Department of Civil Engineering

Aravali Institute of Technical Studies, Udaipur

ARAVALI
INSTITUTE OF TECHNICAL STUDIES

COURSE CURRICULUM

B.Tech. In Civil Engineering

Academic Session 2021-2022

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Vision of the Institute

Tomorrow will take care itself, if one does an excellent job today. To nurture and develop talent, blended with values and technology to strengthen the technical man power of the nation.

Mission of the Institute

- **Impart quality education along with industrial exposure.**
- **To provide industry interface for faculty and students to work on projects with end goal of real time knowledge.**
- **Enhancing the quality of life through sustainable development.**
- **To Continuous development of infrastructure and enhance state of the art equipment to provide our students a technology up to date and intellectually inspiring environment of learning, research, creativity, innovation and professional activity and provide ethical and moral values.**

Vision - Department of Civil Engineering

To establish a center of learning for providing a quality based engineering education to the students from the urban and rural area and services to the professional and the community; and to produce innovative civil engineers.

Mission - Department of Civil Engineering

- **To serve the civil aspirants from all over the country by providing a broad and high quality education for a successful professional career.**
- **To promote quality education, research and consultancy for industrial and societal needs.**
- **To conduct strong basic and applied research.**

Programme Educational Objectives (PEOs)

PEO1: To ensure that graduates will have a mastery of fundamental knowledge, problem solving skills, engineering experimental abilities, and design capabilities necessary for entering civil engineering career and/or graduate school.

PEO2: To incorporate verbal and written communication skills necessary for successful professional practice.

PEO3: Demonstrate knowledge of management principles and engineering techniques for effective project management.

PEO4: To prepare graduates to deal with ethical and professional issues, taking into account the broader societal implications of civil engineering.

PSO's (Program Specific Outcomes)

PSO1: Graduates will be able to apply technical skills and modern engineering tools for civil engineering day to day practice.

PSO2: Graduates will be able to participate in critical thinking and problem solving of civil engineering field that requires analytical and design requirements.

PSO3: Graduates will be able to pursue of lifelong learning and professional development to face the challenging and emerging needs of our society.

Programme Outcomes (PO's)

A student will develop:

PO1-Engineering knowledge : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2- Problem analysis : Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3-Design/development of solutions : Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4-Conduct investigations of complex problems : Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5-Modern tool usage : Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6-The engineer and society : Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7- Environment and sustainability : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8- Ethics : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9- Individual and team work : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10- Communication : Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11- Project management and finance : Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12- Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B.Tech. : Civil Engineering
2nd Year - III Semester

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
THEORY											
1	BSC	3CE2-01	Advance Engineering Mathematics -I	3	0	0	3	30	70	**100**	**3**
2	HSMC	3CE1-02/ 3CE1-03	Technical Communication /Managerial Economics & Financial Accounting	2	0	0	2	30	70	**100**	**2**
3	ESC	3CE3-04	Engineering Mechanics	2	0	0	2	30	70	**100**	**2**
4	PCC	3CE4-05	Surveying	3	0	0	3	30	70	**100**	**3**
5		3CE4-06	Fluid Mechanics	2	0	0	2	30	70	**100**	**2**
6		3CE4-07	Building Materials and Construction	3	0	0	3	30	70	**100**	**3**
7		3CE4-08	Engineering Geology	2	0	0	2	30	70	**100**	**2**
			Sub Total	17	0	0					**17**
PRACTICAL & SESSIONAL											
8	PCC	3CE4-21	Surveying Lab	0	0	3		60	40	**100**	**1.5**
9		3CE4-22	Fluid Mechanics Lab	0	0	2		60	40	**100**	**1**
10		3CE4-23	Computer Aided Civil Engineering Drawing	0	0	3		60	40	**100**	**1.5**
11		3CE4-24	Civil Engineering Maretials Lab	0	0	2		60	40	**100**	**1**
12		3CE4-25	Geolgy Lab	0	0	2		60	40	**100**	**1**
13	PSIT	3CE7-30	Industrial Training	0	0	1		60	40	**100**	**1**
14	SODECA	3CE8-00	Social Outreach, Discipline & Extra Curricular Activities							**100**	**0.5**
			Sub- Total	0	0	13					**7.5**
		TOTAL OF III SEMESTER		17	0	13					**24.5**

L: *Lecture,* ***T:*** *Tutorial,* ***P:*** *Practical,* ***Cr:*** *Credits*

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B.Tech. : Civil Engineering
2nd Year - IV Semester

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
THEORY											
1	BSC	4CE2-01	Advance Engineering Mathematics -II	2	0	0	2	30	70	**100**	**2**
2	HSMC	4CE1-03/ 4CE1-02	Managerial Economics & Financial Accounting/ Technical Communication	2	0	0	2	30	70	**100**	**2**
3	ESC	4CE3-04	Basic Electronics for Civil Engineering Applications	2	0	0	2	30	70	**100**	**2**
4	PCC	4CE4-05	Strength of Materials	3	0	0	3	30	70	**100**	**3**
5		4CE4-06	Hydraulics Engineering	3	0	0	3	30	70	**100**	**3**
6		4CE4-07	Building Planning	2	0	0	2	30	70	**100**	**2**
7		4CE4-08	Concrete Technology	3	0	0	3	30	70	**100**	**3**
			Sub Total	17	0	0					**17**
PRACTICAL & SESSIONAL											
8	PCC	4CE4-21	Material Testing Lab	0	0	2		60	40	**100**	**1**
9		4CE4-22	Hydraulics Engineering Lab	0	0	2		60	40	**100**	**1**
10		4CE4-23	Building Drawing	0	0	3		60	40	**100**	**1.5**
11		4CE4-24	Advanced Surveying Lab	0	0	2		60	40	**100**	**1**
12		4CE4-25	Concrete Lab	0	0	3		60	40	**100**	**1.5**
13	SODECA	4CE8-60	Social Outreach, Discipline & Extra Curricular Activities	0	0	0		60	40	**100**	**0.5**
			Sub- Total	0	0	12					**6.5**
			TOTAL OF IV SEMEESTER	17	0	12					**23.5**

L: *Lecture,* ***T:*** *Tutorial,* ***P:*** *Practical,* ***Cr:*** *Credits*

ETE: *End Term Exam,* ***IA:*** *Internal Assessment*

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B.Tech. : Civil Engineering
3rd Year –V Semester

