PCC-CV504	4	4	4	-	-	-	1	2	2		CIE	30	100	40		25	10	2	50	20
												ESE	70								
5	PCC-CV505	2	2	2	-	-	-	2	4	4		-	-	-	-		50	20	2	50	20
6	OEC-CV506	3	3	3	-	-	-	-	-	-		CIE	30	100	40		-	-	-	-	-
												ESE	70								
	TOTAL	**19**	**19**	**19**	**-**	**-**	**-**	**6**	**12**	**12**				**500**			**100**			**200**	

SEMESTER –VI

Sr. No	Course (Subject Title)	TEACHING SCHEME — THEORY			TUTORIAL			PRACTICAL			EXAMINATION SCHEME — THEORY					PRACTICAL			TERM WORK		
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	Min	Hours	Max	Min	Hours	Max	Min
1	PCC-CV601	3	3	3	1	1	1	-	-	-		CIE	30	100	40	As per BOS Guidelines	-	-	2	25	10
												ESE	70								
2	HM-CV602	4	4	4	-	-	-	1	2	2		CIE	30	100	40		25	10	2	25	10
												ESE	70								
3	PCC-CV603	4	4	4	-	-	-	1	2	2		CIE	30	100	40		25	10	2	25	10
												ESE	70								
4	PCC-CV604	4	4	4	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10
												ESE	70								
5	OEC-CV605	3	3	3	-	-	-	-	-	-		CIE	30	100	40		-	-	-	-	-
												ESE	70								
6	PCC-CV606	-	-	-	-	-	-	2	4	4		-	-	-	-		50	20	2	50	20
7	MC-CV607	-	-	-	-	-	-	1	2	2		-	-	-	-		-	-	2	50	20
8	*SI-CV707	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-	-	-	-
	TOTAL	**18**	**18**	**18**	**1**	**1**	**1**	**6**	**12**	**12**				**500**			**75**			**225**	
	TOTAL	**37**	**37**	**37**	**1**	**1**	**1**	**12**	**24**	**24**				**1000**			**175**			**425**	

CIE- Continuous Internal Evaluation

ESE – End Semester Examination

SEMESTER - V					
Sr. No	Code No.		Course (Subject Title)	Semester	Credits
1	PCC-CV501	WRE-I	Water Resource Engineering-I	5	4
2	PCC-CV502	DSS	Design of Steel Structures	5	5
3	PCC-CV503	EE-I	Environmental Engineering-I	5	4
4	PCC-CV504	GTE-I	Geotechnical Engineering-I	5	5
5	PCC-CV505	BPD	Building Planning and Design	5	4
6	OEC-CV506	OE-I	Open Elective-I	5	3
TOTAL					25

SEMESTER – VI					
Sr. No	Code No.		Course (Subject Title)	Semester	Credits
1	PCC-CV601	TOS	Theory of Structures	6	4
2	HM-CV602	EM	Engineering Management	6	5
3	PCC-CV603	EE-II	Environmental Engineering-II	6	4
4	PCC-CV604	GTE-II	Geotechnical Engineering-II	6	5
5	OEC-CV605	OE-II	Open Elective-II	6	4
6	PCC-CV606	SDD-I	Structural Design and Drawing-I	6	2
7	MC-CV607		SEMINAR	6	1
8	*SI-CV707	FT	Field Training	-	-
TOTAL					25

Water Resources Engineering – I

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
WRE - I (PCC-CV501)	03	--	02	04	ISE	--	--	50	20
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To impart the basic knowledge of importance of Hydrology & irrigation in water resources development.
2. To know various hydrometeorological parameters and their estimation.
3. To create awareness about floods, their estimation using various methods.
4. To understand the importance of irrigation in Indian agricultural industry considering cropping patterns.
5. To understand the principles of watershed management and water harvesting.

Course Outcomes:
After successful completion of this course students will be able to:
1. Apply the knowledge of estimation of hydrometeorological parameters.
2. Estimate direct runoff and peak discharge using hydrograph technique.
3. Apply different methods of efficient irrigation and water conservation.
4. Determine reservoir capacity based on crop water requirement.

SECTION I

Unit 1: Hydrology and Precipitation   **6 hrs**
  1.1 *Introduction of Hydrology:* Definition, Importance and scope of hydrology, Hydrologic cycle.
  1.2 *Precipitation:* Forms and types of precipitation, Methods of measurement, Rain-gauge Network, Determination of average precipitation over the catchment & its numerical, Estimation of missing rainfall data, Graphical representation of rainfall - Mass rainfall curves, Double mass rainfall curve, Rainfall hyetograph.

Unit 2: Evaporation and Runoff   **6 hrs**
  2.1 *Evaporation:* Process, Factors affecting, Measurement and control of evaporation.
  2.2 *Evaporation Transpiration:* Process, factors affecting, Measurement.
  2.3 *Infiltration:* Process, Factors affecting and measurement of infiltration, Infiltration indices & its numerical.
  2.4 *Runoff:* Classification, Factors affecting runoff, Determination of runoff-empirical equations, Rainfall runoff co-relation.

Unit 3: Hydrograph and Floods   **6 hrs**
  3.1 *Hydrograph:* Components of Storm hydrograph, Base flow and Separation of base flow, Direct runoff hydrograph, Unit hydrograph – theory, assumptions and limitations,

Derivation and use of unit hydrograph, Conversion of UH of different durations using Principle of Superposition & S-curve hydrograph.

3.2 *Floods:* Introduction of river gauging, Estimation of peak flow - empirical equations, rational method; Importance of - Design flood, Standard project flood, Maximum probable flood.

SECTION II

Unit 4: Ground Water Hydrology   **6 hrs**

4.1 *Ground Water Hydrology:* Occurrence, Distribution and classification of ground water, Darcy's law, Aquifer parameters - Permeability, Specific yield, Specific retention, Porosity, Storage coefficient, Transmissibility.

4.2 *Hydraulics of Well:* Under steady flow conditions in confined and unconfined aquifers.

4.3 *Construction:* Tube wells and open wells. (Construction features only)

Unit 5: Irrigation and Minor Irrigation Works   **6 hrs**

5.1 *Introduction to Irrigation:* Definition and necessity of irrigation, ill-effects of irrigation, Systems of irrigation - Surface, Sub-surface (Drip irrigation), Sprinkler irrigation; Water logging and land drainage, Assessment of irrigation water.

5.2 *Minor Irrigation Works:* General layout, main components and functioning of –
1. Percolation tanks 2. K. T. Weir, 3. Bandhara irrigation 4. Lift irrigation

Unit 6: Water Requirements of Crops   **6 hrs**

6.1 *Water Requirement of Crops:* Principal crops and crop seasons, cropping pattern and crop rotation, Classes and availability of soil water, depth and frequency of watering, Duty, delta, base period and their relationship, factors affecting duty, methods of improving duty, Numerical on command area calculations and reservoir capacity based on crop water requirement.

Term Work:
Assignments on the following topics
1. Determination of average annual rainfall using Thiessens polygon & Isohyetal map method.
2. Consistency of rain gauge station by double mass rainfall curves.
3. Determination of evaporation losses, effective rainfall hyetograph infiltration losses – Phi index calculation, Horton's infiltration curve.
4. To develop a unit hydrograph from a total runoff hydrograph resulting from isolated storms.
5. Alteration of base period of given unit hydrograph using method of superposition and S-curve technique.
6. Determination of well discharge in a confined/unconfined aquifer.
7. Layout of Percolation tank, K. T. Weir, Bandhara Irrigation, Lift Irrigation.
8. Estimating depth and frequency of irrigation on the basis on soil moisture regime concept.
9. Crop water requirement and irrigation command area calculations.
10. A brief report on introduction to GIS software in Water Resource Engineering.
11. Site visit & report on meteorological station.

Text Books:
1. "Irrigation Engineering" – S. K. Garg – Khanna Publishers, Delhi.
2. "Water Resources & Irrigation Engineering" – Dr. K. R. Arora, Standard Publisher.
3. "Irrigation, Water Resources and Water Power Engineering" – Dr P.N. Modi, Standard Book House.
4. "Irrigation and Water Power Engineering" – Dr. Punmia and Dr. Pande – Laxmi Publications, Delhi

5. "Engineering Hydrology" – Dr. K. Subramanya, -Tata McGraw Hill, New Delhi.
6. "Hydrology" – Dr. P. Jayarami Reddy, Laxmi Publications, New Delhi
7. "Engineering Hydrology" – Dr. Raghunath H.M. - New Age International Publishers.
8. "Watershed Management in India" – J. V. S. Murthy – Wiley Eastern Publications, Delhi.
9. "Irrrigation Engineering" – Dahigaonkar, Asian Book Pvt Ltd.
10. "Irrigation Engineering" – S. R. Sahastrabudhe, Katson Publishers.

Reference Books:
1. "Hydrology and water resources" - R.K.Sharma, Dhanpatrai and sons, New Delhi.
2. "Theory and design of irrigation structures" - Varshney, Gupta and Gupta, vol. I and II and III, New Chand and Brothers.
3. "Irrigation Theory and practice" - Michael, Vikas Publications House.
4. "Water management" - Jaspal Sing, M.S.Acharya, Arun Sharma, Himanshu Publications.
5. "Design of M.I. and Canal Structure" - Satyanarayan and R. Murthy, Wiley Eastern Ltd, New Delhi.
6. "Irrigation Engineering" - Raghunath, Wiley Eastern Ltd, New Delhi.

Guidelines Regarding Question Paper Setting:
1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No. 5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15
5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

Design of Steel Structures

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	**T**	**P**	**Credit**	**Scheme**	Max	Min. for Passing	Max	Min. for Passing
DSS (PCC-CV502)	04	---	02	05	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To understand the behavior of elements of steel structure.
2. To understand the design concept of steel structure and its members by LSM.

Course Outcomes:
After successful completion of this course students will be able to:
1. Describe the design philosophy, behavior of steel structure and failure mechanism.
2. Analyze and design different types of bolted & welded connections.
3. Assess the strength of structural members as per Indian Standards.
4. Analyze and design members subjected to tension, compression and flexure.

SECTION- I

Unit 1: Introduction and Connections   **8 hrs**
   1.1 *Introduction:* Design philosophy, Advantages and disadvantages of steel structures, Types of steel structures, Grades of structural steel, Loads and load combinations, Partial safety factors for load and materials for steel structures.
   1.2 *Connections:* Bolted & welded - Analysis and design of axially and eccentrically loaded bolted and welded connections.

Unit 2: Tension Members   **8 hrs**
   2.1 Common sections, Net area, Modes of failure, Load carrying capacity.
   2.2 Design of tension members.

Unit 3: Compression Members   **8 hrs**
   3.1 Compression members as struts common sections, Economical sections, Effective length, Slenderness ratio, Modes of failure, Classification of cross section, Behavior of compression member, Load carrying capacity
   3.2 Design of compression members - Single and double angle.

SECTION- II

Unit 4: Column and Column Bases   **8 hrs**
   4.1 *Columns:* Design of column subjected to axial and eccentric loading, Design of lacing, Battening system, Column splices.
   4.2 *Column Bases:* Design of slab base & gusseted base subjected to axial and eccentric loading, Design of concrete pedestal (dimensions only)

Unit 5: Beams   8 hrs
    5.1 Beam in flexure - Types of sections, Behavior, Design of laterally supported and unsupported beams, Rolled steel sections, Built up beams/compound beams using flange plates, Curtailment of flange plates,
    5.2 Design for strength and serviceability
    5.3 Web buckling & web crippling.

Unit 6: Gantry Girder   8 hrs
    6.1 Forces acting on gantry girder, Commonly used sections
    6.2 Design of gantry girder as laterally unsupported beam
    6.3 Connection details

Term Work:
One assignment per unit with minimum four numerical in each assignment

Text Books:
1. "Limit State Design of Steel Structures" - Duggal S.K. - Tata McGraw-Hill Education private Ltd., New Delhi, 2nd Edition 2014
2. "Design of Steel Structures: By Limit State Method as Per IS: 800 – 2007" - Bhavikatti S. S., I K International Publishing House.
3. "Limit State Design in Structural Steel" - Shiyekar M. R, 2nd Edition, PHI Publisher
4. "Design of Steel Structures" - Dayaratnam, Wheeler Publications, New Delhi.
5. "Design of Steel Structures" – B. C. Punmia, A. K. Jain and Arun Kumar Jain, Laxmi Publication

Reference Books:
1. "LRFD Steel Design" - William T. Segui, PWS Publishing
2. "Design of Steel Structures" - Edwin H. Gaylord, Charles N. Gaylord James, Stallmeyer, Mc-Graw Hill
3. "Design of Steel Structures" - Mac. Ginely T.
4. "Design of Steel Structures" - Kazimi S. M. and Jindal R. S., Prentice Hall India.
5. "Design of Steel Structures" - Breslar, Lin Scalzi, John Willey, New York.
6. "Steel Structure" - Controlling Behaviour Through Design, Englekirk, WILEY.

I.S. Codes:
1. IS: 800 – 2007
2. IS: 875 (part I, II and III)
3. SP6 (1) & SP 6 (6),
4. IS: 816
5. IS: 808.

Guidelines Regarding Question Paper Setting:
1. IS: 800 – 2007 is permitted in examination.
2. Q. No. 1 and Q. No. 5 are compulsory.
3. Attempt any two questions from Q. No. 2, 3, 4 and any two questions from Q. No. 6, 7, 8

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1, 2, 3 - Theory	7
2.	1 - Problem	14
3.	2 - Problem	14
4.	3 - Problem	14
5.	4,5,6 - Theory	7
6.	4 - Problem	14
7.	5 - Problem	14
8.	6 - Problem	14

Environmental Engineering – I

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EE-I (PCC-CV503)	03	--	02	04	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To understand various sources of water with respect to quality and quantity of water.
2. To describe and design the various water treatment units.
3. To learn the special water treatments and sequencing of treatment for various qualities of surface & ground water.
4. To design the various components related to transmission and distribution of water.
5. To understand various water supply appurtenances.

Course Outcomes:
After successful completion of this course students will be able to:
1. Describe the various sources of water with respect to quality and quantity of water.
2. Design the various water treatment units.
3. Illustrate the special water treatments and sequencing of treatment for various qualities of surface & ground water.
4. Describe the various components related to transmission and design of distribution of water.
5. Summarize the different water supply appurtenances.

SECTION I

Unit 1: Introduction to Water Supply Scheme   **6 hrs**
    1.1 *Introduction to Water Supply Scheme:* Data collection for water supply scheme, Components and layout, Design period, Factors affecting design period.
    1.2 *Quantity:* Rate of water consumption for various purposes like domestic, industrial, institutional, commercial; Fire demand and water system losses, Factors affecting rate of demand, Population forecasting.
    1.3 *Quality:* Water quality parameters, Characteristics & significance in water treatment, Drinking water quality standards - BIS, WHO Standards.
    1.4 *Water Intake Structures:* General design considerations, Types such as river intake, canal intake and reservoir intake, Concept of rising main and pumping station.

Unit 2: Water Treatment   **6 hrs**
    2.1 *Water Treatment:* Principles of water treatment processes. Introduction to different types of water treatment flow sheets.
    2.2 *Aeration:* Principle and concept, Necessity, Methods, Design of cascade aerator.

2.3 *Coagulation & Flocculation:* Theory, Factors affecting, Destabilization of colloidal particles, Types of dosing of coagulants, Selection of coagulants, Jar tests, Design of rapid mixer & flocculator, Theory of clariflocculator.

2.4 *Sedimentation:* Theory, Types of settling, Types of sedimentation tanks, Principles & design, Concept of tube & plate settler.

Unit 3: Water Treatment   6 hrs

3.1 *Filtration:* Mechanism, Head loss development, Negative head loss, Types of filters- slow sand filter, rapid sand filter & pressure filter, Operation & design of slow sand & rapid sand filter.

3.2 *Disinfection:* Theory, Factors affecting disinfection, Types of disinfectants, Types and methods of chlorination break point chlorination

3.3 *Water Softening Processes:* Lime-soda process, Ion exchange

3.4 *Demineralization:* Reverse osmosis, Electro-dialysis

SECTION II

Unit 4: Distribution Reservoirs and Service Storages   6 hrs

4.1 Necessity, Location, Head requirement, Capacity determination by analytical & graphical method.

4.2 Transmission of water, Pumping & gravity mains, Choice of pipe materials, Forces acting on pressure pipes, Leakage & pressure testing of pipes, Corrosion types & control measures, Thrust block concept,

Unit 5: Water Distribution Systems   6 hrs

5.1 Method of distributing water, Layout pattern, Basic system requirements for water distribution system

5.2 *Methods of Network Analysis:* Equivalent pipe method, Hardy-Cross method, Design problem.

Unit 6: Water Supply Appurtenances   6 hrs

6.1 *Types of Valve:* Sluice valve, Air relief valve, Gate valve, Non-return valve, Scour valve

6.2 Fire hydrants water meter, Service connections, Maintenance & leak detection of water distribution system.

6.3 Necessity of water audit, Water audit in domestic sector, Concept of preparation of DPR.

Term Work:
A. Analysis of any 10 of the following test parameters for water
   1. pH
   2. Acidity
   3. Alkalinity
   4. Chlorides content
   5. Hardness – Total, temporary and permanent
   6. Turbidity
   7. Residual Chlorine
   8. Total dissolved solids through measurement of electrical conductivity
   9. Dissolved Oxygen
   10. Most Probable Number
   11. Optimum dose of alum by jar test.
   12. Fluorides & Nitrogen
   13. Iron and Manganese
B. Design/analysis problems on water treatment unit & distribution system.

C. Visit to a water treatment plant & visit report.

Text Books:
1. "Environmental Engineering" - Peavey, H.S.Rowe, D.R. and Tchobanoglous McGraw Hill Book Company.
2. "Water Supply and Pollution Control" - Viessman W.and Hammer M.J. Harper Collins College Publishers.
3. "Water and Waste Water Technology" - Hammer M.J. Prentice-Hall of India Private Ltd.
4. "Water and Wastewater Technology" - G.S. Birdie and J.S. Birdie
5. "Water Supply" - Duggal K.N.S. Chand and Company.
6. "Water Supply" - Garg S.K., Khanna Publishers.
7. "Water Supply and Waste water Disposal" - Fair and Gayes, John Wiley Publication.
8. "Water Supply Engineering" - B.C.Punmia,Ashok Jain,Arun Jain, Laxmi Publications

Reference Books:
1. Manual on Water Supply and Treatment- Government of India Publication, 1993
2. "Water and Waste Water Engineering" - Fair G. M, Geyer J. C, and Okun D. A, Vol. I & II", John Wiley Publication, 1966.
3. "Water and Waste Water Technology", Prentice Hall of India Private Limited, 1996.Hammer Structure of question paper for End Semester Evaluation

Guidelines Regarding Question Paper Setting:
1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

Geotechnical Engineering - I

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
GTE - I (PCC-CV504)	04	--	02	05	ISE	--	--	50	20
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To provide a coherent development to the students for the courses in sector of Geotechnical Engineering & Soil Improvement Techniques etc.
2. To present the foundations of many basic Engineering tools and concepts related Geotechnical Engineering.
3. To give an experience in the implementation of Engineering concepts which are applied in field of Geotechnical Engineering
4. To involve the application of scientific and technical principles of planning, analysis, design of foundation along with soil improvement techniques.

Course Outcomes:
After successful completion of this course, student will be able to:
1. Able to evaluate the Index and Engineering properties of soil
2. Understand the fundamental relationships in properties of soils
3. Evaluate the stress calculations in soil under different soil conditions
4. Understands the process and importance of compaction and consolidation
5. Know the shear strength of soil and its determination
6. Analyze the lateral pressure on vertical retaining walls

SECTION I

Unit 1: Soil Properties   **10 hrs**
　1.1 Origin of soil, Soil structure, Soil phase systems, Weight volume relationship
　1.2 *Index Properties of Soil:* Unit weights, water content, specific gravity, void ratio, porosity, air content, degree of saturation their relationships and significance
　1.3 Particle size distribution by sieve analysis and hydrometer analysis
　1.4 Atter berg's consistency limits (Liquid limit, plastic limit, shrinkage limit), Consistency indices, Activity
　1.5 IS classification of soil, Casagrande plasticity chart

Unit 2: Permeability and Seepage Analysis   **6 hrs**
　2.1 Darcy's law and its validity, Factors affecting permeability
　2.2 Determination of permeability of soil by constant head, Variable head, Permeability of stratified (layered) soil
　2.3 Concept of total stress, Pore pressure and effective stress, Different forms of water
　2.4 Seepage pressure, Seepage force, Seepage force per unit volume, Critical hydraulic gradient, Quick sand condition, Piping

2.5 Flow net construction and characteristics, Applications of flow net, Determination of seepage loss

Unit 3: Compaction and Consolidation   8 hrs

3.1 Concept of compaction, factors affecting compaction, Standard proctor test and modified proctor test as per IS 2720, Dry density and moisture content relationship, Zero air void line, Placement water content

3.2 Field compaction control, Field compaction equipment with their suitability.

3.3 Concept of consolidation, Factors affecting consolidation, Terzaghi's piston and spring analogy model, Terzaghi's theory of one-dimensional consolidation, Lab consolidation test to find coefficient of consolidation, Coefficient of volume change, Compression index, Coefficient of compressibility, NCC, UCC, OCC

3.4 Determination of coefficient of consolidation by square root of time fitting method and logarithm of time fitting method.

SECTION II

Unit 4: Stress Distribution in Soil   6 hrs

4.1 Bousinessq theory assumptions and application to point load, Strip load, Circular sections, Pressure distribution diagrams on horizontal and vertical plane, Radial shear stress

4.2 Isobars and pressure bulbs, Use of Newmark's charts, Westergaard theory assumptions and application to uniformly loaded rectangular area.

4.3 Contact pressure for different footings in different soils, Equivalent point load method for stress calculation, Approximate method (2V:1H) method for stress calculation

Unit 5: Shear Strength of Soil   10 hrs

5.1 Concept of shear stress and shear strength, Mohr-Coulomb's theory and failure envelopes for different types of soils such as C-soil, $\emptyset$-soil, and C-$\emptyset$ soils, Representation of stress on Mohr's circle

5.2 Terzaghi's total stress and effective stress approach, Factors affecting shear strength of cohesive and cohesionless soils

5.3 Determination of shear strength of soil by Direct shear test, Triaxial compression test, under UU, CU & CD conditions, Unconfined compression test and vane shear test, Sensitivity, Skempton pore water pressure parameters

Unit 6: Earth Pressure Theory   8 hrs

6.1 Concept of earth pressure, Plastic equilibrium, Earth pressure at rest, Active and passive condition, its practical applications.

6.2 Rankine's earth pressure theory for cohesionless soils under dry, Partially and fully submerged condition, Horizontal back fill with surcharge, Total lateral force on wall

6.3 Bell-Rankine's theory for cohesive soils under dry, partially and fully submerged condition, tension cracks in soil, Critical height, Coulomb's wedge theory for earth pressures

Term Work:

A. Performance of at least ten experiments from the following:
1. Determination of specific gravity by pycnometer/density bottle method
2. Determination of water content by oven drying method & Pycnometer method
3. Particle size distribution by dry sieve analysis
4. Particle size distribution by hydrometer analysis
5. Determination of consistency limits (LL, PL, SL)

6. Determination of field density by core cutter method
7. Determination of field density by sand replacement method
8. Determination of MDD & OMC by standard/Modified proctor test
9. Determination of coefficient of permeability by variable head method/Constant head method
10. Determination of shear strength parameters of soil by using direct shear test
11. Determination of shear strength of soil using Triaixal, Unconfined and Vane shear Test (Any one)

B. One assignment per unit with minimum four numerical in each assignment

Text Books:
1. "Soil Mechanics and Foundation Engineering" - B. C. Punmia, Laxmi Publication
2. "Soil Mechanics and Foundation Engineering" - K. R. Arrora, Standard Publisher
3. "Soil Mechanics and Foundation Engineering" - V. N. S. Murthy, Marcell Decker
4. "Basic and Applied soil Mechanics" - A. S. R. Rao and Gopal Ranjan, New age International Publication
5. "Geotechnical Testing and Instrumentation" - Alam Singh, CBS Publisher
6. "Geotechnical Engineering" - C. Venkatramaiah, New age International Publication
7. "Geotechnical Engineering" - Purushottam Raj

Reference Books:
1. "Soil Mechanics" - Terzaghi and Peak, Jony Willey and Sons, New York
2. "Soil Testing" - T. W. Lambe, Willey Eastern Ltd, New Delhi

Guidelines Regarding Question Paper Setting:
1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1 - Theory and Problem	12
2.	2 - Theory and Problem	11
3.	3 - Theory and Problem	12
4.	4 - Theory and Problem	11
5.	5 - Theory and Problem	12
6.	6 - Theory and Problem	12

Building Planning and Design

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
BPD (PCC-CV505)	02	--	04	04	ISE	--	--	50	20
					CIE	--	--	--	--
					ESE	--	--	50	20

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To study dimensions and space requirements for various elements of the building in relation to human body measurements.
2. To study Planning, designing of various public buildings considering principles of planning and Building Bye- Laws and regulations.
3. To study procedures for preparing perspective drawings of various objects as well as buildings.
4. To study Architectural composition and terms.

