परीक्षा नियंत्रण प्रकोष्ठ, जबलपुर इंजीनियरिंग महाविद्यालय, जबलपुर (म.प्र.)

क्रमांक / प.नि.प्र. / 2024 / 2682 जबलपुर, दिनांक 18 / 10 / 2024

सूचना

महाविद्यालय में अध्ध्यनरत B.Tech. (AICTE) / B.Tech. (PTDC) [AICTE] [Regular/Ex.] विद्यार्थियों को सूचित किया जाता है कि वे नवम्बर 2024 की परीक्षा एवं आगामी सत्र की परीक्षाओं में सम्मिलित होने से पूर्व अपने पेपर / विषय का Equivalence Syllabus महाविद्यालय के पोर्टल से Download कर प्राप्त कर सकते हैं अथवा महाविद्यालय के परीक्षा नियंत्रण प्रकोष्ठ में संपर्क कर सकते हैं। नवम्बर 2024 परीक्षा एवं आगामी सत्र की परीक्षा में उन्हें अपने पेपर / विषय में Equivalence Syllabus में ही सम्मिलित होना है। अतः Equivalence Syllabus की जानकारी न होने की दशा में सम्पूर्ण जिम्मेदारी स्वयं छात्र / छात्राओं की होगी।

Equivalence Syllabus हेतु निम्नानुसार Link का उपयोग कर सकते हैः–

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जबलपुर इंजीनियरिंग महाविद्यालय
जबलपुर

पृ.क्रमांक / प.नि.प्र. / 2024 / जबलपुर, दिनांक / 10 / 2024

प्रतिलिपिः–

01. समस्त विभागाध्यक्ष, जबलपुर इंजीनियरिंग महाविद्यालय, जबलपुर।
02. पीटीडीसी कार्यालय, जबलपुर इंजीनियरिंग महाविद्यालय, जबलपुर।

प्राचार्य / मुख्य परीक्षा नियंत्रक
जबलपुर इंजीनियरिंग महाविद्यालय
जबलपुर

EQUIVALENCE OF SUBJECTS OF DIFFERENT SCHEMES OF UNDER GRADUATE COURSES (B.E. / B.Tech.) OF CIVIL ENGG.

S.No.	Schemes	Subject Code & Subject Name (Semester) Having Equivalence in Syllabus	Final Subject code & subject (after equivalence)
(i)	(ii)	(iii)	(iv)
1	AICTE	BT205 Basic Civil Engg. **B.Tech. I/II Sem.**	BT25 Basic Civil Engg. **B.Tech. I/II Sem.**
	Scheme 2023	BT25 Basic Civil Engg. **B, Tech. I/II Sem.**	
2	AICTE	CE303 Strength of Materials **B.Tech. III Sem./ B.Tech. (PTDC) II Sem.**	CE33 Strength of Materials **B.Tech. III Sem.**
	Scheme 2023	CE33 Strength of Material **B.Tech. III Sem.**	
3	AICTE	CE304 Engg. Geology **B.Tech. III Sem./B.Tech. (PTDC) I Sem.**	CE34 Engg. Geology **B.Tech. III Sem.**
	Scheme 2023	CE34 Engg. Geology **B.Tech. III Sem.**	
4	AICTE	CE305 Building Design and Drawing **B.Tech. III Sem./ B.Tech. (PTDC) I Sem.**	CE35 Building Design and Drawing **B.Tech. III Sem.**
	Scheme 2023	CE35 Building Design and Drawing **B.Tech. III Sem.**	
5	AICTE	CE601C Concrete Technology **B.Tech. VI Sem./ B.Tech. II Sem.**	CE41 Concrete Technology **B.Tech. IV Sem.**
	Scheme 2023	CE41 Concrete Technology **B.Tech. IV Sem.**	
6	AICTE	CE402 Transportation Engg. **B.Tech. IV Sem. / B.Tech. (PTDC) III Sem.**	CE42 Transportation Engg. **B.Tech. IV Sem.**
	Scheme 2023	CE42 Transportation Engg. **B.Tech. IV Sem.**	
7	AICTE	CE403 Geotech Engg.-I **B.Tech. IV Sem. / B.Tech. (PTDC) III Sem.**	CE43 Geotech Engg. I **B.Tech. IV Sem.**
	Scheme 2023	CE43 Geotech Engg.-I **B.Tech. IV Sem.**	

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S.No.	Schemes	Subject Code & Subject Name (Semester) Having Equivalence in Syllabus	Final Subject code & subject (after equivalence)
8	AICTE	CE404 Fluid Mechanics **B.Tech. IV Sem. /B.Tech. (PTDC) IV Sem.**	CE44 Fluid Mechanics **B.Tech. IV Sem.**
	Scheme 2023	CE44 Fluid Mechanics **B.Tech. IV Sem.**	
9	AICTE	CE405 Advance Surveying **B.Tech. IV Sem./B.Tech. (PTDC) II Sem.**	CE45 Advance Surveying **B.Tech. IV Sem.**
	Scheme 2023	CE45 Advance Surveying **B.Tech. IV Sem.**	
10	AICTE	CE502A Elements of Environmental Engg. **B.Tech. V Sem.** CE401B Elements of Environmental Engg. **B.Tech. (PTDC) III Sem.**	CE51A Elements of Environmental Engg. **B.Tech. V Sem.**
	Scheme 2023	CE51A Elements of Environmental Engg. **B.Tech. V Sem.**	
11	AICTE	CE502B Water Resource Conservation **B.Tech. V Sem.** CE401C Water Resource Conservation **B.Tech. (PTDC) III Sem.**	CE51B Water Resource Conservation **B.Tech. V Sem.**
	Scheme 2023	CE51B Water Resource Conservation **B.Tech. V Sem.**	
12	AICTE	CE502C Water Resource Engg. **B.Tech. V Sem. /B.Tech. (PTDC) V Sem.**	CE51C Water Resource Engg. **B.Tech. V Sem.**
	Scheme 2023	CE51C Water Resource Engg. **B.Tech. V Sem.**	
13	AICTE	CE503 Structural Analysis - I **B.Tech. V Sem./B.Tech. (PTDC) V Sem.**	CE52 Structural Analysis - I **B.Tech. V Sem.**
	Scheme 2023	CE52 Structural Analysis - I **B.Tech. V Sem.**	
14	AICTE	CE504 Geotechnical Engg. - II **B.Tech. V Sem. / B.Tech. (PTDC) IV Sem.**	CE53 Geotechnical Engg. -II **B.Tech. V Sem.**
	Scheme 2023	CE53 Geotechnical Engg. - II **B.Tech. V Sem.**	
15	AICTE	CE505 Structural Design-I (RCC) **B.Tech. V Sem./ B.Tech. (PTDC) V Sem.**	CE54 Structural Design & Drawing-I (RCC) **B.Tech. V Sem.**
	Scheme 2023	CE54 Structural Design & Drawing-I (RCC) **B.Tech. V Sem.**	

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S.No.	Schemes	Subject Code & Subject Name (Semester) Having Equivalence in Syllabus	Final Subject code & subject (after equivalence)
16	AICTE	BT521 Engineering Economics & Management **B.Tech. V Sem./ B.Tech. (PTDC) IV Sem.**	BT52 Engineering Economics & Management **B.Tech. V Sem.**
	Scheme 2023	BT52 Engineering Economics & Management **B.Tech. V Sem.**	
17	AICTE	CE601A Geographical Interformation System **B.Tech. VI Sem. /** CE611A Geographical Interformation System **B.Tech. (PTDC) IV Sem.**	CE61A Geographical Interformation System **B.Tech. VI Sem.**
	Scheme 2023	CE61A Geographical Interformation System **B.Tech. VI Sem.**	
18	AICTE	CE601B Natural Disaster Mitigation and Management **B.Tech. VI Sem. /** CE611B Natural Disaster Mitigation & Management **B. Tech. IV Sem.**	CE61B Natural Disaster Mitigation and Management **B.Tech. VI Sem.**
	Scheme 2023	CE61B Natural Disaster Mitigation and Management **B.Tech. VI Sem.**	
19	AICTE	CE803A Pre-Stressd Concrete **B.Tech. VIII Sem./B.Tech. (PTDC) VIII Sem.**	CE61C Pre-Stressed Concrete Structure Design **B.Tech. VI Sem.**
	Scheme 2023	CE61C Pre-Stressed Concrete Structure Design **B.Tech. VI Sem.**	
20	AICTE	CE704A Advanced Water Resourse Engg. **B.Tech. VII Sem.**	CE62A Advanced Water Resourse Engg. **B.Tech. VI Sem.**
	Scheme 2024	CE704M A Advanced Water Resourse Engg. **B.Tech. VII Sem.**	
	Scheme 2023	CE62A Advanced Water Resourse Engg. **B.Tech. VI Sem.**	
21	AICTE	CE602B Waste Management **B.Tech. VI Sem./B.Tech. (PTDC) VI Sem.**	CE62B Waste Management **B.Tech. VI Sem.**
	Scheme 2023	CE62B Waste Management **B.Tech. VI Sem.**	
22	AICTE	CE602C Elements of FEM **B.Tech. VI Sem./ B.Tech. (PTDC) VI Sem.**	CE62C Elements of FEM **B.Tech. VI Sem.**
	Scheme 2023	CE62C Elements of FEM **B.Tech. VI Sem.**	
23	AICTE	CE603 Structural Analysis -II **B.Tech. VI Sem./ B.Tech. (PTDC) VI Sem.**	CE63 Structural Analysis -II **B.Tech. VI Sem.**
	Scheme 2023	CE63 Structural Analysis -II **B.Tech. VI Sem.**	

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S.No.	Schemes	Subject Code & Subject Name (Semester) Having Equivalence in Syllabus	Final Subject code & subject (after equivalence)
24	AICTE	CE604 Structural Design and Drawing -II (Steel) **B.Tech. VI Sem./ B.Tech. (PTDC) VI Sem.**	CE64 Structural Design & Drawing -II (Steel) **B.Tech. VI Sem.**
	Scheme 2023	CE64 Structural Design & Drawing -II (Steel) **B.Tech. VI Sem.**	
25	AICTE	CE605 Enviromental Engg.-I **B.Tech. VI Sem./B.Tech. (PTDC) VI Sem.**	CE65 Enviromental Engg.-I **B.Tech. VI Sem.**
	Scheme 2023	CE65 Enviromental Engg.-I **B.Tech. VI Sem.**	
26	AICTE	CE704B Advanced Foundation Design **B.Tech. VII Sem.**	CE71B Advanced Foundation Design **B.Tech. VII Sem.**
	Scheme 2024	CE704M B Advanced Foundation Design **B.Tech. VII Sem.**	
	Scheme 2023	CE71B Advanced Foundation Design **B.Tech. VII Sem.**	
27	AICTE	CE704C Bridge Engineering **B.Tech. VII Sem.**	CE71C Bridge Engineering **B.Tech. VII Sem.**
	Scheme 2024	CE704M C Bridge Engineering **B.Tech. VII Sem.**	
	Scheme 2023	CE71C Bridge Engineering **B.Tech. VII Sem.**	
28	AICTE	CE705A Project Management **B.Tech. VII Sem./B.Tech. (PTDC) VII Sem.**	CE72A Project Management **B.Tech. VII Sem.**
	Scheme 2024	CE705M A Project Management **B.Tech. VII Sem.**	
	Scheme 2023	CE72A Project Management **B.Tech. VII Sem.**	
29	AICTE	CE705B Computational Methods in Structural Engg. **B.Tech. VII Sem./ B.Tech. (PTDC) VII Sem.**	CE72B Computational Methods in Structural Engg. **B.Tech. VII Sem.**
	Scheme 2024	CE705M B Computational Methods in Structural Engg. **B.Tech. VII Sem.**	
	Scheme 2023	CE72B Computational Methods in Structural Engg. **B.Tech. VII Sem.**	