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
THEORY											
1	ESC	5CE3-01	Construction Technology & Equipments	2	0	0	2	20	80	**100**	**2**
2	PCC/ PEC	5CE4-02	Structural Analysis-I	2	0	0	2	20	80	**100**	**2**
3		5CE4-03	Design of Concrete Structures	3	0	0	3	30	120	**150**	**3**
4		5CE4-04	Geotechnical Engineering	3	0	0	3	30	120	**150**	**3**
5		5CE4-05	Water Resource Engineering	2	0	0	2	20	80	**100**	**2**
6		Departmental Elective-I:		2	0	0	2	20	80	**100**	**2**
		5CE5-11	Air & Noise Pollution and Control								
		5CE5-12	Disaster Management								
		5CE5-13	Town Planning								
7		Departmental Elective-II:		2	0	0	2	20	80	**100**	**2**
		5CE5-14	Repair and Rehabilitation of Structures								
		5CE5-15	Ground Improvement Techniques								
		5CE5-16	Energy Science & Engineering								
		Sub Total		**16**	**0**	**0**		**160**	**640**	**800**	**16**
PRACTICAL & SESSIONAL											
8	PCC	5CE4-21	Concrete Structures Design	0	0	3	3	45	30	**75**	**1.5**
9		5CE4-22	Geotechnical Engineering Lab	0	0	3	3	45	30	**75**	**1.5**
10		5CE4-23	Water Resource Engineering Design	0	0	2	2	30	20	**50**	**1**
11	PSIT	5CE7-30	Industrial Training	0	0	1		75	50	**125**	**2.5**
12	SODECA	5CE8-00	Social Outreach, Discipline & Extra Curricular Activities	0	0	0		0	25	**25**	**0.5**
		Sub- Total		**0**	**0**	**9**		**195**	**155**	**350**	**7**
		TOTAL OF V SEMESTER		**16**	**0**	**9**		**355**	**795**	**1150**	**23**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B. Tech.: Civil Engineering
3rd Year – VI Semester

SN	Category	Course Code	Course Title	Contact hrs/week L	T	P	Marks Exm Hrs	IA	ETE	Total	Cr
THEORY											
1	ESC	6CE3-01	Wind & Seismic Analysis	2	0	0	2	20	80	**100**	**2**
2	PCC/ PEC	6CE4-02	Structural Analysis-II	3	0	0	3	30	120	**150**	**3**
3		6CE4-03	Environmental Engineering	3	0	0	3	30	120	**150**	**3**
4		6CE4-04	Design of Steel Structures	3	0	0	3	30	120	**150**	**3**
5		6CE4-05	Estimating & Costing	2	0	0	2	20	80	**100**	**2**
6		Departmental Elective-III:		2	0	0	2	20	80	**100**	**2**
		6CE5-11	Pre-stressed Concrete								
		6CE5-12	Solid and Hazardous Waste Management								
		6CE5-13	Traffic Engineering and Management								
7		Departmental Elective-IV:		2	0	0	2	20	80	**100**	**2**
		6CE5-14	1. Bridge Engineering								
		6CE5-15	2. Rock Engineering								
		6CE5-16	3. Geographic Information System & Remote Sensing								
		Sub Total		**17**	**0**	**0**		**170**	**680**	**850**	**17**
PRACTICAL & SESSIONAL											
8	PCC	6CE4-21	Environmental Engineering Design and Lab	0	0	3	3	45	30	**75**	**1.5**
9		6CE4-22	Steel Structure Design	0	0	3	3	45	30	**75**	**1.5**
10		6CE4-23	Quantity Surveying and Valuation	0	0	2	2	30	20	**50**	**1**
11		6CE4-24	Water and Earth Retaining Structures Design	0	0	2	2	30	20	**50**	**1**
12		6CE4-25	Foundation Design	0	0	2	2	30	20	**50**	**1**
13	SODECA	6CE8-00	Social Outreach, Discipline & Extra Curricular Activities						25	**25**	**0.5**
		Sub- Total		**0**	**0**	**12**		**180**	**145**	**325**	**6.5**
		TOTAL OF VI SEMESTER		**17**	**0**	**12**		**350**	**825**	**1175**	**23.5**

***L:** Lecture, **T:** Tutorial, **P:** Practical, **Cr:** Credits*
***ETE:** End Term Exam, **IA:** Internal Assessment*

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Scheme & Syllabus

IV Year- VII & VIII Semester: B. Tech. (Civil Engineering)

Teaching & Examination Scheme
B.Tech.: Civil Engineering
4th Year - VII Semester

SN	Category	Course Code	Course Title	Hours Per Week			Marks				Cr
				L	T	P	Exm Hrs	IA	ETE	Total	
			THEORY								
1	PCC	7CE4-01	Transportation Engineering	3	0	0	3	30	120	**150**	**3**
2	OE		Open Elective-I	3	0	0	3	30	120	**150**	**3**
			Sub Total	**6**	**0**	**0**		**60**	**240**	**300**	**6**
			PRACTICAL & SESSIONAL								
3	PCC	7CE4-21	Road Material Testing Lab	0	0	2		30	20	**50**	**1**
4		7CE4-22	Professional Practices & Field Engineering Lab	0	0	2		30	20	**50**	**1**
5		7CE4-23	Soft Skills Lab	0	0	2		30	20	**50**	**1**
6		7CE4-24	Environmental Monitoring and Design Lab	0	0	2		30	20	**50**	**1**
7	PSIT	7CE7-30	Practical Training	1	0	0		75	50	**125**	**2.5**
8		7CE7-40	Seminar	2	0	0		60	40	**100**	**2**
9	SODECA	7CE8-00	SODECA	0	0	0		0	25	**25**	**0.5**
			Sub- Total	**3**	**0**	**8**		**255**	**195**	**450**	**9**
			TOTAL OF VII SEMESTER	**9**	**0**	**8**		**315**	**435**	**750**	**15**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B.Tech.: Civil Engineering
4th Year - VIII Semester

SN	Category	Course Code	Course Title	Hours Per Week			Marks				Cr
				L	T	P	Exm Hrs	IA	ETE	Total	
THEORY											
1	PCC	8CE4-01	Project Planning and Construction Management	3	0	0	3	30	120	**150**	**3**
2	OE		Open Elective-II	3	0	0	3	30	120	**150**	**3**
			Sub Total	**6**	**0**	**0**		**60**	**240**	**300**	**6**
PRACTICAL & SESSIONAL											
3	PCC	8CE4-21	Project Planning & Construction Management Lab	0	0	2		30	20	**50**	**1**
4		8CE4-22	Pavement Design	0	0	2		30	20	**50**	**1**
5	PSIT	8CE7-50	Project	3	0	0		210	140	**350**	**7**
6	SODECA	8CE8-00	Social Outreach, Discipline & Extra Curricular Activities	0	0	0		0	25	**25**	**0.5**
			Sub- Total	**0**	**0**	**4**		**270**	**205**	**475**	**9.5**
			TOTAL OF VIII SEMESTER	**9**	**0**	**4**		**330**	**445**	**775**	**15.5**

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ETE: *End Term Exam,* ***IA:*** *Internal Assessment*

3CE2-01: ADVANCE ENGINEERING MATHEMATICS-I

Credit: 3 **Max. Marks: 100 (IA: 30, ETE: 70)**

3L+0T+0P **End Term Exam: 3 Hours**

Course Outcomes:

C2O1.1	**Explain the concept of operators, finite differences and interpolation**
C2O1.2	**Apply Numerical methods to solve first order Ordinary Differential Equations and Algebraic and Transcendental equations**
C2O1.3	**Use Laplace Transforms in engineering applications.**
C2O1.4	**Demonstrate the ability of solving ordinary differential equations and partial differential equations by Fourier transform**
C2O1.5	**Determine the solution of difference equations by use of Z transform.**

Syllabus:

Chapter-1

Numerical Methods – 1: Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Gauss's forward and backward interpolation formulae. Stirling's Formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange'sformulae. Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

Chapter-2

Numerical Methods – 2: Numerical solution of ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge- Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Solution of polynomial and transcendental equations-Bisection method, Newton-Raphson method and Regula-Falsi method.