Course Outcomes:
After successful completion of this course students will be able to:
1. Specify dimensions and space requirements for various elements of the building in relation to human body measurements.
2. Plan, design public building considering principles of planning and Building Bye- Laws and regulations.
3. Prepare the submission and working drawings of public building.
4. Illustrate the procedures for preparing perspective drawings of various objects as well as buildings.
5. Apply knowledge of architectural composition and terms for betterment of aesthetic view.

Unit 1: Introduction   **2 hrs**
   1.1 Dimensions & space requirement in relation to body measurements
   1.2 Human body figures and its applications in space design of service elements.

Unit 2: Planning and Design   **14 hrs**
   Site selection, site layout for various types of building such as:
   2.1 *Educational Buildings:* Younger age range, Middle age range
   2.2 *Building for Health:* Health centers, Hospitals
   2.3 *Assembly Buildings:* Recreational halls, Cinema theatres, Restaurants, Hotels, Clubs
   2.4 *Business and Mercantile Buildings:* Shops, Banks, Markets and malls
   2.5 *Industrial Buildings:* Factories, Workshops, Cold storages
   2.6 *Office Buildings:* Administrative buildings, Corporate office
   2.7 *Buildings for Transportation:* Bus stations, Railway / metro stations

Unit 3: Perspective Drawings   **6 hrs**
   3.1 Elements of perspective drawings
   3.2 Parallel perspective and angular perspectives of different objects and small buildings

Unit 4: Nature of Architecture   **2 hrs**
    4.1 Architectural composition and terms such as mass, space, proportion, symmetry, balance, contrast, pattern.

Term Work:
1. Sheet for human body dimensions for space design (different human body figures, dimensions and their relevant applications)
2. Visit to a building complex and a report based on that.
3. Planning and designing of a public building project (Max. five students group) for which drawings shall be prepared covering scope of:
   i) Municipal drawing
   ii) Layout plan showing site development details (Internal roads, parking, secondary structures for allied services)
   iii) Working drawings with suitable scale (Furniture, electrification, plumbing)
   iv) Elevation treatment.
4. Perspective view of the buildings planned above.
5. Line plan of buildings on graph paper of at least five remaining types of buildings not covered in 2.
6. Two exercises on parallel and angular perspective of simple objects.
7. Report for the building project stated in 2, including necessary sketches and design details.
8. Minimum one exercise of preparing a plan and elevation on CAD.

Text Books:
1. "Building Drawing with an integrated approach to Built-Environment" - Shah, Kale and Patki, Tata Mcgraw Hill publication.
2. "Principles of Building Drawing" – M.G.Shah and C.M.Kale, Macmillan India ltd.
3. "Planning and Designing Building" – Y.S.Sane, Modern Publication House, Pune

References Books:
1. "Building Planning" – Kumar Swami, Charotar Publication
2. "Civil Engineering Drawing" – M.Chakaborty, UBS publication.

Open Elective – I (Energy & Environment)
(Offered by Faculty of Civil Engineering to All Faculties)

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
OE - I (OEC-CV506)	03	--	--	03	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To study energy needs, demand and various renewable alternatives.
2. To understand potential of renewable energy resources.
3. To study technologies to harness the energy.
4. To understand advantages, limitations of resources and energy management.

Course Outcomes:
After successful completion of this course students will be able to:
1. Compare conventional and renewable energy resources

2. Identity scope and potential of renewable energy
3. Analyze suitability of renewable energy resource.

4. Explain energy management principles and strategies

SECTION I
Unit 1: Introduction   **5 hrs**
    1.1 Global energy, Environmental resources
    1.2 Energy needs
    1.3 Indian scenario- Energy consumption, Needs and crisis

Unit 2: Renewable Sources of Energy   **9 hrs**
    2.1 *Biogas:* Types & factors affecting, Community biogas plant
    2.2 *Solar Energy:* Introduction, Utilization methods, Merits and demerits & potential
    2.3 *Wind Energy:* Site selection criteria, Potential & scope
    2.4 *Tidal Energy:* Site suitability, Types

Unit 3: Non-Renewable Sources of Energy   **4 hrs**
    3.1 *Energy from Coal and Oil:* Introduction, Merits and demerits
    3.2 *Natural Gas & Geothermal Energy:* Introduction, Merits and demerits
    3.3 Relevance to other branches, Green building

SECTION II

Unit 4: Environmental Impacts   **5 hrs**
    4.1 Global Warming
    4.2 Greenhouse effect
    4.3 Acid rain

Unit 5: Environmental Impact Assessment (E.I.A.)   **6 hrs**
    5.1 Objectives
    5.2 General E.I.A. process
    5.3 Capability & limitations

Unit 6: Energy Audit and Management   **7 hrs**
    6.1 Definition and objectives
    6.2 Types and general guidelines for energy audit
    6.3 Principles of energy management, Energy planning

NOTE: One assignment on each unit.

Text Books:
1. "Non-Conventional Energy Sources" - G. D. Rai, Khanna Publishers, 5th Edition, 2014.
2. "Solar Energy and Non-Conventional Energy Sources" - Dr. V. M. Domkundwar, Dhanpar Rai & Co. Ltd., 1st Edition, 2010.
3. "Non-Conventional Energy Sources" - R. K. Singal, Katson Publication, 2nd Edition, 2009

Reference Books:
1. "Renewable Energy Resources" - Jhon Twidell and Tony Weir, Roultledge Publication, 2nd Edition,2005.
2. "Solar Energy" - Dr. S. P. Sukhatme, McGraw Hill Publication, 2nd Edition, 2005.
3. "Non-Conventional Resources of Energy" - G. S. Sawhney, PHI Publication, 5th Edition, 2010.

Guidelines Regarding Question Paper Setting:
1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	11
2.	2	12
3.	3	12
4.	4	11
5.	5	12
6.	6	12

Open Elective – I (Waste Management)
(Offered by Faculty of Civil Engineering to All Faculties)

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
OE - I (OEC-CV506)	03	--	--	03	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To study the effects of the various types of waste on human being, animals and environment.
2. To study the water & wastewater management and solid waste of urban area.
3. To study the various techniques and options for handling industrial wastewater, hazardous waste and air pollution of urban area.

Course Outcomes:
After successful completion of this course students will be able to:
1. To evaluate the effects of various wastes on human beings, animals and on Environment.
2. To solve the water and wastewater treat by using conventional and advanced treatment methods.
3. To estimate quantity of solid waste, E-waste and biomedical wastes and to suggest their disposal methods.
4. To suggest reuse and recycles techniques of solid waste, E-waste and biomedical wastes and to suggest their disposal methods.
5. To characteristics and to select treatment options for selected industrial wastewater.
6. To discuss the impacts of hazardous waste and air pollution.

SECTION I

Unit 1: Introduction 6 hrs
1.1 Definition of waste, Types and sources of waste, Properties of waste
1.2 Effects on human beings and animals and on their environment
1.3 Introduction to various acts and rules for waste in India

Unit 2: Domestic Water and Wastewater Management 6 hrs
2.1 Importance of water and wastewater treatment, Water quality standards, Effluent standards
2.2 Flow diagram of water and wastewater treatment
2.3 Advanced wastewater treatments-RO
2.4 Nitrification and De-nitrification process, SBR techniques

Unit 3: Industrial Wastewater Management 6 hrs
3.1 Volume and strength reduction, Equalization, Neutralization
3.2 Propagation techniques
3.3 Flow diagram and treatment methods for pulp and paper, dairy, sugar & textile industries

SECTION II

Unit 4: Solid Waste Management   **6 hrs**
  4.1 *Municipal Waste:* Types, Sources, Collection, Transportation and disposal methods
  4.2 *Biomedical Waste:* Types, Sources, Collection and disposal methods
  4.3 *Construction and Demolition Waste:* Problems of collection, Segregation, Transportation
     & limitations, Reuse and disposal of waste

Unit 5: Hazardous Waste Management   **6 hrs**
  5.1 Definition of hazardous waste, Classification of waste
  5.2 Processing techniques
  5.3 Rules and regulation of disposal of waste

Unit 6: E-waste Management   **6 hrs**
  6.1 Composition, Segregation
  6.2 Reuse and recycle
  6.3 Disposal techniques, E-waste management rules 2016

NOTE: One assignment on each unit.

Text Books:
  1. "Water and Waste Water Technolog" - M.J. Hammer, Prentice-Hall of India Private Ltd.
  2. "Environmental Engineering – Peavey" - H. S. Rowe and D. R. Tchobanoglous, McGraw Hill Book Company
  3. "Water and Wastewater Technology" - G.S. Birdie and J.S. Birdie
  4. "Waste Water Engineering Treatment & Disposal" - Mertcalf & Eddy, Tata McGraw Hill
  5. "Solid Waste Management" - Dr. A. D. Bhide

Reference Books:
  1. "Manual on Water Supply and Treatment", Government of India Publication, 1993
  2. "Manual on Sewerage & Sewage Treatment", Ministry of Urban Development, Govt. of India.
  3. "Manual on Municipal Solid Waste Management", Ministry of Urban Development, Govt. of India.
  4. "Solid Waste Management" - Gorge Tchobanoglous

Guidelines Regarding Question Paper Setting:
  1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
  2. All questions are compulsory.
  3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	11
2.	2	12
3.	3	12
4.	4	12
5.	5	11
6.	6	12

Theory of Structures

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
TOS (PCC-CV601)	03	01	--	04	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To impart principles of elastic structural analysis and behavior of indeterminate structures.
2. To analyze indeterminate structures by using different methods.
3. To compare suitability of different methods.
4. To make aware of the limitations of the methods of solution and their outcomes.

Course Outcomes:
After successful completion of this course students will be able to:
1. Understand the concept of determinacy and indeterminacy.
2. Apply various techniques of structural mechanics to solve indeterminate structures.
3. Analyze indeterminate structures by using various approaches.
4. Know the limitations of the methods of solution and their outcomes.

SECTION I

Unit 1: Introduction and Consistent Deformation Method   6 hrs
1.1 Concept of determinacy and indeterminacy, Degrees of freedom and structural redundancy, Methods of analysis. (No numerical).
1.2 Consistent deformation method: propped cantilever with uniform section, fixed beam.

Unit 2: Clapeyron's Theorem   6 hrs
Clapeyron's theorem of three moments, application to
2.1 Continuous beams
2.2 Sinking of supports
2.3 Beams with different M.I.

Unit 3: Energy Theorems   6 hrs
Castiglione's theorem and unit load method (Degree of S.I. ≤ 2), application to
3.1 Statically indeterminate beam
3.2 Truss (lack of fit and temperature variation effect)

SECTION II

Unit 4: Slope Deflection Method   6 hrs
Slope deflection equation, Modified slope deflection equation (Degree of K.I. ≤ 2), application to
4.1 Beams, sinking of supports
4.2 Portal frames without sway

Unit 5: Moment Distribution Method   **6 hrs**

Moment distribution method (Degree of S.I. ≤ 2), application to
    5.1 Beam
    5.2 Sinking of supports
    5.3 Portal frames without and with sway.

Unit 6: Matrix Methods   **6 hrs**
    6.1 *Flexibility Method:* Flexibility coefficients, Development of flexibility matrix, Compatibility equations, Application to propped cantilever, fixed beam, continuous beam (Degree of S.I. ≤ 2)
    6.2 *Stiffness Method:* Stiffness coefficients, Development of stiffness matrix, Equilibrium equations, Applications to beams and portals (Degree of K.I. ≤ 2)

Term Work:
    One assignment per unit with minimum four numerical in each assignment

Text Books:
    1. "Structural Analysis" - Bhavikatti, Vikas Publishing House Pvt, ltd.
    2. "Analysis of Structures" - Vazirani and Ratwani, Vol. I & II, Khanna Publishers
    3. "Mechanics of Structures" - S. B. Junnarkar, H.J. Shah, Vol-I & II, Charotar Publishers.
    4. "Structural Analysis: Matrix approach - Pandit and Gupta.
    5. "Structural Analysis" - L.S. Negi and R.S. Jangid, Tata Mc-Graw Hills Publishing House, New Delhi

Reference Books:
    1. "Basic Structural Analysis" - C.S. Reddy, Tata McGraw Hill Publishing House, New Delhi.
    2. "Structural Analysis" - Devdas Menon, Narosa Publishing House.
    3. "Basic Structural Analysis" - K.U. Muthu, Azmi Ibrahim, M. Vijyan, Maganti Janadharn. I.K. International Publishing House Pvt. Ltd.
    4. "Matrix analysis of structures" - Gere & Weaver.
    5. "Indeterminate structural analysis" - C.K. Wang

Guidelines Regarding Question Paper Setting:
    1. Section I - Q. No. 1 to 4 and Section II - Q. No. 5 to 8
    2. Q. No. 1 & 5 is compulsory question based on entire theory of section I and section II respectively.
    3. Solve any two questions out of remaining three questions in each section

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1, 2, 3 - Theory	07
2	1 - Problem	14
3	2 - Problem	14
4	3 - Problem	14
5	4,5,6 - Theory	07
6	4 - Problem	14
7	5 - Problem	14
8	6 - Problem	14

Engineering Management

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
EM HM-CV602	04	--	02	05	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To introduce management theories.
2. To learn project management tools.
3. To understand Resource management.
4. To get acquainted with financial management.

Course Outcomes:
After successful completion of this course students will be able to:
1. Understand importance of management in construction.
2. Use the Project planning and management tools in Construction.
3. Evaluate and draw project network for estimating time and cost.
4. Know the techniques of Material Management.
5. Explore and understand the concepts of Economics in construction.
6. Know the advance concepts in management.

SECTION I

Unit 1: Management Introduction   6 hrs
1.1 Importance, Contribution by Henry Fayol and F.W.Taylor
1.2 Functions of management w.r.t its influence in construction management
1.3 Introduction to decision making and decision tree.

Unit 2: Project Management and Network Analysis   10 hrs
2.1 Phases of project management, Bar chart, Gantt chart.
2.2 Work breakdown structure.
2.3 *CPM Network:* Time estimate, Floats, Critical path. Network compression and updating

Unit 3: PERT   8 hrs
3.1 Introduction, Time estimates, Floats, Project duration. Introduction to precedence network
3.2 Study of Project Management Software.

SECTION II

Unit 4: Resource Management   8 hrs
4.1 Objectives, Functions, Inventory control, ABC analysis, EOQ analysis. HML, VED, SDE.
4.2 Resource allocation, Concept of smoothing and leveling

Unit 5: Engineering Economics   10 hrs
5.1 Types of interests, Time value of money, Equivalence.
5.2 *Economic Comparison Methods:* Present worth method, EUAC method, Capitalized cost method.
5.3 *Investment Criteria:* Net present value, Rate of return, Benefit cost ratio, Payback period method, Concept of breakeven analysis

Unit 6: Advances in Management   6 hrs
6.1 Concept of work study and method study, ISO 9000
6.2 Site layout, Safety in construction - Personal protective equipment.

Term Work:
1. One assignment per unit with minimum four questions in each assignment
2. Planning and scheduling of any construction project by using Project management software.

Text Books:
1. "Project planning and Control with PERT and CPM" - B.C.Punmia, Laxmi Publication.
2. "PERT &CPM: Principles and Application" - Srinath L.S, Affiliated East west press
3. "Construction Engineering and Management" - Dr. S. Seetharaman, Umesh Publications
4. "Financial Management" – Prasanna Chandra, TATA McGraw Hill.
5. "Industrial Engineering and Production Management - Martand Telsang, S.Chand Publication.
6. "Work Study" - O. P. Khanna, Dhanapat Rai Publication.

Reference Books:
1. "Engineering Management" – Stoner, Pearson Publication.
2. "Construction Project Management" – K.K.Chitkara, TATA McGraw Hill.
3. "Project Cost Control in Construction" - Roy Pilcher, Blackwell Scientific Publications.
4. "Principles of Construction Management - Roy Pilcher, TATA McGraw Hill.
5. "Engineering Economics" - Layland Blanck and Torquin, TATA McGraw Hill.
6. "Engineering Economics" - Paneerselvam, PHI Publications. .
7. "Industrial Engineering and Management" - O.P. Khanna, Dhanapat Rai Publication.
8. "Operations Research and Engineering Management" - S.D. Sharma, KEDAR NATH RAM NATH

Guidelines Regarding Question Paper Setting:
1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	11
2	2	12
3	3	12
4	4	12
5	5	12
6	6	11

Environmental Engineering – II

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
EE - II PCC-CV603	04	--	02	05	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To describe wastewater, its sources, characteristics and collection systems.
2. To design the various treatment processes for wastewater treatment and low cast treatment methods.
3. To interpret various methods of wastewater disposal.
4. To explain various aspects of solid waste management.
5. To outline the effects of air pollution and its control measures.

Course Outcomes:
After successful completion of this course students will be able to:
1. Explain sources, characteristics and methods of wastewater collection.
2. Design the primary and secondary wastewater treatment units and describe low cost wastewater treatment units.
3. Understand various methods of wastewater disposal
4. Explain the necessity and importance of solid waste management.
5. Describe air pollution, its effect and controlling techniques.

SECTION I

Unit 1: Waste Water Treatment   **8 hrs**
    1.1 Components of wastewater flows, Wastewater sources and flow rate, Variations in flow rates and strength, Wastewater constituents, Characteristic of municipal waste water, Problems on B.O.D. calculations, Quantity of storm water.
    1.2 Sewerage system, Types, Layout, Types of sewers, Collection system, Appurtenances, Design of sanitary and storm water sewers, Maintenance of sewerage systems, Sewage and sludge pumping.

Unit 2: Primary and Secondary Treatment   **8 hrs**
    2.1 Screening, Comminuting, Grit removal, Oil and grease trap primary settling tank.
    2.2 Secondary Treatment-Activated sludge process, Process, Design and operating parameters of ASP, Modification of ASP, Operational problems, Concept of trickling filter.

Unit 3: Sludge Treatment and Disposal   **8 hrs**
    3.1 Concept of anaerobic digestion, Types of reactors.
    3.2 Low cost wastewater treatment methods - Principles of waste stabilization pond. Design and operation of oxidation pond, Operation of aerobic & anaerobic Lagoons, Oxidation ditch, Septic tank.

Unit 4: Stream Pollution   **8 hrs**

    4.1 Self-purification, DO sag curve, Streeter Phelp's Equation, Stream classification

    4.2 Disposal of waste water methods, Effluents standards for stream and land disposal as per MPCB and CPCB standards

Unit 5: Solid Waste Management   **8 hrs**

    5.1 Solid wastes definition, Types, Sources, Characteristics, Functional outlines-storage, Collection, Processing techniques

    5.2 Methods of treatment of solid waste composting, Incineration, Pyrolysis and sanitary land filling.

Unit 6: Air Pollution Noise Pollution and EIA   **8 hrs**

    6.1 *Air Pollution:* Definition, Sources and classification of pollutants, Effects. Control of industrial air pollution - Settling chamber, Bag filter, Cyclone separator, Scrubbers, Electrostatic precipitators. Air quality standards

    6.2 *Noise Pollution:* Noise characteristics and measurements, Levels of noise and standards, Control.

    6.3 *Environmental Impact Assessment:* Concept, Outline and details of EIA, Report preparation.

Term Work:

    A. Characterization of municipal waste water (Any five of the following):
1. pH
2. Alkalinity
3. Solids
4. Chlorides
5. DO
6. BOD
7. COD
8. Sulphates
9. Oil & grease
10. Volatile acids

    B. Design/analysis problems on sewerage system and treatment system

    C. Visit to sewage treatment plant & visit report.

Text Books:

1. "Environmental Engineering" – H. S. Peavey, D.R. Rowe and Thobanoglous, McGraw Hill Book Company
2. "Water Supply and Pollution Control" - Viessman W. and Hammer M.J., Harper Collins College Publishers.
3. "Waste Water Engineering Treatment & Disposal" - Mertcalf & Eddy, Tata McGraw Hill
4. "Sewage Disposal and Air Pollution Engineering" - Garg S.K., Khanna Publishers
5. "Waste Water Supply Engineering" - B. C. Punmia, Laxmi Publication
6. "Solid Waste Management in Developing Countries" - Bhide A.D. and Sundersen B.B., Indian National Scientific Documentation Centre, New Delhi
7. "Air Pollution" - Rao M.N. and Rao H.V.N., Tata Mcgraw Hill

Reference Books:

1. "Manual on Sewerage & Sewage Treatment" Ministry of Urban Development Govt. of India Msy-2000. 35 PDOP-4-59-85-97, Ministry of Urban development

2. "Water and Waste Water Technology" - Hammer M.J, Prentice-Hall of India Private ltd.
3. "Manual on Municipal Solid Waste Management" - Ministry of Urban Development Govt. of India.

Guidelines Regarding Question Paper Setting:
1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	11
2	2	12
3	3	12
4	4	12
5	5	12
6	6	11

Geotechnical Engineering II

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
GTE - II PCC-CV604	04	--	02	05	ISE	--	--	25	10
					CIE	30	10	--	--
					ESE	70	30	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. Know Various concepts of different soil/rock strata and use of this data for interpretation of bearing capacity
2. Understand the importance and basics of foundation engineering in the civil engineering projects.
3. Evaluate the load bearing capacity and settlement of foundations by classical theories.
4. Analyze the geotechnical aspects of shallow and deep foundations
5. Understand the concepts of the stability of slopes and study various methods of evaluating the stability of slopes.
6. Know the modern foundation techniques.

Course Outcomes:
After successful completion of this course students will be able to:
1. Use engineering science principles to develop foundation engineering knowledge.
2. Apply foundation engineering knowledge in the civil engineering projects.
3. Calculate bearing capacity theoretically as well as practically.
4. Calculate settlement and design shallow and deep foundation
5. Apply basics concepts of slope stability on field.
6. Apply modern foundation techniques.

SECTION I

Unit 1: Soil & Rock Exploration   8 hrs
  1.1 Necessity, Planning, No & depth of bore holes, Exploration methods - auger boring (hand and continuous flight augers), and wash boring, rotary drilling, percussion drilling.
  1.2 Soil sampling - Disturbed and undisturbed, Rock drilling and sampling, Types of sampler.
  1.3 Mechanical properties of rock, Behavior of rocks in uniaxial compression, Tensile strength of rocks
  1.4 Types of rock failure, Core barrels, Core boxes, Core recovery, Rock quality designation

Unit 2: Bearing Capacity Evaluation   8 hrs
  2.1 Definitions, Modes of failure, Terzaghi's bearing capacity theory, Meyerhof's bearing capacity, I.S. Code method of bearing capacity evaluation & computation (IS 6403)
  2.2 Effect of various factors on bearing capacity (Size & Shape, Depth, WT)
  2.3 Bearing capacity evaluation from Plate Load Test, S.P.T. (By I.S. Code method), Static cone penetration test and Menards pressure meter tests with detailed procedure.

Unit 3: Shallow Foundation and Foundation Settlement   **8 hrs**

   3.1 Types and their selection, Minimum depth of footing, Assumptions & limitations of rigid design analysis. Design of isolated, combined, strap footing (Rigid analysis), raft foundation (elastic analysis), floating foundations (R.C.C. Design is not expected)

   3.2 Immediate settlement - computations from I.S. 8009 - 1976 (Part I) approach, Consolidation

   3.3 Settlement computations, Concept of total settlement, Differential settlement and angular distortion.

SECTION II

Unit 4: Pile Foundation   **8 hrs**

   4.1 Classification and their uses, Single pile capacity evaluation by static and dynamic methods for cohesive and cohesion less soil, Pile load test. Negative skin friction

   4.2 Group action piles, Spacing of piles in group, Group efficiency.

   4.3 Under reamed piles – equipment, construction and precautions.

Unit 5: Well Foundations, Coffer Dam and Ground Improvement Techniques   **8 hrs**

   5.1 Element of wells, Types, Methods of construction, Tilt and shift, Remedial measures.

   5.2 *Pneumatic Caissons:* Sinking method - Sand island method, Caisson disease. Types and material used for sheet piling

   5.3 Common types of cofferdams, Braced cofferdam.

   5.4 Stone columns, Vibroflotation, Preloading technique, Civil engineering application of geo synthetics, Geo textile & geomembrane

Unit 6: Analysis of Slope Stability   **8 hrs**

   6.1 Slope classification, Slope failure, Modes of failure. Infinite slope in cohesive and cohesion less soil

   6.2 Taylor's stability number, Swedish slip method, Method of slices and concept of friction circle method, Landslide

Term Work:

1. Minimum one assignment on each unit with theory and minimum four numerical, (wherever applicable)
2. Any software-based project **OR** Foundation site visit with report

Text Books:

1. "Soil Mechanics in Engineering Practice" - Karl Terzaghi, Ralph B. Peck and Gholamreza Mesri, Wiley India Pvt. Ltd
2. "Basic and Applied Soil Mechanics" - Gopal Ranjan and A S Rao, G. K. Publications Pvt. Ltd.
3. "Soil Mechanics and Foundation Engineering" - V. N. S. Murthy, B. S. Publications (3rd Edition)
4. "Soil Mechanics and Foundation Engineering" - B. C. Punmia, Laxmi Publishing Co., New Delhi.
5. "Geotechnical Engineering" - Dr. B. J. Kasmalkar, Pune Vidyarthi Griha Prakashan.