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S.No.	Schemes	Subject Code & Subject Name (Semester) Having Equivalence in Syllabus	Final Subject code & subject (after equivalence)
30	AICTE	CE705C Environmental Impact Assessment **B.Tech. VII Sem./ B.Tech. (PTDC) VII Sem.**	CE72C Environmental Impact Assessment **B.Tech. VII Sem.**
	Scheme 2024	CE705M C Environmental Impact Assessment **B.Tech. VII Sem.**	
	Scheme 2023	CE72C Environmental Impact Assessment **B.Tech. VII Sem.**	
31	AICTE	CE701 Enviromental Engg.-II **B.Tech. VII Sem./B.Tech. (PTDC) VII Sem.**	CE73 Enviromental Engg.-II **B.Tech. VII Sem.**
	Scheme 2024	CE701M Enviromental Engg.-II **B.Tech. VII Sem.**	
	Scheme 2023	CE73 Enviromental Engg.-II **B.Tech. VII Sem.**	
32	AICTE	CE802 Estimating Costing and Tendering **B.Tech. VIII Sem./ B.Tech. (PTDC) VIII Sem.**	CE74 Estimating Costing & Tendering **B.Tech. VII Sem.**
	Scheme 2024	CE703M Estimating Costing & Tendering **B.Tech. VII Sem.**	
	Scheme 2023	CE74 Estimating Costing & Tendering **B.Tech. VII Sem.**	
33	AICTE	CE702 Structural Design & Drawing-III (RCC) **B.Tech. VII Sem./ B.Tech. (PTDC) VII Sem.**	CE75 Structural Design and Drawing-III (RCC) **B.Tech. VII Sem.**
	Scheme 2024	CE702M Structural Design & Drawing-III (RCC) **B.Tech. VII Sem.**	
	Scheme 2023	CE75 Structural Design and Drawing-III (RCC) **B.Tech. VII Sem.**	
34	AICTE	CE801 Structural Design & Drawing-IV (Steel) **B.Tech. VIII Sem./ B.Tech. (PTDC) VIII Sem.**	CE81A Structural Design & Drawing-IV (Steel) **B.Tech. VIII Sem.**
	Scheme 2024	CE801M A Structural Design & Drawing-IV (Steel) **B.Tech. VIII Sem.**	
	Scheme 2023	CE81A Structural Design & Drawing-IV (Steel) **B.Tech. VIII Sem.**	
35	AICTE	CE803B Pavement Design **B.Tech. VIII Sem./B.Tech. (PTDC) VIII Sem.**	CE81B Pavement Design **B.Tech. VIII Sem.**
	Scheme 2024	CE801M B Pavement Design **B.Tech. VIII Sem.**	
	Scheme 2023	CE81B Pavement Design **B.Tech. VIII Sem.**	

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S.No.	Schemes	Subject Code & Subject Name (Semester) Having Equivalence in Syllabus	Final Subject code & subject (after equivalence)
36	AICTE	CE803C Traffic Engineering **B.Tech. VIII Sem./B.Tech. (PTDC) VIII Sem.**	CE81C Traffic Engineering **B.Tech. VIII Sem.**
	Scheme 2024	CE801M C Traffic Engineering **B.Tech. VIII Sem.**	
	Scheme 2023	CE81C Traffic Engineering **B.Tech. VIII Sem.**	
37	AICTE	CE804A Finite Element Method **B.Tech. VIII Sem./B.Tech. (PTDC) VIII Sem.**	CE82A Finite Element Method **B.Tech. VIII Sem.**
	Scheme 2024	CE802M A Finite Element Method **B.Tech. VIII Sem.**	
	Scheme 2023	CE82A Finite Element Method **B.Tech. VIII Sem.**	
38	AICTE	CE804B Air Quality Monitoring & Control **B.Tech. VIII Sem./ B.Tech. (PTDC) VIII Sem.**	CE82B Air Quality Monitoring & Control **B.Tech. VIII Sem.**
	Scheme 2024	CE802M B Air Quality Monitoring & Control **B.Tech. VIII Sem.**	
	Scheme 2023	CE82B Air Quality Monitoring & Control **B.Tech. VIII Sem.**	
39	AICTE	CE804C FRP Composites **B.Tech. VIII Sem./B.Tech. (PTDC) VIII Sem.**	CE82C FRP Composites **B.Tech. VIII Sem.**
	Scheme 2024	CE802M C FRP Composites **B.Tech. VIII Sem.**	
	Scheme 2023	CE82C FRP Composites **B.Tech. VIII Sem.**	

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(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) I/II Semester (Civil Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
BT25	Basic Civil Engineering	70	20	10	30	20	150	3	-	2	4

PART A-BUILDING MATERIALS & CONSTRUCTION

MODULE-I

Types, properties, test & uses of: Stones, bricks, cement, lime, timber. Laboratory tests of concrete and mortar materials, workability, strength properties of concrete, nominal proportion of concrete, preparation of concrete, compaction, curing.

PART B-SURVEYING

MODULE-II

Introduction to surveying, Various Instruments used in Surveying, Measurement of distances-conventional and EDM methods, Types of Chain, Tape, Correction, Measurement of Horizontal angles, Prismatic and Surveyor's Compass, Bearing, Traversing, Included angle, Magnetic declination, Local Attraction

MODULE-III

Measurements of Elevation, Types of leveling, Rise and Fall method, Height of Instrument method, Reciprocal leveling, Contours, Properties of Contour, Measurement of Area and Volume, Simpson's rule, Trapezoidal rule

PART C-ENGINEERING MECHANICS

MODULE -IV

Forces and Equilibrium: Graphical and Analytical treatment of concurrent and non concurrent co-planar forces, free body diagram, Force diagram and Bow's notations, Application of Equilibrium Concepts. Analysis of plane trusses: Method of Joints, Method of sections, Friction force in equilibrium problems.

MODULE-V

Moment of Inertia of area and mass, centre of gravity, centroid, Radius of Gyration, Introduction to product of Inertia and Principle Axes. Support Reactions in beams. Shear force and bending

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moment Diagram for Cantilever & simply supported beam with concentrated load, distributed load and couple.

Reference Books

1. S. Ramamrutam & R Narayanan Dhanpat Rai Pub. By "Basic Civil Engineering"
2. Prasad I.B. by Applied Mechanics Khanna Pub.
3. Punmia B.C. Surveying Standard book Depot.
4. S.P. Timoshenko, Mechanics of Structure, East West Press Pvt. Ltd.
5. Surveying by Duggal- Tata McGraw Hill New Delhi
6. Building Construction by S.C. Rangwala Charotar Pub. House Anand
7. R.K. Rajput, Engineering Mechanics S. Chand & Co.

COURSE OUTCOMES (COs)

After completion of this course the students will be able to

CO1. Summarize properties and uses of building materials, contours, Remote sensing & its applications.

CO2. Calculate resultant forces, axial forces in simple truss, shear force, bending moment, centre of gravity, moment of inertia, horizontal & vertical distances and angles using different survey instruments, area & volume

CO3. Draw SFD & BMD for simply supported and cantilever beam.

List of Experiments-

1. Determine the magnitude of resultant force using law of polygon of forces and compare the result with analytical and graphical method.
2. Determine the coefficient of friction between the two given surfaces and find the weight of box.
3. Find the coefficient of friction between drum and cord.
4. Determine the modulus of Elasticity of mild steel and timber using simply supported beam.
5. Determine the modulus of inertia of a closed coiled helical spring.
6. Find the forces in the members of a simple jib crane and compare them with analytical and graphical method.
7. Draw the location of given points on a medium size field using chain survey.
8. Complete closed traverse and surrounding offsets by prismatic compass.
9. Determine reduced level of 10 stations by Auto level/Dumpty level.

Course Outcomes

After completion of this course the students will be able to

1. Measure horizontal & vertical distances and angles using different survey instruments.
2. Verify law of polygon of forces
3. Determine material properties of different building material, coefficient of friction, modulus of elasticity, moment of inertia.

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(AICTE Model Curriculum Based Scheme)

Bachelor of Technology (B.Tech.) III Semester (Civil Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-33	Strength of Materials	70	20	10	30	20	150	3	-	2	4

MODULE I:-

Simple Stress and Strains. Concept of Elastic body, stress and Strain, Hooke's law, Concept of stress and strains & their relationships, Fatigue and thermal stresses, Creep. Equilibrium equations, Elastic constants, Stresses in compound bars, composite and tapering bars, Complex Stress and Strains: Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and strains, Mohr's circle of stresses and strain, Combined Bending and Torsion, Theories of failure.

MODULE II:-

Bending &Deflection, Theoryof simple bending: Concept of pure bending and bending stress, Equationof bending. Neutral axis, Section-Modulus, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading. Bending & shear stress distribution across a section in Beams.

MODULE III:-

Deflection of beams: Double integration Method. Conjugate Beam Method, Macaulay's Method, Area Moment Method, Unit load method : Strain Energy in direct stress, bending and shear. Theory of Plates and Shells, Introduction to theory of elasticity and photo-elasticity.

MODULE IV:-

Torsion of Shafts:Concept of pure torsion, Torsion equation, Determination of shear stress and angle o twist of shafts of circular section, Hollow shafts, Open and closed coil springs, Leaf Spring, Helical Spring, Pressure Vessels: Thin and Thick walled cylinders and spheres. Stress due to internal pressure, Change in diameter and volume, Compound cylinders and shrink fittings' Stresses in thin, thick cylinders and rotating discs.

MODULE V:-

Unsymmetrical Bending: Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of, symmetry. Concept of shear flow and shear centre. Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis. Columns and Struts: Euler's buckling load for uniform

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section, various end conditions, slenderness Ratio, Stress V in columns, Rankine formulae, Eccentric loading on columns. Combined Stresses and Bending.

References

1. E,P. Popov, Engineering Mechanics of Solids, 2nd Ed., Prentice Hill, New Delhi, 1999.
2.F.P. Beer, E.R. Johnston and J.T. DeWolf, Mechanics of Materials, 3rd Ed., Tata McGraw Hill, New Delhi, 2004.
3.I.H. Shames and J.M. Pitanesi, Introduction to the Solid Mechanics, 3rd Ed., Prentice Hill, New Delhi, 1989.
4.J.M. Gere, Mechanics of Materials, 5th Ed., Brooks/Cole, Chennai, 2001. S.H. Crandall, N.C. Dhal and T.J. Lardner,
5.Mechanics of Solids: An Introduction, McGraw Hill, Tokyo, 1994. S.M.A. Kazimi, Solid Mechanics,McGraw-Hill, New Delhi, 1981.
6.Nash; Strength of Materials (Schaum), TMH.
7.Ramamrutham; Strength of Materials, ,
8.Subramaniam; Strength of Materials: R; Oxford

LIST OF EXPERIMENTS

1. To determine Tensile strength of steel rod.
2. To determine flexural strength of steel rod.
3. To determine Young's Modulus of Elasticity of different materials of beam simply supported at ends.
4. To determine the Stiffness of the open and closed coil Spring.
5. To determine the deflection of simply supported beam of different materials.
6. To determine Hardness of Mild Steel.
7. Torsion test on steel rod.
8. To determine Impact strength of steel.
9. Compression Test on Cast Iron.
10. Compression Test on Mild Steel.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Explain mechanical properties of steel, different laws of engineering mechanics
CO2	Determine various stresses in symmetrical & unsymmetrical beams, rods, shafts, cylinders & springs.
CO3	Calculate buckling load in columns & deflection in beams by using various methods.

After the completion of this lab student will be able to-

CO1	Perform experiments to determine mechanical properties of steel, timber etc.

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(AICTE Model Curriculum Based Scheme)

Bachelor of Technology (B.Tech.) III Semester (Civil Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-34	Engineering Geology	70	20	10	30	20	150	3	-	2	4

MODULE I :- Physical Geology

The Earth as a Planet, important parts of the Earth, Action of Atmosphere, Weathering of Rocks, Principles and processes, Engineering significance of weathering, Geologic Action of wind erosion transportation and deposition, Action of River, Ground water and glaciers' Processes and features with all Engineering consideration.

MODULE II :-MINERALOGY&PETROLOGY

Study of Rocks : their origin, composition, classification. Detailed study of important Igneous, Sedimentary, Metamorphic Rocks with Rock cycle.Bowens reaction series, distribution of rocks on Indian sub continent. Civil Engineering importance of Rock forming minerals , Study of Minerals with their importance, hand specimen properties. distribution of some economic minerals on Indian sub continent.

MODULE III:-STRUCTURAL GEOLOGY

Structural features of rocks, Folds, Faults, Joints; Lineaments, Mountains, valleys. terminology, classification, their Engineering properties for Civil Engineering considerations. Earthquakes : Their causes,

MODULE IV:- REMOTE SENSING, GIS & ITS APPLICATION

Remote Sensing technology, E.M.S., Spectral signatures , its Applications in Civil Engineering, Geographical information system, data base management, use of Remote sensing in G.LS. for soil, rock, site selection purposes.

MODULE V:- APPLIED GEOLOGY

Study of major and minor structures of Civil Engineering like Dam ,Tunnel , Bridges, Culvert, Roads. Their terminolory, classification, different causes for failure, Geological considerations different methods for sub- surface, surface, aerial, satellite investigations for site selection of such structures.

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References :

1. Engineering Geology by Kranine& Jade
2. Engineering Geology by Pravin Singh
3. Physical and Engineering Geolory by S.K.Garg

List of Experiments

1. Identify the given minerals sample for the following :
"HAND SPECIMEN" Mega-scopic Identification on the basis of physical properties
i. Rock forming minerals
ii.Ore forming minerals
iii. Gangue minerals

2.Identiy the given rock sample for the following : "HAND SPECIMEN" Mega-scopic Identification on the basis of physical properties
i.Igneous rocks
ii.Sedimentary rocks
iii. Metamorphic rocks

3. Study the given geological maps for the following:
i. Topography - Configuration of the ground surface with the help of (dotted lines) contours drawn at a regular interval.
ii. Geologic rock boundaries (dark continuous lines.) superimposed on geographic map.
iii. Inter relationship of different rock t1ryes with each other i.e. unconformities, sequence etc.
iv. Structural feature of the rock formations in the form of folds, faults igneous intrusions etc.