Chapter-3

Laplace Transform: Definition and existence of Laplace transform, Properties of Laplace Transform and formulae, Unit Step function, Dirac Delta function, Heaviside function, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace transforms method.

Chapter-4

Fourier Transform: Fourier Complex, Sine and Cosine transform, properties and formulae, inverse Fourier transforms, Convolution theorem, application of Fourier transforms to partial ordinary differential equation (One dimensional heat and wave equations only).

Chapter-5

Z-Transform: Definition, properties and formulae, Convolution theorem, inverse Z- transform, application of Z-transform to difference equation.

Text Books:

1. Engineering MathsVol-I by Chandrika Prasad, Standard Publishers and Distributers.
2. Vol-II by Chandrika Prasad, Standard Publishers and Distributers.
3. Higher Engineering Maths by Gaur & Kaul, Jaipur Publishing House

3CE1-02: TECHNICAL COMMUNICATION

Credit: 2 | Max. Marks: 100 (IA: 30, ETE: 70)

2L+0T+0P | End Term Exam: 2 Hours

Course Outcomes:

C202.1 **Ability to describe the Elements of Written Communication.**
C202.2 **Ability to recognize basic Value-based Text Reading**
C202.3 **Ability to express fundamentals of Technical Communication**
C202.4 **Ability to choose Appropriate Forms of Technical Communication**
C202.5 **Ability to Design programs that presentation Strategies.**

Syllabus:

Chapter-1

Introduction to Technical Communication- Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication, technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication.

Chapter-2

Comprehension of Technical Materials/Texts and Information Design & development- Reading of technical texts, Reading and comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note-making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media.

Chapter-3

Technical Writing, Grammar and Editing- Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking, Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, Minutes of Meetings.

Chapter-4

Advanced Technical Writing- Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals, Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles.

Text Books:

1. Communication techniques grammatical aspects by Dr. Shukla Arora, Dr. Medhavijain, Dr. Rita Arora.

2. Dr. RajendraLadiya

3CE3-04: ENGINEERING MECHANICS

Credit: 2
2L+0T+0P

Max. Marks: 100 (IA: 30, ETE: 70)
End Term Exam: 2 Hours

Course outcomes:

C204.1 **Determine resultants and apply conditions of static equilibrium to plane force system.**
C204.2 **Identify and quantify all forces associated with a static framework and determine forces and stress in truss.**
C204.3 **Determine Centroid and moment of inertia of composite section and theorems.**
C204.4 **Derive and apply stress and strain relationships in single and compound members.**
C204.5 **Solve the problems of spring, friction and determine work, energy, power and virtual work.**

Syllabus:

Chapter- 1

Introduction: objective, scope and outcome of the course.

Chapter- 2

Statics of particles and rigid bodies: Fundamental laws of mechanics, Principle of transmissibility, System of forces (conservative and non- conservative), Resultant force, Resolution of force, Moment and Couples, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.

Chapter- 3

Plane trusses: Types of structures, Trusses, Support Conditions, Types of Loadings, Classification of trusses, Determinacy of trusses, Basic assumptions of truss analysis (zero force member, tension or compression member), Method of joints, Method of sections.

Chapter- 4

Centroid & Moment of inertia (M.I.): Location of centroid, Moment of inertia (mass and area), Parallel axis and perpendicular axis theorems, M.I of composite section, M.I. of solid bodies, Polar moment of inertia, principle axis and principle moment of inertia.

Chapter- 5

Virtual work: Principle of Virtual Work, Active forces and active force diagram, Stability of equilibrium.
Work, Energy and Power: Work of a force, weight and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservation of energy.

Chapter- 6

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction.

Chapter- 7

Springs: Stiffness of springs, springs in series and parallel, Introduction to laminated plate springs, leaf spring, close coiled helical springs, open coiled springs.

Chapter- 8

Simple Stresses and Strains: Concept of stress and strain in three dimensions and generalized Hooke's law; Young's modulus, Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress; Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants, Stress and strain thin cylinder and spherical cell under internal pressure.

Text Books:

1. Mechanics of Structures Vol. I & II by S.B Junarkar, Charotar Publishing House, Anand
2. Strength of Materials & Mechanics of Structures: Vol. I, II by Dr. B.C. PunmiaLaxmi Publications (p) Ltd

3CE4-05: SURVEYING

Credit: 3 | Max. Marks: 100 (IA: 30, ETE: 70)
3L+0T+0P | End Term Exam: 3 Hours

Course Outcomes:

C205.1 **Understand the importance of surveying in the field of civil engineering**
C205.2 **Study the basics of linear/angular measurement methods like chain surveying, compass surveying**
C205.3 **Know the basics of levelling and theodolite survey in elevation and angular measurements**
C205.4 **Understand the basics and elements of different types of curves on roads and their preliminary survey**
C205.5 **Understand tachometric surveying and photogrammetric and also understand the modern field survey systems.**

Syllabus:

Chapter-1

Introduction: objective, scope and outcome of the course

Chapter-2

LINEAR AND ANGULAR MEASUREMENTS

Method of linear measurements, Correction to length measured with a chain/tape, ranging a survey line; direct and indirect Angular measurement by compass, Designation of bearing, traversing with tape and compass, Correction to measured bearing, Angular measurement by Theodolite; Temporary adjustments, Method of horizontal angle measurement and vertical angle, Traverse computation, Plotting of traverse and determining the closing error, balancing traverse.

Chapter-3

LEVELLING

Measurements of elevations methods of levelling: direct/differential, Indirect/Trigonometrically, and Profile/Cross sectional levelling. Digital and Auto level, Errors in leveling, contours and contour lines; Methods of contouring: direct and indirect, characteristics, uses, and area and vol. measurements.

Chapter-4

CURVE SURVEYING

Elements of simple and compound curves, Types of curves, Elements of circular, reverse, and transition curves. Method of setting out simple, circular, transition and reverse curves, Types of vertical curves, length of Vertical curves, setting out vertical curves. Tangent corrections.

Chapter-5

TACHEOMETRY AND PHOTOGRAMMETRY SURVEYING

Advantages of tachometric surveying, different systems of tachometric measurements, Stadia system of tachometry, distance elevation formulae for horizontal sights. Determination of tachometric constants, distance and elevation formulae for inclined sights with staff vertical. Introduction to basic concepts perspective geometry of aerial photographs, relief and tilt displacements, Terrestrial Photogrammetric, flight planning

Chapter-6

SETTING OUT WORKS & MODERN FIELD SURVEY SYSTEMS

Instruments and methods for laying out buildings, setting out culverts, setting out sewer lines. Principle of E.D.M. (Electronic Distance Measurements), Modulation, Types of E.D.M., Distomat, Total station, parts of total station, advantages and application.

Text Books:

1. Surveying volume-I by Dr. BC PunamiaLaxmi Publications (P) Ltd.
2. Surveying volume-I & II by K.R. Arora

3CE4-06: FLUID MECHANICS

Credit: 2
2L+0T+0P

Max. Marks: 100 (IA: 30, ETE: 70)
End Term Exam: 2 Hours

Course Outcomes:

C206.1 **Understand various types of fluid and study of their properties**
C206.2 **Analyze pressure of fluid and calculate buoyancy force on floting bodies.**
C206.3 **Study the kinematics of flow.**
C206.4 **Study of various types of forces acting in flowing fluid i.e. fluid dynamics**
C206.5 **Determination of various major and minor loses in pipe flow.**

Syllabus:

Chapter-1

Introduction to objective, scope and outcome of the course

Chapter-2

Fluids: Definition, Type of fluids, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids

Chapter-3

Properties of Fluids: Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.