Reference Books:

1. "Engineering Properties of Soils and Their Measurements" - Joseph E Bowles, McGraw Hill Publications
2. "Soil Mechanics" - Lambe and Whitman, S. Chand Publications (SI Version).

3. "Geotechnical Engineering Principle and Practice" - Donald P Coduto, McMillan Press (PHI).
4. "Geotechnical Engineering" - P Purushothma Raj, McGraw Hill Publication (4th Edition).
5. "Foundation Design Manual" - Dr. N.V. Nayak. Dhanpat Rai and Sons

Guidelines Regarding Question Paper Setting:
1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	11
2	2	12
3	3	12
4	4	12
5	5	11
6	6	12

Open Elective-II (Soil and Water Conservation Techniques)
(Offered by Faculty of Civil Engineering to All Faculties)

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
OE - II (OEC-CV605)	03	--	--	03	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To understand the concept of soil and water conservation.
2. To apply the knowledge of conservation for societal benefit.
3. To evaluate the specific needs of soil and water conservation in given area.

Course Outcomes:
After successful completion of this course students will be able to:
1. Understand methods of soil and water conservation.
2. Develop an integrated model for sustainable natural conservation.
3. Explain the groundwater exploration techniques and its artificial recharge.
4. Analyze the needs for protection of banks and preservation of soil.

SECTION I

Unit 1: Introduction 4 hrs
   1.1 Concept of soil erosion and water conservation
   1.2 Principles of Soil Erosion – Causes, Types, Agents, Factors affecting, Mechanics of soil erosion.

Unit 2: Soil Conservation Methods 9 hrs
   2.1 Introduction, Erosion due to water,
   2.2 Terraces for water erosion control-Terraces and their design, Bench terracing, Types of bench terraces, Alignment of bench terraces,
   2.3 Bunding Methods- Measures for water erosion control, Bunds (contour bunds, graded bunds), Construction of bunds
   2.4 Gully Erosion - Classification of Gullies, Principles of Gully Control, Gully Control Measures;
   2.5 Maintenance of Bench Terraces, bunding and gully.

Unit 3: Stream Bank Erosion and Protection 5 hrs
   3.1 Introduction - Susceptible area to stream bank erosion, Process of stream bank erosion, Bank scour, Mass failure
   3.2 Impacts of stream bank erosion - Causes of stream bank erosion, Control measures for stream bank erosion
   3.3 Objectives and methods of river training works.

Unit 4: Water Harvesting Structures   **5 hrs**
   4.1 Importance of water harvesting, Types of water harvesting
   4.2 Water harvesting technique, Runoff vs. flood water harvesting
   4.3 Performance of WHS - Check dams, Nala bund, MI tank, Percolation tank

Unit 5: Modeling of Watershed Process   **5 hrs**
   5.1 Watershed model and modeling, Benefits of watershed modeling, Watershed models
   5.2 Case study – Watershed, Modelling for soil and water conservation.

Unit 6: Groundwater Conservation   **8 hrs**
   6.1 Introduction, Sources of ground water, Porosity and permeability, Types of   aquifers, Zones of ground water
   6.2 Ground water regulations, Ground water conservation techniques, Artificial recharge systems, Causes, effects and solutions of ground water depletion.

NOTE: One assignment on each unit.

Text Books:
1. "Soil and Water Conservation Engineering" - Dr. R. Suresh, Standard Publications
2. "Hydrology and Soil Conservation Engineering including Watershed Management" - Ghanshyam Das, PHI
3. "Watershed Management" - GVS Murthy, New Age international Publication.

Reference Books:
1. "Principles of Soil Conservation and Management" - Hamberto Blanco and Rattan Lal, Springer
2. "Manual of Soil and Water Conservation Practices" - Gurmal Singh, C. Venkatraman, G. Sastry, B. P. Singh
3. "Soil Erosion Research Methods" - R. Lal, Lib. of Congree Catloing in Publication Data.
4. "Soil and Water Conservation in Semiarid Area" - Norman W. Handsom, United Book Prints
5. "Groundwater Hydrology" - D.K. Todd, Wiley Publication

Guidelines Regarding Question Paper Setting:
1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

Open Elective-II (Disaster Risk Management)
(Offered by Faculty of Civil Engineering to All Faculties)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
OE - II (OEC-CV605)	03	--	--	03	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To provide basic conceptual understanding of disasters and its relationships with development.
2. To gain understand approaches of disaster preparedness, response and recovery.
3. To enhance awareness of Disaster Risk Management institutional processes in India
4. To build skills to respond to disasters.

Course Outcomes:
After successful completion of this course students will be able to:
1. Gain the ability to understand and categories the disaster.
2. Apply preparedness plans for disaster response.
3. Setting up of early warning systems for risk reductions
4. Application of Sphere Standards Indian context

SECTION I

Unit 1: Introduction   **5 hrs**
    1.1 Concepts and definitions: Disaster, Hazard
    1.2 Vulnerability, Risks severity, Frequency and details, Capacity, Impact
    1.3 Prevention, Mitigation

Unit 2: Types of Disaster   **6 hrs**
    2.1 *Natural Disasters:* Floods, Draught, Cyclones, Volcanoes, Earthquakes, Tsunami, Landslides, Thunder storms, Forest fires, Avalanches.
    2.2 *Manmade Disasters:* Industrial pollution, Artificial flooding in urban areas, Nuclear radiation, Chemical and biological spills, Transportation accidents (air, sea, rail and road), Terrorist strikes

Unit 3: Disaster Impacts   **7 hrs**
    3.1 Environmental, Physical, Social, Ecological, Economic, Political
    3.2 Health, Psycho-social issues
    3.3 Demographic aspects (gender, age, special needs)
    3.4 Global and national disaster trends
    3.5 Climate change and urban disasters.

SECTION II

Unit 4: Disaster Risk Reduction (DRR)   **6 hrs**

    4.1 *Pre-Disaster:* Risk assessment and analysis, Risk mapping, Zonation and micro zonation, Prevention, Mitigation, Early warning systems, Preparedness, Capacity assessment, Structural and non-structural measures

    4.2 *During-Disaster:* Evacuation, Disaster communication, Search and rescue, Emergency operation centre, Incident command system, Relief and rehabilitation,

    4.3 *Post-Disaster:* Damage and needs assessment, Restoration of critical infrastructure, Early recovery, Environmental response (water, sanitation, food safety, waste management), Disease control, Security, Communications

Unit 5: Disasters, Environment and Development   **6 hrs**

    5.1 Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization)

    5.2 Sustainable and environmentally friendly recovery

    5.3 Reconstruction and development methods

Unit 6: Disaster Management in India   **6 hrs**

    6.1 Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005

    6.2 Roles and responsibilities of government, Community, Local institutions, NGOs and other stakeholders

    6.3 Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority

    6.4 Applications of Science and Technology - Geo-informatics in Disaster Management (RS, GIS, GPS and RS)

NOTE: One assignment on each unit.

Text Books:

1. "Disaster Risk Reduction in South Asia" - Pradeep Sahni, Prentice Hall.
2. "Disaster Management" - Ghosh G.K., APH Publishing Corporation
3. "Manual on natural disaster management in India" - M C Gupta, NIDM, New Delhi
4. "An overview on natural & man-made disasters and their reduction" - R K Bhandani, CSIR, New Delhi
5. "Disasters in India Studies of grim reality" - Anu Kapur, Rawat Publishers, Jaipur
6. "Management of Natural Disasters in developing countries" - H.N. Srivastava and G.D. Gupta, Daya Publishers, Delhi
7. "Disaster Management Act 2005", Publisher by Govt. of India
8. "National Disaster Management Policy, 2009", GoI
9. "Space Technology for Disaster management: A Remote Sensing & GIS Perspective" - P.S. Roy, Institute of Remote Sensing (NRSA) Dehradun.
10. "Natural Disaster" - R.K. Sharma and G. Sharma, APH Publishing Corporation, New Delhi.
11. "Disaster Management in the Hills" - Satendra Singh, Concept Publishing Company, New Delhi.
12. "Disaster Management through Panchayati Raj" - K Taori, Concept Publishing Company, New Delhi

Reference Books:

1. "Handbook of Disaster Management: Techniques & Guidelines" - B. K. Singh, Rajat Publication.
2. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
3. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).
4. "Disaster Medical Systems Guidelines". Emergency Medical Services Authority, State of California, EMSA no.214, June 2003
5. "IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings", Inter-Agency Standing Committee (IASC), Feb. 2007, Geneva
6. "World Disasters Report, 2009", International Federation of Red Cross and Red Crescent, Switzerland
7. "Disaster management policy and administration", Vol I, II and III, S L Goyal, Deep & Deep, New Delhi

Guidelines Regarding Question Paper Setting:

1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

Structural Design and Drawing - I

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
SDD - I (PCC-CV606)	--	--	04	02	ISE	--	--	50	20
					CIE	--	--	--	--
					ESE	--	--	50	20

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To analyze and design steel structures.
2. To prepare the working drawing for various structural elements.

Course Outcomes:
After successful completion of this course students will be able to:
1. Analyze and design different types of bolted & welded connections
2. Demonstrate the knowledge of common sections subjected tension and compression members & its design,
3. Analyze and design of steel column, flexural members and its elements.
4. Aware of application of software in structural analysis and design.
5. Prepare the working drawing as per requirement of project execution.

Term Work:
Detailed structural design and drawing of the following steel structure along with necessary drawings by limit state method analysis. (Max group size should not exceed four students)
1. Design of industrial building including roof truss, purlin, bracings, gantry girder, column, column base and connections. Preparation of all working drawings.
2. Analysis and Design of building frame manually and by using any FEM based software. Preparation of all working drawings.

Text Books:
1. "Limit State Design of Steel Structures" - Duggal S.K., Tata McGraw-Hill Education private Ltd., New Delhi, 2nd Edition 2014
2. "Design of Steel Structures: By Limit State Method as Per IS: 800 – 2007" - Bhavikatti S. S., I K International Publishing House.
3. "Limit State Design in Structural Steel" - Shiyekar M. R, 2nd Edition, PHI Publisher
4. "Design of Steel Structures" - Dayaratnam, Wheeler Publications, New Delhi.
5. "Design of Steel Structures" – B. C. Punmia, A. K. Jain and Arun Kumar Jain, Laxmi Publication

Reference Books:
1. "LRFD Steel Design" - William T. Segui, PWS Publishing
2. "Design of Steel Structures" - Edwin H. Gaylord, Charles N. Gaylord James, Stallmeyer, Mc-Graw Hill
3. "Design of Steel Structures" - Mac. Ginely T.
4. "Design of Steel Structures" - Kazimi S. M. and Jindal R. S., Prentice Hall India.

5. "Design of Steel Structures" - Breslar, Lin Scalzi, John Willey, New York.
6. "Steel Structure" - Controlling Behaviour Through Design, Englekirk, WILEY.

I.S. Codes:
1. IS: 800 – 2007
2. IS: 875 (part I, II and III)
3. SP6 (1) & SP 6 (6),
4. IS: 816
5. IS: 808.

Seminar

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
Seminar MC-CV607	--	--	2	1	ISE	--	--	50	20
					CIE	--	--	--	--
					ESE	--	--	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To understand, develop research ability & present the knowledge gained from curriculum/field etc.
2. To study the recent trends, technological innovations in civil engineering & interdisciplinary areas.
3. To enhance presentation skills.

Course Outcomes:
After successful completion of this course students will be able to:
1. Summarize the present status and make literature review on the selected topic with current issues to give a state of an art of technological progress in the past through technical report.
2. Deliver seminar presentation using modern tools highlighting the distinguishing features of the studies conducted.
3. Prepare the technical report of seminar work in given format.

Term Work:
1. Selection of topic from curriculum / field in civil engineering / interdisciplinary areas on current issue.
2. Minimum three presentations as follows,
   a. Synopsis presentation
   b. Literature review presentation
   c. Final presentation
3. Preparation of final report in hard and soft format.

Text Books:
Relevant text books on selected topic of seminar.

Reference Books:
Relevant reference books, journal publications, conferences publications, magazines, open web site sources on selected topic of seminar.

*Guidelines about Field Training (SI-CV707): -

1. On site/office field training for 2 weeks during winter and 3 weeks during summer vacation of T.Y. B.Tech.
2. College has to provide field book containing 35 pages about daily report of field training to students.
3. Each page of field book should contain the signature of site supervisor/office engineer.
4. College has to allot site/office to students and students should strictly do the field training at allotted site/office.
5. After successful completion of field training students should bring satisfactory report from allotted firm.
6. The evaluation of field training should be done in semester VII under course Field Training having course code SI-CV707.
7. If possible, external practicing examiner should be called for evaluation of term work of Field Training.

SHIVAJI UNIVERSITY, KOLHAPUR

FINAL YEAR (B.Tech.) CBCS

In

CIVIL ENGINEERING

(To be implemented from JUNE 2021)

Final YearCivil Engineering - CBCS Pattern

SEMESTER– VII

Sr.No	Course(Subject Title)	THEORY Credits	No. ofLecture	Hours	TUTORIAL Credits	No. ofLecture	Hours	PRACTICAL Credits	No. ofLecture	Hours	Exam Hours	Mode	Marks	Total Marks	Min	Prac. Hours	Max	Min	TW Hours	Max	Min
1	PCC-CV701	4	4	4	-	-	-	1	2	2		CIE	30	100	40	AsperBOSGuidelines	-	-	2	25	20
												ESE	70								
2	PCC-CV702	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10
												ESE	70								
3	PCC-CV703	3	3	3	-	-	-	1	2	2		CIE	30	100	40		25	10	2	25	10
												ESE	70								
4	PCC-CV704	3	3	3	-	-	-	1	2	2		CIE	30	100	40		25	10	2	25	20
												ESE	70								
5	PCE-CV705	3	3	3	1	1	1	-	-	-		CIE	30	100	40		25	10	2	25	20
												ESE	70								
6	PCC-CV706	2	2	2	-	-	-	1	2	2		-	-	-	-		-	-	2	25	20
7	SI-CV707	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-	-	25	20
8	PW-CV708	-	-	-	-	-	-	1	2	2		-	-	-	-		-	-	2	50	20
	TOTAL	18	18	18	2	2	2	5	10	10				500			75			225	

SEMESTER –VIII

Sr.No	Course(Subject Title)	THEORY Credits	No. ofLecture	Hours	TUTORIAL Credits	No. ofLecture	Hours	PRACTICAL Credits	No. ofLecture	Hours	Exam Hours	Mode	Marks	Total Marks	Min	Prac. Hours	Max	Min	TW Hours	Max	Min
1	PCC-CV801	4	4	4	-	-	-	1	2	2		CIE	30	100	40	AsperBOSGuidelines	-	-	2	25	10
												ESE	70								
2	PCC-CV802	3	3	3	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10
												ESE	70								
3	PCC-CV803	3	3	3	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10
												ESE	70								
4	PCE-CV804	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	-	-	-
												ESE	70								
5	PCE-CV805	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	-	-	-
												ESE	70								
6	PCC-CV806	-	-	-	-	-	-	2	4	4		-	-	-	-		25	10	2	50	10
7	PW-CV807	-	-	-	-	-	-	1	2	2		-	-	-	-		100	40	2	50	20
	TOTAL	16	16	16	2	2	2	7	14	14				500			125			175	
	TOTAL	35	35	35	3	3	3	12	24	24				1000			200			400	

SEMESTER-VII					
Sr. No	**CodeNo.**		**Course(SubjectTitle)**	**Semester**	**Credits**
1	PCC-CV701	DCS-I	Design of Concrete Structures-I	7	5
2	PCC-CV702	EQ	Earthquake Engineering	7	4
3	PCC-CV703	QSV	Quantity Survey and Valuation	7	4
4	PCC-CV704	TR-I	TransportationEngineering-I	7	4
5	PCE-CV705	EL-I	Professional Elective-I	7	4
6	HM-CV706	LACE	Legal Aspect in Civil Engineering	7	3
7	SI-CV707	FT	Field Training	7	-
8	PW-CV708	PP-I	Project Phase-I	7	1
TOTAL					**25**

SEMESTER-VIII					
Sr. No	**CodeNo.**		**Course(SubjectTitle)**	**Semester**	**Credits**
1	PCC-CV801	DCS-II	Design of Concrete Structures-II	8	5
2	PCC-CV802	WRE-II	WaterResourceEngineering-II	8	4
3	PCC-CV803	TR-II	TransportationEngineering-II	8	4
4	PCE-CV804	EL-II	Professional Elective-II	8	4
5	PCE-CV805	EL-III	Professional Elective-III	8	4
6	PCC-CV806	SDD-II	StructuralDesignandDrawing-II	8	2
7	PW-CV708	PP-II	Project Phase-II	8	2
TOTAL					**25**

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
DESIGN OF CONCRETE STRUCTURES-I

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Total credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max	Min for Passing	Max	Min for Passing
Design of Concrete Structures-I (PCC-CV701)	4	-	2	5					
					ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE – In Semester Evaluation   CIE – Continuous Internal Evaluation   ESE – End Semester Evaluation

Course Objective:
1. To understand the concept of RCC structuraldesign
2. Toconceivetheelementarydeignofdifferentstructuralelements.
3. To impart knowledge of strength determination of different kinds of R.C. elements using I.S. Code.

Course Outcome: After successful completion of this course student will be able to
1. Understand the basic data (Basic Mechanics, Mathematics, and structural analysis) required for design of concrete structures.
2. Understand the design process of concrete structure
3. Understand the application of limit state method for structural element such as footing, column, beam slab, staircase etc.
4. Designtheindividualmembersandhencebuilding.

SECTION- I

Unit: 1(06)
Introduction to R.C.C., Stress-Strain behavior of concrete, Steel and R.C.C, Different design philosophies, Various Limits States, Characteristic Strength and Characteristic Load, Load Factor, Partial Safety Factors.

Unit: 2(10)
Limit State of Collapse (Flexure) - Analysis and design of singly reinforced beam. Analysis and design of doubly reinforced beam, Analysis and design of symmetrical T and L beams.

Unit: 3(08)
Limit state of collapse (shear and bond): Shear failure, Types of Shear reinforcement, Design of Shear reinforcement, Bond-types, Factorsaffecting bond Resistance, Check for developmentlength. (No Numericals on bond)

SECTION- II

Unit: 4 (08)
a)Design of slabs: Cantilever Slab, Simply Supported One way slab, Simply Supported Two
    wayslabwithdifferentsupportconditionsasperIS:456-2000
b)DesignofSimplySupportedsingleflightandDogleggedstaircase.

<u>**Unit:5**</u> **(08)**
Design of Columns - General aspects, Effective length of column, Loads on column, Slenderness ratio for column, Maximum and Minimum eccentricity, Codal provisions, Designof short axiallyloadedcolumns, Design of columns subjected combined axial load and uniaxial bending using SP-16.

<u>**Unit : 6**</u> **(08)**
Designofisolatedrectangularcolumnfootingwithconstantdepthsubjectedto axialloadandmoment.

Term work: At least one assignment on each unit consisting of four questions.

Text books:
1. IS 456-2000,SP-16 & Relevant Special publications ofBIS
2. LimitstatetheoryandDesign–KarveandShah,Structurespublications, Pune
3. ReinforcedConcreteDesign–Limitstate-A.K.JainNemChandbrothers, Roorkee
4. Fundamentals of Reinforced Concrete –Sinha and Roy, S. Chand and company Ltd. Ram Nagar, NewDelhi
5. ReinforcedConcreteDesign-B.C.PunmiaLaxmipublicationsNewDelhi
6. Reinforced Concrete Design-M. L. Gambhir-Mc millan India Ltd. New Delhi

Reference Books
1. Limit State Design of Reinforced Concrete P.C.Varghese, Prentice Hall, NewDelhi

Guidelines regarding question paper setting:
1. Section –I – Q.No-1 to Q.No-3 and Section –II – Q.No-4 to Q.No-6
2. All questions are Compulsory.
3. Internal option question are allowed, weightage of optional question should not be more than 30% of total marks i.e.21 marks out of 70 marks

<p align="center">**END SEMESTER EXAMINATION PAPER PATTERN**</p>

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
EARTHQUAKE ENGINEERING

Course	Teaching Scheme				Evaluation Scheme					
	L	T	P	Total credit	Scheme	Theory (Marks)		Practical (Marks)		
						Max	Min for Passing	Max	Min for Passing	
Earthquake Engineering(PCC-CV702)	3	1	-	4	ISE	--	--	25	10	
					CIE	30	12	--	--	
					ESE	70	28	--	--	

ISE – In Semester Evaluation   CIE – Continuous Internal Evaluation   ESE – End Semester Evaluation

Course objectives:
1. To understand interior of earth and behavior of earth duringearthquake.
2. To understand the concepts of mathematicalmodeling.
3. To understand dynamic behavior ofstructure.
4. To understand earthquake resistant philosophy ofstructure.
5. Tounderstandmoderntechniquesofearthquakeresistantmethod.

Course Outcomes: After successful completion of course student will be able to
1. Prepare mathematical modeling of Single Degree of Freedom System.
2. Design earthquake resistantstructure by applying various codal provisions related to seismic design
3. Know the concept of modern earthquake resistant techniques

SECTION-I

Unit:1 (05)

Elements of seismology – terminology, structure of earth, causes of an earthquake, plate tectonic theory, continental drift theory, elastic rebound theory, seismic waves, magnitude and intensity, methods of measurement, energy released, seismograph, strong motion earthquakes, accelogram, prominent earthquakes of India

Unit:2 (07)

Fundamentals of theory of vibration, free and forced vibrations (harmonic loading)ofsingledegreeoffreedomsystems.Undampedandviscouslydamped vibrations, equations of motion and solution, General dynamic loading Duhamel Integral, earthquake response of SDOFsystem

Unit:3(06)
Response spectrum theory: Earthquake response spectrum, tripartite spectrum,constructionofdesignresponsespectrum,effectoffoundationsoil

6

andstructuraldampingondesignspectrum,evaluationoflateralloadsdueto earthquakeonmultistorybuildingsasperIS1893–2016PartI

SECTION- II

Unit : 4

Part A: (04)

Conceptual Design: Planning aspects, Load path, Stiffness and strength distribution, different structural system, liquefaction and settlement.

Part B: (05)

EarthquakeResistanceDesignPrinciples:Designphilosophy,BehaviorofRC building,ductilityandductiledetailingofbeamandcolumnsusingIS13920.

Unit:5   (04)

Masonry Structures: Behavior of unreinforced masonry and reinforced masonry,RCbands,verticalreinforcement,openings,ProvisionsofI.S.4326, Repairs and strengthening of masonry and RCmembers.

Unit:6   (05)

Introduction to Earthquake resistant modern techniques – Base Isolation- Elastomeric, Sliding, Combined.

Seismic Dampers - Friction Dampers, TMD, Visco elastic dampers.

Term work:

1) One assignment on each unit.
2) Calculation of seismic forces by using any FEM software or RESIST Software.

Text Book-

1. Earthquake Resistance Design of Structure – S. K. Duggal , Oxford Uni. Press
2. EarthquakeEngineering-ManishShrikhandeandPankajAgarwal,Prentice Hall of India Pvt Ltd, NewDelhi
3. Structural Dynamics - Mario Paz CBSPublication
4. FoundationDesignManual–N.V.Nayak,Dhanpatraiandsons,Delhi
5. Earthquake resistant design of structures by vinodhosur, wiley precise textbook series.
6. Earthquake Dynamics of Structures A primer, A K chopra earthquake engineering research institute
7. Elements of Earthquake Engineering – Jai Krishna, South Asian Pub. NewDelhi
8. Earthquake Resistant Design of Masonry and Timber Structures – A.S. Arya
9. EarthquakeResistantDesignofR.C.C.Structures–S.K.Gosh

Reference books :

1. DynamicsofStructures-TheoryandApplicationstoEarthquake Engineering by A.K. Chopra – Prentice HallPublications.
2. EarthquakeResistantStructures–D.J.DowrickJohnWileyPublication
3. Dynamics of Structures – R. M. Clough and Ponian ,McGraw Hill co.New Delhi
4. MechanicalVibrations–G.R.GroverRoorkeeUniversity,Roorkee.