4. Use the given geological map for the site selection of a Dam, Bridge, Canal& Tunnel.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Illustrate action of natural agencies on various geological formation.
CO2	Categorize various types of rocks and structural formation on earth crust.
CO3	Apply remote sensing technology for site selection of structures such as dams, tunnels, bridges etc. by sub-surface, surface & aerial investigations.

After the completion of this lab student will be able to-

CO1	Identify the given sample of minerals and rocks.
CO2	Study geological and geographical maps.

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COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-35	Building Design and Drawing	70	20	10	30	20	150	3	-	2	4

MODULE I:-

Components of a building and their functions.Drawing& dimensions of various types of foundations, doors, windows, ventilators, lintels, chhajjas, stairs, trusses.

MODULE II:-

Basics of building planning : Orientation, sun diagram. Principles of building planning viz aspect, prospect, roominess, Grouping, elegance etc, building lay-out.Energy Efficient buildings, principle of architectural composition (i.e. unit, scale, contest etc.)

MODULE III:-

Percentage built up area concept, FAR, open area, set backs, height of buildings, municipal bye laws National building code and its important provisions. Preparation of submission drawing.Basics of colony planning.Fire safety measures.

MODULE IV:-

Planning of residential buildings on different sizes of plots including plan, elevation sectional elevation.drawing to show all dimensions of various components of buildings health buildings.

MODULE V:-

Planning of school & Hostel buildings including drawings selection of site and salient features related to dimensions of each components of these buildings.

References :

1. Building planning, Designing & scheduling by Gurcharan Singh &Jagdish Singh
2.Building Design & Drawing by Shah, Kale &Patki
3.Building Design & Drawing by Malik &Meo.
4. Building Construction by B.C. Punamra
5. Estimating & Costing by B.N. Datta

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List of Experiments

1. Drawing of various types of Shallow foundations.
2. Drawing of various types of Deep foundations.
3. Drawing of various types of foundations door, window, ventilators, stair case
4. Drawing of plan section & elevation of simple four Roomed building
5. Planning & Drawing of residential building
6. Planning & Drawing of simple health building
7. Planning & Drawing of school
8. Planning & Drawing of College Building
9. Planning & Drawing of Hostel
10. Planning & Drawing of Shopping complex.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Illustrate various components of building with drawings.
CO2	Elaborate basics of building planning along with provisions of national building code
CO3	Plan different types of buildings like residential, school and hostel buildings.

After the completion of this lab student will be able to-

CO1	Draw various components of buildings
CO2	Plan different types of buildings.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-41	Concrete Technology	70	20	10	-	-	100	3	1	-	4

MODULE-I

Introduction: Concrete as construction materials, Concrete making materials: Cement- Types and testing, Aggregates- various properties and testing, Water- quality for mixing and curing and use of sea water, Admixtures- functions and classification.

MODULE-II

Properties of fresh concrete, workability, factors affecting and measurement of workability, segregation, bleeding, setting time. process of manufacturing of concrete, curing of concrete, strength of concrete, elasticity, creep, durability, corrosion and shrinkage.

MODULE-III

Concrete mix design factors influencing mix proportion, mix design by ACI method and I.S. code method, design of high strength concrete.

MODULE-IV

Testing of hardened concrete, compression flexure strength, tensile strength of concrete, comparison between cube and cylinder strength. non-destructive testing methods, test on composition of hardened concrete.

MODULE V

Special concrete, lightweight concrete, fiber reinforced concrete, polymer-modified concrete, fibrocement, mass concrete, ready mix concrete, self compacting concrete.

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Books References:

1. Shetty, MS, Concrete Technology, Theory & Practice, S. Chand and Co,2004.
2: Gambhir, ML., Concrete Technology, Tata McGraw Hil, 20C14.
3. Revile, Properties of Concrete, Longman Publishers, 2004.
4. Santakumar A.R., Concrete Technology, Oxford University Press, New Delhi, 2007

After the completion of this course students will able to –

CO1	Outline the importance of ingredients of concrete and its properties.
CO2	Summarise the concept of workability and testing of green concrete
CO3	Compute the design mix proportion for special work for required strength and workability with available material at workplace.
CO4	Illustrate the physical properties of hardened concrete
CO5	Ability to analyze various special concrete and their applications.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-42	Transportation Engineering	70	20	10	30	20	150	3	-	2	4

MODULE-I

Highways : Classification of Roads, Road Patterns, Brief History of Road Development around the World, Road Development Plans of the India, Typical Cross Sections in Urban and Rural roads, Various Cross Sections Elements, Width of Carriage-way, Shoulders, Medians, Width of Roadways, Right of Way, Camber, Design Speed, Sight Distance, Stopping Sight Distance, Passing Sight Distance, Sight Distance at Inter-Section, Passing Zones, Super Elevations, Set Back, Extra Widening on Horizontal Curve, Transition Curve, Design of Horizontal and Vertical Alignment, Combinations of Horizontal and Vertical Alignment

MODULE-II

Traffic Engineering : Definition, Road User and Vehicle, Traffic Studies - Speed, Volume, Origin & Destination, Capacity, Parking and Accidents, Traffic Signs, Traffic Markings, Traffic Signals - Types, Signal systems, Warrants and Design, Traffic Management, Intersection Types - At Grade & Grade Separation, Rotary Design, Street Lighting.

MODULE-III

Highway Materials: Soil, Desirable Properties, Classification, CBR, G. I. Modulus of Subgrade Reaction, Aggregates and their Characterisations, Bitumen Types, Tests on Bitumen, Bituminous Mixes-Requirements and Design, Concrete Mixes-Design, I.R.C. - 44 Method, Road Note No. 4 Method, ACI., Guidelines by I.S.

MODULE-IV

Pavement Design: Pavement Structures, Wheel Load Configuration, Behaviour under Repeated Loading, Function of Various Pavement Components, Factors affecting Pavement Design, Flexible Pavement Design Methods-GI, CBR, California R-Value Method. Triaxial Method, Mcleod Method, Burmister Method, I.R.C. Method Rigid Pavements, Calculation of Wheel Load Stresses and Temperature Stresses, Westergaard Method, Analysis, Joints in Rigid Pavements, I.R.C. Method for Design, Filling and Sealing of Joints, Design of Reinforcement, Dowel Bars and Tie Bars, Pumping of Concrete Pavements.

MODULE-V

Railway Engineering : Early development in rail transport, Permanent Way, Gauges, Sleepers, Ballast, Rails, Rail Fastenings, Calculation of Materials for Permanent way, Coning of Wheels, Rail Cross Section, Tilting of Rails, Wear & Creep of Rails, Geometrics, Gradients, Transition Curves, Widening of Gauges on Curves, Cant & Cant Deficiency.

Points & Crossing - Design of Turn outs and description of Track Junctions, Signalling and Interlocking, Classification of Signals and Points, Control of Train, Track Circuits, Station Yards.

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References:-

1. Khanna S.K. & Justo, C.E.G. "Highways Engineering" 10th edition. Nem Chand and Brothers, 2015.
2. O. Flaherty C.A., "Highway Vol. I & II:, Butterworth Heinemann, 2002
3. IRC-58-2015, "Guideline for Design of Rigid Pavements".
4. IRC-37-2012, "Guideline for the Design of Flexible Pavements".
5. Railway Engineering by S.C. Saxena and S.P. Arora; DhanpatRai Publication

List of Experiments:

1. Impact Test of Aggregates.
2. Abrasion Test of Aggregates.
3. Shape test – Elongation and Flakiness Index Test of Aggregates.
4. Penetration Test of Bitumen
5. Softening point Test of Bitumen
6. Ductility test of Bitumen
7. Crushing strength of Aggregate
8. Bituminous mix design by marshal method
9. Specific gravity and water absorption of aggregate
10. CBR of soil sub grade.

Course Outcomes-

After the completion of this course students will able to –

CO1	Calculate geometrical elements of highways and railways.
CO2	Illustrate traffic engineering aspects highways and railways.
CO3	Design of Flexible and rigid pavements and components of railway track.
CO4	Explain materials used in construction of highways.

After the completion of this lab students will able to –

CO1	Evaluate properties of materials used in construction of highways.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
CE-43	Geotechnical Engineering-I	End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work	150	L	T	P	4
		70	20	10	30	20		3	-	2	

MODULE-I

Basic Definitions & Index Properties : Definition and scope of soil mechanics, Historical development. Formation of soils, Soil composition. Minerals, Three phase system. Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits.

MODULE-II

Influence of clay minerals on engineering behavior, Soil structure. Effective, Neutral and Total stresses, Permeability, Determination of permeability in laboratory and in field. Seepage and seepage pressure, Flownets, uses of a flownet.

MODULE-III

Soil Compaction, Laboratory Tests, Factors Affecting Compaction, Behavior of compacted Soils and Compaction control in the field. Stress distribution beneath loaded areas by Boussinesq and water guard's analysis. Newmark's influence chart.

MODULE-IV

Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays.Determination of preconsolidation pressure, settlement analysis.Calculation of total settlement.

MODULE-V

Shear Strength of Soils : Mohr-Coulomb's theory of shear failure of soils, Mohr'sstress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test. Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

Reference Books :

1. Soil Mech. & Found. Engg. By Dr. K.R. Arora - Std Publishers Delhi.
2. Soil Mech. & Found by Dr. B.C.Punmia - Laxmi Publications, Delhi
3. Modem GeotechEngg. By Dr. I Aram Singh - IBT Publishers Delhi
4. GeotechEngg. By C.Venkatramaiah New Age International Publishers, Delhi
5. Soil Mech& Found. Engg. By S.K. Garg - Khanna Publishers, Delhi
6. Soil Testing for Engg. By T.W. Lambe - John Wiley &Soms. Inc.

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List of Experiments:

1. Determination of Hygroscopic water content
2. Determination of field density by Core Cutter method.
3. Determination of field density by Sand Replacement method.
4. Determination of field density by Water Replacement method
5. Particle - size analysis
6. Determination of Specific gravity of soil particles
7. Determination of plastic limit
8. Determination of liquid limit
9. Determination of shrinkage limit
10. Permeability test
11. Light Compaction Test (Std. Compaction Test)
12. Heavy Compaction Test (Modifies Compaction Test)

Course Outcomes-

After the completion of this course students will able to –

CO1	Determine index properties, compressibility and permeability parameters of soil.
CO2	Calculate shear strength and earth pressure of cohesive and non-cohesive soil.
CO3	Analyze the stability of finite and in-finite slopes

After the completion of this lab students will able to –

CO1	Determine insitu density using various methods.
CO2	Classify soil as per IS classification.

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		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-44	Fluid Mechanics	70	20	10	30	20	150	3	-	2	4

MODULE-I

Review of Fluid Properties: Engineering units of measurement, mass, density, specific weight, volume and gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure.

Fluid Static's: Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems on gravity dams and tainter gates); buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

MODULE-II

Kinematics of Flow : Types of flow-ideal & real , steady & unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streak-lines, stream lines and stream tubes; continuity equation for one and three dimensional flow, rotational &irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow nets their utility & method of drawing flow nets.

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow, momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications.

MODULE-III

Laminar Flow: lntroduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles.

Turbulent Flow: Laminar and turbulent boundary layers and laminar sub layer, hydro dynamically smooth and rough boundaries, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes commercial pipes, aging of pipes.

MODULE-IV

Pipe flow problems : Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, branching of pipes.

Pipe Network : Water Hammer (only quick closure case) transmission of power, Hardy Cross Method

Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations

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MODULE-V

Turbines: Classifications, definitions, similarity laws, specific speed and unit quantities, Pelton turbine-their construction and settings, speed regulation, dimensions of various elements,

Centrifugal pumps : Various types and their important components, manometric head, total head, net positive suction head specific speed, shut of head, energy losses cavitation, principle of working and characteristic curves.

Reciprocating Pumps: Principle of working, Coefficient of discharge, slip single acting and double acting pump, Manometric head, Acceleration head.

Forces on immersed bodies: Types of drag, drag on a sphere, flat plate, cylinder and an aerofoil development of lift, lifting vanes, magnus effect.

Reference Books-

1. Modi& Seth; Fluid Mechanics; Standard Book House, Delhi
2. Som and Biswas; Fluid Mechnics and machinery; TMH
3. Cengal; Fluid Mechanics; TMH
4. White ; Fluid Mechanics ; TMH
5. JNIK DAKE; Essential of EnggHyd; Afrikan Network &ScInstt. (ANSTD
6. Franiss JRD; A Text Book of fluid Mech. for Engg. Student
7. R Mohanty; Fluid Mechanics; PHI
8. Gupta; Fluid Mechanics, Pearson.