Chapter-4

Principles of Fluid Statics: Basic equations, Pascal Law, Type of pressure:-atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, manometers, Bourdon pressure gauge

Chapter-5

Buoyancy: Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centreand analytical determination of meta centric height.

Chapter-6

Kinematics of Flow: Visualization of flow, Types of flow: Steady and unsteady, uniform and non-uniform, rotational and irrotaional flow, Laminar and turbulent flow, streamline, path line, streak line, principle of conservation of mass, equation of continuity, acceleration of fluid particles local and convective, velocity, acceleration, velocity potential and stream function, elementary treatment of flow net, vorticity, circulation, free and forced vortex. Fluid mass subject to horizontal and vertical acceleration and uniform rotation

Chapter-7

Fluid Dynamics: Control volume approach, Euler's equation, Bernoulli's equation and its applications, venture-meter, orifice meter, orifices & mouthpieces, time of emptying of tanks by orifices, momentum and angular momentum equations and their applications, pressure on flat plates and nozzles.

Chapter-8

Laminar Flow through Pipes: Laminar flows through pipes, Relation between shear & pressure gradient. Flow between plates & pipes. Hagen- Poiseuille equation, Equations for velocity distribution, pressure difference velocity distribution over a flat plate and in a pipe section, Darcy-Weisbach equation, friction factor , minor losses, pipe networks

Text Books:

1. Fluid Mechanics by Modi & Seth, Standard Publishers, Delhi.

3CE4-07: BUILDING MATERIALS AND CONSTRUCTION

Credit: 3 | Max. Marks: 100 (IA: 30, ETE: 70)
3L+0T+0P | End Term Exam: 3 Hours

Course Outcomes:

C207.1	**Understand various properties of different civil engineering materials like stone, lime and fly ash etc.**
C207.2	**Understand properties of steel and timber as building material & principle of brick and stone masonry.**
C207.3	**Analyze various types of structure and Floor components of different floors in building.**
C207.4	**Understand the Purpose, types of foundation & importance of damp proofing.**
C207.5	**Understand the concept and application of Arches & Lintels, construction of staircase and classification of roofs.**

Syllabus:

Chapter-1

Introduction to objective, scope and outcome of the course

Chapter-2

Basic Civil Engineering Materials (Properties, Types and Uses): Stone: Compressive strength, Water absorption, Durability, Impact value, Tensile strength; Bricks: Water absorption, Compressive strength, Effloresces, Dimension and Tolerance; Tiles: Water absorption, Tolerance, Impact value and glazing; light weight concrete blocks.
Lime: classification as per IS, properties, standard tests and uses in construction.
Fly-ash: Properties and Use in manufacturing of bricks & cement;
Miscellaneous: Gypsum, Plaster of Paris, PVC materials, Paints, Varnish and Distemper.

Chapter-3

Timber & Steel: Timber: Definitions of related terms, Classifications and Properties, Defects in Conversion of wood, Seasoning wood, Preservation, Fire proofing, Ply woods, Fiber boards; Steel: Mild steel and HYSD steel, Properties and their use, common tests on steel.

Chapter-4

Mortar and Plaster: Mortar preparation methods**:** Functions and tests & their uses in various types of pointing & plastering

Chapter-5

Brick and Stone Masonry: Basic principle of masonry work, different types of bonds, relative merits and demerits of English, Single Flemish and Double Flemish bond. Comparison between stone and brick masonry. General principles, classification of stone masonry and their relative merits and demerits.

Chapter-6

Building Requirements & Construction System: Building components, their functions and requirements, Types of construction: load bearing and framed structure construction, RCC beam, column and slab construction, Precast and In-situ construction, Relative merits and demerits. Fire resistance construction, FRC
Ground & Upper floors: Floor components and their functions, Floor types and Selection of flooring, construction details of ground and upper floors, merits and demerits.

Chapter-7

Foundation & Site Preparation: Purpose, types of foundation: like shallow, deep, pile, raft, grillage foundation and their suitability. Depth of foundation, Sequence of construction activity and co-ordination, site Clearance, layout of foundation plan.
Temporary structures: Types & methods of shoring, underpinning and scaffolding

Chapter-8

Damp Proofing: Causes and Effects of dampness, Methods and materials for damp proofing, Methods and materials for anti-termite treatment.
Construction and Expansion Joints: Requirements, Types material used, Construction details.

Chapter-9

Arches and Lintels: Terms used types of arches and their construction detail, types of lintels and constructions.

Partition Wall: Types, purpose and use of partition wall.

Chapter-10

Stairs: Terms used, requirements of good staircase, classification, Construction details and suitability of different types of stairs, Lifts and Ramps

Chapter-11

Roof and Roof Covering: Purposes, classification of roofs, terms used. Introduction to Solid slab, Flat slab, Shell Roofs and Pitched roofs, and their constructional features. Types of pitched roofs and Trusses, typical Constructional details; Roof covering materials, types and typical constructional details.

Text Books:

1. Construction Equipments& Management by R.L. Purifoy, Tata Mc Graw Hill.

REFERENCE BOOKS

1. "Affordable Housing", Published by Indian Building Congress, Delhi. 2014
2. Construction Technology by Subir K. Sarkar &SubhajitSaraswati, Oxford University Press
3. Building Construction by Bindra& Arora; Dahnpat Rai & Sons.
4. Construction Equipments by Mahesh Verma, Metropolitan Book Co.
5. Construction Equipments and its Management by S.C.Sharma, Prentice Hall of India (PHI).

3CE4-08: ENGINEERING GEOLOGY

Credit: 2 Max. Marks: 100 (IA: 30, ETE: 70)
2L+0T+0P End Term Exam: 2 Hours

Course Outcome:

C208.1 **Introduction, and understanding the fundamental features of the earth and to relate geology to practical applications in Civil Engineering**
C208.2 **Understanding megascopic propertis of rocks and minerals**
C208.3 **Analyze Engineering consideration of faults, fold, joints and unconformities, Dip and strike.**
C208.4 **Know considerations for site selection for engineering projects**
C208.5 **Understand the remote sensing process and application in various fields of civil engineering**

Syllabus:

Chapter-1

Introduction to objective, scope and outcome of the course

Chapter-2

General Geology: Branches and Scope of Geology, Types of Weathering & Geological work of natural agencies like River & Wind. Geological Time Scale. Physical Properties of Minerals

Chapter-3

Petrology: Formation, Texture, Structure and Classification of Igneous, Sedimentary and Metamorphic Rocks. Engineering Properties of Rocks for Building & Road Material. Laboratory and Field & in-situ Test for Site Construction.

Chapter-4

Structural Geology: Causes, Terminology, Classification, Recognition, Effects and Engineering consideration of Fold, Fault, Joints and Unconformities

Chapter-5

Engineering Geology: Geophysical methods as applied to Civil Engineering for Subsurface Analysis (Electrical and Seismic methods). Terminology, Types and Geological consideration for site selection of Dam & Tunnel.