5. AnalysisandDesignofFoundationsforVibrations–P.J.Moove.Oxfordand I. B. H. Publication, Delhi

6. ManualofEarthquake ResistantNon engineeringConstruction,UniversityofRoorkee

7. Elements Seismology –Rochter

8. IITK-BMTPCEarthquakeTips,NationalInformationCentreofEarthquake Engineering, IITKanpur.

9. Government of Maharashtra Earthquake resistant design of house guiding lines and assessment ofdamages.

10. IS 1893 -2016 – Part-I and IS 13920, IS 4326.

Guidelines regarding question paper setting:

1. Section –I – Q.No-1 to Q.No-3 and Section –II – Q.No-4 to Q.No-6
2. All questions are Compulsory
3. Internal option question are allowed, weightage of optional question should not be more than 30% of total marks i.e.21 marks out of 70 marks

END SEMESTER EXAMINATION PAPER PATTERN

Question No.	Based on Unit No.	Marks
1	1	07
2	2	14
3	3	14
4	4	12
5	5	12
6	6	11

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
QUANTITY SURVEY AND VALUATION

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Total credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max	Min for Passing	Max	Min for Passing
Quantity Survey and Valuation **(PCC-CV703)**	3	-	2	4	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE – In Semester Evaluation   CIE – Continuous Internal Evaluation   ESE – End Semester Evaluation

Course Objectives:
1. To understand the basic skills in estimation of Civil Works.
2. To prepare specifications & rate analysis of various items.
3. To carry out the estimation for various Civil engineering structures.
4. To understand the valuation of Civil Engineering Structures.

Course Outcome: After successful completion of this course students will be able to:
1. Explain the importance of estimation in Civil Engineering works.
2. Prepare rate analysis of various items.
3. To estimate for various construction projects.
4. Explain importance of valuation in Civil Engineering works.

Section I

Unit : 1   **(06)**
a) General introduction to quantity surveying – purpose of estimates, Types of estimates - Detailed estimates & approximate estimates, purpose, various methods used for building and other civil engineering works such as bridge. Water supply, drainage, road project, school building, industrial sheds. Various items to be included in estimates.
b) Principles in selecting units of measurement for items , various units and modes of measurement for different trades, administrative approval & technical sanction of estimates, I.S. 1200, introduction to D.S.R.
c) Prime cost, provisional sum & provisional quantities.

Unit :2   **(06)**
a) Specifications - Definition and basic principle of general and detailed Specifications (writing the detailed specification tor various Constructions should be covered in term work)
b) Analysis of rates, factors affecting the cost of materials, How to fix up the rate of items Task Works, standard schedule of rate, price escalation.

Unit : 3   (06)
a) Measurement and abstract sheets and recordings, taking out quantity methods – Long wall-short wall method, Centre line method.

Section II
Unit : 4   (06)
a) Detailed estimate of building, R.C.C. Works, culverts, earthwork for canals, Roads including hill roads and other civil engineering works,
b) Preparation of schedule for steel as reinforcement.

Unit : 5   (06)
a) Valuation- Definition and Principles of valuation, Purposes. Definition of value, price & cost, Attributes of value, Different types of values.
b) Values and his duties, factors affecting the valuation of properties, Tangible and Intangible properties, Landed properties – freehold and leasehold properties, Different types of lease.
c) Valuation from yield and from life, Gross income and Net income, Outgoings, Capitalized value, Years purchase – single rate and dual rate, reversion value of land

Unit : 6   (06)
a) Methods of valuation - Rental method of valuation, direct comparison with capital value, valuation based on profit, valuation based on cost, Development method of valuation.
b) Rent – Definition, form of rent, different types of rent.
c) Depreciation – methods of depreciation: Straight line method, Constant percentage method, Sinking fund method and Quantity survey method, Obsolescence

Term Work:
1] Detailed specification for minimum ten civil engineering items. (One each from Roads, Irrigation works, Water Supply & Sanitation & seven from buildings)
2] Rate Analysis of ten civil engineering items.(Prepare excel sheet for minimum 5 items of works)
3] Detailed estimate of G + 1 residential Framed Structure.
4] Preparing detailed estimate for any one of the following:
a) A stretch of a road about 1 Km. long including earthwork.
b) A reach of canal about 1 Km. long.
c) A factory shed of steel frame.
5] Schedule of reinforcement for the following
a) Beams
b) Slab,
c) Staircase
d) Column & Column footing
6] Valuation reports for building of residential purpose or commercial purpose
7] Detailed estimation of building having 10 sq.m.area by using any software.   10

Text Books:

1. Quantity Surveying – P. L. Bhasin., S. Chand & Co-Ramnagar, Delhi-110055
2. Elements of Estimating and Costing – S. C. Rangwala. Charotar Publishing
   House - Opp Amul Dairy Court road Anand.388001 (west rly)India.
3. Civil Engineering, Contracts and Estimates – B. S. Patil. Universities Press Private Ltd. 3-5-819
   Hyderguda, Hyderabad. 500029(A.P),India.
4. Estimating and Costing – B.N.Dutta. Dhanpat Rai & Sons. 1682, NaiSarak, Delhi-110006
5. Estimating and Costing – BirdiDhanpat Rai & Sons 1682, NaiSarak, Delhi-110006
6. Estimating, Costing and Specification in civil engineering – Chakroborty M. 21 b,
BhabanandaRoad,Kolkata-700026
7. Valuation of real Properties – S. C. RangwalaCharotar Publishing House, opposite
   Amul dairy, court Road Anand. 388001.India
8. Standard specifications Volumes I & II (P. W. D. Maharashtra) Govt. of
   Maharashtra

Reference Books:
1. Professional Practice (Estimating and Valuation) – Roshan Nanavati (1984
   Edition) U.B.S. Publishers, Distributers PVT. Ltd.5 Ansari road, New Delhi.
2. Standard specifications Volumes I & II (P. W. D. Maharashtra) Govt. of
   Maharashtra
3. C.P.W.D. specifications& schedules of rates.

Guidelines regarding question paper setting:
1. Section –I – Q.No-1 to Q.No-4, Q.No3 Compulsory, Solve any two from Q.No.
   1/2/4 and Section –II – Q.No-5 to Q.No-8, Solve any two
2. Time allotted to solve 70 marks Q.Paper 03 Hours

End Semester Examination Paper Pattern

Question No.	Based on Unit	Marks
1	1	10
2	2	10
3	3 (Compulsory)	15
4	1,2,3	10
5	4	11
6	5	11
7	6	12
8	4,5,6	12

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
TRANSPORTATION ENGINEERING – I

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Total credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max	Min for Passing	Max	Min for Passing
Transportation Engineering – I **(PCC-CV704)**	3	-	2	4	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE – In Semester Evaluation   CIE – Continuous Internal Evaluation   ESE – End Semester Evaluation

Course Objectives:
1. To Study of the various principles of highway planning, design of flexible and rigid pavements, traffic engineering, traffic safety analysis
2. To familiarizing the students with desirable properties and testing procedures of highway construction materials as per BIS and Indian Roads Congress (IRC) standards.
3. To know about tunneling methods in various types of soils.

Course Outcomes: After successful completion of this course students will be able to
1. Carry out surveys involved in planning and highway alignment
2. Design the geometric elements of highways and expressways
3. Carry out traffic studies and implement traffic regulation and control measures and intersection design
4. Characterize pavement materials and design flexible and rigid pavements as per IRC

SECTION I

Unit 1: Introduction to Highway Engineering:(06)

1.1 Modes of transportations, their importance and limitations, the importance of highway transportation. Highway Development and Planning: Principles of Highway planning.
1.2 Road development in India, NHAI, NHDP, PMGSY, MSRDC. Classification of roads, road network patterns, Planning Surveys.
1.3 Terrain classification, design speed, vehicular characteristics, highway cross-section elements.
1.4 Sight distance: introduction to sight distance, reaction time, analysis of safe sight distance, analysis of overtaking sight distance, intersection sight distance.

Unit 2: Highway Geometric Design: (06)
2.1 Design of horizontal alignment: horizontal curves, design of super elevation and its provision, radius at horizontal curves, widening of pavements at horizontal curves, analysis of transition curves.

2.2 Design of vertical alignment: different types of gradients, grade compensation on curves, analysis of vertical curves, summit curves, valley curves.
2.3 Intersection: at grade and grade separated intersections, speed change lanes, Canalization, Design of rotary intersection and mini roundabout.

Unit 3: Pavement Materials & Design: (06)
3.1 Pavement materials- Stone aggregates: desirable properties, tests, requirementsof aggregates for different types of pavements. Bituminous materials: types, tests onbitumen, desirable properties, selection of grade of bitumen. Bituminous mix design: principle, methods, modified binders.
3.2 Design of pavements-Types of pavements, functions of pavement components, pavement design factors, design wheel load, equivalent single wheel load, repetition of loads, equivalent wheel load factors, strength characteristics of pavement materials, climatic variation; design steps of flexible highway pavement as per IRC 37-2001 and problems based on CBR method, Design of rigid pavement as per IRC 58-2002, Stresses in rigid highway pavements,
3.3 Joints in rigid pavements: transverse joints, longitudinal joints, fillers and sealers.

SECTION II

Unit 4: HighwayConstruction, Maintenance & Rehabilitation (06)
4.1 Highway construction- construction of different Types of roads: water bound macadam,BBM, SDBC, DLC &PQC , use of geo-textiles and geo-grids.
4.2 Highway maintenance & rehabilitation- Pavement failures: flexible pavementfailures, rigid pavement failures, maintenance of different types of pavements: assessment and need for maintenance, pavement management system, evaluation of pavements: structural evaluation of pavements, functional evaluation of pavements, strengthening of existing pavements: object of strengthening, types of overlays, design of different types overlays.

Unit 5: Traffic Engineering & Highway Drainage (06)
5.1 Traffic Engineering: Fundamentals of traffic flow, Road User and Vehicular characteristics. Traffic Studies: Volume studies, speed studies, parking studies, origin-destination studies and accident studies.
5.2 Traffic management and Safety: Traffic control devices, channelization, traffic signal, junctions, intelligent transportation system, Design of Rotary Intersection and traffic Signal.
5.3 Highway drainage- Necessity, surface draining and sub drainage

Unit 6: Tunnel Engineering   (06)
6.1 Tunnel Engineering: Introduction to tunneling, size and shape of tunnel and suitability
6.2 Tunneling in hard rock, and soft material, shield method, safety measures,
6.3 Ventilation, lighting and drainage of tunneling.

Term work: At least two assignments on each unit including design problems
List of experiments
• Aggregate Impact Value
• Los Angles Abrasion Test
• Crushing test of aggregate
• Bitumen Penetration
• Softening Point

- Flash Point and Fire Point Test
- Ductility test
- Viscosity of bitumen
- Stripping value

Text Books

1. Highway Engineering By S.K.Khanna and C.E.G.Justo, NemchandBross. Roorkee.
2. Traffic and transport planning, By L.R.Kadiyali, Khanna publisher, New Delhi.
3. Principles and practice of highway engineering, by L R Kadiyali, N B Lal Khanna Publications, 2005
4. Principles Of Transportation Engineering, ParthaChakroborty, PHI Learning, 1st edition
5. Principles of Highway Engineering and Traffic Analysis, 4th Edition, Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski, John Wiley
6. Harbour, Dock and Tunnel engineering by R. Shrinivassan, Charotar Publishing House.

Reference Books

1. Transportation Engineering – An Introduction, by Khistry, C.J, PHI Publication.
2. An Introduction to Transportation Engineering and Planning, by Morlok, E.R., McGraw Hill,NY,1970
3. Introduction to transportation Engineering, by Hay W.W., John Wiley & Sons, NY, 1988.
4. Fundamentals of transportation Engineering, by Papacostas C.S., Prentice Hall of India, 1987.
5. IRC-37-2001 - Guidelines for the Design of Flexible Pavements for Highways
6. IRC-058-1988 - Guidelines for the Design of Plain Jointed Rigid Pavements for Highways
7. IS 1201 to 1220 Methods for testing tar and bituminous materials.
8. IS 1201 to 1220 Methods for testing tar and bituminous materials
9. IS 2386 : Part1to 5 : 1963 Methods of Test for Aggregates

Guidelines Regarding Question Paper Setting:
1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15
5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

Elective I

Sr.No.	Name of Subjects
1.	Advanced Traffic Engineering
2.	Open Channel Hydraulics
3.	Remote Sensing and GIS Application in Civil Engineering
4.	Solid Waste Management
5.	Optimization Techniques
6.	Town Planning

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
Professional Elective I: Advanced Traffic Engineering (PCE-CV705)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EL - I (PCE-CV705)	03	01	--	04	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. Provide an insight on traffic and its components, factors affecting road traffic.
2. Provide an insight on traffic movements and speed studies.
3. Provides clear understanding on conducting various types of traffic surveys, data collection, analysis, inference and presentation.
4. To identify the role of various modes of Mass Transportation like Bus and Rail and its Planning and Management.
5. Learn the objectives, benefits in ITS and functional areas in ITS.

Course Outcomes: After the Successful completion of the course students should be able to
1. Acquire and apply knowledge of traffic, its components, factors affecting road traffic.
2. Analyse traffic speed study data and its presentation.
3. Apply the knowledge of sampling data in conducting various surveys and analysis.
4. Understand various modes of mass transit system.
5. Use the advantages of ITS and suggest the appropriate technologies for field conditions

SECTION- I

Unit: 1   (05)

Introduction: Infrastructure &its role in developing society; Transport sector in India – policy framework; Development plans –Airports,Highways –National highway development program (NHDP); JNNURM, Asian highways network(AH).

Unit: 2   (06)
Traffic characteristics: Traffic characteristics – Road user characteristics, General human characteristics, Physical characteristics. Vision eye – movement peripheral vision, Visual attention, Visual sensitivity to light and colour, glare vision and recovery perception of space. Hearing, Stability sensation, Time factor in response, Theory of PIEV modifying factors, conditional responses; Vehicular Characteristics – types, dimensions, resistance, power requirement for different resistance, change in direction – minimum turning radius, off tracking, slip angle.

Unit: 3 (07)
a) Traffic Engineering & Speed Analysis: Introduction, Speed studies, journey time and delay studies, Sampling in traffic studies & application, Traffic surveys-types of volume count Planning, Problems on PCU, moving observer method and spot speed.

b) Traffic operation and management.
Traffic systems management and Travel demand management - Congestion management-Cost effective management measures, Traffic control aids, Street furniture, Road Arboriculture– Traffic Regulation, Traffic Sign and Road Markings.

SECTION II

Unit: 4 (05)
Trip generation and distribution: Factors governing trip generation and attraction –Application of Regression Analysis- Methods of trip distribution; Growth and Synthetic Models Calibration and Application of gravity model.- Category analysis.

Unit: 5 (07)
a) Introduction to intelligent transportation systems (ITS) – Definition, Objectives,Historical Background, Benefits of ITS -ITS Data collection techniques –Detectors,Automatic vehicle location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS), Video data collection**.**
b) ITS functional areas – Advanced traffic management systems (ATMS), Advanced traveller information Systems (ATIS), Commercial vehicle operations (CVO), Advanced vehicle control systems (AVCS), Advanced Public transportation systems (APTS), Advanced rural transportation systems (ARTS).

Unit: 6 (06)
Specialized traffic studies:
Parking Studies: Parking inventory, statistics, parking surveys; in out, license palate, on-street and off-street parking.
Accident Studies: Accident data collection, statistics, safety audit, safety measures.
Fuel consumption and emission studies: Consumption models, pollutants, air quality models, mitigation measures.
Toll operation: Design and configuration, queuing theory, operation and maintenance issues.

Term Work:
Assignment on each unit
On field practices.
1) Volume study
2) Spot speed study
3) Parking study
4) Marking study

Text books:
1. Kadiyali L.R. and N.B. Lal (2004): Principles and Practice of Highway
Engineering Including Expressways and Airport Engineering), Khanna Publishers, New Delhi.
2. Kadiyali L.R. (1994): Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi.

3. ParthaChakroborty and Animesh Das (2003): Principles of Transportation Engineering, Prentice-Hall India, New Delhi.

Reference books :

1. Black John (1981): Urban Transportation Planning. Croom Helm Ltd. London.
2. BPR (1970): Urban Transportation Planning: General Information and Introduction to System 360. Bureau of Public Roads, Washington D.C.
3. Bruton M.J. (1975): Introduction to Transportation Planning. II Edn. Hutchinson, London
4. Drew D.R. (1968): Traffic Flow Theory and Control, McGraw-Hill, New York.
5. Hutchinson B.G. (1974): Principles of Urban Transport Systems Planning. McGraw-Hill Book Co., New York.
6. McShane W.R. and Roess R.P. (1990): Traffic Engineering, Prentice-Hall Inc., New Jersey
7. Pignataro L.J. (1973): Traffic Engineering: Theory and Practice, PrenticeHall Inc., New Jersey.
8. Putman S.H. (1983): Integrated Urban Models. Pion Ltd., London.
9. Wilson A.G. (1970): Entropy in Urban and Regional Modelling. Pion Ltd., London 10. Wells G.R. (1970): Traffic Engineering – An Introduction, Griffins, London.
11. Wohl M. and Martin B.V. (974): Traffic System Analysis of Engineers and Planners, McGraw-Hill Book Co., New York.
12. Papacostas, C.A., Fundamentals of Transportation Engineering', Prentice-Hall of India Private Limited, New Delhi.2000.
13. Road Development Plan, Indian Road Congress, November 2000.
14.Roess, RP.,McShane,WR.andPrassas,ES.(1998), Traffic Engineering,Prentice Hall
15. www.nhai.org

Guidelines Regarding Question Paper Setting:

1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15
5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
PROFESSIONAL ELECTIVE I :OPEN CHANNEL HYDRAULICS (PCE-CV705)

| Course | Teaching Scheme | | | | Evaluation Scheme | | | | |
| | L | T | P | Credit | Scheme | Theory (Marks) | | Practical (Marks) | |
						Max.	Min. for passing	Max.	Min. for passing
EL - I (PCE-CV705)	03	01	--	04	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives :
1. To Study the fundamental principles governing open channel hydraulics required to the design of engineering systems
2. To Studyvarious types of open channel flow and their analysis
3. To study and understand thetechniques , skills , and modern mathematical tools to applied to the river engineering problems.

Course Outcomes : After the Successful completion of the course students should be able to
1. Apply knowledge of open channel flow for designing most efficient channel section and computations of flow parameters
2. Analyse the Gradually varied , Rapidly varied and Spatially varied flow and apply to complexfield problems
3. Design erodible channels by applying the knowledge of sediment transportation
4. Collect ,analyse the data and apply similitude to river models

SECTION- I

Unit : 1   (06)
Basic Fluid Flow Concepts: Basic equations (Continuity, Energy, Momentum) applied to OCF, Energy and Momentum correction factors, First and Second hydraulic exponent, Uniform flow computations by using section factor curve ,Determination of Rugosity coefficient 'n', Flow in channel transitions,Measurement of velocity of channel flow and sediment concentration in the flow by various methods. River Gauging by different methods.

Unit : 2   (06)
Non-Uniform Flow in Open Channel: Computation of GVF in prismatic channels and Natural channels by different methods, Hydraulic jump in rectangular and nonrectangular channels, Location of Jump, Jump on sloping floor , Use of jump as Energy Dissipater (recommended by USBR and IS), Spatially-Varied Flow, Side weir, Bottom racks

Unit : 3   **(06)**

Flow in Non-linear alignment and Nonprismatic Channels: Nature of Flow, Spiral Flow, Energy Loss, Superelevation, Cross Waves, Design Considerations for Subcritica and Supercritical flow,Standing wave flume, Venturi flume, Flow between bridge piers, Flow through culvert, Flow through Trash Racks.

SECTION- II

Unit : 4   **(06)**

Unsteady Flow in Open Channels: Gradually Varied Unsteady Flow, Flood routing, Rapidly Varied Flow, Waves and their classification, Celerity of a wave, Positive and negative Surges, S Dam-break problem, Introduction to HEC RAS software

Unit : 5   **(06)**

a) Dispersion in Open Channels: Diffusion and dispersion, Some classical solutions of the diffusion equation, Discharge measurement using tracer techniques

b) Hydraulics of Mobile Bed Channels: Initiation of motion of sediment, Bed forms, Sediment Load, design of Erodible Channels, Regime Theory for Alluvial Channels

Unit : 6   **(06)**

Hydraulic Models: Fixed bed river models (Distorted and Undistorted), Moveable bed Models, Model materials and construction, Physical model calibration and verification, Special-Purpose models

Tutorial Exercises :

Term work based on

1. Numerical and design problems on each unit.
2. Visit to the river gauging station.
3. Data collection of river flow and Sedimentation .
4. Use of water resources software.

Reference books :

Open Channel Hydraulics: By, Ven Te Chow, McGraw-Hill International Editions

1 Open Channel Hydraulics: By, Richard H. French, McGraw-Hill International Student Edition
2 Flow Through Open Channels: By, K. G. RangaRaju, Tata McGraw Hill Publsh. Co. Ltd.
3 Flow in Open Channels: By, K. Subramanyam, Tata McGraw Hill Publsh. Co. Ltd.
4 Open-Channel Flow: By, M. Hanif Chaudhary, Prentice-Hall International Publications
5 Mays, L. W., Water Resources Engineering, John Wiley and Sons, New York, 2001.
6 Rajesh Srivastava., Flow Through Open Channels, Oxford University Press, 2008.
7 Open Channel Flow by Madan Mohan Das.

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Guidelines Regarding Question Paper Setting:
1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15
5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
PROFESSIONAL ELECTIVE I :REMOTE SENSING AND GIS APPLICATIONS IN CIVIL ENGINEERING (PCE-CV705)

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
EL- I (PCE-CV705)	03	01	-	04	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE: InSemesterEvaluation CIE: ContinuousInternalEvaluationESE: End Semester Examination

Course Objectives:
1. To study the evolution of Remote Sensing and G.I.S
2. To get a basic and advanced level insight into the approach of latest remote sensing techniques.
3. To understand the application of Geographical information system in civil engineering

Course Outcomes: After completing of this course, student will be able to,
1. Adopt the principles of physics of Electromagnetic radiation as applied to remote sensing.
2. Learns the interrelationship of civil, environmental and geological studies.
3. Formulate and apply remote sensing and GIS concepts to engineering problems.

Section I

Unit No.1 Introduction (06)
1.1 Definition, History, Types of satellites based upon uses,
1.2 Programs of different countries, India's position, etc. Scope - Various fields of applications, Users in India, Data requirements of users. Topo sheets, Evolution of G.I.S. Technology.

Unit No.2 Space System (08)
2.1 Technique of aerial photography, Photographic flight mission, Factors influencing flight mission, Numbering, scale and measurement of aerial photographs, mosaic of aerial photographs, introduction of mirror stereoscope

2.2 Remote Sensing Technique of satellite imaging - Important units of satellite and functioning of satellite, height, and coverage.

2.3 Stages in remote sensing, Electromagnetic radiation, and electromagnetic spectrum, Interaction of electromagnetic radiation with atmosphere and earth surface.

2.4 Sensors, Types of Resolutions used in remote sensing.

2.5 Introduction to the application of computer in analysis of satellite images, Digital Image processing.

Unit No.3 Geomorphology   (04)
3.1 Geomorphology and its scope in photo interpretation as well as in engineering,

3.2 Drainage analysis, Drainage patterns, Drainage density and Drainage frequency.

3.3 Geomorphologic aspects for water resources studies.

Section II

Unit No. 4 G.I.S.   (07)
4.1 Fundamentals of GIS, Definition, Components, Types of data inputs in GIS, spatial data, thematic characteristics, rasters and vectors,

4.2 Databases and database management.

Unit No.5 Application of RS and G.I.S in Civil Engineering   (05)
5.1 Study and selection of site or hydraulic structures, Application in urban planning.

5.2 Use in Landslide, Application in Urban Planning and transportation engineering.

Unit No.6 Application of RS and G.I.S in water Resources and Environmental Studies:(06)
6.1 Surface water delineation, study of floods, surface keys for subsurface water, steps in water investigations of the area.

6.2 Land use/Land cover study, Terrain analysis and soil mapping with the help of remote sensing techniques, delineating forest areas.

Term Work: The term work shall consist of the Assignment on each unit and laboratory work based upon following syllabus-

Laboratory Work:

1. Study of topo sheets.
2. Study of drone survey
3. Study of drainage density, drainage pattern, watershed from Soil and water Maps.
4. Ground truth data collection using Total station and G.P.S.
5. G.I.S- Open Source Quantum GIS for practical's.
    a. Georeferencing of toposheets.
    b. Vectorosation (digitization) of raster Images.
    c. Converting Google map kml files into shape files.

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The oral examination based upon above syllabus of the term work.