List of Experiment:

1. To determine the local point velocity with the help of Pitot tube.
2. To find out the terminal velocity of a spherical body in water.
3. Calibration of Orifice meter and Venturi meter
4. Determination of Cc, Cr, Co of Orifices
5. Calibration of Nozzle meter and Mouth Piece
6. Reynolds experiment for demonstration of stream lines & turbulent flow
7. Determination of meta-centric height
8. Determination of Friction Factor of a pipe
9. To study the characteristics of a centrifugal pump.
10. Verification of impulse momentum principle

Course Outcomes-

After the completion of this course students will able to –

CO1	Explain fluid properties, flow nets, flow measurements, laminar and turbulent flow, similarity laws
CO2	Solve problems on dynamics, kinematics of fluid flow, fluid statics, laminar & turbulent flow through pipes
CO3	Calculate pressure, dimension-less numbers, forces on plane & curved surface and fixed & moving vanes

After the completion of this lab students will able to –

CO1	Determine local point velocity, terminal velocity, meta-centric height
CO2	Calibration of Orifice-meter, Venturi-meter, Nozzle- meter and Mouth-piece

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-45	Advance Surveying	70	20	10	-	-	100	3	1	-	4

MODULE-I

Reciprocal leveling, profile leveling, cross sectioning, contouring, methods of contouring, trignometrical leveling.

MODULE-II

Traversing by theodolite, field work checks, traverse computations, latitude and departures, adjustments, computations of co-ordinates, plotting and adjusting of traverse, omitted measurements.

MODULE-III

Tacheometry : Tachometric systems and principles, stadia system, uses of analytic lens, tangential system, subtense system, instrument constant field work, reduction, direct reading tacheometers, use of tacheometry for traversing and contouring.

MODULE-IV

Curves : Classification and use; element of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscates, setting out vertical curves.

MODULE-V

Control Surveys: Providing frame work of control points, triangulation principle, reconnaissanceselection and marking of stations.

Hydrographic Surveying: Sounding, methods of observations, computations and plotting.

Field Astronomy: Spherical trigonometry, Astronomical terms, co-ordinate systems circumpolar stars, astronomical triangle determination of Azimuth & time.

References:

1. Surveying & Levelling Vol.I& Vol II T.P. Kanetkar.
2. Duggal, Surveying Theory & Practice, Vol .I&II, Tata McGraw Hell Pub co.ltd.
3. Surveying Vol I, II & III B.C. Punamia.
4. Surveying Vol I, II, KR.Arora.

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Course Outcomes-

After the completion of this course students will able to –

CO1	Explain various method of leveling and contouring.
CO2	Analyse traversing data obtained using theodolite.
CO3	Determine horizontal and vertical distances using tacheometry.
CO4	Set out curves and control point for carrying out any civil engineering work.

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COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-51A	Elements of Environmental Engineering	70	20	10	-	-	100	3	1	-	4

Module-I
Water sources- origin of waste water - types of water pollutants and their effects, sources of water pollution and their effects

Module-II
Air pollution - causes of air pollution - types & sources of air pollutants- climatic & meteorological effect on air pollution concentration- formation of smog and fumigation, different air pollution episodes in India and abroad.

Module-III
Sources and types of municipal solid wastes - sources and types of solid wastes - factors affecting generation of solid wastes; characteristics - effects of improper disposal of solid wastes - public health effects- principle of solid waste management - social & economic aspects- public awareness- role of NGOs- legislation

Module-IV
Noise pollution & control - noise pollution: intensity, duration - types of industrial noise - ill effects of noise - noise measuring & control - permissible noise limits

Module-V
Environmental Impact Assessment- assessment of impact on land, water and air, noise, social, cultural flora and fauna - Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) -EIA capability and limitations - legal provisions on EIA.

References
1. Garg, S.K, (2015) "Environmental Engineering (Vo1.11): Sewage disposal and Air Pollution Engineering" Khanna Publishers (33th Edition, 2008).

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2. Peavy, H.S., Rowe, D.R., and Tchobanoglous, G, (1985), "Environmental Engineering" McGraw-Hill international edition (7th Edition).
3. Dr. B.S.N. Raju, (1995), "Water supply and Waste Water Engineering" McGraw-Hill Education
4. Dr. P.N. Modi,(2010), "Sewage treatment disposal and waste water engineering" Standard Book House-Delhi (4th Edition)
5. Urban and Jain (1993) "Environmental Impact Assessment", McGraw-Hill Education
6. Relevant I.S. Codes.

Course Outcomes-

After the completion of this course student will be able to-

CO1	To develop environmental scientists and engineers and sensitize them towards environmental issues.
CO2	To acquire analytical skills in assessing environmental impacts through a multidisciplinary approach.
CO3	To identify environmental problems and solutions through organized research.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
CE-51B	Water Resource Conservation	End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work	100	L	T	P	4
		70	20	10	-	-		3	1	-	

Module-I

Water and its importance. Scenario of water in Rajasthan: sources, geographical distribution, quality. Water (hydrological) cycle, influence of human activity on the water cycle, Surface water resources. Elementary knowledge of ground water: general aquifer. Water quality and its impact on human beings.

Module-II

Water harvesting: need, principles of water harvesting, general water harvesting methods rain water harvesting roof top rain water harvesting mostly used in urban areas, subsurface barrier/dykes, farm ponding, etc mostly used in rural areas. Groundwater recharge. Revival of traditional techniques for water harvesting. Calculation of available rain water for harvesting. Preparation of suitable technical drawing and design of rain water harvesting structure

Module-III

Water conservation: importance, elementary knowledge regarding conservation/saving of water in daily use, in agriculture, in industries. Subsurface investigation of Ground water: general, geophysical methods and its importance. Present law regarding water management Water footprints.

Module-IV

Community involvement in water management: roles of Panchayati Raj institutions, NGO's, educational institutions, media, political parties and farmers associations.

Module-V

Elementary idea of water analysis and instruments used (chemist). Chemical analysis with the help of portable instrument

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REFERENCES:

1. Ahuja, Satinder 2008, Arsenic Contamination of Groundwater: Mechanism, Analysis, and Remediation WileyIntersci
2. Bennison, E. W.1947, Ground water: its development, uses & conservation CornellU
3. Bisson 2004, Modern Groundwater Exploration, Drilling, Testing and Integrated WileyIntersci
4. Bitton 2005, Wastewater Microbiology, Third Edition (Online Version) WileyIntersci
5. Edmunds 2008, Natural Groundwater Quality WileyIntersci
6. ErachBharucha Textbook for Environmental Studies For Undergraduate Courses of all Branches of Higher Education by for University Grants Commission

Course Outcomes-

After the completion of this course student will be able to-

CO1	Illustrate Water conservation and its Background.
CO2	Apply different water harvesting techniques and ground water recharge
CO3	Analyze different water management techniques

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		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-51C	Water Resource Engineering	70	20	10	-	-	100	3	1	-	4

Module-I

Hydrology: Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, infiltration and infiltration indices, evaporation stream gauging, run off and its estimation.

Module-II

Hydrographs and Floods: Hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph, types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control.

Module-III

Water Resources Planning & Irrigation: Irrigation water requirement and soil-water-crop relationship, irrigation, definition, necessity, advantages and disadvantages, types and methods, irrigation development, soil types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination, irrigation method, surface and subsurface, sprinkler and drip irrigation, duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation, water logging-causes, effects andits prevention, salt efflorescence-causes and effects, reclamation of water logged and salt affected lands.

Module-IV

Canal Irrigation: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, linings-objectives, materials used, economics, canal falls & cross drainage works, description and design, head and cross regulators, escapes and outlets, canal transitions.

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Module-V

Ground Water & Well Irrigation Confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries, ground water recharge necessity and methods of improving ground water storage, rain water harvesting, types of wells, well construction, yield tests, specific capacity level and specific yield, hydraulic design of open wells and tube wells, methods of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation.

Suggested books :-

1. Engineering Hydrology - J.NEMEC - Prentice Hall
2. Engineering Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
3. Hydrology and Water Resources Engineering by S.K.Garg - Khanna Publishers
4. Hydrology: Principles, Analysis, Design by H.M. Raghunath - New Age International Pvt. Ltd.
5. Irrigation Irrigation& Water Power Engineering by B.C.Punmia- Laxmi Publications Pvt. Ltd.
6. Irrigation Engineering and Hydraulic Structures by S.K.Garg- Khanna Publishers

Course Outcomes-

After the completion of this course student will be able to-

CO1	Illustrate Hydrologic Cycle and its Hydrological Background
CO2	Apply different water harvesting techniques and ground water recharge
CO3	Analyze different water management techniques

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CE-52	Structural Analysis-I	70	20	10	30	20	150	3	-	2	4

MODULE-I: Static and Kinematics Indeterminacy, Virtual Work and Energy Principles:
Principles of Virtual work applied to deformable bodies, strain energy and complementary energy.
Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.

MODULE-II: Indeterminate Structures -I:
Analysis of Fixed and continuous beams by theorem of three moments. Effect of sinking and rotation of supports, Moment distribution method (without sway)

MODULE-III: Indeterminate Structures -II:
Analysis of beams and frames by slope deflection method. Column Analogy method.

MODULE-IV: Arches and Suspension Cables:
Three hinged arches of different shapes, Eddy's Theorem, Suspension cable, stiffening girders, Two Hinged and Fixed Arches - Rib shortening and temperature effects.

MODULE-V: Rolling loads and Influence Lines:
Maximum SF and BM curves for various types of Rolling loads, focal length EUDL, influence Lines for Determinate Structures - Beams, Three Hinged Arches.

Books Reference:

1. Wang C.K. Intermediate Structural Analysis, Mc GrawHillNew York.
2. Kinney, Sterling J: indeterminate Structural Analysis Addison wasley
3. Reddy C S Basic Structural Analysis Tata Mc Graw Hill Pub. Co. New Delhi.

List of Experiment:

1. To verify "THEOREM OF RECIPROCAL DEFLECTIONS" or "MAXWELL'S RECIPROCAL THEOREM" using SSB & cantilever beam.
2. To verify "Principle of superposition for deflection" using SSB & cantilever beam made with linearly elastic material.

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3. To draw "INFLUENCE LINE DIAGRAM FOR BENDING MOMENT" at a section of SSB using bending moment apparatus.
4. To obtain horizontal thrust at support of a "Circular three hinged arch" and to draw ILD for this horizontal thrust, also to compare experimental results with analytical solutions
5. To obtain horizontal thrust at support of a " Two hinged parabolic arch" and to draw ILD for this horizontal thrust, also to compare experimental results with analytical solutions
6. To obtain horizontal thrust at support of a "SEMICIRCULAR TWO HINGED ARCH" and to draw ILD for this horizontal thrust, also to compare experimental results with analytical solutions.
7. To obtain force in members of a shear leg apparatus and to compare results with those obtained using analytical method.
8. To obtain deflection at free end of a curved member consist of a "quadrant with straight edge" and to compare results with those obtained by using analytical solutions.
9. To obtain elastic deflection at free end of a "SEMICIRCULAR FRAME WITH STRAIGHT EDGE" due to load applied at free end to compare results with those obtained using analytical solutions.
10. To obtain "INFLUENCE LINE DIAGRAM" for intermediate reaction of a continuous beam of two unequal spans using "MULLER-BRESLAU's PRINCIPLE" and comparing the results with those obtained using analytical solution.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Distinguish between stable and unstable structures; statically determinate and indeterminate structures.
CO2	Draw the influence lines for beams, trusses and arch due to moving load.
CO3	Technically able to analyze the arches and understand the use of different type of arches in structure.
CO4	Understand the concept of Strain energy for the analysis of different structures
CO5	Technically able to analyze the beams, frames and trusses by different methods

After the completion of this lab student will be able to-

CO1	Verification of the structural analysis theorems and principles by conducting the experiments.
CO2	Determine deflection and internal forces for various structures experimentally and validate using classical methods.
CO3	Determine horizontal thrust and obtain the influence lines for statically determinate and indeterminate structures.
CO4	Analyze the determinate and indeterminate structures.
CO5	Understand the behavior of struts with different end conditions.

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CE-53	Geotechnical Engineering-II	70	20	10	30	20	150	3	-	2	4

MODULE - I: Shallow Foundations :

Type of foundations shallow and deep Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity, Prandtl.TezaghiBalla, Skempton Meyerhof and Hansan, I.S. code on B.C. Determination of bearing capacity limits of total and differential settlements. Plate load test.

MODULE - II: Deep Foundation :

Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae. Pile loadtest. Settlement of pile group Negative skin friction. Under-reamed piles and their design piles under tension, inclined and lateral load caissons.Well foundation.