Chapter-6

Remote Sensing & GIS: Application of Remote Sensing and GIS in Various fields of Civil Engineering.

Text Books: Parbin Singh-A Text Book of Engineering & General Geology- S.K. Kataria& sons
REFERENCE BOOKS
1. S.K.Garg- Physical & Engineering Geology- Khanna Publishers
2. N ChennaKesavulu- A Text book of Engineering Geology- Macmillan India Ltd.
3. M.T.Maruthesha Reddy- A Text book of Applied Engineering
Geology- New Age International Publisher
4. Remote Sensing and GIS: B.Bhatta- Oxford Publishers

3CE4-21: SURVEYING LAB

Credit: 1.5 Max. Marks: 100 (IA: 60, ETE: 40) 0L+0T+3P

Course Outcome:

C209.1 **Understand working of different type of surveying equipment's**
C209.2 **Analyze the procedures involved in field work.**
C209.3 **Understand accurate measurements, field book, plotting and adjustment of errors**
C209.4 **Calculate distance, direction and elevation via measurement, angle measurement, differential levelling and contouring**
C209.5 **Study the various electronic surveying instruments like EDM, Total Station etc**

List of Experiments

1. Linear Measurement by Tape:
   a. Ranging and Fixing of Survey Station.
   b. Plotting Building Block by offset with the help of cross staff.
2. Compass Survey: Using Surveyor's and Prismatic compass
   a. Measurement of bearing of lines
   b. Adjustment of included angles of compass traverse.
3. Levelling: Using Tilting/ Dumpy/ Automatic Level
   a. To determine the reduced levels in closed circuit.
   b. To carry out profile levelling and plot longitudinal and cross sections for road.
4. Theodolite Survey: Using Vernier Theodolite
   a. To carryout temporary adjustment of Theodolite & Measurement of horizontal and vertical angle: by method of repetition and method of Reiteration.
   b. To measure and adjust the angles of a braced quadrilateral.
5. Trigonometric Levelling: To determine the Height of an object by trigonometric levelling:
   a. By using Instruments in same vertical plane.
   b. By using Instruments in different vertical planes.
6. Tacheometry Survey:
   a. To determine the tachometric constant.
   b. To determine the horizontal and vertical distance by tachometric survey.
7. To study the various electronic surveying instruments like EDM, Total Station etc.
   One-week Survey Camp for topographic/ project survey/Contouring be arranged before or after Term End Exam.

3CE4-22: FLUID MECHANICS LAB

Credit: 01 Max. Marks: 100 (IA: 60, ETE: 40) 0L+0T+2P

Course Outcome:

C210.1 **To study the various pressure measuring device**
C210.2 **Understand Bernoulli's theorem for governing fluid flows.**
C210.3 **Calculate the buoyancy force,To calibrate the Venturi-meter and Orifice-meter.**
C210.4 **To determine various co-officient of an orifice, mouthpiece and V-notch.**
C210.5 **Calculate the different fluid properties using various type of equipment's like measurement of flow, pressure velocity and head loss.**

List of Experiments

1. To study the various pressure measuring devices
2. To verify the Bernoulli's theorem.
3. To calibrate the Venturi-meter.
4. To calibrate the Orifice-meter.
5. To determine Metacentric Height.
6. To determine Cc, Cv, Cd of an orifice.
7. To determine Cd of a mouthpiece.
8. To determine Cd of a V-notch.
9. To determine viscosity of a given fluid.
10. To study the velocity distribution in pipes

3CE4-23: COMPUTER AIDED CIVIL ENGINEERING DRAWING

Credit: 1.5 Max. Marks:100 (IA: 60, ETE: 40)

0L+0T+3P

Course Outcome:

C211.1 **Study and draw the labelled sketch of brick and stone masonry on sheets with exposure to CAD**

C211.2 **Study and draw the labelled sketch of pointing, arches, lintels, floors, doors and window on sheets with exposure to CAD.**

C211.3 **Understand development of front elevation and sectional elevation from a given plan**

C211.4 **Understand development of plan, front elevation and sectional elevation from line diagram.**

C211.5 **To study and draw the labelled sketch of Stairs, Cross section of Dog legged stairs**

List of Experiments:

To study and draw the labeled sketch of different Building Components on sheets with exposure to CAD:

1. Drawing of walls
   a. Brick and Stone masonry
   b. Cross section of external wall from foundation to parapet
   c. Partition wall, cavity wall and
2. Pointing, Arches, Lintels and Floors
3. Doors and Windows
4. Stairs, Cross section of Dog legged stairs
5. Roofs: Flat and Pitched roof (Steel truss)
6. Development of Front Elevation and Sectional Elevation from a given plan
7. Development of Plan, Front Elevation and Sectional Elevation from line diagram

3CE4-24: CIVIL ENGINEERING MATERIALS LAB

Credit: 01 Max. Marks: 100 (IA: 60, ETE: 40)

0L+0T+2P

Course Outcome:

C212.1 **Identify the materials by visual inspection**
C212.2 **Analyze various test for physical properties of timber, stone, bricks and tiles.**
C212.3 **Identify the properties and utilization of fly ash, glass, timber, kota stone,**
C212.4 **Identify the properties and utilization of aluminium and steel sections.**
C212.5 **Understand the manufacturing and use of concrete hollow blocks.**

List of Experiments

1. To determine properties of following materials:

A. STONE:
   a. Compressive strength,
   b. Water absorption,
   c. Impact value,
   d. Tensile strength;

B. Bricks:
   a. Water absorption,
   b. Compressive strength,
   c. Dimension and Tolerance;

C. Tiles:
   a. Water absorption,
   b. Tolerance,
   c. Impact value

D. Timber: Compressive and Tensile Strength of Timber across and along the Grain

2. To Study the Properties & Utilization of Fly Ash in Construction

3. To Study the Different Aluminium and Steel Sections

4. To Study the Manufacturing and Use of Concrete Hollow Blocks

5. To Study the Properties and Uses of Kota Stone and its Slurry

3CE4-25: GEOLOGY LAB

Credit: 01 Max. Marks: 100 (IA: 60, ETE: 40)

0L+0T+2P

Course Outcome:

C213.1 **Identify of different types of minerals and rock according to their physical properties**
C213.2 **Understand geological features by the use of structural geological diagrams, petrological diagrams and engineering geological diagrams**
C213.3 **Analyze how to interpretation geological map**
C213.4 **Understand importance of geological aspects in civil engineering related infrastructure projects.**
C213.5 **Dip and strike problems**

List of Experiments

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Identification of Geological features through wooden Models

a. Structural Geological Diagrams
b. Petrological Diagrams
c. Engineering Geological Diagrams

6. Interpretation of Geological Map (10 Nos.)
7. Dip & Strike Problems (8 Nos.)

4CE2-01: ADVANCE ENGINEERING MATHEMATICS-II

Credit: 2 Max. Marks: 100 (IA: 30, ETE: 70)

2L+0T+0P End Term Exam: 2 Hours

Course Outcomes:

C215.1	**Use the basic probability rules, Baye's theorem, and Translate real-world problems into probability models**
C215.2	**Understand the discrete and continuous random variables , Mathematical expectations and their Probability distributions**
C215.3	**Calculate Correlation and Regression of given set of values, Fitting the curves on given data table.**
C215.4	**Check the level of significance applying large sample test for single proportion and difference of proportion**
C215.5	**Apply large sample test for mean, difference of means and difference of standard deviations.**

Syllabus:

Chapter-1

Introduction: Objective, scope and outcome of the course

Chapter-2

Probability: Basic concepts of probability, conditional probability, Baye's theorem. Random variable: Discrete and Continuous random variables, Joint distribution, Marginal distribution, Probability distribution function, Conditional distribution. Mathematical Expectations: Moments, Moment Generating Functions, variance and correlation coefficients, Chebyshev's Inequality, Skewness and Kurtosis. Binomial, Poisson and Normal distribution and their properties

Chapter-3

Applied Statistics: Basic concept of variance, Correlation and regression– Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations

Text Books:

1. Engineering MathsVol-I by Chandrika Prasad, Standard Publishers and Distributers. Vol-II by Chandrika Prasad, Standard Publishers and Distributers
2. Higher Engineering Maths by Gaur & Kaul, Jaipur Publishing House.

4CS1-03/3CS1-03: MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTING

Credit-2
2L+0T+0P

Max. Marks: 100 (IA: 30, ETE: 70)
End Term Exam: 2 Hours

Course Outcomes:

C203.1	**To determine concepts, nature and problems of basic economics.**
C203.2	**To detailed study about demand and supply analysis.**
C203.3	**Study the cost behavior and its importance for managerial decision making and to determine Break Even Point (BEP) for any business organization.**
C203.4	**Discuss in detail different market situations such as monopoly, oligopoly, monopolistic and perfect markets and explanation through graphical representation.**
C203.5	**Discuss the process & principles of financial accounting and prepare Profit & Loss A/c. and Balance Sheet of an enterprise. transforms.**

Syllabus:

Chapter-1

Introduction: Objective, scope and outcome of the course.

Chapter-2

Basic economic concepts- Meaning, nature and scope of economics, deductive vs inductive methods, static and dynamics, Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement.

Chapter-3

Demand and Supply analysis- Demand-types of demand, determinants of demand, demand function, elasticity of demand, demand forecasting –purpose, determinants and methods, Supply- determinants of supply, supply function, elasticity of supply.

Chapter-4

Production and Cost analysis- Theory of production- production function, law of variable proportions, laws of returns to scale, production optimization, least cost combination of inputs, isoquants. Cost concepts-explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation.

Chapter-5

Market structure and pricing theory- Perfect competition, Monopoly, Monopolistic competition, Oligopoly.

Chapter-6

Financial statement analysis Balance sheet and related concepts, profit and loss statement and related concepts, financial ratio analysis, cash-flow analysis, funds- flow analysis, comparative financial statement, analysis and interpretation of financial statements, capital budgeting techniques.

4CS1-02/3CS1-02: TECHNICAL COMMUNICATION

Credit-2
2L+0T+0P

Max. Marks: 100 (IA: 30, ETE: 70)
End Term Exam: 2 Hours

Course Outcomes:

C202.1 **Ability to describe the Elements of Written Communication.**
C202.2 **Ability to Recognize basic Value-based Text Reading**
C202.3 **Ability to express fundamentals of Technical Communication**
C202.4 **Ability to choose Appropriate Forms of Technical Communication**
C202.5 **Ability to Design programs that presentation Strategies.**

Syllabus:

Chapter-1

Introduction: Objective, scope and outcome of the course.

Chapter-2

Introduction to Technical Communication- Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication. Technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication.

Chapter-3

Comprehension of Technical Materials/Texts and Information Design & development- Reading of technical texts, Reading and comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note-making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media.

Chapter-4

Technical Writing, Grammar and Editing- Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking, Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, and Minutes of Meetings.

Chapter-5

Advanced Technical Writing- Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals, Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles.

Reference Books:

1. S. McConkey, “Writing a work term report,” *ENGR 120 Plenary Lecture*, University of Victoria, March 3, 2017.
2. J. Swartz, S. Pigg, J. Larsen, J. Helo Gonzalez, R. De Haas, and E. Wagner, "Communication in the workplace: What can NC State students expect?" Professional Writing Program, North Carolina State University, 2018 [Online].

4CE3-04: BASIC ELECTRONICS FOR CIVIL ENGINEERING APPLICATIONS

Credit: 2 | Max. Marks: 100 (IA: 30, ETE: 70)
2L+0T+0P | End Term Exam: 2 Hours

Course Outcomes:

C216.1 **Characterize semiconductors, diodes and bipolar junction transistors**

C216.2 **Learn the fundamentals of digital electronics**

C216.3 **Analyze the characteristics of different types of transducers & sensors**

C216.4 **Understand the working of various instruments and measure the error**

C216.5 **Understand the concept and processing of digital images**

Syllabus:

SN	CONTENTS
1	**Introduction:** to objective, scope and outcome of the subject.
2	**Basic Electronics**: Number systems & Their conversion used in digital electronics, Demorgan's theorem, Logic Gates, half and full adder circuits, R-S flip flop, J-K flip flop.
3	Introduction to Semiconductors, Diodes, V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations.
4	**Instrumentation**: mechanical, electrical, electronic system and their calibration, Use of automatic and digital levels, electronic Theodolite, total stations; Control surveys using GNSS, Total station and traversing methods (adjustment and computations of coordinates).
5	**Measurement errors**: Gross error and systematic errors, absolute and relative errors, accuracy, precision, resolution and significant figures. Full-field measurements;
6	**Data acquisition system and data processing**: analog systems, digital systems using personal computers, dynamic measurement, numerical and graphical data processing and archiving.
7	**Sensors & Transducers**: various types of sensors for displacement, velocity, acceleration, pressure, loads, strains, Displacement sensors, Mass &Piezoelectric, strain gauges, Temperature sensors thermocouple, flow sensors : Ultrasonic, electromagnetic, laser and thermal
8	**Sensor types characteristics**: types of resolution, FOV, IFOV, PSF; Geometric and radiometric distortions, Geo-referencing, re-sampling methods; Atmospheric errors and removal; Satellite orbits and characteristics; Applications of optical and microwave remote sensing techniques in Civil Engineering.
9	**Digital Image Processing**: Digital image, introduction to digital image processing, pre-processing, enhancement, classification, accuracy assessment.

4CE4-05: STRENGTH OF MATERIALS

Credit: 3
3L+0T+0P

Max. Marks: 100 (IA: 30, ETE: 70)
End Term Exam: 3 Hours

Course Outcomes:

C217.1 **Compute Stress and strain caused by applied loads in simple and composite sections.**
C217.2 **Determine the effects of external loads such as axial force, shear force and bending moment at any section of the beam, using consistent sign conventions.**
C217.3 **Understand the concept of simple bending and shear stress including combined direct and bending stress.**
C217.4 **Understand the concept of torsion and columns.**
C217.5 **Determine deflection of beam by using various method**

Syllabus:

SN	CONTENTS
1	**Introduction:** to objective, scope and outcome of the subject
2	**Simple Stresses and Strains in different members:** Stresses in prismatic & non prismatic members and in composite members; Thermal stresses; Stresses in composite members, Compatibility condition.
3	**Compound Stress:** Two dimensional stress systems: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle &its application. Introduction to theories of failures.
4	**Bending of Beams:** Bending moment, Shear force and Axial thrust diagrams for statically determinate beams subjected to various types of loads and moments, Point of Contra-flexure, relation between load, SF and BM.
5	**Theory of simple bending**: Distribution of bending and shear stresses for simple and composite sections, Combined direct and bending stress,
6	**Torsion:** Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion;
7	**Columns:** Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler's theory and its limitation, concept of effective length of columns; Rankine & Secant formulae, middle third rule, core of a section.
8	**Deflection of Beams:** Differential relation between load, shear force, bending moment, slope deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method and their application to statically determinate prismatic beams.