Reference Books:

1) American Society of Photogrammetry Washington D. C. Manual of Photographic Interpretation. (1960) and (1975)

2) Remote Sensing, Principles and Interpretation –F. F. Sabins, W. H. Freeman &co.

3) Principles of Geomorphology – W. D. Thornbury – John Wiley and Sons, INC.

4) G.I.S- Anji Reddy , publishers- MGH

5) Remote sensing in Civil Engineering – T. J. M. Kennie and M. C. Mathews, Surry University press, London.

6) Remote Sensing and Image Interpretation- Thomas M. Liillesand and R.W. Kiefer, Wiley & Sons Insc.

7) Remote Sensing of the Environment – John R. Jensen, Pearson Education Inc

8) Principles of Remote Sensing- P.N.Patel and Surendra Singh, Scientific Publishers, Jodhapur.

9) Text book on Remote Sensing –C.S.Agrawal and P.K.Garg,Wheeler Publishing, New-Delhi.

10) Introduction to geomatics –QGIS user guide – Mr.C.V. Nishinkanth, Mrs.AnnuNishinkanth, Dr S S Vasudevan, Dr P Ramkumar, Publishers-

Guidelines Regarding Question Paper Setting:

1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions arecompulsory.
3. Internal optional questions are allowed, weightage of optional questionshould not be more than 30% of total marks i.e. 21 marks out of 70marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	11
5	5	12
6	6	12

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
PROFESSIONAL ELECTIVE I : SOLID WASTE MANAGEMENT (PCE-CV705)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EL - I (PCE-CV705)	03	01	--	04	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE: InSemesterEvaluation   CIE: ContinuousInternalEvaluation   ESE: End SemesterExamination

Course Objectives:

1. To get on broader understandings on various aspects of solid waste management (starting from its generation to processing with options for reuse and recycle, transport, and disposal)
2. To study different processing technologies of municipal solid waste.
3. To know the various aspects including recovery of biological conversion products from solid waste to compost and biogas, incineration and energy recovery
4. To know various disposal methods of solid waste.

Course Outcomes: After successful completion of this course students will be able to,

1. Learn basic concepts of solid waste management, beginning from source generation to waste disposal in a system of municipality organizational structure.
2. To acquire a fair amount of knowledge on waste characterization and its management practices
3. Develop understanding on various technological applications for processing of waste and their disposals in various ways.
4. Acquire knowledge on waste to energy productions in the perspectives of sustainable development.
5. Apply basic concepts in hazardous waste management and integrated waste management for urban areas.

SECTION I

Unit 1: Introduction to Solid Waste Management: (06)

1.1 Introduction , Overview: problems and issues of solid waste management - Need for solid waste management

1.2 Indian scenario, progress in MSW (municipal solid waste) management in India , Rules & regulation regarding MSWM ,

1.3 Functional elements of Solid Waste Management.

1.4 Classification of solid wastes (source and type based)

1.5 Hazardous waste:-Definition, sources, hazardous characteristics, management, treatment and disposal

1.6 Biomedical waste:-Definition, sources, classification, collection, segregation- Color coding, treatment and disposal

Unit 2: Solid Waste Generation, Handling, Storage and Processing   (06)

2.1 Waste generation, Solid waste generation ratesand expression of unit generation,Methods used to estimate Waste Quantities,factors affecting generation of solid wastes.

2.2 Composition, sampling and characteristics of waste (physical and chemical),

2.3 Solid Waste Handling, Storage and Processing at the Source - Introduction, On-site handling, storage and segregation of wastes at source, On-site processing.

2.4 Collection of municipal solid waste - Methods of collection, Types of Collection system, Analysis of Collection System, Collection routes.

Unit 3: Transfer and Transport of Solid Waste and Waste Processing: (06)

3.1 Transfer station- Introduction, Need, Types, Criteria for Transfer station location, Factors to be considered in planning and design of Transfer Station.

3.2 Transport - Common Waste Collection Vehicles, factors considered in selecting collection vehicles

3.3 Waste Processing – Objectives, Unit operations for component separation, material separation and processing technologies.

3.4 Material Recovery Facilities (MRF) & types, Commonly Recycled Materials and Processes.

SECTION II

Unit 4: Land Disposal of Solid Waste   (06)

4.1 Sanitary landfilling - Introduction, Impacts from Dumps , Essential components of sanitary landfilling,

4.2 Methods of landfilling, site selection criteria for landfilling ,

4.3 Planning & designing of sanitary landfilling , Sanitary Landfilling Construction

4.4 Leachate :- Drainage, Collection and Removal , Leachate Management & treatment,
Landfill gas and its control measures

4.5 Maintenance and precautions of landfilling, Closure & end-use.

Unit 5: Biological Treatment of Solid waste – Composting   (06)

5.1 Composting- Definition and phases of composting , Theory of composting

5.2 Types of composting, Methods of composting

5.3 Factors affecting composting process, Compost quality

5.4 Vermi Composting, Mechanical composting plant, Recovery of Bio – gas energy.

Unit 6: Incineration   (06)

6.1 Introduction, Objectives of Incineration, Need of incineration

6.2 Incineration process, Types of incinerators,

6.3 Site selection criteria, factors affecting incineration,

6.4 Waste to energy, Pyrolysis and its by-products

6.5 Air pollution and its control.

Term work:

A. At least one assignment on each unit.

B. Visit to any Municipal Solid Waste Processing Plant/Unit & its report.

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Text Books

1. Integrated Solid Waste Management: Engineering principles and management issues by George Tchobanoglous, Hilary Theisen, Samuel A Vigil, , M/c Graw hill Education . Indian edition.
2. Environmental Engineering by Howard S Peavy, Donald R Rowe and George Tchobanoglous , Tata Mcgraw Hill Publishing Co ltd.,

Reference Books:

1. Municipal Solid Wastes (Management and Handling) Rules, 2000.Ministry of Environment and Forests Notification, New Delhi, the 25th September, 2000. Amendment – 1357(E) – 08-04-2016
2.Municipal Solid waste management manual, Part II published under Swachh Bharat Mission, Central Public Health And Environmental Engineering Organization (CPHEEO), 2016, Ministry of Urban Development, Government of India.
3.Handbook of Solid waste management, second edition, George Tchobanoglous, Frank Kreith, published by M/c Graw hill Education, 2002, ISBN-13 9780071356237 ISBN -10 0071356231

Guidelines Regarding Question Paper Setting:
1.Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2.Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15
5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
PROFESSIONAL ELECTIVE I :OPTIMIZATION TECHNIQUES (PCE-CV705)

Course	TeachingScheme				EvaluationScheme				
	L	T	P	Credit	Scheme	Theory(Marks)		Practical(Marks)	
						Max.	Min. forpassing	Max.	Min. forpassing
EL-I (PCE-CV705)	03	01	00	04	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE:InSemesterEvaluation   CIE:ContinuousInternalEvaluation   ESE:EndSemesterExamination

Course Objective:
1. To provide the students with knowledge on the application of various optimization techniques which can help making decisions for practical problems in industries.
2. Building capabilities in the students for analyzing different situations in the industrial/Business scenario involving limited resources and finding the optimal solution within constraints by using advanced optimization tools.

Course Otcomes: After successful completion of this course students will be able to,
1. Apply the theory of optimization methods and algorithms to develop and for solving various types of optimization problems.
2. Ability to go in research by applying optimization techniques in problems of Engineering and Technology.
3. The students will be able to analyze the real life systems with limited constraints.
4. The students will be able to depict the systems in a mathematical model form.

SECTION-I
Unit : 1   **(06)**
Introduction: Importance of optimization techniques , Linear programming:
Formulation, graphical solution, simplex method, Big M Method.

Unit : 2   **(06)**
Duality, Sensitivity analysis, Transportation problems.

Unit : 3   **(06)**
Assignment problems,Introduction to non linear programming.
28

SECTION-II

<u>Unit : 4</u> **(06)**

Decision theory, decision tree, Game theory.

<u>Unit : 5</u> **(06)**

Inventory models -deterministic model ,probabilistic model.

<u>Unit : 6</u> **(06)**

Queuing theory, simulation applications, Forecasting techniques.

Term Work:

At least one assignment based on each unit.

Reference books :

1Optimization –S. S. Rao, Wiley Eastern Ltd.
2Operation Research -H. A. Taha, MacMillan
3Graph Theory –NarsinghRao, Prentice Hall
4Operation Research –Wagner, Wiley Eastern Ltd.
5Project Management –Lick D., Gower Publication England

Guidelines Regarding Question Paper Setting:

1.Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2.All questions arecompulsory.
3.Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	11
5	5	12
6	6	12

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
PROFESSIONAL ELECTIVE I: TOWN PLANNING(PCE-CV705)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EL - I (PCE-CV705)	03	01	--	04	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	25	10

ISE: InSemesterEvaluationCIE: ContinuousInternalEvaluationESE: End SemesterExamination

Course Objectives-
1. To understand the concept of balanced town by ensuring that new and existing facilities are complimentary to each other.
2. Provides a basic knowledge on Urbanizations and its trend.
3. Deals with different types of plan, its implementation, regionaldevelopment and management for sustainable urban growth.
4. Describe different legislations related to urban planning and policy.

Course Outcomes-After successful completion of this course students will be able to,
1. Understand importance of town planning and its past trends.
2. Understand with a different types of urban strategies andmanagement for sustainable urban growth.
3. Understand the different types of acts related to town and country planning

SECTION- I
Unit: 1   **(04)**
Introduction: Objects of town planning, principles of town planning,Origin and growth of towns – development of towns, Modern townplanning in India, Socio – Economic aspects of town planning. Selectionof site for an ideal town.

Unit: 2   **(06)**
A)Surveys& Planning: Various types of surveys to be conducted fortown planning project. Data's to be collected in different types of townplanning survey. Types of planning, -a brief note on urban, rural andregional planning
b) Zoning: Definition – objects and principles of zoning. Advantages ofzoning, Special Economic Zone (SEZ), Maps for zoning.

Unit: 3   **(08)**   30
A) Housing: Classification of residential building as per HUDCOnorms, Housing in villages, Low Cost Housing, Housing policy, differenttypes of housing agencies involved in housing, investment in Housing,Housing Problems in India

B) Slums: Causes, growth, characteristics, effects, slum clearance andre-housing, prevention of slum formation, financial assistance for slumclearance.

SECTION- II

Unit 4: (05)

Public buildings & Industries: Classification, location, DesignPrinciples of public building, Effects of Industries on towns and cities, classification of industries, regulation of their location.
Recreation measures: Parks- park ways, Playgrounds, Theme parks,boulevards and their space standards.

Unit 5: (07)

A) Master Plan: Meaning – Definition – objects and necessity of masterplan, Data and Drawings required for master planning. Building byelaws, Preparation of a layout plan for a residential area showing LIG,MIG and HIG houses and other amenities (not to scale).
B)Re-planning Existing Towns: General - Objects of re-planning –Analyzing the defects of existing towns -–difficulties in Master Planningof existing towns / cities - Urban renewal projects, merging of suburbanareas – Decentralization - Satellite Towns – Smart cities- definition andfeatures.

Unit 6: (06)

A) Town and Country Planning Act, Improvement Trust Act, Urban Planning and Development Authorities Act – objectives, contents, procedures for preparation and implementation of Regional Plans, Master Plans and Town Planning Schemes. Various Acts related to urban governance.
B)MRTP Act, Provisions of Land Acquisition Act, Urban Land Ceiling Act, Conservation Act.

Text Books:

1.Town and country Planning-G.K. Hiraskar& K. G. Hiraskar, By Dhanpat Rai Publication (p) Ltd., 22 Ansari Road, Dariyaganj New Delhi.
2 Town and country Planning- N.K. Gandhi
3 Town Planning- S.C.Rangawala, Charotar Publications, Pune
4. Town Planning by Abir Bandyopadhyay.

Reference books:

1. MRTP Act 1966
2. Land Acquisition Act - 1894
3. Urban Pattern by Gallion, Eisner
4. Rural development Planning – Design and method :Misra S.N., Satvahan Publications New Delhi
5. Economic development in Third world: Todaro Michael, Orient Longman Publication, New-Delhi

Guidelines Regarding Question Paper Setting:

1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15
5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
Legal Aspects in Civil Engineering

Course	Teaching Scheme					Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)		
						Max.	Min. for Passing	Max.	Min. for Passing	
LACE (HM-CV706)	02	--	02	03	ISE	---	---	25	10	
					CIE	---	---	---	---	
					ESE	---	---	---	---	

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:

1. To aware the students about Indian Contract and Arbitration act.
2. To provide knowledge about contract administration.
3. To provide knowledge about safety acts.

Course Outcome: After successful completion of this course students will be able to:

1. Students will learn Indian contract act, Arbitration act and contract administration.
2. Students will understand the labour laws.
3. Students will be understand safety engineering and relevant acts.

Unit IContract and Tenders: (06)

Contracts, Types of Contracts, Tender document- invitation of tenders. Tender notice, tender documents, Submission. Scrutiny and acceptance two envelop method. Award of jobs. Various conditions to contracts. Rights and responsibilities of parties of contracts. E- Tendering, Introduction to Non-Conventional Contracts

Unit IIContract administration: (06)

Essentials of legally void and avoidable contracts, contract for engineer and architecture services, contract between owner and contractor. Introduction to RERA

Unit IIIArbitration: (06)   33

Introduction to Indian Arbitration Act, Arbitration Agreement, Power and Duties of Arbitration, Different types of arbitration, Qualification of arbitrator.

Unit IV Safety laws and acts: (06)

Workmen's Compensation Act, Safety and health standards, Employer's liability act, Employer's Insurance act.

Term Work:

1. One assignment per unit.
2. Visit to one Public Bodies & prepare a report regarding tendering process over there.
3. In house tendering process which includes demonstration & preparation of reports in batches

Text Books:

1. Indian arbitration Act by B. S. Patil
2. Contract-I by R. K. Bangia
3. Contract-II by R. K. Bangia
4. Estimation, Costing, Spectification, and valuation in Civil Engineering by M.   Chakraborti.
5. Estimation & Costing in Civil Engineering by B.N.Dutta, UBS Publishers &DistributorePvt.Ltd.
6. Civil Engineering Contracts & Estimates by B. S. Patil
7. Legal Aspects of building and Engineering Contracts by B. S. Patil
8. Indian contract Act Avatar singh
9. Indian Contract Act.

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
FIELD TRAINING

Course	Teaching Scheme					Evaluation Scheme				
							Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme		Max.	Min. for Passing	Max.	Min. for Passing
FT (SI-CV707)	--	--	--	--	ISE		---	---	25	10
					CIE		---	---	---	---
					ESE		---	---	---	---

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Based on the field training done by the students in T.Y.B.Tech during the winter andsummer vacation, as mentioned in the T. Y. B. Tech. syllabus.The oral is to be conducted preferably in presence of expert from field and final term work marks are to be given based on performance in oral exam and the project report in the field book.

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VII
PROJECT PHASE - I

Course	Teaching Scheme					Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)		
						Max.	Min. for Passing	Max.	Min. for Passing
PP-I (PW-CV708)	--	--	02	01	ISE	---	---	50	20
					CIE	---	---	---	---
					ESE	---	---	---	---

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

The project work will be a design project, experimental project, field surveying or computer oriented on any of the topics of civil engineering interest. It will allot as a group project consisting of a minimum THREE and maximum FIVE number of students, depending upon the depth of project depth work. The student is required to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem.

Probable Activities of Project Phase – I

01. Submission of project topic with names of group member
02. Finalization of topic and allotment of guide by department through Departmental Research Committee (DRC)
03. Introduction and literature review presentation
04. Methodology and future work presentation
05. Submission of synopsis duly signed by students and guide
06. Presentation of synopsis in front of DRC

The term work assessment of the project will be done continuously throughout the semester by a DRC consisting of 3-4 faculty members from the department along with Project Guide. The students will present their project work before the committee. The complete project report is not expected at the end this semester. However, ten pages typed report based on the work done will have to be submitted by the students to the DRC. The project guides will award the marks to the individual students depending on the group average awarded by the committee.

One Project Guide shall be allotted Maximum TWO groups for guidance.

For work load calculation minimum load is 1 Hr./week, for one group of FOUR to FIVE students. (As per AICTE Guide Lines).

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VIII
DESIGN OF CONCRETE STRUCTURES-II

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Total credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max	Min for Passing	Max	Min for Passing
DCS-II (PCC-CV801)	4	-	2	5	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE – In Semester Evaluation   CIE – Continuous Internal Evaluation   ESE – End Semester Evaluation

Course Objectives:
1. To study the concept of torsion,
2. To design two span and three continuous beams,
3. To analyse and design watertanks resting on ground by WSM
4. To study concept of prestressed concrete, losses in prestress, analysis & design of prestressed concrete sections.

Course Outcomes:
After successful completion of course student will be able to design -
1. Sections subjected to torsion
2. Continuous beams
3. Water tanks resting on ground
4. Prestressed concrete sections

SECTION- I

Unit: 1   (07)

Limit State of Collapse in Torsion - Behavior of R.C. rectangular sections subjected to torsion, Design of sections subjected to combined bending and torsion, combined shear and torsion.

Unit: 2   (08)³⁷

Limit State Design of two span continuous beams and three span continuous beams using IS

coefficient or Moment Distribution Method, Introduction to moment redistribution.

Unit: 3   (09)

Design of water tank - Introduction to working stress method for water tank design, Calculation of design constants, Design criteria, permissible stresses, design of water tank restingon groundusingIScodemethod–circularwatertankswithflexibleandrigid jointbetweenwallandfloor.

SECTION- II

Unit: 4   (08)

Basic Concept of Prestressing, Types and Systems of Prestressing. Analysis of rectangular and symmetrical I sections. Different cable profiles.

Unit: 5   (06)

Losses in Prestress - elastic deformation, creep, shrinkage, friction, anchorage slip, relaxation in steel for Pre & Post tensioned members.

Unit: 6   (10)

Design of Prestress Concrete - Rectangular and Symmetrical I sections by Working Stress Method for flexure.

Term Work:

At least one assignment on each unit.

Use of IS: 456-2000, IS:1343, IS 3370 is allowed for students

Text books :

1. LimitStateTheory&design-Karve&ShahStructuresPub.Pune

2. ReinforcedConcreteDesign(LimitState)-A.K.Jain

3. Fundamentals of Reinforced Concrete- - Sinha &Roy

4. LimitStateDesignofReinforcedConcrete-P.C.Varghese, Prentice all of India, NewDelhi

5. Reinforced Cement Concrete -B.C. Punmia

8HandbookofReinforcedConcreteSP-34

10PrestressedConcrete-Sinha&RoyS.Chand&Co.NewDelhi

Reference Books:-

1. Prestressed Concrete - T.Y. Lin John Willey &sons Newyark

2. PrestressedConcrete–N KrishnaRaju,TataMcGraw-HillPublication Company ltd., NewDelhi

Guidelines regarding question paper setting:

1.   Section –I – Q.No-1 to Q.No-3 and Section –II – Q.No-4 to Q.No-6
2.   All questions are Compulsory
3.   Internal option question are allowed, weightage of optional question should not be more than 30% of total marks i.e.21 marks out of 70 marks

END SEMESTER EXAMINATION PAPER PATTERN

Question No.	Based on Unit No.	Marks
1	1	12

2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VIII
WATER RESOURCES ENGINEERING - II

Course	Teaching Scheme					Evaluation Scheme				
							Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme		Max.	Min. for Passing	Max.	Min. for Passing
WRE-II PCC-CV802	03	--	02	04	ISE		---	---	25	10
					CIE		30	12	---	---
					ESE		70	28	---	---

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To equip the students with capabilities required for identifying, formulating and management of water resources related issues and problems.
2. To impart the students with knowledge required for planning design, and development of different types of dams and reservoirs.
3. To impart the students with knowledge required for planning design, and development of canal distribution systems for agriculture purpose
4. To make the students understand the importance of hydropower projects and their needs of development.
5. To understand the basic concepts and importance of river engineering works.

Course outcomes: After successful completion of this course students will be able to:
1. Identify and understand various issues related to water resources systems.
2. Understand the role of dams and reservoirs in controlling the floods.
3. Plan and design different types of hydraulic structures.
4. Plan, design and monitor an efficient canal network system.
5. Understand the role of rivers in the development of nation.

SECTION I

Unit-1 (08)

Introduction to dams and reservoirs:Types of dams, selection of site for dams, selection of type of dam.
Reservoirs – Types of reservoirs, site selection, control levels, Area elevation-curve & Elevation-capacity curve, Reservoir capacity determination using mass curves, Silting of reservoirs, Control of losses in reservoirs.
Earthen dam: Types of earthen dams, Components and their functions, methods of construction of earthen dam, plotting of phreatic line, Modes of failure, seepage control measures - Drainage & filters, stability of slopes for sudden drawdown & steady seepage case only.

Unit-2 (07)

Gravity Dams: Forces acting on gravity dams, Modes of failures, Stress analysis, Elementary and practical profile, stability analysis, Structural joints, keys and Water seals in Gravity Dames, Drainage galleries, Foundation treatment.

Arch dams and Buttress dams- Introduction to different Types.

Unit-3 (05)

Spillway: Necessity and function, components of spillway, different types, Energy dissipation arrangements, gates for spillway, Elementary design of an ogee spillway

Outlets in Dams: Outlets through concrete and earth dams, different types, Trash racks.

SECTION II

Unit-4 (05)

Diversion Head Works: Component parts & their functions, types of weir and barrages, Causes of failure and remedies, Introduction to Theories seepage-Bligh's creep theory, critical exit gradient, Khosla's theory.

Unit-5 (08)

Canals: Types, alignment, typical sections of canals, balancing depth, Kennedy's and Lacey's silt theories, Canal lining - purpose, types, selection, and economics of lining. Types of canal outlets

C.D.Works: Necessity and Types.

Canal Regulatory Works: head regulator, cross regulator, canal fall, canal escape, standing wave flume.

Drainage of Irrigated lands: Necessity and methods,

Unit-6 (07)

River Engineering: Classification and types of rivers, meandering phenomenon,

River training works: Classification-Marginal bunds, Guide banks and Groynes. River navigation. Interlinking of rivers

Elements of hydro-power: Hydro-power & importance, typical layout & functions of components parts-Intakes, conveyance system, surge tanks, Power house, Tail race, Types of hydro-power plants.

Term work:

A) Students have to solve any **Eight** out of following Ten assignments

1. Determination of height of dam: Demand / supply reservoir calculation and control levels and free board
2. Earthen dam: Determination of section (drawing of one plate), one slip circle calculations, Types of failure
3. Gravity dam: Forces acting, Modes of failure, Elementary and practical profile with stability calculations (drawing of one plate),
4. Types of arch dam and buttress dams – Simple sketches and brief 41 explanation
5. Spillway: Geometrical sections, energy dissipation arrangement and gates,

Outlet through earth dam and gravity dam.
6. Typical section of diversion headwork, Different components, Blighs creep theory, khosla's theory.
7. Typical sections of canals, kennedy&lacey's theory
8. Types of CD work and canal regulatory works
9. Different types of river training work, Interlinking of rivers
10. A typical layout & component parts of Hydropower plant and its functioning
B) A Report based on field visit to a dam & CD works.

Text Books :
1. "Irrigation Engineering" – S. K. Garg – Khanna Publishers, Delhi.
2. "Water Resources & Irrigation Engineering" – Dr. K. R. Arora, Standard Publisher.
3. "Irrigation, Water Resources and Water Power Engineering" – Dr P.N. Modi, Standard Book House.
4. "Irrigation and Water Power Engineering – Dr. Punmia and Dr. Pande – Laxmi Publications, Delhi
5. "Irrigation Engineering" – Dahigaonkar, Asian Book Pvt Ltd.
6. "Irrigation Engineering" – S. R. Sahastrabudhe, Katson Publishers.
7. "Irrigation Theory and practice" - Michael, Vikas Publications House.
8. "Irrigation Engg.", - G. L. Asawa, Wiley Eastern
9. "Theory and design of irrigation structures" - Varshney and Gupta, vol. I, II and III, New Chand and Brothers.
10. "Irrigation Engineering" - Raghunath, Wiley Eastern Ltd, New Delhi.

Reference Books:
1. U.S.B.R., Oxford and IBH Publication -- Design of small dams.
2. Justinn, Creager and Hinds,--Engg. For Dams.- Vol. I, II, and III
3. Varshney, - Design of hydraulic structures.
4. Leliavsky,- Design of hydraulic structures
5. SatyanarayanMurty, - Water resources Engg, New age international private Ltd.
6. Satyanarayan and R. Murthy - "Design of M.I. and Canal Structure", Wiley Eastern Ltd, New Delhi.
7. Bharat Singh,'Irrigation', New Chand and Bros., Roorkee.
8. River Behaviour and Management and Training,- CBIP publication
9. "Water management" - Jaspal Sing, M.S.Acharya, Arun Sharma, Himanshu Publications.