MODULE -III: Stability of Slopes:

Infinite and finite slopes. Types of slope failures, Rotational slips. Stability number. Effect of ground water, selection of shear strength parameters in slope stability analysis.Analytical and graphical methods of stability analysis.Stability of Earth Dams.

MODULE - IV: Lateral Earth Pressure :

Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann'stheories.Analyical and graphical methods of determination of earth pressures on cohesion - less and cohesive soils.Effect of surcharge, water table and wallfriction.Arching in soils.Reinforced earth retaining walls. Cantilever and anchored sheet piles.

MODULE -V: Soil Exploration and Machine Foundation.

Introduction, Methods of Exploration, Methods of boring, Soil Samples, Soil Samplers and Sampling, Field Tests and Laboratory Tests, Geophysical Methods. Machine Foundation.

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Books Reference :

1. Soil Mechanics & Foundation Engg. By Dr. K.R. Arora - Std Pub. Delhi
2. Soil Mechanics & Foundation Engg. By B.C. Punmia - Laxmi Pub. Delhi
3. Modern Geotechnical Engg. By Dr. Alam Singh-IBT Publishers Delhi
4. Geotechnical Engg. By C. Venkatramaiah- New Age Intemational Pub Delhi
5. Foundation Engg.ByGAleonards Mc Graw Hill Book Co. Inc.DT.

List of Experiments:

1. The unconfined compression test
2. Tri-axial compression test.
3. Vane shear test.
4. CBR test.
5. Plate load test.
6. Standard Penetration test.
7. Dynamic cone penetration test
8. Free swelling index and differential free swell test
9. Swelling pressure test.
10. Consolidation test.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Determine allowable bearing pressure of soil for shallow foundations..
CO2	Evaluate individual and group capacity of piles.
CO3	Apply techniques for soil improvement and soil stabilization.
CO4	Explain behavior and construction techniques for expansive and collapsible soil.
CO5	Design sheet pile and machine foundation.

After the completion of this lab student will be able to-

CO1	Evaluate strength of soil through different methods.
CO2	Determine settlement of different types of soil.

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		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-54	Structural Design & Drawing-I (RCC)	70	20	10	30	20	150	3	-	2	4

MODULE – I:

Basic Principles of Structural Design : Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, introduction to working stress method ; Limit state methods of design, partial safety factors for load and material. Calculation of various loads for structural design . Calculation of moment of resistance of rectangular and flanged sections by WSM and LSM.

MODULE – II:

Design of Beams: Singly & doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement: Redistribution of moments in continuous beams, Design of beam for shear, bond and torsion.

MODULE-III:

Design of Slabs: Slabs spanning in one direction. Cantilever, Simply supported and Continuous slabs, Slabs spanning in two directions, Circular slabs.

MODULE –IV:

Columns & Footings: Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, isolated footings. Columns subjected to axial loads and bending moments (sections with no tension).

MODULE –V:

Staircases: Staircases with waist slab having equal and unequal flights with different support conditions, Slab less tread-riser staircase. Design of flat slabs and waffle slabs.

NOTE :

All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 Design aids

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Books Reference :

1. Reinforced Concrete;Pillai& Menon, TMC New Delhi.
2. Plain & Reinforced Concrete Vol. I & II - O.P. Jain & Jay Krishna
3. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi.
4. Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
5. Reinforced Cement Concrete by Gupta &Mallick, Oxford and IBH
6. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
7. Plain & reinforced concrete - Rammruttham
8. Plain & reinforced concrete - B.C. Punmia
9. Structural Design & Drawing by N.K.Raju.

List of Experiment:

1. Detailed of Drawing of Beams.
2. Detailed of Drawing of Slabs.
3. Detailed of Drawing of Columns.
4. Detailed of Drawing of Footings.
5. Detailed of Drawing of Stairs.
6. Determination Of Slump Value Using Slump Cone test
7. Determination Of Slump Value Using Compaction Factor Test
8. Determination Of Compressive Strength Of Cubes
9. Testing Of Aggregates For Concrete
10. Fineness Modulus of fine aggregates & course aggregate

Course Outcomes-

After the completion of this course student will be able to-

CO1	Classify different design philosophies used in RCC construction and assess various loads for the buildings.
CO2	Design different types of beams for flexure, shear and torsion.
CO3	Design different types of slabs.
CO4	Identify the effective length of column and design oflong and short column and isolated footing.
CO5	Design staircases with different support conditions, design of flat slabs and waffle slabs.

After the completion of this lab student will be able to-

CO1	Identify the major steps and symbol used in civil engineering drawings
CO2	Draw civil engineering drawings for different structural elements like beam, column, slab etc

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		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
BT-52	Engineering Economics and Management	70	20	10	-	-	100	3	1	-	4

Module -I

Introduction to Engineering Economics and Managerial Economics Concept of Efficiency, Theory of Demand , Elasticity of Demand, Supply and Law of Supply indifference Curves, Budget Line; Welfare Analysis, Scope of Managerial Economics, Techniques and Applications of Managerial Economics.

Module -II

Market Structure Perfect Competitions Imperfect - Monopolistic: Oligopoly, duopoly sorbent features of price determination and various market conditions. Demand Forecasting and cost Estimation Characteristics of Forecasts, Forecasting Horizons, Steps to Forecasting, Forecasting Methods, Seasonal Adjustments, Forecasting Performance Measures, Cost Estimation, Elements of cost, Computation of Material Variances Break - Even Analysis.

Module -III

Introduction: Concept, Development, application and scope of Industrial Management. Productivity: Definition, measurement, productivity index, types of production system, Industrial Ownership.

Module -IV

Management Aspects, Functions of Management, Project Management, Value Engineering, Project Evaluation, Work simplification — process charts and flow diagrams, Production Planning, Decision Making.

Module -V

Inventory Control: Inventory, Cost, Deterministic Models Quality Control: Process control, SQC, Control charts, Single, Double and Sequential Sampling, Introduction to TQM.

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TEXT BOOKS:

1. Principles of Management by Tripathy and Reddy
2. Mechanical estimation and costing, T.R. Banga& S.C. Sharma, 17th edition 2015
3. Engineering Economy, Riggs J.L. McGraw Hill, 2002
4. Engineering Economy, Thuesen H.G. PHI , 2002

REFERENCE BOOKS:

1. Management Fundamentals- Concepts, Application, Skill Development - RobersLusier - Thomson

Course Outcomes-

After the completion of this course student will be able to-

CO1	Understand the key management concepts, principles and contribution by different Management thinkers.
CO2	Analyze and design organization for effective management.
CO3	Application of modem management techniques.

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CE-61A	Geographical Information System	70	20	10	-	-	100	3	1	-	4

MODULE I:
Definition of GIS, maps & GIS, digital representation of geographic data, data quality and data standards, raster and vector based data processing, digital terrain modeling, spatial analysis and modeling. remote sensing, its terminology, electro magnetic signal, atmospheric window. active and passive systems for remote sensing, remote sensing applications.

MODULE II:
Principle of aerial photograph, flight planning, relief displacement of vertical photographs. stereoscope, parallax bar, methods of aerial photo visual interpretation keys by this instrument.

MODULE III:
Principle of satellite image procurement, spectral reflectance curves, spatial, spectral, temporal. radiometric resolution characteristics of images, errors of satellite images & their rectification. methods of visual interpretation of satellite images.

MODULE IV:
Projection, different types of projections and applications in image correction, projection used in India, measure of shortest distance between two points on the earth.

MODULE V:
Remote sensing, technique used in resource management (soil, water,) & database management system (urban & rural planning) for civil engineering projects, global positioning system.

Reference Books:

1. Concept and Principle of Geographical Information system by: W.Yeung
2. Principle of Remote Sensing by Sabins
3. Manual of Remote Sensing by (A.S.R.S.) USA.

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Course Outcomes-

After the completion of this course student will be able to-

CO1	Process GIS raster and vector data for further spatial analysis and modeling.
CO2	Compute measurements of various ground features through mathematical computations of aerial photograph.
CO3	Perform visual interpretation of satellite images in terms of different resolutions studied.
CO4	Apply different projection systems for image correction and calculation of shortest distance.
CO5	Illustrate remote sensing and GPS techniques for resource collection and database management.

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		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-61B	Natural Disaster Mitigation and Management	70	20	10	-	-	100	3	1	-	4

MODULE I
Natural Disasters Overview introduction, natural disasters around the world, natural disaster risk assessment, earth and its characteristics.

MODULE II
Enviromental change and its degradation. climate change, global warming.

MODULE III
Plate tectonics & earthquakes: introduction and review natural disasters, principles, elements, and systems, geological, geo- morphological aspects, earthquake, geology, seismology, characteristics and dimensions. landslides.

MODULE IV
Critical climate system aspects and processes: oceanic, atmospheric and hydrologic cycles.

MODULE V
Mapping modeling risk analysis and loss estimation, natural disaster risk analysis prevention and mitigation, applications of space technology, education and training, establishment of capacity building and along various stakeholders government education institute, use of multimedia, etc.

Reference Books
1. Edward A Keller Robert Natural Hazards, pearson
2. Didas Natural Diasater. Dicrax Education

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Course Outcomes-

After the completion of this course student will be able to-

CO1	Summarize the causes of natural disaster and its preventive measures.
CO2	Explain principles, elements and characteristics of natural disasters
CO3	Summarize critical climatic systems.
CO4	Categorize different modelling methods for natural hazards assessment.
CO5	Explain administrative mechanism for disaster mitigation.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-61C	Pre-stressed Concrete Structure Design	70	20	10	-	-	100	3	1	-	4

MODULE-I

Pre-stressing Systems and losses of pre-stressing, introduction various systems of pre- stressing. Types of loss and their analysis. Working Stress Design of Simple Beams: Critical load conditions allowable stresses, flexural design criteria axially pre-stressed members design of pre-stressing cable for a given cress section, design procedure based on flexure, design by load balancing method and multiple stage pre-stressing.

MODULE-II

Continuous Beams: Analysis of two span beam analysis of two span beam with eccentricities at outer supports, continuous beams with variable section design of continuous beam. Miscellaneous Structural Members: Columns subjected to combined bending and axial force, piles, poles, piers and abutments, Tension members, ring beams circular tanks and pipes pavement sleepers roads and runways.

MODULE-III:

Limit State Design of Beams: Limit state of strength in flexure, shear and torsion permissible stresses limit state of serviceability against deflection. Cracking and durability, design of simply supported and continuous beams.

MODULE-IV

Bond and Anchorage of Pre-stressing cables Bond in pre tensioned and post tensioned construction, prestressing cable at centroid axis symmetric multiple cables causing axial thrust cable with eccentricity,inclined pre-stressing cable spanning stress, end zone reinforcement

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MODULE-V

Pre-stressed Concrete Slabs: One way slab two way slabs, pre-stressed concrete beam slab construction, pre-stressed flat slab.

Deflection and Crack Width: Factors influencing deflection, short term deflections of un cracked members, long term deflection deflections of cracked members. Estimation of crack width using British code and FIP recommendations.

Reference Books:

1. N.Krishna Raju, Pre-stressed Concrete, Tata Mc Graw Hill Book Co.
2. P. Dayaratran, Pre-stressed Concrete Structures, Oxford & IBH Co. Delhi.
3. Jain& Jai Krishna, Plain & Reinforced Concrete Vol - II Nemchand& Bros Roorkee.
4. IS 1343-980 code of Practice for Pre-stressed Concrete Bureau of India Standards New Delhi.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Explain different types of pre-stressing systems.
CO2	Analyze different types of prestressed concrete structural members.
CO3	Design pre-stressed concrete simple & continuous beam, slab, column and miscellaneous structural members.
CO4	Calculate pre-stressing losses, short term, long term deflection and crack width.

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CE-62A	Advance Water Resource Engineering	70	20	10	-	-	100	3	1	-	4

Module -I

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.

Module - II

Earth and Rock fill dams: Earth Dams : Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.

Module - III

Spillways: Various Types of Spillways, Ogee spillway and its design details of Siphon shaft, chute and side channel spillways, emergency spillways.

Module - IV

Energy dissipation and gates: Principles of energy dissipation, Energy dissipaters based on tail water rating curve and jump height curves spillway crest gates - vertical lift and radial gates, their design principles and details. Design of canal regulating structures, detailed design of sarda type canal fall. Types of cross drainage works - Aqueduct siphon aqueduct, super passage, level crossing &inlet & outlets.

Module - V

Hydropower Plants: Introduction of Hydropower development, assessment of

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power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft fubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.