Text Books:

1. Mechanics of Structures Vol. I & II by S.B Junarkar, Charotar Publishing House, Anand.
2. Strength of Materials & Mechanics of Structures: Vol. I, II by Dr. B.C. PunmiaLaxmi Publications (p) Ltd.

4CE4-06: HYDRAULICS ENGINEERING

Credit: 3
3L+0T+0P

Max. Marks: 100 (IA: 30, ETE: 70)
End Term Exam: 3 Hours

Course Outcomes:

C218.1 **Applying dimensional homogeneities between dependent and independent quantities and model similarities on both prototype and its model**

C218.2 **Analyze and Compute the frictional loss and Reynolds's number in laminar and turbulent flows.**

C218.3 **Analyze and design of fluid flows in open channel open channels for most economical sections like rectangular, trapezoidal and circular sections.**

C218.4 **Calculate forces and work done by a jet on fixed or moving plate and curved plates and understand the characteristics pump and turbine**

C218.5 **Understand hydrologic cycle, the systems for canal irrigation and the concepts of movement of ground water beneath the earth**

Syllabus:

SN	CONTENTS
1	**Introduction:** to scope, objective and outcome of subject
2	**Dimensional Analysis & Models:** Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold's, froudes, Weber's, Euler and Mach numbers. Distorted river models and undistorted models, proper choice of scale ratios. Scale effect. Principle of dimensional analysis Rayleigh method, Buckingham theorem.
3	**Turbulent flow**, Reynolds equations, Prandtl's mixing length theory, Equations of velocity distribution and friction coefficient **Boundary Layer Theory**: Concept of boundary layer, laminar and turbulent boundary layers, boundary layer thickness, von Karman integral equation, laminar sub-layer, hydro-dynamically smooth and rough boundaries, separation of flow and its control, cavitation.
4	**Open channel Flow** Uniform, Non-Uniform and variable flow. Resistance equations of Chezy and Manning. Section factor for uniform flow. Most Efficient rectangular, triangular and trapezoidal sections. Velocity distribution in open channels.
5	**Gradually varied flow** in Prismatic channels. Specific energy of flow. Critical depth in prismatic channels. Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes. Classification of surface curves in prismatic channels and elementary computation
6	**Rapidly varied flow**: Hydraulic jump or standing wave in rectangular channels. Conjugate or sequent depths Losses in jump, location of jump. velocity distribution in open channels. Energy correction factor. Moment correction factor
7	**Impact of free Jets:** Impact of a jet on a flat or a curved vane, moving and stationary vane. **Introduction of Hydraulic machine –** Type of pumps and turbine and its brief description. Draft tube and its principle
8	**Hydrology:** Definition, Hydrologic cycle, Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method, catchment area formulae, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination, Estimation of runoff.
9	**Ground Water**: Aquifers and its types, Confined and unconfined aquifer, Darcy's Law, hydraulic conductivity, transmissivity, well hydraulics.
10	**Canal Hydraulics:** Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirements, estimation of channel losses, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels, silt control in canals.

Text Book:

1. Fluid Mechanics & Hydraulics by Dr. K.R, Arora, Standard Publishers & Distributers, Delhi.

4CE4-07: BUILDING PLANNING

Credits: 2 | Max. Marks: 100 (IA: 30, ETE: 70)
2L+0T+0P | End Term Exam: 2 Hours

Course Outcomes:

C219.1 **Identify the factors to be considered in planning and construction of building.**
C219.2 **Impart the ability to work with an architect and contractor**
C219.3 **Plan a building following the bye-laws.**
C219.4 **Plan the buildings according the modern requirements such as sustainability, environment friendly etc.**
C219.5 **Prepare drawings, foundation plans and others executable drawings with proper details of building.**

Syllabus:

SN	CONTENTS
1	**Introduction:** to scope, objective and outcome of subject
2	**Introduction**: Types of buildings, criteria for location and site selection, site plan and its detail.
3	**Sun Consideration:** Different methods of drawing sun chart, sun shading devices, design of louvers.
4	**Climatic and comfort Consideration**: Elements of climate, global climate, climatic zones of India, thermal comfort, bioclimatic chart,
5	**Orientation:** Meaning, factors affecting orientation, orientation criteria for tropical climate.
6	**Building Bye Laws and NBC Regulations:** Objective of by-laws, regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation.
7	**Principles of Planning:** Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc.
8	**VastuShastra In Modern Building planning:** Factors considered in Vastu, site selection, orientation, planning and design of residential buildings, school/hospital
9	**Functional Design And Accommodation Requirements Of Non Residential Buildings:** viz-school buildings, rest house, primary health centers, post office etc.
10	**Services in Buildings**) Lighting and ventilation, doors and windows, lifts.) Acoustics, sound insulation and noise control.) Fire fighting provisions

REFERENCE BOOKS

1. Building Drawing by M.G.Shah, C.M. Kala, S.Y.Patki , Tata Mc Graw Hills.
2. National Building Code, BIS.
3. Time Saver Standards for Housing and Residential Development by DE Chiara, Tata Mc Graw Hill, Delhi.

4CE4-08: CONCRETE TECHNOLOGY

Credit: 3 Max. Marks: 100 (IA: 30, ETE: 70)

3L+0T+0P End Term Exam: 3 Hours

Course Outcomes:

C220.1 **Identify the functional role of ingredients of concrete and apply this knowledge to mix design philosophy**

C220.2 **Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete & Application & use of NDT.**

C220.3 **Understand the techniques of handling, placing and maturity of concrete and also Causes of deterioration.**

C220.4 **Understand the importance and uses of admixtures in concrete. Design a concrete mix which fulfils the required properties for fresh and hardened concrete and awareness about the formwork.**

C220.5 **Understand the Requirements of Formwork and Special types of concrete for advanced construction.**

Syllabus:

SN	CONTENTS
1	**Introduction:** to objective, scope and outcome of the subject
2	**Ingredients of concrete:** Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel-space ratio etc.
3	**Aggregates:** types, physical properties and standard methods for their determination, including Grading of aggregates as per IS. Manufactured sand- properties and IS Specifications for use in concrete.
4	**Concrete:** Grade of concrete, proportioning of ingredients, water content and its quality, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. Factors affecting, methods of determination.
5	Properties of hardened concrete such as strengths, permeability, creep, shrinkage, factors influencing, Standard tests on fresh and hardened concrete as per IS code. Aggregate- cement interface, its effect on properties of concrete.
6	**NDT**: Introduction and their importance. Application & use of Rebound Hammer, Ultra-sonic pulse velocity meter, Rebar & Cover meter, half-cell potential meter, corrosion resistivity meter, core sampling. Interpretation of their results,
7	**Concrete Handling in Field:** Batching, mixing, placing and transportation of concrete, equipments for material handling, various methods their suitability and precautions. Compaction of concrete: methods &equipments. Curing of concrete: various methods their suitability.