Guidelines Regarding Question Paper Setting:

1. Q. No. 4 and Q. No. 8 are compulsory, and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No. 5, 6, 7

End Semester Examination Paper Pattern

Question No.	Based on Unit	Marks
1	1	10
2	2	10
3	3	10
4	1,2 & 3 (Compulsory)	15
5	4	10
6	5	10
7	6	10
8	4,5 & 6 (Compulsory)	15

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VIII
TRANSPORTATION ENGINEERING – II

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
TR - II (PCC-CV803)	03	--	02	04	ISE	--	--	25	10
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: InSemesterEvaluation   CIE: ContinuousInternalEvaluation   ESE: End SemesterExamination

Course Objectives
1. To study of various components of a railway track and geometric design of curves along railway tracks.
2. To impart knowledge of functioning of railway points, crossings and junctions.
3. To learn about the aircraft characteristics, airport planning and air traffic control.
4. To introduce the students to docks and harbor engineering.
5. To introduce the students to various types of bridges, bridge components, and design aspects of bridges.

Course Outcomes:
After successful completion of this course students will be able to:
1. Perform geometric design for the railway tracks.
2. Plan the layout of different types of air terminals.
3. Carry out the surveys for layout of railways, airports and harbors.
4. Design various bridge components

SECTION I

Unit 1: Airport Engineering (06)
1.1 Airport Engineering- Aircraft characteristics and their influence on airportplanning. Airport planning: topographical and geographical features, air trafficcharacteristics, and development of new airports, factors affecting airport site selection.Airport obstruction: Zoning laws, classification of obstruction, imaginary surfaces, approachzones, turning zones.
1.2 Airport layout: runway orientation, wind rose diagrams, and basic runway length. Correction of runway length, airport classification, geometric design, airport capacity, run way configuration, taxiway design, geometric standards

Unit 2: Airport layout details (06)
2.1 Exit taxiways, holding aprons, location of terminal buildings, aircraft hangers and parking. Airport marking and lighting: marking and lighting of runways, taxiways and approach areas.
2.2 Terminal area, planning of terminal building, Apron: size of the gate position, number of gate position, aircraft parking system; Hanger: general planning considerations, blast considerations. Air traffic control: Air traffic control aids, Enroute aids, landing aids.

2.3 Airport Drainage: requirement of airport drainage, design data, surface drainage design, subsurface drainage design.

Unit 03: Dock and Harbours Engineering (06)

3.1 Hydrographic Survey, Sea and tide, Wind Waves & cyclone, Siltation and erosion, Shipfeature, Traffic forecasting, Harbour layout, channel basin and berth, Breakwater, JettiesDolphins & mooring, Berth for crude oil, Locks,

3.2 Dry dock and slipwell, Carbohydrate equipment, Apparent, Transit shade, Ware Houses, Navigation Aids.

SECTION II

Unit: 4 Railway Engineering (06)

4.1 Introduction, Permanent Way : Components, coning of wheels

4.2 Geometric design: Alignment, gradient, horizontal curves, super elevation, design problems on above.

4.3 Points & 4Crossing: Terms used, standard points and crossings, design of simple turnout various types of track junctions.

4.4 Stations and yards: purpose, location, site selection, types and general layouts of terminus, Junction.

Unit: 5 Railway Engineering (06)

5.1 Signaling and interlocking—Introduction,

5.2 Construction and maintenance of railway track: methods, material required per KM of track, tools and plant used for plate laying,

 5.3 Maintenance of Track, Modern trends in railways, Safety in railways

Unit : 6 Bridge Engineering (06)

6.1 Classification of bridges, selection of site, Bridge Hydrology: determination of design discharge, linear water way, economical span, location of piers and abutments, afflux, scour depth, design problems on above topics.

6.2 Standard specification for bridges: - IRC loads, Railway bridge loading, forces acting on super structure. Design considerations, aesthetics of bridge design.

6.3 Types of bridge foundations, Bridge piers, Abutments, Wing walls, Bearings, Construction and maintenance of bridges-Introduction; Recent trends in bridges.

Term Work

Assignment on each unit and field visit report on airport/ railway/ bridge shall be submitted by the students.

Text Books

1. Airport Engineering by G.V. Rao. Rao, Tata McGraw Hill
2. Airport Planning & Design, by Khanna and Arora, Nemchand Bros, Roorkee
3. Harbour, Dock and Tunnel Engineering by R. Shrinivasan, Charotar Publishing House.
4. A Text book of Railway Engineering by Saxena and Aror, Dhanapat Rai & Sons Publication.
5. Railway Engineering by Rangwala, by Charotar Publication.
6. Bridge Engineering by PonnuswamyS,, Tata McGraw Hill

Reference Books

1. Railway Engineering- by Aggarwal M.M.
2. Railway and track Engineering- by Mundrey J.S.
3. Indian Railway permanent way manual – 1986.
4. Planning and Construction of Docks and Harbors–Quinn.
5. Docks and Harbour Engineering Oza, Charotar Publication House.
6. Airport Planning & Design by Khanna &Arrora.
7. Concrete Bridge Practice by Raina V K, Tata McGraw Hill

8. IRC:5-2015- Standard Specifications and Code of Practice for Road Bridges, Section I – General Features of Design
9. IRC:6-2017- Standard Specifications and Code of Practice for Road Bridges, Section II – Loads and Load Combinations

Guidelines Regarding Question Paper Setting:

1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15
5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

ELECTIVE-II (STRUCTURE GROUP)

Sr.No.	Name of Elective
1.	Design of bridges
2.	Maintenance, Retrofitting, Rehabilitation Of Structure
3.	Advance Foundation Engineering
4.	Advanced Pre-stressed Concrete Design
5.	Structural Design of Foundation & Retaining Structures
6.	Advanced Design of Concrete Structures
7.	Dynamics of Structure
8.	Finite Element Method

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.TechCIVIL SEMESTER VIII
Professional Elective II: DESIGN OF BRIDGES (PCE-CV804)

Course	Teaching Scheme					Evaluation Scheme			
	L	T	P	Credit	Scheme	Theory (Marks)		Practical(Marks)	
						Max.	Min. for passing	Max.	Min. for passing
El - II **PCE-CV804**	3	1	-	4	ISE	-	-	-	-
					CIE	30	12	-	-
					ESE	70	28	-	-

CIE: Continuous Internal Evaluation ISE: In Semester Evaluation   ESE: End Semester Evaluation

Course Objectives:
1. To understand the types of bridges and its suitability.
2. To understand the design concept of bridges i.e. superstructure and substructure.

Course Outcomes:
After successful completion of course, the students will be able to
1. Classify the types of bridges and its components.
2. Assess the different kinds of loading on the bridge.
3. Design the different types bridges.
4. Analyze the substructures of the bridges.

SECTION I

Unit No. 1 (06)
Introduction & Brief History of bridges, Classification, Importance of bridges, Components of bridges: Substructure -superstructure, Investigation for Bridges.

Unit No. 2 (04)
Standard specification for Road Bridges. I.R.C. bridge code, width of carriage way, clearances, loads to be considered i.e. D.L., L.L., Impact load, wind load, Earthquake load, Longitudinal force, Centrifugal force, buoyancy, Earth pressure, water current force, thermal force etc.

Unit No. 3 (08)
General design considerations. For R.C.C. & P.S.C. bridges. Traffic aspects for highway bridges. Aesthetics of bridge design, Relative costs of bridge components. Design of reinforced concrete, deck slab, Pigeaud's theory, beam and slab and T – beam, Courbon's theory.

SECTION II   48

Unit No. 4 (06)

Construction Techniques – Construction of sub structure footing, piles, cassions, construction of reinforced earth retaining wall and reinforced earth abutments, super structure – erection method for bridge deck construction by cantilever method, Repair, Strengthening, and Rehabilitation of Existing Bridges.

Unit No. 5 (06)

Design of sub structure – Abutments, Piers, Approach slab. (Numerical on Abutments, Pier)

Unit No. 6 (06)

Different types of bridge Bearing and expansion joints , forces on bearings, Types of bearings, design of unreinforced elastomeric bearings, expansion joints. (Numerical on Bearings)

Practice Work

One assignment per unit with minimum five questions.

Text Books

1. Design of Bridge Structures, -T.R Jagadeesh and M.A.Jayaram, PHI Publications.
2. Bridge Enginnering – Rangwala, Charotar Publications.
3. Principles and practice of Bridge Engineering, S.P. Bindra ,Dhanapat Rai Publications.

Reference Books

1. Reinforced Concrete Structures – Vol. II by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications.
2. Concrete Bridge Practice, Analysis, Design and Economics by Dr. V. K. RAINA, Tata McGraw- Hills Publishing Company Limited.
3. Bridge Engineering by S. Ponnuswamy, Tata McGraw-Hills Publishing Company Limited.
4. Design of Bridges by N. Krishna Raju, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
5. IRC Codes – IRC: 5, IRC: 6, IRC: 18, IRC: 27, IRC: 45, IRC: 78, IRC: 83.

Guidelines Regarding Question Paper Setting:

1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

Structure of question paper for End Semester Evaluation

Question No.	Unit No.	Marks
1.	Theory question on Unit 1	12
2.	Theory question on Unit 2	11
3.	Theory question on Unit 3	12
4.	Theory question on Unit 4	11
5.	Theory question/ Numerical on Unit 5	12
6.	Theory question/ Numerical on Unit 6	12

Note-

1. Required data for Numerical should be provided in numerical, IRC codes are not allowed in examination.

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VIII
Professional Elective II: MAINTENANCE, RETROFITTING, REHABILITATION OF STRUCTURE(PCE-CV804)

Course	Teaching Scheme				Evaluation scheme				
						Theory (marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max	Min for passing	Max	Min for passing
El - II (PCE-CV804)	03	01	--	4	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To understand the importance of maintenance of
2. To learn various repair techniques of damaged structures.

Course outcomes : After successful completion of this course students will be able to:
1. Understand types of damage to structure
2. Identify Causes of distress and damage
3. Classify different repair and retrofit techniques
4. Apply the repair and retrofitting techniques to damaged structure
5. Analyse damage structure and propose repair techniques
6. Design rehabilitation proposal for damaged structure

SECTION I

UNIT-I (06)
Introduction –Introduction - rehabilitation, repair, retrofit/ strengthening, need for rehabilitation and retrofit/strengthening of structures. Importance of Maintenance various aspects of Inspection. Assessment procedure for evaluating a damaged structure routine and preventive maintenance. Effects on structures due to climate, temperature, sustained elevated temperature, Corrosion – Effects. Causes of deterioration, Various cracks in R.C. buildings, causes and effects. Corrosion mechanism and Stages of corrosion damage.

UNIT-II (06)
Damage Assessment Visual inspection, Non-Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test, Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement Substrate preparation

Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning

UNIT-III (06)
Repair Materials - Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials Strength, Durability and Thermal properties, of concrete, Special mortars and concretes Polymer Concrete and Mortar Expansive cement, Quick setting compounds sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete, Grouting Materials Gas forming grouts, Sulfamate grouts, Polymer grouts, Acrylate and Urethane grouts. Bonding agents Latex emulsions, Epoxy bonding agents. Protective coatings Protective coatings for Concrete and Steel.

SECTION II

UNIT-IV (06)
TECHNIQUES FOR REPAIR Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, . Overlays, Repair to active cracks, Repair to dormant cracks shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection. Corrosion of embedded steel in concrete,

UNIT-V (06)
RETROFITTING/Strengthening of structures Treatments to overcome low member strength, Deflection, strengthening of various corrosion damaged structural elements (slab, beam and columns) - Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing., Beam shear strengthening, Flexural strengthening. Strengthening for seismic loads, shear wall, base isolation system, dampers and other techniques

UNIT-VI (06)
Case Studies – Structural Audit, Rehabilitation of Heritage building, Retrofitting of structure, DEMOLITION AND DISMANTLING TECHNIQUES Non Engineering Demolition, Mechanical Method of demolition, Dismantling of building and reuse of material and fittings. - case studies.

TEXT BOOKS
1 Shetty M.S, Concrete Technology – Theory and Practice, 10th Edition, S.Chand and Company, 2005
2. Concrete repair and maintenance Illustrated by Peter.H. Emmons, Galgotia publications Pvt. Ltd., 2001.
3. Ravishankar.K., Krishnamurthy. T.S, Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures
4. "Earthquake resistant design of structures" by Pankaj agarwal, Manish shrikande, PHI, 2006.

REFERANCE BOOKS
1. Failures and repair of concrete structures by S. Champion, John Wiley and Sons, 1961.   51
2. Diagnosis and treatment of structures in distress by R. N.Raikar Published by R & D Centre of Structural Designers and Consultants Pvt.Ltd, Mumbai.

3. Handbook on repair and rehabilitation of RCC buildings, CPWD, Government of India.

4. Handbook on seismic retrofit of buildings, A. Chakrabarti et.al., Narosa Publishing House, 2010.

5. DovKominetzky.M.S, Design and Construction Failures, 8th Edition, Galgotia Publications Pvt. Ltd, 2008

Practice Work: One case study related to health monitoring of a structure, or Repair/Retrofit proposal for a structure or report of present status of Heritage building is compulsory. One assignment per unit with minimum five questions in each assignment.

Guidelines Regarding Question Paper Setting:

1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6

2. All questions are compulsory.

3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	11
2	2	12
3	3	12
4	4	12
5	5	12
6	6	11

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VIII
PROFESSIONAL ELECTIVE II: ADVANCE FOUNDATION ENGINEERING
(PCE-CV804)

Course	Teaching Scheme				Evaluation scheme				
						Theory (marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max	Min for passing	Max	Min for passing
El - II (PCC-CV804	3	1	-	4	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   **CIE:** Continuous Internal Evaluation   **ESE:** End Semester Examination

Course Objectives:
1. To study different types of soils, foundation and their applications.
2. To learn the stability analysis of structure using specific foundation system.
3. To study the analysis of load carrying capacity of foundations.
4. To enhance the knowledge about structural foundations in weak soils.
5. To learn dynamic analysis of foundations for industrial machines
6. To study the types & analysis process for earth & water retaining structures.

Course Outcomes:
After successful completion of this course students will be able to:
1. Understand the different types of foundations & their necessities.
2. Select the suitable foundation system based on soil and loading conditions.
3. Calculate dimensions and capacity of shallow foundations.
4. Design the foundations for Industrial machines under dynamic loadings.
5. Understand suitable technique for weak soil to enhance the stability of foundations.
6. Analyse the earth and water retaining structures used for special functions.

SECTION – I

Unit 1: Shallow Foundations (06)

1.1   Types & shapes of shallow foundation, minimum depth of foundation

1.2   Calculation of bearing capacity of soil by Terzaghi's theory, IS Code method &Skempton's approach

1.3   Concept of proportioning of footings (Isolated), calculation of immediate and consolidation settlement, foundation on slopping ground etc.

1.4 Different shapes, bending moment diagrams & Dimensional analysis of rectangular & Trapezoidal combined footings

1.5 RCC design of Isolated box & slopped type footings with reinforcement details

Unit 2: Raft Foundation (06)

2.1 Introduction to raft or mat foundation, necessity & types of rafts

2.2 Analysis of bearing capacity and settlements of raft or mat foundation

2.3 Design guidelines for raft foundation, types of raft design, floating foundation & problems associated with floating foundation.

2.4 Analysis of raft or mat foundation by Rigid method (Conventional method) & Elastic plate method (IS Code method)

2.5 Calculation of soil pressure at different points in a raft foundation

Unit 3: Pile Foundation (06)

3.1 Introduction, necessity, advantages and classification of piles

3.2 Calculation of load capacity of single pile by static formulae in cohesive & cohesionless soils and by dynamic formulae, pile load test etc.

3.3 Group action of files, efficiency of group of piles, feld's rule, Seiler-Keeney formula, Converse-Labarre formula etc.

3.4 Concept of negative skin friction and its estimation, settlement in pile foundation, estimation of load on single pile in a group of pile etc.

3.5 Calculation of group capacity of pile in cohesive soil, under reamed pile – its application and installation techniques

SECTION – II

Unit 4: Machine Foundations (06)

4.1 Introduction to machine foundation, types of machine foundations, terms related to dynamic loadings, static and dynamic design criteria etc.

4.2 Permissible amplitude of vibrations for different types of machines, calculation of probable amplitude, amplitude ratio & maximum amplitude, criteria for design of machine foundations,

4.3 Design criteria for foundations of reciprocating machines (IS2974-Part-I), design criteria for foundations of impact type machines (IS2974-Part-II),

4.4 Vibration Isolation & Its methods, vibration effects on soil etc.

Unit 5: Sheet Piles (06)

5.1 Introduction to sheet piles, types and uses of sheet piles

5.2 Analysis & design of cantilever sheet pile walls in cohesive & cohesionless (granular) soils,

5.3 Anchored bulkhead, free earth support and fixed earth support method

5.4 Introduction to coffer dams, different types of coffer dam, uses of cofferdams, construction techniques of cofferdams etc

Unit 6: **Foundations in difficult soils and soil stabilization** **(06)**

6.1 Introduction to difficult or weak soils, foundations in expansive soils, foundations in soft & compressible soils

6.2 Problems associated with foundation installation- ground water lowering and drainage, shoring and underpinning, different methods, damage and vibrations due to constructional operations.

6.3 Introduction to soil stabilization, methods of stabilization & their applications - mechanical stabilization, cement stabilization, lime stabilization, bituminous stabilization, chemical stabilization & stabilization by grouting

Practice Work:
1. One assignment on each unit containing at least 10 questions in each assignment
2. Problem practice from unit 1, 2, 3 and 4

Reference books:

1. "*Foundation Engineering Handbook- I*", Van Nostrand Reinhold Company, 1975 by Winterkorn H.F. and Fang H. Y

2. "*Principles of Foundation Engineering*", by Braja. M. Das, Cengage India Private Limited

3. "*Foundation Analysis & Design*", by Joseph Bowles, McGraw-Hill Education; 5th edition March 2001

4. "*Foundation Design* ", by W. C. Teng, Prentice Hall of India PVT. LTD, New Delhi

5. "*Foundation Design*", by N. S. V. Kamesware Rao, John Wiley & Sons Inc.

6. "*Advance Foundation Engineering*", by T. G. Sitharam, CRC Press, 1st Edition 2019

7. "*Design Applications of Raft Foundations*", by J. A. Hemsley, Published on 2000 by Thomas Telford

8. "*Soil Mechanics & Foundation Engineering*", by V. N. S. Murthy, CBS Publishers & Distributors.

Text Books:

1. "*Foundation Engineering*", by P. C. Varghese, Prentice Hall India Learning Private Limited

2. "*Raft Foundation Design and Analysis with a Practical Approach*", by Sharat Chandra Gupta, New age Publisher 1997

3. "*Pile foundation Design & Construction*", by Satyendra Mittal, CBS Publishers & Distributers Pvt. Ltd.

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4.   "*Soil Mechanics and Foundations*" by B. C. Punamia& Ashok Kumar Jain, Laxmi Publications

5.   "*Soil Mechanics and Foundation Engineering*", by Purushotama Raj, Published by Pearson Education India, Ltd.

6.   "*Foundation Engineering*", by B. J. Kasmalkar, Pune Vidyarthi GrihaPrakashan

7.   "*Handbook of Machine foundations*", by Srinivasulu P, Vaidyanathan C.V

8.   "*Foundation Design Manual for Practicing Engineer*", by Narayan Nayak, Dhanapat Rai Publications Pvt. Ltd.

9.   "*Soil Mechanics & Foundation Engineering*", by S. K. Gerg, Khana Publishers

10.   "*Foundation Design*", by W. C. Teng, Prentice Hall of India Pvt. Ltd., New Delhi

11.   "*Foundations for Industrial Machines – Handbook for practicing Engineers*", Dr. K. G. Bhatia, D-CAD Publications

Guidelines Regarding Question Paper Setting:

1. Question paper consist of 2 sections & each section carries maximum 35 marks
2. Section – I is based on unit 1, 2 & 3, Section – II is based on unit 4, 5 & 6
3. Maximum 3 questions in each section.
4. Internal optional questions are allowed; weightage of optional question should not be more than 30% of total marks i.e., 21 marks out of 70 marks.
5. Make all questions compulsory.

End Semester Examination Pattern:

Question Number	Related to unit Number	Marking weightage
1	1	10
2	2	12
3	3	13
4	4	13
5	5	12
6	6	10

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VIII
PROFESSIONAL ELECTIVE II: ADVANCED PRESTRESSED CONCRETE
Design (PCE-CV804)

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Total credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max	Min for Passing	Max	Min for Passing
El - II (PCC-CV804)	3	1	-	4	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE – In Semester Evaluation   CIE – Continuous Internal Evaluation   ESE – End Semester Evaluation

Course Objectives:
5. To study Basic concept of prestressed concrete
6. To design the rectangular and I section beams for flexure.
7. To design the prestressed concrete beams for shear
8. To analysis and design of continuous beams upto two spans.
9. To analyse and design prestressed Concrete Pipes and Sleepers.
10. To design prestressed concrete bridges as per IRC loadings.

Course Outcomes:
After successful completion of course student will be able to design -
5. Prestressed Concrete Rectangular and I section beams for flexure and shear.
6. Continuous beams.
7. Prestressed Concrete Pipes and Sleepers
8. Prestressed concrete bridges as per IRC loadings

SECTION- I

Unit : 1   **(07)**
a) Analysis and Design of beams - Rectangular, Flanged and I sections, for Limit State of flexure, ultimate flexural strength, recommendations of I.S. codes.
b) Analysis and Design of End Blocks in post tensional members -primary and secondary distribution zones, Bursting and spalling tensions.

Unit : 2   **(07)**
Shear strength of prestressed concrete beams - Mode of failure in beams, recommendations of I.S. code, ultimate shear strength of concrete, Design of shear reinforcement, Bond in prestressed concrete.

Unit : 3 (04)

Analysis and Design of Continuous (upto two spans) and fixed beams. Elastic analysis, Secondary moments, concordant cable, Linear transformations.

SECTION- II

Unit : 4 (04)

Analysis and Design of Prestressed Concrete structures such as concrete pipes and Sleepers.

Unit : 5 (07)

Analysis and Design of Portal Frames, Single Storey and Limited to two bays (Fixed and Hinged).

Unit : 6 (07)

Design of Pre-stressed concrete bridges (simply supported) for I.R.C. loadings or equivalent uniformly
distributed loads.

Text Books:-
1. Fundamentals of Prestressed Concrete, N.C. Sinha and Sujitkumar Roy
2. IS 1343:2012, Code of Practice for *Prestressed Concrete*

Reference books:-
1. IS 1343: Code of Practice for Prestressed Concrete by Bureau of Indian Standards.

2. Prestressed Concrete, Guyon Y, Vol. I & II, John Wiley and Sons, New York.

3. Prestressed Concrete, N. Krishna Raju, Tata McGraw Hill Publications Company, New Delhi.

4. Prestressed Concrete, Lin T. Y , Tata McGraw Hill, New Delhi.

5. Prestressed Concrete Structures, Dayaratnam P.

Guidelines regarding question paper setting:
1. Section –I – Q.No-1 to Q.No-3 and Section –II – Q.No-4 to Q.No-6
2. All questions are Compulsory.
3. Internal option question are allowed, weightage of optional question should not be more than 30% of total marks i.e.21 marks out of 70 marks

END SEMESTER EXAMINATION PAPER PATTERN

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VIII
PROFESSIONAL ELECTIVE II: STRUCTURAL DESIGN OF FOUNDATION & RETAINING STRUCTURES (PCE-CV804)

| Course | Teaching Scheme | | | | Evaluation Scheme | | | | |
| | L | T | P | Credit | Scheme | Theory (Marks) | | Practical Marks | |
						Max Marks	Min for passing	Max Marks	Min for passing
El - II PCE-CV804	3	1	--	4	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   **CIE:** Continuous Internal Evaluation   **ESE:** End Semester Examination

Course Objectives:
1. To learn various foundation systems and their applications
2. To evaluate the load carrying capacity & stability of specify foundation system.
3. To learn analysis & design of different foundations with reinforcement details.
4. To enhance the knowledge about reinforcement curtailments with economy.
5. To study the structural construction in water bodies as retaining structures.
6. To study the various forces acting on modern foundation techniques.

Course Outcomes:
After successful completion of this course students will be able to:
1. understand the different types of foundations & their necessities
2. Select the suitable foundation system based on soil and loading conditions.
3. Analyse the different types of loading acting on foundation system.
4. Design the foundation for lighter & heavy structures.
5. Learn the reinforcement curtailments in foundation systems.
6. Design the vertical walls to retain water or soil on one side of wall

<u>SECTION – I</u>

Unit 1:   Shallow Foundations – Combined footing   6 hrs.