Reference Books:

1. Engineering for Dams (Volumes I,II&ID by Creager. Justin & Hinds
2. Hydroelectric Hand Book by Creager

Course Outcomes-

After the completion of this course student will be able to-

CO1	Calculate the forces acting on gravity dam and stability analysis of hydraulic
CO2	Determine the rate of seepage using flow-net
CO3	Design various types of spillways, energy dissipaters and canal regulating structures.
CO4	Explain the functioning & elements of hydropower plants.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-62B	Waste Management	70	20	10	-	-	100	3	1	-	4

MODULE I
Municipal solid waste (management and handling) rules, hazardous waste (management and handling) rules; biomedical waste handling rules, fly ash rules; recycled plastics usage rules; batteries (management and handling) rules.

MODULE II
Municipal solid waste managements-fundamentals sources; composition; generation rates; collection of waste; separation, transfer and transport of waste; treatment and disposal options.

MODULE III
Hazardous waste management fundamentals characterization of waste, compatibility and flammability of chemicals; fate and transport of chemicals, health effects.

MODULE IV
Radioactive waste management fundamentals sources, measures and health effects; nuclear power plants and fuel production; waste generation from nuclear power plants, disposal option.

MODULE V
Exposure pathway of pollutants emitted from recycling of e-waste, e-waste management rules of India (2011 and 2016 rules) e-waste management: case studies and unique initiatives from around the world.

References

1. Pichtel, John. Waste Management Practices: Municipal, Hazardous and Industrial. CRC Press, Taylor and Francis Group, 2005

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2. LaGrega, Michael D., Buckingham, Philip L and Evans, Jeffrey C. Hazardous Waste Management

3. Waveland Press Inc., Reissue Edition, 2010. 3. Warta, Richard 1. Hazardous Wastes - Sources, Pathways, Receptors, Wiley (1) Edition), 1998

Course Outcomes-

After the completion of this course student will be able to-

CO1	Classify solid waste by its physical, biological and chemical characteristics.
CO2	Apply proper methods of collection and conveyance to reduce solid waste.
CO3	Predict impact on socio economic environment.

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		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-62C	ELEMENTS OF FEM	70	20	10	-	-	100	3	1	-	4

MODULE I:
Calculus of variation, introduction to calculus of variations, introduction to equilibrium equations in elasticity, Euler's Lagrange's equations, principal of virtual work, virtual displacements, principle of minimum potential energy, boundary value, initial value problems, flexibility approach, displacement approach, different problems in structural analysis.

MODULE II:
FEM procedure, derivation of FEM equations by variation principle polynomials, concept of shape functions, derivation for linear simplex element, need for integral forms, interpolation polynomials in global and local coordinates weighted residual methods: concept of weighted residual method. derivation of FEM equation by Galerkin's method, Solving cantilever beam problem by Galerkin's approach, introduction of shape functions for CST triangular elements, rectangular elements, quadrilateral elements

MODULE III:
Concept of iso-parametric elements, concept of Jacobin matrix. numerical integration: numerical integration, one point formula and two point formula for 2D formula, different problems of numerical integration evaluation of element stiffness matrix.

MODULE IV:
Pascal's triangle law for 3D shape function polynomials, shape function for beam elements, convergence: convergence criteria, compatibility requirements, characteristics of stiffness matrix, direct method for deriving shape functions using Langrage's formula, plane stress problems.

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MODULE V:

Analysis of structures: truas elements, analysis of truss problems by direct stiffness method analysis of frames and different problems, different axi-symmetric truss problems,

Reference Books:

1. The Finite Element method-ZIENKIEWICZ.O.C.Tata McGraw Hill Pub, New Delhi, 2000
2. Finite Element Methods by CR Alaval, PHI
3. Finite element method with application in engineering by Chandrupatia&Belegundu. Pearson Publication.
4. Concepts and Applications of Finite Element Analysis: COOK. D. Robert, Malus S. David, Plesha E Michel, John wilely& sons 3rd Edn. New York, 2000
5. Finite Element Analysis -CS, Krishnanmoorthy, Tata McGraw Hill Publishing Co, Ltd, New Delhi
6. Introduction to the Finite Element method Desai ABEL CBS Publishers & Distributors New Delhi

Course Outcomes-

After the completion of this course student will be able to-

CO1	Interpret the philosophy behind principles, design and modeling considerations in using finite element analysis.
CO2	Develop stiffness matrices for spring, truss, beam, plane stress problems and three dimensional problems using the concept of direct equilibrium and potential energy methods.
CO3	Develop the finite element formulations for heat transfer problems.
CO4	Evaluating the convergence of solutions using finite element analysis and assess the accuracy of simulated results.
CO5	Be proficient in the use of commercial finite element software.

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		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-63	Structural Analysis - II	70	20	10	30	20	150	3	-	2	4

Module - I:
Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members, analysis of beams and frames by Kani's method.

Module - II:
Plastic analysis of beams and frames.

Module - III:
Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.

Module - IV:
Matrix method of structural analysis: force method and displacement method.

Module - V:
Influence lines for indeterminate structures, Muller Breslau principle, Analysis of Beam-Columns.

Books Reference:

1. Wang C.K. Intermediate Structural Analysis McGraw Hill New York
2. Kinney Streling J. Indeterminate structural Analysis. Addison Wesley.
3. Reddy C.S. Basic Structural Analysis, Tata Mc Graw Hill Pub. Co. New Delhi
4. Norris C.H. Wilbur J.B. and Utkys Elementary Structural Analysis, MC Graw Hill International Tokyo
5. Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Pub.& Dis. Delhi

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STRUCTURAL ANALYSIS - II LAB

List of Experiments:

1. Verify theorem of Reciprocal deflection of Maxwell reciprocal theorem using simply supported & cantilever beam.
2. Verify principle of superposition for deflection using simply supported & cantilever beam.
3. Draw influence line diagram for bending moment at a section of SSB using bending moment apparatus.
4. Obtain horizontal thrust at support of a semicircular two hinged arch and to draw ILD for this horizontal thrust;alsoto compare experimental results with analytical solutions.
5. Obtain force in members of a shear leg apparatus and to compare results with analytical method.
6. Obtain deflection at free end of curved member consists of a quadrant with straight edge and to compare results withthose obtained by analytical method.
7. Obtain elastic deflection at free end of a semicircular frame with straight edge.
8. Obtain ILD for intermediate reaction of a cantilever beam of two unequal span using Muller Breslau's principle tocompareresultswith those obtained by analytical method.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Analyze portal frames with sway and frames with inclined members.
CO2	Calculate plastic moment capacity and collapse load for beams and frames subjected to different loading conditions.
CO3	Analysis of tall frames/multistory buildings by approximate methods
CO4	Analyze the beams and frames using matrix method of analysis.
CO5	Draw ILD for support reaction, SF & BM at various sections for indeterminate structures.

After the completion of this lab student will be able to-

CO1	Verify Max-well's reciprocal theorem
CO2	Perform experiments to determine horizontal reaction for two and three hinged arch
CO3	Perform experiments to determine deflection and slope of beams and frames for various loading conditions.

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		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-64	Structural Design and Drawing – II (Steel)	70	20	10	30	20	150	3	-	2	4

Module-I:
Various loads and mechanism of the load transfer, partial load factors structural properties of steel, Design ofstructural connections-Bolted, Rivetted and Welded connections.

Module - II:
Design of compression members, Tension members, Roof Trusses - Angular & Tubular, Lattice Girders.

Module - III:
Design of Simple beams Built-up beams, plate girders and gantry girders.

Module - IV:
Effective length of columns, Design of columns- simple and compound, Lacings and battens. Design of footings forsteel structures, Grillage foundation.

Module-V:
Design of industrial building frames, multi-storey frames, Bracings for high rise structures. Design of transmissiontowers.

NOTE :
All the Designs for strength and serviceability should strictly be as per the latest version of IS:800.

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Books Reference:

1. Design of Steel Structures by Subramanium
2. Design of Steel Structures by Duggle
3. Design of Steel Structures by BhaviKatti

STRUCTT'RAL DESIGN & DRAWING.II (STEEL) LAB

List of Experiments:

1. Design & drawing of structural connection.
2. Design & drawing of members of roof trusses.
3. Design & drawing of beams & Plate Girders.
4. Design & drawing of build up Columns.
5. Design & drawing of Footing.
6. Draw the layout of different types of Rivet connections.
7. Draw the neat sketch of staggered joints and show pitch ,gauge and edge distance.
8. Draw the plan and elevation of Grillage foundation.
9. Draw the plan and elevation of slab base.
10. Draw the plan and elevation of Gusset base

Course Outcomes-

After the completion of this course student will be able to-

CO1	Identify various loads, mechanism of load transfer and design of structural connections for Steel.
CO2	Design truss members, girder, other structural member-for-steel buildings and transmission tower
CO3	Explain different types of building frames and bracing systems
CO4	Apply effective length of column, lacing and battens

After the completion of this lab student will be able to-

CO1	Identify the major steps and symbol used in civil engineering drawings
CO2	Draw civil engineering drawing for different connections used in steel structures
CO3	Draw civil engineering drawing for different structural elements for steel

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		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-65	Environmental Engg - I	70	20	10	30	20	150	3	-	2	4

Module - I:
Estimation of Ground and surface water resources, quality of water from different sources, demand & quantity of water, fire demand, water requirement for various uses, fluctuations in demand, forecast of population.

Module - II:
Impurities of water and their significance, water-borne diseases, physical, chemical and bacteriological analysis ofwater, water standards for different uses. lntake structure, conveyance of water, pipe materials, pumps operation &pumping stations.

Module - III:
Water Treatment methods theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.

Module - IV:
Layout and hydraulic Design of different distribution systems, pipe fittings, valves and appurtenances, analysis of distribution system. Hardy cross method, leak detection, maintenance of distribution systems, service reservoir capacity and height of reservoir.

Module - V:
Rural water supply schemes, financing and management of water supply project, water pollution control act,conservancy& water carriage system, sanitary appliance and their operation, building drainage system of plumbing.

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Books Reference:

1. Water Supply & Sanitary Engg. By G.S. Birdi-Laxmi publications (p) Ltd. New Delhi
2. Water & Waste Water Technology by Mark J.Hammer Prentice - Hall of India, New Delhi.
3. Environmental Engineering - H.S. Paeavy& D.R. Rowe Mc Graw Hill Book Co. New Delhi
4. Water & Waste Water Technology G.M. Fair & J.C. Geyer.

ENVIRONMENTAL ENGINEERING - I LAB

List of Experiments:

l. To study the various standards for water
2. To study of sampling techniques for water
3. Measurement of turbidity
4. To determine the coagulant dose required to treat the given turbid water sample
5. To determine the conc. of chlorides in a given water samples.
6. Determination of hardness of the given sample.
7. Determination of residual chlorine by chloroscope.
8. Determination of Alkalinity in a water samples
9. Determination of Acidity in a water samples
10. Determination of Dissolved oxygen in the water sample.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Compare the quality of raw water from various resources and calculate water demand based on population forecast.
CO2	Explain physical, chemical and biological drinking water standards.
CO3	Design Water treatment units for treatment of raw water
CO4	Design Water distribution system including hydraulic layout, leak detection and maintenance.
CO5	Explain water pollution control act and operation of sanitary appliance

After the completion of this lab student will be able to-

CO1	Examine quality of raw water from various resources.
CO2	Analyze physical, chemical and biological drinking water standards

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References:

1. Engineering Seismology - Bruce A. Bolt
2. Elements of Earthquake Engineering - Jai Krishna, A.R. Chandrasekaran
3. IS: 1893 -2016 (part I) Criterion for Earthquake Resistant Design.
4. IS : 4326 - 2013 Earthquake resistant design and construction of buildings.
5. IS : 13920 -2016 Ductile design and detailing of RC structures.
6. IS : 13935 -2013 Seismic evaluation, repair and strengthening of masonry buildings.
7. IS : 15988 -2013 Seismic evaluation and strengthening of existing Reinforced buildings.
8. Earthquake Resistant Design of structures, Pankaj Agrawal and Manish Srikhande.
9. Earthquake Resistant Design of structures, S.K. Duggal.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering
CO2	The theoretical and practical aspects of earthquake resistant along with the planning and design aspects
CO3	Diverse knowledge of earthquake resistant design practices applied to real life problems

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-71B	Advanced Foundation Design	70	20	10	-	-	100	3	1	-	4

MODULE -1

Modern methods of soil investigations, Geophysical methods; soil resistivity methods seismic refraction method, stress below ground due to loads.

MODULE -II

Bearing capacity and settlement analysis of shallow foundations: Meyerhof and Hansen's bearing capacity equations, BIS bearing capacity equation, immediate and consolidation settlements in cohesive soil, De-Beer and schmmertman's methods of settlement prediction in non-cohesive soil.

MODULE -III

Classification of piles, load carrying capacity of single piles in clay, silt and sand by dynamic and static methods, Pile load test, Pile group, Negative skin friction, Settlement of pile group.

MODULE – IV

Foundation on expansive soil, Construction on expansive soil, Alteration of soil condition, under-reamed piles. Elements of well foundation, Shape, Depth of scour, well sinking, Tilt, shift and their prevention.