    1.1   Introduction to combined footings, necessity & types of combined footings

    1.2   Dimension analysis of rectangular & Trapezoidal combined footings   59

    1.3   Design of slab type combined footing with reinforcement details

1.4 Design of slab-beam type combined footing with reinforcement details

Unit 2:   Shallow Foundations – Raft Foundation   **6 hrs.**

2.1   Introduction to raft or mat foundation, necessity & types of raft

2.2   Design of raft as a slab with reinforcement details (without primary & secondary beams)

2.3   Design of raft as slab including primary peripheral beams with proper reinforcement details

2.4   Design of raft as a slab including both primary & secondary beam with proper reinforcement details

Unit 3:   Deep Foundations – Pile Foundation   **6 hrs.**

3.1   Introduction to pile foundation, necessity, classifications of pile foundation.

3.2   Design of single pile with reinforcement details

3.3   Introduction to group of piles, pile cap & efficiency of group of pile

3.4   Design of pile cap for a group of 2, 3, 4 and 6 piles with reinforcement details

SECTION – II

Unit 4:   Deep Foundations – Well Foundation   **6 hrs.**

4.1   Introduction to well foundation, necessity & types of well foundations

4.2   Elements of well foundation, shapes of well foundation, installation etc.

4.3   Forces acting on well foundation & lateral stability analysis

4.4   Problems associated with sinking of well & remedial measures

4.5   Tilt, shift & techniques to overcome, health problems of workers etc.

Unit 5:   Retaining Structures   **6 hrs.**

5.1   Introduction, functions & types of retaining wall

5.2   Stability analysis of cantilever type retaining wall

5.3   Reinforcement curtailment in cantilever type wall, use of shear key etc.

5.4   Design of cantilever type retaining wall for various types of backfill conditions with reinforcement details

Unit 6:   Break water Structures   **6 hrs.**

6.1   Introduction, Necessity, functions and types of breakwater

6.2   Parameters for construction of breakwater

6.3   Methods of constructions of breakwaters   60

6.4   Stability analysis and design of breakwater

Practice Work:
1. One assignment on each unit containing at least three problems to practice
2. Students should visit at least one foundation siteduring academic term

Reference books:

1. "*Foundation Engineering Handbook- I*", Van Nostrand Reinhold Company, 1975 by Winterkorn H.F. and Fang H. Y
2. "*Pile Foundation Analysis and Design*", Poulos, H.G. and Davis, E.H. (1980), John Wiley and Sons, New York.
3. "*Foundation Analysis & Design*", by Joseph Bowles, McGraw-Hill Education; 5th edition March 2001
4. "*Foundation Design* "by W. C. Teng, Prentice Hall of India PVT. LTD, New Delhi
5. "*Basics of retaining wall design*", by hugh brooks, HBA Publications, Incorporated (23 May 2018)
6. "*Earth Pressure and Earth-Retaining Structures*", by Clayton Chris R.I, Woods Rick. I, Bond Andrew J, Publisher: Taylor & Francis Inc.
7. "*Design Applications of Raft Foundations*", by J. A. Hemsley, Published on 2000 by Thomas Telford

Text Books:

1. "*Foundation Engineering*", by P. C. Varghese, Prentice Hall India Learning Private Limited
2. "*Raft Foundation Design and Analysis with a Practical Approach*", by Sharat Chandra Gupta, New age Publisher 1997
3. "*Pile foundation Design & Construction*", by Satyendra Mittal, CBS Publishers & Distributers Pvt. Ltd.
4. "*Soil Mechanics and Foundations*" by B. C. Punamia& Ashok Kumar Jain, Laxmi Publications
5. "*Soil Mechanics and Foundation Engineering*", by Purushotama Raj, Published by Pearson Education India, Ltd.
6. "*Foundation Engineering*", by B. J. Kasmalkar, Pune Vidyarthi GrihaPrakashan
7. "*Advance Foundation Engineering*", by V.N.S. Murthy, CBS Publishers & Distributers Pvt. Ltd.
8. "*Foundation Design Manual for Practicing Engineer*", by Narayan Nayak, Dhanapat Rai Publications Pvt. Ltd.

Guidelines regarding question paper setting:

1. Section –I – Q.No-1 to Q.No-3 and Section –II – Q.No-4 to Q.No-6

2. All questions are Compulsory.

3. Internal option question are allowed, weightage of optional question should not be more than 30% of total marks i.e.21 marks out of 70 marks

END SEMESTER EXAMINATION PAPER PATTERN

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VIII
PROFESSIONAL ELECTIVE II: ADVANCED DESIGN OF CONCRETE STRUCTURES(PCE-CV804)

Course	Teaching Scheme				Evaluation Scheme					
	L	T	P	Total credit	Scheme	Theory (Marks)		Practical (Marks)		
						Max	Min for Passing	Max	Min for Passing	
EL-II (PCC-CV804)	3	1	-	4	ISE	--	--	--	--	
					CIE	30	12	--	--	
					ESE	70	28	--	--	

ISE – In Semester Evaluation   CIE – Continuous Internal Evaluation   ESE – End Semester Evaluation

Course Objective:
1. To understand the concept and design of large span concrete roofs and deep beam
2. Toanalyze the stresses in chimney, design of chimney
3. To understand the design of elevated water tank and its elements and retaining wall.
4. To understand yield line analysis and design of slab.

Course Outcome: After successful completion of course student will be able to

1. Analysis and design of large span concrete roofs and design flat slab as per IS 456 – 2000
2. Analysis and design deep beams.
3. Analysis of stresses in concrete chimney and design the chimney
4. Analysis and design overhead water tank with codal provision of 3370-2009
5. Analysis and design of cantilever and counter fort retaining wall.
6. Describe yield line theory and analyze rectangular and circular slab by yield line theory

SECTION- I

Unit: 1   **(06)**

Large span concrete roofs with detail Classification
Behavior of Flat slabs, Direct design and equivalent frame method with Codal provisions

Unit: 2   **(06)**
Analysis of deep beams and design as per IS 456-2000

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Unit: 3   **(06)**
Analysis of stresses in concrete chimneys with un cracked and cracked sections, Codal

provisions, Design of chimney.

SECTION- II
Unit: 4   (06)

Overhead water tanks, rectangular and circular with flat bottom, spherical and conical tank roofs, Staging , Design based on IS 3370 -2009

Unit: 5   (06)
Analysis and Design of cantilever and counter fort retaining walls with horizontal and inclined surcharge.

Unit : 6 (06)
Yield line analysis of slabs, virtual work and equilibrium method of analysis, simply supported rectangular slabs with corners held down uniform and concentrated loads, design of simply supported rectangular and circular slabs

Practice work: At least one assignment on each unit consisting of four questions.

Text books :
7. Reinforced Concrete Structural Elements- Purushothaman. P, Tata Mc Graw Hill
8. Design and Construction of Concrete Shell Roofs-G.S.Ramaswamy
9. Reinforced Concrete – Ashok K Jain, Nem Chand Bros. Roorkee
10. Plain and Reinforced Concrete – Jain &Jaikrishna, Vol. I & II, Nem Chand Bros. Roorkee
11. Reinforced Concrete Chimneys- Taylor C Pere,
12. Yield Line Analysis of Slabs- Jones L L, Thomas and Hudson
13. Reinforced Concrete, Mallick & Gupta- Oxford & IBH
14. IS 456-2000
15. IS2210-1998- Criteria for design of reinforced concrete shell structures and folded plates
16. IS 4998-1998- Criteria for design of reinforced concrete chimneys
17. IS 3370- 2009- Part (1 to 4) Code of Practice for concrete structures for the storage of liquids

Reference Books
1. Design of deep girders, Concrete Association of Indi
2. Reinforced concrete design 9th Edition by Abi O Aghayere, pearsonindia

Guidelines regarding question paper setting:

1. Section –I – Q.No-1 to Q.No-3 and Section –II – Q.No-4 to Q.No-6

2. All questions are Compulsory.

3. Internal option question are allowed, weightage of optional question should not be more than 30% of total marks i.e.21 marks out of 70 marks.

END SEMESTER EXAMINATION PAPER PATTERN

Question no	Based on Unit no	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VIII
PROFESSIONAL ELECTIVE II: DYNAMICS OF STRUCTURE(PCE-CV804)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical(Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EL-II (PCE-CV704)	03	01	--	04	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives:
1. To analyse damped and undamped single degree of freedom system subjected to different types of loading.
2. To analyse single degree of freedom system by piece wise exact method.
3. To analyse multi degree of freedom system by various methods.
4. To analyse beams in flexure subjected to free and forced vibration.

Course Outcomes: After successful completion of this course students will be able to:
1. Differentiate between damped and undamped system, free and forced vibration.
2. Write the equation of motion for single and multi degree of freedom system.
3. Determine natural frequency, period.
4. Understand the resonance condition,
5. Determine natural frequencies and mode shapes for multi degree of freedom system.
6. Determine the model contribution.

SECTION - I

Unit 1: Single degree of freedom (SDOF) system subjected to general loading   6hrs
1.1 Mathematical models, Equation of motion
1.2 SDOF system subjected to free vibration
1.3 Damping, Types of damping
1.4 Response to harmonic loading, Resonance
1.5 Response to support motion, Transmissibility, Vibration isolation

Unit 2: SDOF system subjected to periodic and impulsive loading   6 hrs
2.1 SDOF system subjected to Fourier series loading
2.2 SDOF system subjected to rectangular pulse
2.3 Introduction to frequency – Domain analysis

Unit 3: SDOF system subjected to general dynamic loading   6 hrs
3.1 Duhamel's' integral, Application to simple loading cases
3.2 Numerical evaluation of response integral
3.3 Piece wise exact method

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Unit 4: Multi degree of freedom (MDOF)system   **6 hrs**
4.1 Selection of degrees of freedom, Formulation of equations of motion
4.2 Structure matrices, Static condensation
4.3 Free vibration - Eigen value problem
4.4 Frequencies and Mode shapes, Determination of natural frequencies and mode shapes by Stodola-Vianello method
4.5 Orthogonality conditions

Unit 5: Discrete systems   **6 hrs**
5.1 Fundamental mode analysis, Rayleigh method
5.2 Response of MDOF systems to dynamic loading
5.3 Mode superposition method, Coupled and uncoupled equations of motion
5.4 Modal contribution

Unit 6: Distributed - parameter systems   **6 hrs**
6.1 Partial differential equations of motion
6.2 Free and forced Vibration
6.3 Application to beams in flexure

Practice Work: One assignment on each unit.

Text Books:
1. "Structural Dynamics", Mario Paz, CBS Publication
2. "Mechanical Vibrations", G. R. Grover, Roorkee University, Roorkee
3. "Earthquake Resistant Design of R. C. C. Structures", S. K. Gosh
4. "Earthquake Resistance Design of Structure", S. K. Duggal, Oxford University Press
5. "Earthquake Resistance Design of Structure", Vinod Hosur, Wiley Publication

Reference Books:
1. "Dynamics of Structures - Theory and Applications to Earthquake Engineering", A.K. Chopra, Prentice Hall Publications
2. "Earthquake Resistant Structures", D.J. Dowrick, John Wiley Publication
3. "Dynamics of Structures", R. M. Clough and Ponian, McGraw Hill Co., New Delhi

Guidelines Regarding Question Paper Setting:
1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questionsare allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70 marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	11
2.	2	12
3.	3	12
4.	4	11
5.	5	12
6.	6	12

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech Civil Semester VIII
PROFESSIONAL ELECTIVE II: FINITE ELEMENT METHOD(PCE-CV804)

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Total credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max	Min for Passing	Max	Min for Passing
El - II (PCC-CV804)	3	1	-	4	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE – In Semester Evaluation   CIE – Continuous Internal Evaluation   ESE – End Semester Evaluation

Course Objectives:
1. To impart knowledge of element stiffness matrix formulation for 1D,2D and 3D elements
2. To demonstrate applications of finite element method in structural engineering in a wide perspective.
3. To provide knowledge of finite element method to model and solve continuum structures by using FEM based softwares.

Course Outcomes: After successful completion of course student will be able to design -
1. Comprehend basic concept of F.E.M. and formulation of [k] for spring, bar and truss element with their applications.
2. Develop element stiffness matrix for beam and frame element and solve the problems of continuous beams and portal frames.
3. Analyze plane stress/strain problems by using theory of elasticity.
4. Demonstrate the concept of displacement function and its convergence requirements.
5. Develop shape functions in Cartesian and natural coordinate system and apply concept of isoparametric elements.
6. Solve three dimensional and axisymmetric problems by using finite element method.

SECTION- I

Unit : 1 (07)

Basic concept of finite element analysis, Discretization, nodes, element incidences, formulation of element stiffness matrices for spring, bar and plane truss elements. Solutions for unknown nodal displacements; Applications of method to spring, bar and plane truss problems

Unit : 2 (06)

Formulation of element stiffness matrices for beam and plane portal frame element by direct method; Transformation of matrix from local to global system; Numbering of nodes; minimization of band width; force displacement relations; Solution for displacement unknowns; Application of method to plane truss; Continuous beams and plane portal frames.

Unit : 3 (06)
Elementary theory of Elasticity: Stress strain relation; Strain displacement, relations; plane stress and plane strain problems; Compatibility conditions; differential equations of equilibrium; equations for two dimensional and three dimensional problems.

SECTION- II

Unit : 4 (06)
Principle of minimum potential energy; variational method; continuum problems; Two dimensional Elements; use of displacement functions; Pascal's triangle; triangular and rectangular elements; Formulation of element stiffness matrix.
Convergence requirements – Selection of the order of polynomial, conforming and non-conforming elements, Effect of element aspect ratio, finite representation of infinite bodies.

Unit : 5 (05)
Shape function in Cartesian and natural co-ordinate system, Lagrange's interpolation formulae, concept of iso-parametric element, relation between Cartesian and natural coordinate system, Jacobian matrix, one and two dimensional Iso-parametric elements.

Unit : 6 (06)
Introduction to three-dimensional problem, various three-dimensional elements, Axisymmetric problems, formulation of stiffness matrix of three dimensional and axisymmetric elements.

Text Books:-
1. P.N.Seshu "Finite Element Analysis", PHI learning private Lim. Delhi,2013.
2. J. N. Reddy. *"An Introduction to the Finite Element Method"* McGraw Hill, 3rd Edition, New York, ,3rd edition,2006.
3. Robert D. Cook, David S. Malkus, Michael E. Plesha,Robert J. Witt,"Concepts *and Applications of Finite Element Analysis",*2003

Reference books:-
1. Klaus-Jurgen Bathe, *"Finite Element Procedures in Engineering Analysis",1982*
2. T. R. Chandrupatla and A.D. Belegundu, *"Introduction to Finite Element in Engineering",* Prentice Hall of India Private Limited, 3rd Edition,2002.
3. Zienkiewicz.O.C. &Taylor.R.L., *"The Finite Element Method- Vol I &Vol II* Tata McGraw-Hill Publishing Company Limited, 6th Edition,2005.
4. C. S. Desai & J. F. Abel *"Introduction to Finite Element Method",* AEP,1st Edition, 1972.

Guidelines regarding question paper setting:
1. Section –I – Q.No-1 to Q.No-3 and Section –II – Q.No-4 to Q.No-6
2. All questions are Compulsory.
3. Internal option question are allowed, weightage of optional question should not be more than 30% of total marks i.e.21 marks out of 70 marks

END SEMESTER EXAMINATION PAPER PATTERN

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12

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6	6	11

ELECTIVE-III

Sr.No.	Name of Elective
1.	Hydrology And Watershed Management
2.	Site Investigation Methods And Practices
3.	Industrial Waste Treatment
4.	AdvancedConstructionTechniques
5.	Engineering Geology
6.	Valuation Of Real Properties
7.	Air Pollution And Control
8.	Construction Practices
9.	Water Power Engineering

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.TechCIVIL SEMESTER VIII
PROFESSIONAL ELECTIVE III: HYDROLOGY AND WATERSHED MANAGEMENT(PCE-CV805)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EL- III (PCE-CV805)	03	01	-	04	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: InSemesterEvaluation CIE: ContinuousInternalEvaluation   ESE: End Semester Examination

Course Objectives:
1. To study the evolution of watershed management concepts
2. Know the major components of watershed management and its effect on human and environment
3. Have knowledge of technologies used to develop watershed management
4. Tounderstand the subject of hydrology and watershed management with help of various hydrological software

Course Outcomes: After completing of this course, student will be able to:
1. Able to understand the importance of watershed management and its past trends
2. Able to understand with different methods of watershed management for sustainable development.
3. Know the various runoff methods helps for proper planning of watershed management
4. Decide the selection of soil conservation structures, list of factors affecting and its suitability

Section- I

Unit No.1 Runoff and River Gauging (06)
1.1 Estimation of Runoff by Curve Number Method, Rational Method and using Empirical formulas, Stage –Discharge Measurement
1.2 Runoff Simulation Models (HEC)

Unit No.2 Design Flood (06)
2.1 Definition and causes of Floods, Design Flood and its Importance
2.2 Estimation of Design Flood in Gauged and Ungauged Catchments
2.3 Flood Frequency Analysis, Rainfall Intensity-Duration and Frequency Relationships

Unit No.3 Flood Routing   (06)

3.1 Inflow-Outflow Relationship, Hydrologic Channel Routing, Hydrologic Reservoir Routing, Flood Routing Machines

3.2 Flood Forecasting, Flood Control Measures

Section- II

Unit No. 4 Soil Erosion and Conservation   (06)

4.1 Soil erosion Agents, Types of soil erosion due to water

4.2 Estimation of Soil Erosion by Soil Loss Models, Sediment Outflow Models, Bed Load Models and Sedimentation Models of water storage structures Soil Conservation Practices Erosion Control Structures for Agricultural and Nonagricultural Lands (viz. Contouring, Bunds Terraces, Gully Control Structures etc.)

Unit No.5 Water Harvesting   (06)

5.1 Watershed: Concept and Characteristics, Elements of Watershed Management, Watershed Models, Water Conservation/Harvesting Measures through Appropriate Technology viz. Contour Methods, Check Dams, Ponds, Rooftop Rainwater Harvesting etc.

5.2 Integrated Water Resources management, Conjunctive Use, Groundwater Recharge, Application of Remote Sensing and GIS

Unit No.6 River Basin Management   (06)

6.1 Types of Rivers and their characteristics, Indian rivers and their classification, Behavior of Rivers, River Regime theory, Meandering, Control and Training of Rivers River Basin Systems, Actions Causing Disturbance in Stream System and their Impacts

6.2 Environmental Effects of Hydraulic Structures, Water Quality in Reservoirs, Stream Pollution, River Action Plans, Stream Restoration

Practice Work:

1. At least 2 assignments based on each unit
2. Field visit to river-gauging site
3. Preparing Watershed Management Report

Reference Books:

1.   Hydrology and Soil Conservation Engineering: By, Ghashyam Das (Prentice-Hall India)
2.   Irrigation Engineering (Including Hydrology): By, R.K.Sharma, T.K. Sharma (S.Chand)
3.   Hydrology- Principles, Analysis, Design: By H.M.Raghunath (Wiley Eastern Limited)
4.   Manual of Soil and Water Conservation Practices: By Gurmel Singh, VenkatRamanG.Sastry, B.P.Joshi (Oxford and IBH)
5.   Watershed management: By, J.V.S. Murthy. (New Age International Pubishers)
6.   River Morphology: By, R.J. Garde. (New Age International Pubishers)
7.   Water Resources Engineering: By Ralph A. Wurbs and Wesley P. James (Prentice-Hall India) 72

Guidelines Regarding Question Paper Setting:

1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6

2. All questions arecompulsory.

3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	11
5	5	12
6	6	12

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech CIVIL SEMESTER VIII
PROFESSIONAL ELECTIVE III: SITE INVESTIGATION METHODS AND PRACTICES(PCE-CV805)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EL-III (PCE-CV805)	03	01	--	04	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: InSemesterEvaluation   CIE: ContinuousInternalEvaluation   ESE: End SemesterExamination

Course Objectives:
1. To access the general suitability of the site
2. To know the nature of each stratum and engineering properties of the soil and rock, which may affect the design and mode of construction of proposed structure and foundation.
3. To foresee and provide against difficulties that may arise during construction due to ground and other local conditions.
4. To investigate the occurrence or causes of all natural and manmade changes in conditions and the results arising from such changes.
5. To achieve safe and economical design of foundations and temporary works.

Course Outcomes: At the end of successful completion of course, the students will be able to--
1. State the importance of site investigation in Civil Engineering process
2. Describe different site investigation methods
2. Illustrate different subsurface exploration by nondestructive test
4. Identify the various soil exploration methods for soil sampling
5. Examine the various field and lab test on soil
6. Interpret how to write the technical report for site investigation

SECTION I

Unit: 1 Introduction to Site investigation   **(06)**
1.1Introduction, the Importance of Site Investigation,
1.2 Purposes of a Site Investigation, Objectives, Need for Site investigation, Advantages of Site Investigation,
1.3 Phases in site investigation process, Approach to site investigation.

Unit: 2 Methodology of site investigation   **(06)**
2.1 Preliminary site investigations: Preliminary desk study,

2.2 Topographical maps, Geological records, mining records,

2.3 Air-photography and remote sensing, Photogrammetry, Air-photo interpretation,

2.4 Site walk-over survey, Reconnaissance of site works.

Unit: 3 Site Investigation using Non-Destructive Tests   (06)

3.1 Introduction to Non-Destructive Tests, Electrical Methods,

3.2 Magnetic Methods, Gravity Methods,

3.3 Acoustic Emission Methods, Seismic Methods

SECTION- II

Unit: 4 Site investigation using in situ testing (06)

4.1 Introduction, Penetration testing - Standard penetration test & Cone penetration test,

4.2 Strength and compressibility testing - Field vane shear test, Pressure meter test, Plate loading test.

Unit: 5 Sampling   (06)

 5.1 Introduction, Sample sizes, Soil Disturbance, Soil disturbance during drilling ,

5.2 Soil disturbance during sampling ,Disturbance after sampling , Undisturbed sampling techniques ,

5.3 Sand Sampling, Preparation of disturbed samples for testing ,Preparation of undisturbed samples for testing.

Unit: 6 Laboratory testing for site investigation   (06)

6.1 Introduction, Purpose of soil testing, Purpose & Significance of following test – Soil classification tests , Particle size distribution tests (Sieve analysis, Hydrometer analysis) , tests (Liquid limit, Cone penetrometer test, Plastic limit) ,Compaction tests (Proctor compaction test) , Particle density(Specific gravity) determination ,

6.2 Tests for Geotechnical parameters - Strength tests (CBR test, Lab vane test, Direct shear test, Triaxial test) ,Seepage and permeability tests

6.3 Technical Report writing-Standard format for a site investigation report

Text Book

1. Site Investigation Practice by Joyce, M.D.; ESFN. SPON Publishers, 1982.
2. Instrumentation in geotechnical engineering by K.R. Saxena and V.M. Sharma.
3. Geotechnical Engineering Investigation Manual by R.E. Hunt, Mc Graw Hill Co. New York
4. Geotechnical and Geophysical Site Characterization, An-Bin Huang, Paul W Mayne, CRC Press, 2008, ISBN 0415469368, 9780415469364.
5. Advances in Site Investigation Practice by Craig C., ICE Publishing.

References Books:

1. Subsurface exploration and sampling of soils for Civil Engg. purposes by Hvorslev M.J.
2. Site Investigation, by C. R. I. Clayton, M. C. Matthews and N. E. Simons, Second Edition.
3. Compendium of Indian Standards on Soil Engineering Parts 1 and II 1987 - 1988.
4. Measurement of Engineering Properties of Soils by E. Saibaba Reddy , K. Rama Sastri , New Age International (P) Ltd., Publishers
5 In Situ Tests in Geotechnical Engineering by Monnet Jacques ; John Wiley & Sons Inc. Publisher
6. Soil Testing for Engineers by S. Mittal&J. P. Shukla;Khanna Publishers .

Guidelines Regarding Question Paper Setting:

1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15
5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech CIVIL SEMESTER VIII
PROFESSIONAL ELECTIVE III: INDUSTRIAL WASTE TREATMENT
(PCE-CV805)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EL-III (PCE-CV805)	03	01	--	04	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: InSemesterEvaluation CIE: ContinuousInternalEvaluation   ESE: End SemesterExamination

Course Objectives-
1. To provide students the necessary knowledge and concepts of advancements/emerging techniques of treatment in physical, chemical and biological treatment processes.
2. To impart students with the skill of design and operation of wastewater treatment plants based on latest technology.
3. To provide students prerequisite knowledge necessary for higher studies and research in the field of wastewater treatment

Course Outcomes-
Student will be able to,
1. Explain & apply the concepts of unit operation & processes for advanced treatment of wastewater.
2. Analyse & evaluate the advanced treatment systems used is wastewater treatment.
3. Design advanced treatment facilities for wastewater.

SECTION- I

Unit : 1   **(07)**
Use of water in industry, sources of wastewater, quality and quantity variations in waste discharge, water budgeting, characterization and monitoring of wastewater flow, stream standards and effluent standards. Miscellaneous methods of dissolved solids removal, sludge disposal methods

Unit : 2   **(06)**
Waste volume and strength reduction, in-plant measure, good housekeeping, process change, leakage prevention, segregation and recycling Neutralization, equalization and proportioning of waste   77

Unit : 3   **(05)**

Water Quality monitoring of Streams, Self purification of streams, B.O.D.reaction rate, D.O. sag curve and D.O. deficit calculations.

SECTION- II

Unit : 4 (06)

Different types of waste treatment & their selections. Wetland and aquatic treatment systems; Types, application, Treatment kinetics and effluent variability in constructed wetlands and aquatic systems, Free water surface and subsurface constructed wetlands.

Unit : 5 (07)

Manufacturing processes in major industries, water requirements, wastewater sources, composition of wastes, Viz. sugar, distillery, dairy, pulps, paper mill, fertilizer, tannery, chemical, steel industry, power plants, textile Treatment flow sheets, alternative methods of treatment, factors affecting efficiency of treatment plant.Anaerobic sludge blanket processes, Design considerations for up flow Anaerobic Sludge Blanket process.

Unit : 6 (05)

Water pollution control act, organizational set up of central and state boardsfor water pollution control, classification of river on water use, minimalnational standards, socio-economic aspects of water pollution control.

Text Books:

1. Metcalf and Eddy "Wastewater Engineering Treatment and Reuse", Tata McGraw Hill
Publication, 6th Reprint. 2003.
2. Hammer M. J and Hammer M. J, "Water and Wastewater Technology", PHI learning private limited, 6th Edition, 2008.

Reference Books:

1. Industrial Waste Treatment by Nelson Meneroo
2. Industrial Waste Treatment by Rao & Datta
3. Droste, Ronald L "Theory and Practice of Water and Wastewater Treatment", John Wiley &
Sons Publication, 1st Edition, 1997.
4. Renolds T. D, and Richards, P. A, "Unit operations and processes in Environmental
Engineering", PWS Publishing Company, 2nd Edition, 1996.

Guidelines Regarding Question Paper Setting:

1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15

5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech CIVIL SEMESTER VIII
PROFESSIONAL ELECTIVE III: ADVANCEDCONSTRUCTIONTECHNIQUES (PCE-CV805)

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
EL-III (PCE-CV805)	03	01	--	04	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE:InSemesterEvaluation   CIE:ContinuousInternalEvaluation   ESE:EndSemesterExamination

SECTION-I
Unit : 1   (06)
1.1 COMPOSITE CONSTRUCTION: Compositev/snoncomposite action;composite steel-concrete construction.
1.2 FORMWORK:-Materialforformwork,specialtypesofformwork, designof formwork.

Unit : 2   (06)
2.1 NEWMATERIALof construction such as geosynthetics, Epoxyresins,Adhesives,MDF, FRC,FRP,Polymer-basedcomposites.

Unit : 3   (06)
3.1 GROUND IMPROVEMENT by Vibro Compaction, Soilcrete ,Soil fracturing(SoilFrac),Soil Nailing ,VaccumeConsolidation**,**Gabbions and Cribs.

SECTION-II
Unit : 4   (06)
4.1 COFFER DAMS: Types, requirements, Selection criteria, Design features, Leakage points and leakage prevention in coffer dams. **Caissons:** Materials used, Sinking loading of caissons

Unit : 5   (06)
5.1 REHABILITATION OF BRIDGES: Necessity and methods of strengthening, preservationof bridges.
5.2 RETAINING STRUCTURES like diaphragmwalls,advanced methods oftheir construction.

Unit : 6   (06)
6.1 CONSTRUCTION OF CONCRETE PAVEMENT by techniques like vaccum processing,revibratedconcrete, Roller–compacted concrete.

6.2 USE OF TECHNIQUES like, Sanitary Landfills, vaccum dewatering, Foundation dewatering,foundationstrengthening.

Referencebooks:

1.HandbookofCompositeconstructionEngg---G.M.Sabanis

2.Formworkdesignandconstruction-----------------------Wynn

3.WaterpowerEngineering—Dandekarsharma

4.BridgeEngineering----------------Raina

5.BridgeengineeringPunnuswamy

6.Concrete Technology--------------- M.S.ShettyS.Chandpublication

7.NPTL Course on Advanced Construction Technology.

Guidelines Regarding Question Paper Setting:

1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15
5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.TECH CIVIL SEMESTER VIII
PROFESSIONAL ELECTIVE III: ENGINEERING GEOLOGY (PCE-CV805)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
El - III (PCC-CV805)	03	1	--	04	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester EvaluationCIE: Continuous Internal EvaluationESE: End Semester Examination

Course Objectives:

1. Minerals, Rocks and soils constitute earth materials. They play a vital role in the site
   evaluation and operations in civil engineering practice.
2. The knowledge about the nature of the rocks in tunneling and construction of roads.
3. To know geological features like faults, joints, beds, folds are found, they have to be built.

Course Outcomes:

After completing of this course, student will be able to:
1. Identify and classify the different types of minerals and rocks with their civil Engineering significance.
2. Interpret the different types of geological structures with emphasis on civil engineering aspects.
3. Identify the phenomenon of earthquake and landslides along with their civil engineering mitigation.
4. Acquire knowledge about groundwater and buildingstones.
5. Investigate the suitability of site for construction of dams, reservoirs, bridges and tunnels etc.

SECTION I

Unit No.1 Introduction and Physical Geology: (07)

1.1.Introduction:Definition, subdivisions of geology, scope of Engineering Geology.

1.2. Physical Geology:Interior of the Earth. Types of volcanic eruption andproducts. Types of weatheringand its civil engineering significance. Geological work of river- Erosionand deposition processes and features, Transportation process, Civil Engineering Significance.

Unit No.2 Mineralogy and Petrology   (06)
2.1 Mineralogy: Classification of minerals.

2.2 Petrology: Igneous rocks: Origin, Structures, Classification - (Mode of occurrence, Silica percentage&Colour Index), Concordant and disconcordant intrusions, Civil Engineering significance. Secondary rocks:Formation, Classification, Structures, Grain size classification of sedimentary rocks. Civil Engineering significance. Metamorphic rocks: Agents and Types of Metamorphism, Structures.

Unit No.3 Structural Geology: (05)

3.1. Strike and Dip, Unconformity

3.2. Fold and Fault: Parameters, Classification, Causes, Civil Engineering significance.

3.3. Joint: Types of joint, drawing geological cross section from outcrop map and its Civil Engineering considerations.

SECTION II

Unit No.4 Earthquake and Groundwater (07)

4.1 Terminology, Causes, Seismic waves, Seismograph, Seismogram, Scale, and its effects

4.2 Landslides: Types of Landslide, Causes, Prevention of Landslide

4.3 Groundwater: Sources of groundwater, Zones of groundwater, Types of Aquifer, Hydrologicalproperties of aquifers.

Unit No.5 Geology of Dams and Reservoirs: (05)
5.1. Suitable and Unsuitable geological conditions for locating a dam site, Type of a dam, Dams on carbonate rocks, sedimentary rocks, folded strata and Deccan traps,
5.2. Suitable and unsuitable geological conditions for reservoir site.

Unit No.6 Surface and Sub-surface Investigations: (06)
6.1. Building Stones: Engineering properties of rocks, Requirement of good building stone.
6.2. Geology of Tunnel and Bridge: Difficulties during tunnelling, Influence of geological conditions on tunnelling, Geological consideration while choosing tunnel alignment,
    Dependence of types of bridges on geological conditions.

Practice Work: Assignment on each unit.

Text Books and References:
1. Engineering and General Geology – By Prabin Singh, S. K. Katariya and sons, Delhi.
2. Engineering and General Geology-By Dr. P. T. Sawant,New India Publishing Agency, New
   Delhi.
3. Principles of Engineering Geology and Geotechnics- By D. P. Krynine& W. R. Judd, CBS
   Publishers & Distributors, New Delhi.
4. Engineering Geology for Civil Engineering – By Dr. D. V. Reddy, Oxfard&IBH
   Publishing Co. PVt.Ltd.,New Delhi.
5. Engineering Geology - By B. S. SathyaNarayanswami,DhanpatRai& Co.(P) Ltd, Delhi.
6.A Text Book of Engineering Geology–By R. B. Gupte, Pune VidyarthiGrihaPrakashan, Pune

7. Engineering Geology-By S. Ramamrutham, DhanpatRai Publishing company (P) Ltd. New
   Delhi.
8. Principles of Petrology – By G. W. Tyrrell, B.I.PublicationPvt.Ltd.,New Delhi.
9. Principles of Physical Geology – By A. Holmes, ELBS Chapman &Hall,London.
10. Structural Geology – By M. P. Billings, Prentice Hall of India Private Ltd., New
Delhi.
11.Experiments in Engineering Geology – By K. V. G. K. Gokhale& D. M. Rao,TMN, New-
    Delhi.
12. Groundwater Hydrology- By Todd D. K., John Wiley & Son, New York.

Guidelines Regarding Question Paper Setting:
1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.
3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.TECH CIVIL SEMESTER VIII
PROFESSIONAL ELECTIVE III: VALUATION OF REAL PROPERTIES (PCE-CV805)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EL-III (PCE-CV805)	03	01	--	04	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

Course Objectives-
1. To make the students to know about the cost approach to value.
2. To make the students understand the laws relating to immovable property
3. To make the students know about the purpose of valuation: fiscal and non-fiscal

Course Outcomes-
Upon completion of this course student will be able to
1. Students will be able to apply the cost approach to value.
2. Students will be able to understand the laws relating to immovable property.
3. Students will be able to carry out the depreciation.

SECTION-I

Unit: 1   (05)
Introduction:
Cost, price and value; types of value; value elements – ingredients – characteristics – highest and best use – value in use – value in exchange. Annuities – capitalization – rate of capitalization– sinking fund – redemption of capital. Construction and use of valuation tables.

Unit: 2   (07)
Income approach to value:
Rent: Origin, classical theories and evolution of the concept. Types of rent – outgoings – income – yield – years' purchase. Lease: lessor and lessee: covenants, terms and conditions. Leasing; land and building; occupational lease. Valuation: lessor's interest, lessee's interest including sublease.

Unit: 3 (06)

Market approach to value:

Market – real estate market – market value; bell type curve (introduction).

Depreciation:

Age – effective age – economic life and remaining life - Depreciated replacement cost. Introduction to IOWA type survival curves.

SECTION-II

Unit: 4 (07)

Cost approach to value:

Advanced studies: land characteristics, belting theory, hypothetical plotting scheme, hypothetical building scheme, transfer of development rights, estimating cost of construction using building cost indices, replacement cost new, reproduction cost, reinstatement value.

Market approach to value:

Advanced studies: Market comparison techniques, adjustment grid model, regression analysis, automated sales analysis, residual technique, comparison by weight ages assigned to various factors to comparison.

Unit-5 (07)

Various purposes of valuation: Fiscal:

Stamp duty on transfer of property, Rating, Direct Tax Acts - Income Tax including capital gains, Wealth Tax, Court fees including probate and partition.

Various purposes of valuation: Non-Fiscal:

Bank Finance and securitization, Auction reserve, compulsory acquisition, Insurance, Sale / Purchase, Betterment levy, Standard / fair rent under rent law, various forms of obsolescence including depreciation.

Unit- 6 (04)

Effects of legislation on Valuation:

Valuation of agricultural lands by market approach & income approach. Elementary considerations in valuation of plantation, forest, orchards, queries, intangible assets like goodwill, royalty rights etc. Valuer's role, functions and responsibility. Code of ethics for valuers.

Reference books:

1. Theory and Practice of Valuation by Roshan H. Namavati
2. Valuation Relating to Standard Rent by Roshan H. Namavati
3. Valuation of Real Property by Shyamles Datta.
4. Law of Land Acquistion and Compensation by V.G. Ramachandran.
5. Parks' Valuation – 5th Edition (1998) by D.N. Banerjee – Eastern Law House, Calcutta

Guidelines Regarding Question Paper Setting:

1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15
5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.TECH CIVIL SEMESTER VIII
PROFESSIONAL ELECTIVE III: AIR POLLUTION AND CONTROL
(PCE-CV805)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EL-III (PCE-CV805)	03	01	--	04	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: InSemesterEvaluation CIE: ContinuousInternalEvaluation   ESE: End SemesterExamination

Course Objectives-
Upon completion of this course you should be able to:
1. Describe current air pollution issues.
2. Know the main air pollutants and its effect on human health andenvironment.
3. Understand the regulations and policies to manage air pollution.
4. Have knowledge of technologies used to control and remove air pollutants.

Course Outcomes-
Student will be able to
1. Know the Scope of air pollution.
2. Design air pollution control devices.
3. Know the air pollution monitoring and regulatory control.

SECTION-I
Unit: 1   **(08)**
The structure of the atmosphere, Definition and Scope of Air Pollution, Sources of air pollution: Natural and artificial, quantity and composition of particulate & gaseous pollutant, Unit of measurements.

Unit-2   **(04)**
Effect of different air pollutants on living and non-living things. Preventive measures to overcome bad effects. Various air pollution Episodes.

Unit- 3   **(08)**
The meteorology and air pollution: Different Meteorological factors &thereeffect, lapse rate and stability of atmosphere, inversion phenomenon, various meteorological factors like

precipitation, humidity, temperature. wind patterns, direction, velocity and fluctuations, models of diffusion and dispersion plume behaviour.

SECTION-II

Unit: 4 (06)

Introduction to application of software for air quality. Air pollution monitoring and regulatory control, Ambient Air quality standards, emission limits, ambient air & stack sampling, equipment for ambient air and stack sampling, methods of sampling, pollution monitoring of existing sources and new installations.

Unit: 5 (06)

Control of pollutant emission at source, alternative fuels, process change,removal methods for particulate, principles of particulate removals, varioustypes of particulate control equipment, settling chamber, cyclone separatorsand scrubbers, fabric filters, electrostatic precipitators.

Unit: 6 (06)

a) Principles of removal of gaseous pollutants. Vehicular pollution, composition, quantity & control.
b) Status of air pollution in India, air pollution control act and strategy for
effective control of air pollution.

Text Books:

1. Environmental engineering- By Peavy & Rowe.
2. Air Pollution- Wark and Warner
3. Martin Crawford, "Air Pollution and Control", Tata McGraw Hill Publication, 1st Edition, 1976.

Reference books:

1. Air Pollution- Martin Crawford
2. Air Pollution and Industry – R.D.Ross
3. Rao, C.S.Environmental Pollution Control Engineering, Wiley Eastern Ltd.,New Delhi, 1996.
4. Environmental engineering- By Peavy & Rowe.
5. Rao M.N. and Rao H.V.N., Air Pollution Control, Tata-Mc Graw-Hill, New
Delhi, 1996.

Guidelines Regarding Question Paper Setting:

1. Q. No. 4 and Q. No. 8 are compulsory and it should be based on all units of respective sections.
2. Attempt any two questions from Q. No. 1, 2, 3 and any two questions from Q. No.5, 6, 7.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1.	1	10
2.	2	10
3.	3	10
4.	1,2 & 3 (Compulsory)	15

5.	4	10
6.	5	10
7.	6	10
8.	4,5 & 6 (Compulsory)	15

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.TECH CIVIL SEMESTER VIII
PROFESSIONAL ELECTIVE III: CONSTRUCTION PRACTICES
(PCE-CV805)

Course	Teaching Scheme				Evaluation Scheme				
						Theory (Marks)		Practical (Marks)	
	L	T	P	Credit	Scheme	Max.	Min. for passing	Max.	Min. for passing
EL-III (PCE-CV805)	03	01	--	04	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: InSemesterEvaluation CIE: ContinuousInternalEvaluation ESE: End SemesterExamination

Course Objectives-
1. To study various earth moving equipment's.
2. To understand RMC and Hot Mix process.
3. To study pre fabrication technique.
4. To study various construction techniques like Slip form, Grouting, Blasting.

Course Outcomes
After successful completion of the course, the students will be able to.-
1. Know the earth moving equipments& excavation in hard rock.
2. Understand new construction methods & techniques.
3. Know the concreting equipments, plants & concreting methods.
4. Understand plants &equipments used for steel construction & road construction.
5. Understand construction of heavy structure & construction management.

SECTION – I

Unit No.1   (06)
   a) Earth moving equipments- Tractors, bulldozers, scrappers, power shovel, hoes, drag line, clamshell, trenchers, compactors
   b) Cycle time and production rates (simple numerical problems), types and performance, operating efficiencies, lifting capacities.

Unit No.2 (06)
   a) Excavation in hard rock- Rippers, jack hammers, drills, compressors and pneumatic equipments.
   b) Blasting explosives, detonators, fuses,
   c) Drainage in excavation- necessity and methods of dewatering

Unit No.3 (06)
   a) RMC plant, layout and production capacity
   b) Grouting, shortcreting, under water concreting
   c) Slip formwork

SECTION – II

Unit No.4 (06)
   a) Prefabricated construction, comparison with monolithic construction
   b) Steel construction- planning and field operation, erection equipments
   c) Floating and dredging equipments

Unit No.5 (06)
   a) Asphalt mixing and batching plant hot mix plant, sensor pavers for rigid roads, crushing plants.
   b) Belt conveyors, cable ways – need and construction methods.
   c) Diaphragm walls- purpose and construction methods.

Unit No.6 (06)
   a) New projects- conceptual planning, site access and services, advantages of mechanization in construction
   b) Introduction to trenchless technology and need
   c) Safety measures in construction, prevention of accidents, introduction to disaster management.

Reference books :-

1. Construction Planning equipment & methods – R. L. Puerifoy, Mc Graw Hill Book
2. Construction equipment – Mahesh Verma.
3. Handbook of Heavy Construction – Stubb.
4. Heavy Construction – Planning, Equipment, Methods- Jagman Singh
5. Erection of steel structures – Thomas Baron
6. Reinforced concrete bridges – Taylor

Guidelines Regarding Question Paper Setting:
   1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
   2. All questions are compulsory.
   3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.TECH CIVIL SEMESTER VIII
PROFESSIONAL ELECTIVE III: WATER POWER ENGINEERING
(PCE-CV805)

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max.	Min. for passing	Max.	Min. for passing
EL-III (PCE-CV805)	03	01	--	04	ISE	--	--	--	--
					CIE	30	12	--	--
					ESE	70	28	--	--

ISE: InSemesterEvaluation CIE: ContinuousInternalEvaluation ESE: End SemesterExamination

Course Objective:

1. To study fundamental knowledge of sources of energy, estimation of hydro power available, types of hydro power plants and water conveyance systems.
2. To study types and classifications of different components of hydro power plants and general arrangements of power stations.
3. To know basic components, functions and types of turbines, choice of turbines, turbine setting and cavitation
4. To understand the concepts of hydraulic design and economic diameter of pipe, pumped storage power plants and tidal power plants with their basics and general descriptions.

Course Outcomes: After successful completion of the course, the students will be able to,

1. Explain the basics of sources of energy, types of hydro power plants, water conveyance systems and general arrangements of power plants.
2. Illustrate the types, classifications and functions of different components of hydro power plants.
3. Identify the hydro power available, hydraulic design and economic diameter of pipe.
4. Analyze the basic components and working of turbines, pumped storage power plants and tidal power plants with their basics and general descriptions.

SECTION-I

UNIT 1: (06)
   A. Introduction: Sources of energy, types of power station, types of hydro power schemes, Estimation of hydro power available, gross head, net head, storage and pondage, hydrographs, mass curves, flow duration curves.
   B. Nature of Demand: Load curve, load duration curves, load factor, plant capacity factor, plant use factor, firm power, secondary power.

UNIT 2: (06)
   A. Intake: Types, hydraulics of intake, trash rack, transition from gate to conduit, intake gates.
   B. Surge Tank: Functions and behavior of the surge tanks, location, types of surge tanks, basic design criteria of simple surge tank, forebay.

UNIT 3: (06)
   A. Water Conveyance Systems: Power canals – Hydraulic design.
   B. Penstock: Types, hydraulic design and economic diameter pipe, supports, anchor blocks.
   C. Tunnels: Classification, location and hydraulic design, tunnel linings.

SECTION-I

UNIT 4: (06)
   A. Power Station: General arrangements of power station, power house, sub-structure and super structure, main dimensions.
   B. Underground Power Station: Necessity, types, development and economics, advantages and disadvantages.

UNIT 5: (06)
   A. Turbines: Classification of turbines, characteristics of different types, choice of type of turbine, turbine setting and cavitation, tail race, draft tubes, function and types, hydraulic design.

UNIT 6: (06)
   A. Pumped Storage Plants: Purpose and general layout of pumped storage schemes, types, economics of pumped storage plants.
   B. Tidal Power Stations: Classification, general description of different types, depression power plants.

TEXTBOOKS AND REFERENCES:
1. Water Power Development – E. Mosoni, Vol. I & II.
2. Hydro-electric Engineering Practice – G. Brown, Vol. I, II & III.
3. Hydro – Electric Hand Book – Creager and Justin.
4. Hydro Power Structures – Varshney.
5. Water Power Engineering – M. M. Dandekar, Vikas Pub. House Pvt. Ltd.
6. Water Power Engineering – P. K. Bhattacharya, Khanna Pub., Delhi.
7. Water Power Engineering – M. M. Deshmukh, DhanpatRai and Sons.

Guidelines Regarding Question Paper Setting:
1. Section I - Q. No. 1 to 3 and Section II - Q. No. 4 to 6
2. All questions are compulsory.

3. Internal optional questions are allowed, weightage of optional question should not be more than 30% of total marks i.e. 21 marks out of 70marks.

End Semester Examination Paper Pattern

Question No.	Based on Unit No.	Marks
1	1	12
2	2	12
3	3	11
4	4	12
5	5	12
6	6	11

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech CIVIL SEMESTER VIII
STRUCTURAL DESIGN AND DRAWING-II

Course	Teaching Scheme				Evaluation Scheme				
	L	T	P	Total credit	Scheme	Theory (Marks)		Practical (Marks)	
						Max	Min for Passing	Max	Min for Passing
SDD-I (PCC-CV806)	-	-	4	2	ISE	--	--	50	20
					CIE	-	-	--	--
					ESE	-	-	25	10

ISE – In Semester Evaluation   CIE – Continuous Internal Evaluation   ESE – End Semester Evaluation

Course Objectives:
1.Toapplyholisticapproachofplanning,analysis,segmentation&design of RCC building.
2.To understand the knowledge of how to use the codal provision in I.S.456-2000, S.P.16 for design
3.To understand the reinforcement detailing of various structures as per codal provision S.P.34
4.Togetanexposuretothemethodofanalysis&designusingsoftware.

Course Outcomes:
After successful completion of course student will be able to
1.Translate the ideas into workableplans
2.Classify thecomponents
3.Design the units & hence the structure as awhole
4.Draft the details forexecution
5.Toreadandunderstandthesupplieddrawingforexecutiononsite.

Term work shall consist of detailed design & drawing of the following R.C.

structures by Limit State Method.
1.Residentialtwostoriedbuilding.(Minimum60 sqmt. per floor).Drawingsprepared shallindicateductilitydetailsaspertheprovisioninIS:13920.(This Project should be in a group of 4-6 students)
2.Any ONE from thefollowing: (Individual Student should perform this project)
a)Retaining wall (cantilever or counter forttype)
b)Design of footing (Raft foundation /pilefoundation)
3.AnalysisanddesignofRCCframedstructureusingsoftware.

Note: At least one site visit to be conducted to show the onsite detailing.

SHIVAJI UNIVERSITY, KOLHAPUR
FINAL YEAR B.Tech CIVIL SEMESTER VIII
PROJECT PHASE - II

Course	Teaching Scheme					Evaluation Scheme				
	L	T	P	Credit	Scheme	Theory (Marks)		Practical (Marks)		
						Max.	Min. for Passing	Max.	Min. for Passing	
PP-II (PW-CV807)	--	--	02	01	ISE	---	---	50	20	
					CIE	---	---	---	---	
					ESE	---	---	100	40	

ISE: In Semester Evaluation   CIE: Continuous Internal Evaluation   ESE: End Semester Examination

The project work started in the seventh semester will continue in thissemester. The students will complete the project work in this semester andpresent it before the assessing committee.

The term work assessment committee as constituted in the seventhsemester will assess the various projects for the relative grading and groupaverage. The guides will award the marks for the individual students dependingon the group average. Each group will submit the copies of the completedproject report signed by the guide to the department. The head of thedepartment will certify the copies and return them to the students. One copywill be kept in the departmental library.

For work load calculation minimum load is 2 Hr./week, for one group ofto FIVE students. (As per AICTE Guide Lines)

Probable Activities of Project Phase – II
1. Progress presentation I
2. Progress presentation II
3. Final presentations in front of DRC along with submission of spiral bound copy
4. Checking of project format on spiral bound by DRC

5. Submission of final bound copy along with published paper