MODULE -V

Stability of slopes, Limit equilibrium method, Method of slices, Simplified Bishop method, Stability Charts. Soil behavior under dynamic loads,Machine foundation: classification, definitions, design principle in brief, Barken's method.

References:

1. J. E. Bowles – Analysis and Design of Foundation.
2. V. N. S. Murthy – Soil Mechanics and Foundation Engineering.
3. K. R. Arora – Soil Mechanics & Foundation Engineering.
4. Alam Singh – Modern Geotechnical Engineering.
5. GopalRanjan and A. S. R. Rao – Basic and Applied Soil Mechanics
6. B. M. Das – Foundation Engineering, CENGAGE Learning

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Course Outcomes-

After the completion of this course students will able to –

CO1	Investigate the soil properties by modern investigation methods
CO2	Calculate bearing capacity and settlement of shallow and deep foundation
CO3	Determine the slope stability using various methods
CO4	Analyze the properties of expansive soil for foundation construction.

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		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-71C	BRIDGE ENGINEERING	70	20	10	-	-	100	3	1	-	4

MODULE -I

Standard Specifications and Code of practice for general requirements of Road Bridges. Design loads for Bridges, IRC loading Standards, Traction Forces and Temperature Effect. General Design requirements. Economic Span of Bridge. Various Types of Bridges.

MODULE -II

Design of Solid Slab and Girder Slab Bridges, Courbon's Theory and Pigeaud' Theory for design of Girders and Slabs.

MODULE -III

Design of Balanced Cantilever Bridges.Design of Cantilever section, Suspended Span and Articulations.

MODULE -IV

Design of Supporting Structures, Piers and Abutments, Solid and Hollow Piers.Single Cellular and Multi Cellular Piers, Design of Bearings.Introduction of Continuous and Arch Bridges.

MODULE -V

Steel Bridges subjected to Railway Loading, Truss Bridges, Girder Bridges, Design of Rocker and Roller Bearing.

Book & References Recommended :

1. D. Johnson Victor, *Essentials of Bridge Engineering.*
2. Aswani M.G., Vazirani V.N., Ratwani M.M., *Design of Concrete Bridges.*
3. Ratwani M.M., *Steel Structures Vol. III.*
4. Ponnuswamy S., *Bridge Engineering.*

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Course Outcomes-

After the completion of this course students will able to –

CO1	Explain the design procedure of girders and bridges by using various theories
CO2	Calculate various kinds of loads on a bridge
CO3	Design slab, girder, truss and cantilever steel bridges

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-72A	Project management	70	20	10	-	-	100	3	1	-	4

MODULE-I
Preliminary and detailed investigation method: Methods of construction, formwork and centering, Schedule of construction, Job layout, Principles of construction management, Modern management techniques like CPM/PERT with network analysis

MODULE-II
Construction Equipments: Factors affecting selection, Investment and operating cost, Output of various equipments, Brief study of equipments required for various jobs i.e. Earthwork, Dredging, Conveyance, Concreting, Hoisting, Pile driving, Compaction and Grouting

MODULE-III
Contracts: Different types of controls, Notice inviting tenders, Contract document, Departmental method of construction, Rate list, Security deposit and Earnest money, Conditions of contract, Arbitration, Administrative approval, Technical sanction

MODULE-IV
Specifications & Public Works Accounts: Importance, Types of specifications, Specifications for various trades of engineering works, Various forms used in construction works, Measurement book, Cash book, Materials at site account, Imprest account, Tools and plants, Various types of running bills, Secured advance, Final bill

MODULE-V
Site Organization & Systems Approach to Planning: Accommodation of site staff, contractor's staff, Various organization charts and manuals, Personnel in construction, Welfare facilities, Labour laws and human relations, Safety engineering, Problem of equipment management, Assignment model, Transportation model and Waiting line modals with their applications, Shovel truck performance with waiting line method

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Reference Books:-

1. Construction Equipment by Peurify
2. CPM by L.S. Srinath
3. Construction Management by S.Seetharaman
4. CPM & PERT by Weist& Levy
5. Construction, Management & Accounts by Harpal Singh
6. Tendering & Contracts by T.A. Talpasai

Course Outcomes-

After the completion of this course students will able to –

CO1	Illustrate formwork, job layout, construction equipments, various types of contracts. various specification of engineering work, assignment models, functional organization
CO2	Analyse a construction project by forming a network/bar chart
CO3	Draft a tender for a constructional project and measurement of a work

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		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-72B	Computational methods in structural engineering	70	20	10	-	-	100	3	1	-	4

MODULE - I

Matrix formulation for the principle of virtual work and energy principles, principle of contragradience, stiffness and flexibility matrices, Degree of Freedom.Axial, bending, shear and torsional deformations.

Local and Global Element stiffness matrices for bar, beam, shaft, grid, shear wall, beam column, beam with rigid ends, beam on elastic foundation and elements with special boundary conditions. Non-prismatic and curved elements, forces and displacements in general coordinate axes, structure stiffness matrix.

MODULE - II

Basics of the Direct Stiffness method - Analysis of pin-jointed frames, rigid jointed structures,plane grids and composite structures for different loads including temperature, shrinkage,prestressing forces. Elastic stability analysis of 2-D rigid jointed frames, (Sway & Non-sway).

MODULE - III

Concepts of Bandwidth, various storage schemes & equation solvers; Reduction in order of stiffness matrix - use of substructures, static condensation method, Exploiting symmetry, skew symmetry and cyclic symmetry in structures, Imposition of Constraints – Lagrange Multiplier and Penalty Methods.

MODULE - IV

Analysis of continuum structures - Fundamental equations of theory of elasticity (2D), basic concepts of Finite Element Analysis, derivation of generalized element stiffness matrix and load vectors, convergence requirements, stiffness matrices for various elements using shape functions, Triangular and Rectangular elements. (PSPS).

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MODULE - V

Two Dimensional Isoparametric elements, shape functions for Simplex.Lagrangian and Serendipity family elements in natural coordinates, computation of stiffness matrix for isoparametric elements, degrading of elements, plate bending elements.

Reference Books:-

1. Ghali A & Neville M., Structural Analysis - A Unified Classical and Matrix Approach, Chapman and Hall, New York.
2. Weaver William & Gere James M., Matrix Analysis of Framed structures, CBS Publishersand Distributors, New Delhi.
3. Cook R.D., Concepts and Applications of Finite Element Analysis, Wiley, New York.
4. Gallagher R., Finite Element Analysis Fundamentals, Prentice-Hall, Englewood Cliffs, NJ.
5. Rubenstein M.F., Matrix Computer Analysis of structures, Prentice Hall, Englewood Cliffs, N.J.
6. Zeinkiewicz O.C & Taylor R.L., The Finite Element Method, McGraw Hill, London

Course Outcomes-

After the completion of this course students will able to –

CO1	Apply matrices method (stiffness and flexibility matrices) for different structural elements
CO2	Examine the structures by stiffness matrices method for different loads including temperature, shrinkage, prestressing forces.
CO3	Modify the matrices in order to increase the efficiency for solving time taking computational problems by various methods
CO4	Analyze the continuum structures and two dimensional Isoperimetric elements using finite element concept

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
CE-72C	Environmental Impact Assessment	End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work	100	L	T	P	4
		70	20	10	-	-		3	1	-	

MODULE-I

Concept of EIA: Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts,Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)

MODULE-II

Methods of Impact Identification: Environmental Indices and indicators for describing the affectedenvironment, matrix methodologies, network, checklist, and other method.

MODULE-III

Impact analysis: Framework, statement predication and assessment of impact of air, water, noise andsocio-economic environment.

MODULE-IV

Preparation of written documentation: Initial planning phase, detailed planning phase, writing phase,organizing relevant information, co-ordination of team writing effort.

MODULE-V

Public Participation in Environmental Decision making: Basic definitions, Regulatory requirements, advantages & disadvantages of Public Participation, Selection of Public participation techniques, Practical considerations for implementation.

Reference Books:-

1. A. K. Srivastav, Environment Impact Assessment, APH Publishing
2. John Glasson, RikiTheivel& S. Andrew Chadwick Introduction to ELA" University College London Press Limited
3. Larry W Canter, "Environment Impact Assessment" More Hill Inc., New York.
4. Ministry of Environment & Forests, Govt. of India 2006 EIA Notification
5. Rau GJ and Wooten C. D." EIA Analysis Hand Book" McGraw Hill

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Course Outcomes-

After the completion of this course students will able to –

CO1	Explain the significance of environment impact assessment
CO2	Identify the environmental impact using various methods
CO3	Assess the impact of various environmental agencies and summarize EIA report
CO4	Demonstrate role of public in environmental decision making.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-73	Environmental Engg.-II	70	20	10	30	20	150	3	-	2	4

MODULE-I:
Sewerage schemes and their importance, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations.

MODULE-II:
Characteristics and analysis of waste water cycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, ThOD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self-purification capacity of stream, oxygen sag analysis.

MODULE-III:
Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.

MODULE-IV:
Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank &inhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.

MODULE-V:
Advanced Waste Water treatment - Diatomaceous earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico-chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods. Rural sanitation - collection & disposal of refuse, sullage& night soil.

Reference Books :-

l. Water Supply & Sanitary Engg. - G.S. Birdie - DhanpatRai Publishing Company,(P) Ltd. New Delhi
2. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi

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3. Environmental Engg. - M.L. Davis & D.A. Cornwell - McGraw Hill Company
4. Chemisfy for Environmental Engg. - Sawyer & Mc Carty - McGraw Hill Book Company New Delhi
5. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
6. Waste Water Engineering - Metcalf & Eddy - McGraw Hill Book Company New Delhi

List of experiments:

1. To study the various standards for waste water.
2. To study the sampling techniques for waste water.
3. To determine the alkalinity in water sample.
4. To determine the acidity in water sample.
5. Determination of Dissolved Oxygen in the water and waste water sample.
6. Determination of Biological Oxygen demand of a waste water sample.
7. Determination of Chemical Oxygen demand of a waste water sample
8. Determination of various types of solids in the waste water sample
9. Determination of bacterial number by membrane filter Technique
10. Determination of bacterial colonies by standard plat count method

Course Outcomes-

After the completion of this course students will able to –

CO1	Apply matrices method (stiffness and flexibility matrices) for different structural elements
CO2	Examine the structures by stiffness matrices method for different loads including temperature, shrinkage, pre stressing forces.
CO3	Modify the matrices in order to increase the efficiency for solving time taking computational problems by various methods
CO4	Analyze the continuum structures and two dimensional isoperimetric elements using finite element concept

After the completion of this lab students will able to –

CO1	Perform common environmental experiments relating to water and wastewater quality, and know which tests are appropriate for given environmental problems.
CO2	Apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
CE-74	Estimating costing and tendering	End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work	150	L	T	P	4
		70	20	10	30	20		3	-	2	

MODULE – I

Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities.Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

MODULE-II

Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates (C.S.R.)

MODULE-III

Detailed Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.

MODULE-IV

Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.

MODULE-V

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

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Reference books:-

1. Chakraborti M "Estimating and Costing" Published by the author 21 B, Bhabananda Road,Calcutta,2002.
2. Dutta B N "Estimating and Costing in Civil Engineering" UBS Publishers' Distributors Ltd., New Delhi, 1999.
3. Birdie G S "Estimating and Costing" Dhanpat Rai & Sons, Delhi,1994.
4. Kohli D. D.,KohliR.C.,'Estimating and Costing",S.Chand&Company,New Delhi,2004
5. Spence Gedder,"Building and Public Works Administration, Estimating and Costing",Newnes Publishers,London,UK,1950.

LIST OF EXPERIMENTS

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project.
6. Analysis of rate for brick work
7. Analysis of rate for plaster work
8. Estimate quantity of reinforcement
9. Preparation for approximate estimate for road project
10. Estimating cost of building on plinth area method

Course Outcomes-

After the completion of this course students will able to –

CO1	Illustrate various type of estimate, their purpose and importance.
CO2	Analyse the rates of important item, material and labour requirement for various trades.
CO3	Prepare detailed estimates of construction works such as building, earth work, water supply, etc.
CO4	Evaluate gross income based on depreciation of property, mortgage and lease problems.

After the completion of this lab students will able to –

CO1	Will have a basic knowledge on methods and types of estimation and its merits and demerits
CO2	Have knowledge on specifications and tendering process for contracts
CO3	Will have the ability to understand the types, formation, terms and conditions in contracts and arbitration

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-75	Structural Design & Drawing-III (RCC)	70	20	10	30	20	150	3	-	2	4

MODULE-I
Design of Multi-storey Buildings - Sway and non sway buildings, Shear walls and other bracing elements.

MODULE-II
Earth Retaining Structures: Cantilever and counter fort types retaining walls.

MODULE-III
Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular &intze tanks.

MODULE-IV
Silos and Bunkers

MODULE-V
T-beam & Slab bridges- for highway loading (IRC Loads).Prestressing concepts materials, systems of prestressing& losses Introduction to working & limit State Design.

Reference Books:

1. R.C.C. by O.P. Jain Vol. II
2. R.C.C. by B.C. Punamia
3. Essentials of Bridge engineering . D.J. Victor
4. Bridge Engineering - Ponnuswamy
5. Advanced R.C.C. Desigr by N.K. RAJU
6. N. krishnaRaju, Prestressed Concrete, Tata McGraw Hill, New Delhi.
7. Pre stresses concrete . T.Y. Lin

List of experiments

1 .Design and drawing of multistory building.
2. Design and drawing of cantilever retaining walls.

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3. Design and drawing of counter fort retaining wall.
4. Design and drawing of water tanks resting on ground.
5. Design and drawing of underground water tank.
6. Design and drawing of overhead water tanks.
7. Design and drawing of silos.
8. Design and drawing of bunkers.
9. Design and drawing of RCC slab for highway loading
10. Compressive, Split-tensile and Flexural Strength of testing samples.

Course Outcomes-

After the completion of this course students will able to –

CO1	Explain bracing elements, shear wall, sway/non-sway buildings, prestressing systems
CO2	Analyze slab bridges, prestressed concrete beams and slabs
CO3	Design multi storey building, retaining walls, overhead and underground water tank. silos and bunkers.

After the completion of this lab students will able to –

CO1	To develop basic understanding of reinforced concrete as a construction material.
CO2	To develop understanding of various design philosophies and their differences.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-81A	Structural Design & Drawing-IV (Steel)	70	20	10	-	-	100	3	1	-	4

MODULE-I:
Plate girder bridges (Riveted and welded)

MODULE - II :
Trussed girder bridges for railways and highways (RC & IRS holding). Bearings for bridges.

MODULE - III :
Water Tanks: Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

MODULE-IV:
Chimneys: Guyed and self supporting steel stacks.

MODULE-V:
Bunkers, Silos & Towers.

Reference Books :-

1. Design of Steel Structures - Ramammutham
2. Design of Steel Structures - Punia
3. Steel Str. by Ramchandra Vol II
4. Steel Str. by Arya&Ajmani
5. Design of steel structures - L.S. Negi

Course Outcomes-

After the completion of this course student will be able to-

CO1	Estimate loads on steel structure like girder, bridges, chimneys etc.
CO2	Analyse the steel structure on the basis of estimated loads
CO3	Design plate girder bridge, trussed girder bridge and bearings for bridges, steel water tanks, guyed self supporting steel stacks Bunkers, Silos and Towers.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-81B	Pavement Design	70	20	10	-	-	100	3	1	-	4

MODULE -I :
Equivalent Single Wheel Load (ESWL) : Definition, calculation of ESWL, repetition of loads and their effects on the pavement structures.

MODULE -II :
Flexible Pavements : Component parts of the pavement structures and their firnctions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque's theory, Burmister's two layered theory,methods of design, group index method, CBR method, Burmister's method and North Dakota cone method.

MODULE -III :
Rigid Pavements : Evaluation of subgrade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stesses, critical loading positions.

MODULE -IV :
Rigid pavement design : IRC method, Fatigue analysis, PCA chart method, joints, design and construction & types, AASHTO Method, Reliability analysis.

MODULE -V :
Evaluation and Stengthening of Existing Pavements :Benkleman beam method, Serviceability Index Method.Rigid and flexible overlays and their design procedures.

Reference Books :--

1. Principles of pavement design by E.J.Yoder& M.W. Witczak
2. AASHO, "A'r{SHO Interim Guide for Design of Pavement Structures", Washington, D.C.
3. Portland Cement Association, Guidlines for Design of Rigid Pavements, Washington New Delhi.

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Course Outcomes- After the completion of this course student will be able to-

CO1	Calculate ESWL, repetition of load and their effects on pavement structures.
CO2	Determine stresses in Flexible and rigid pavements.
CO3	Design rigid pavements as per IRC methods, PCA Chart methods and AASHTO methods.
CO4	Evaluate and strengthen existing pavement by Benkleman beam method and serviceability Index method.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-81C	Traffic Engineering	70	20	10	-	-	100	3	1	-	4

MODULE -I.

Traffic Characteristics: (i) Road user's characteristics - general human characteristics, physical,mental and emotional factors, factors affecting reaction time, PIEV theory. (ii) Vehicularcharacteristics: Characteristics affecting road design-width, height, length and other dimensions. weight, power, speed and braking capacity of a vehicle.

MODULE -II.

Traffic Studies: (i) Spot Speed Studies and Volume Studies.(ii) Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies. (iii) Origin and destination Studies (O & D): Various methods, collection and interpretation of data, planning and sampling. (iv)Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service. (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

MODULE -III.

Traffic Operations and Control: (i) Traffic regulations and various means of control.(ii) One way streets- advantages and limitations. (iii) Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

MODULE -IV.

Street Lighting: (i) Methods of light distribution. (ii) Design of street lighting system. (iii) Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors. (iv) Differenttypes of light sources used for street lighting. (v) Fundamental factors of night vision.

MODULE -V.

Accident Studies & Mass Transportation: (i) Accident Studies: Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

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Reference Books :-

1. Traffic Engineering and Transport Planning by L.R. Kadiyali, Khanna Publishers, Delhi
2. Traffic Engineering by Matson, W.S.Smith& F.W. Hurd
3. G.J. Pingnataro, Principles of Traffic Engineering
4. D.R.Drew, Traffic Flaw Theory
5. W.R. Mchsne and R.P. Roess "Traffic Engg"
6. Wohl& Martin, Traffic System Analysis for Engineering & Planners

Course Outcomes-

After the completion of this course student will be able to-

CO1	Illustrate traffic characteristics, its impact on road traffic, various problems on mass transportation and road accidents
CO2	Practice different traffic studies and give its practical significance
CO3	Design different traffic signal system, traffic islands and street lighting

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		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-82A	Finite Element Method	70	20	10	-	-	100	3	1	-	4

MODULE-I
Introduction- Introduction to Finite Element Method, Comparison with other methods. Basic concepts of finite element method, Introduction to boundary value and initial value problems, Introduction to stiffness matrix and boundary conditions.

MODULE-II
Shape Functions & Discretization of Structures Introduction of shape functions, polynomials, convergence requirements of shape functions, derivation of shape functions, Hermite and Lagrange polynomials. Introduction to discretization of structure, Nodes as discontinuities, Refining mesh, Use of symmetry, Element aspect ratio, Higher order element, Elements numbering.

MODULE-III
Spring, Bar & Beam Element- One dimensional second order equations, Derivation of stiffness matrix for a spring element, Direct stiffness method, Potential energy approach to derive spring element equations, Derivation of stiffness matrix for a bar element in local coordinates, Selection of approximation function, Beam stiffness, assemblage of beam stiffness matrix, potential energy approach to derive beam element equations, Analysis of beam using two noded elements, Galerkin's Residual method.

MODULE-IV
Plane stress and plane strain problems- Introduction, CST (Constant Strain Triangle) element, finite element solution of plane strain problem, Explicit expression for CST stiffness matrix.

MODULE-V
Isoparametric formulation- Coordinate transformation, Bar element, Rectangular plane stress element, Numerical integration, Gauss Quadrature

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Reference Books:

1. Chandrupatla. T.R., and Belegundu, A.D., "Introduction to Finite Element in Engineering". Third Edition, Prentice Hall, India, 2003.
2. Bhavikati, S. S., "Finite Element Analysis", New Age International Publishers, 2005.
3. Daryl L.. Logan, "A First Course in the Finite Element Method", Cengage Learning, 2011.
4. J. N. Reddy, "An Introduction to Finite Element Method", McGraw-Hill. Intl. Student Edition, 1985.
5. Zienkiewics, "The finite element method, Basic formulation and linear problems", Vol.1. 4/e, McGraw-Hill, Book Co.
6. S. S. Rao, "The Finite Element Method in Engineering". Pergaman Press, 2003.
7. C. S. Desai and J. F. Abel, "Introduction to the Finite Element Method". Affiliated East West Press, 1972.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Explain concepts of FEM, plane stress, strain and discretization of structures
CO2	Derive shape functions for various type of elements
CO3	Determine stiffness matrix for spring, bar and beam elements
CO4	Perform numerical integration using Gauss Quadrature.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-82B	Air Quality Monitoring & Control	70	20	10	-	-	100	3	1	-	4

MODULE- I
Air-pollution :Definition, Atmosphere and global effects, Pollutants and their sources, classification. Air Pollution Meteorology : Interaction of Meteorology parameters, Transport and Diffusion Models and mechanism, Wind rose diagram, Particulates Visibility. Dynamics of pollutant dispersion and disposal. Effects on environment including living and non-living matter.

MODULE- II
Air Pollutant Chemistry:Properties of Pollutant, MODULEs for expression of concentrations, Effects on Vegetation, Physical Environment and Human Health Mechanisms of Effect, Estimation Methodology. Human Health Hazard: MODULEs of Measurement, Measurement of Concentration on Human Health. Nature of process Emissions: Mobile Combustion. Sources, Stationary Source, Measurement of Monitoring.

MODULE- III
Ambient air quality monitoring techniques: Air pollution indices, standards, norms, rules and regulations. Removal processes. An introduction to air pollution meteorology. Air Laboratory - High Volume
Sampling, Handy Sampling, Bio aerosols sampling, Indoor Air Sampling, Stack Sampling.

MODULE- IV
Prevention and Control of Air Pollution:Regulated Release of Air Pollutant Practicability, Mechanisms of Control, Equipment Mathematical Model of Control Processes, Mechanical Collectors, Wet Collectors, Filtration, Electrostatics Precipitators Of Form Bed Reactors and Ventury Scrubbers, After Burners And Dispersion. Industrial
Application: Wood Working Operation, Open Hearth Neel Making, Manufacture of Sulfuric Acid, Coffee Roasting, Environmental Industrial Location, Theories And Facilities, Impact of Industrial Products.

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MODULE- V

Legislation : Standards of Air Qualities in Various Countries , Evolution of Standards, Standards and Criteria, Emission Standards and Air Qualities Standards, Clean Air Act, Total Environmental Protection, Social Responsibility, Economics and Production..

Reference Books :

1. "Air Pollution : It's Origin and Control" By Kenneth Wark& Cecil F. Warner.
2. "Air Pollution Control Volume (I to VII)" By A.C. Stern.
3. "Air Pollution" By Henery C. Perkins (Mc-Graw Hill Publication)
4. "Air Pollution and It's Control" By M.N. Rao & C.S. Rao.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Identify the sources of air pollution.
CO2	Relate general diseases and toxicity of pollutants.
CO3	Explain the design and operation of various air pollution control equipments.
CO4	Apply air pollution control legislation, public education pollution standards, etc. to practice.

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Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
CE-82C	FRP Composites	70	20	10	-	-	100	3	1	-	4

MODULE-I
Introduction-Composites- Advantages of FRP –Role of resin and reinforcements -Applications of FRP. Designing in FRP – Selection criteria - material and process selection

MODULE-II
Molds for FRP-Polyester resins. Introduction – Plaster mold, wooden Mold - GRP molds-Epoxide moldsSteel molds- Aluminum alloy molds- Nickel shell molds.

MODULE-III
Reinforcements-Introduction - Surfacing tissue –Glass fiber - Continuous filament rovings-Chopped strands- Chopped strand mats- Continuous strand mat Woven glass fabrics- Carbon fiber- Aromatic polyamide (aramid) fibers - Polyester fibers- Polyacrylonitrile fibers - Nylon - PVC and PVDC Cotton – Sisal - Asbestos– Jute- Boron fibers

MODULE-IV
Molding Processes-Introduction - Contact molding -hand lay up - Spray lay-up- Vacuum bag molding - Pressure bag molding – Resin transfer or resin injection molding-pressure injection-Vacuum impregnation and injection - Hot press/matched metal molding - Filament winding-Centrifugul molding - Continuous sheet manufacture – Pultrusion - Sandwich construction.

MODULE-V
Bulk, Dough and Sheet molding Compounds and Prepregs. Introduction- Dough and bulk molding compounds - Sheet mould compounds- manufacture of SMC- Prepregs - Commercial products.

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Reference Books:

1. FRP TECHNOLOGY by Weatherhead.
2. FIBERREINFORCED COMPOSITES- Materials, Manufacturing, and Design by P.K. Mallick
3. COMPOSITES MANUFACTURING- Materials, Product, and Process Engineering by Sanjay K. Mazumdar 4. Hand book of Reinforcement for plastics – Milewski .
5. M O W Richardson "Polymer Engineering Composite" – Applied Science.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Illustrate selection criteria for materials selection.
CO2	Choose different types of fibre for FRP composites
CO3	Explain types of molds and manufacturing processes.

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