8	Durability of concrete. Causes of deterioration, Carbonation, Tests for durability assessment
9	**Admixture in concrete:** Chemical and mineral admixtures, their types and uses: accelerator, retarders, water-proofing, plasticizers, super plasticizers-types, their suitability. Fly ash-properties for use in concrete, specifications of fly ash as per IS 3812, and effect on properties of concrete. GGBFS, Micro silica and metakaolin- properties, specifications and utility in concrete.
10	Concrete mix deign (IS method)- with and without water reducing admixtures
11	**Form work:** Requirements, their types. Typical formworks and shuttering/centering for Columns, beams, slabs, walls, etc. Slip and moving formwork.
12	**Special types of concrete:** Sulphate resisting concrete, under water concreting, pumpable concrete: methods and issues in making, salient properties and applications.
13	Concretes with tailored properties- including high performance concrete, with specific properties in fresh and hardened states, self-compacting concrete-materials, mix proportioning, test methods, use and applications with case studies.

Text books:

1. Properties of Concrete by A.M. Neville, Longman Publishers.

Reference Books

1. Concrete Technology by M.S. Shetty, DahnpatRai& Sons.
2. Concrete Technology by Nevillee& Brooks, Pearson Education.
3. Concrete Microstructure P.K. Metha, Tata McGraw Hill.
4. Concrete Technology- A. S. Santhakumar, Oxford University Press

4CE21: MATERIAL TESTING LAB

Credit: 01 Max. Marks: 100 (IA: 60, ETE: 40)

0L+0T+2P

Course Outcomes:

After the completion of this course, Students will be able

C221.1 Determine the compressive and tensile strength of steeland HYSD bar
C221.2 Determine the strength of cement and concrete cubes.
C221.3 Determine the hardness and impact of distinct materials.
C221.4 Determine the modulus of rupture of wooden beam.
C221.5 Explain basic material's properties like fatigue, torsion, etc.

List of Experiments:

1. Tests on Mild steel and HYSD Bar –To determine compressive and tensile strength, yield strength, percentage elongation etc.
2. Tests on Cement and concrete cubes/ core to establish their strength
3. Hardness Test – Rockwell Hardness and Brinell Hardness
4. Impact Test – Izod and Charpy
5. Modulus of Rupture of Wooden Beam
6. Fatigue Test
7. Spring Test
8. Torsion Test

4CE4-22: HYDRAULICS ENGINEERING LAB

Credit: 01 Max. Marks: 100 (IA: 60, ETE: 40)

0L+0T+2P

Course Outcomes:

C222.1 **Determine various type of losses in pipe flow.**
C222.2 **"Understand momentum equation for governing fluid flows.**
C222.3 **Analyze the discharge through broad crested wier and venturimeter & velocity distribution in open channel flow.**
C222.4 **Determine Manning's &Chezy's coefficient of roughness**
C222.5 **Understand and plot characteristics curve of hydraulic jump.**

List of experiments:

1. To determine the minor losses.
2. To determine the friction factor.
3. To determine Cd of Broad crested weir.
4. To verify the momentum equation.
5. To determine the discharge of venturimeter.
6. To determine Manning's &Chezy's coefficient of roughness for the bed of a given Channel.
7. To study and plot characteristics curve of hydraulic jump.
8. To study velocity distribution in open channel flow.

4CE4-23: BUILDING DRAWING

Credit: 1.5 Max. Marks: 100 (IA: 60, ETE: 40)

0L+0T+3P

Course Objective:

C223.1 **Apply the Bye laws and Principles of Planning for residential and other public buildings.**

C223.2 **Prepare detail drawings for single and two storied residential building and public building.**

C223.3 **Develop the building models**

C223.4 **Draw the details of parts of buildings**

C223.5 **Provide scope and provisions for building components and services**

List of Experiments:

1. To plan and draw working drawing of a Residential building with following detail.
   a. Site plan
   b. Foundation plan
   c. Plan
   d. Two sectional elevations
   e. Front elevation
   f. Furniture plan
   g. Water supply and sanitary plan
   h. Electric fitting plan
2. To design and draw a Primary Health Centre
3. To design and draw a Primary School
4. To design and draw a Rest House
5. To design and draw a Post Office
6. To design and draw a Bank
7. To design and draw a College Library
8. To design and draw a Cinema Theatre

4CE4-24: ADVANCED SURVEYING LAB

Credit: 01 Max. Marks: 100 (IA: 60, ETE: 40)

0L+0T+2P

Course outcomes: At the end of syllabus students will be able

C224.1 **Measurement of horizontal and vertical angle by theodolite.**

C224.2 **To determine the height of an object by trigonometric levelling.**

C224.3 **Uses of total station to measurement of angles, length of survey lines and area of traverse.**

C224.4 **Prepare the map of area by Plane Table.**

C224.5 **To measure and adjust the angles of a braced quadrilateral.**

List of Experiments:

1. To measure the horizontal and vertical angles by Theodolite.
2. To determine the Height of an object by trigonometric levelling (Instruments in same vertical plane).
3. To determine the Height of an object by trigonometric levelling (Instruments in different vertical planes).
4. Measurement of angles, length of survey line using Total Station, finding the coordinate of station
5. To measure and adjust the angles of a braced quadrilateral.
6. To prepare the map of given area by plane tabling.
7. Measurement of area of a traverse by Total Station

4CE4-25: CONCRETE LAB

Credit: 1.5 Max. Marks: 100 (IA: 60, ETE: 40)

0L+0T+3P

Course Objectives:

C225.1 **Conduct the experiments for determining various physical properties of cement**

C225.2 **Perform experiments evaluating different properties of aggregates related to concrete**

C225.3 **Test the properties of fresh concrete and hardened concrete.**

C225.4 **Design concrete mix for various grades of concrete according to IS recommendations with and without admixtures**

C225.5 **Understand and perform Non-Destructive testing (NDT) of Concrete**

List of Experiments:

1. To determine the fineness of Cement by Blaine's air permeability test.
2. To determine the flexural strength of Concrete.
3. To determine Soundness of cement by Le-chatelier apparatus.
4. To determine the specific gravity of fine aggregate (sand) by Pycnometer.
5. To determine the bulking of fine aggregate and to draw curve between water content and bulking.
6. Sieve analysis of coarse aggregates and fine aggregates.
7. To determine the workability of given concrete mix by slump test.
8. To determine the optimum dose of super plastsizers by Flow table test.
9. To design concrete mix of M-20 grade in accordance with IS 10262.
10. To design concrete mix of M-40 grade with super plasticizer in accordance with IS 10262.
11. To determine the Permeability of Concrete.
12. Study of Core cutter, UPV & Rebound Hammer equipment.

5CE3-01: CONSTRUCTION TECHNOLOGY AND EQUIPMENT

Credit: 2 Max. Marks: 100(IA: 20, ETE80)
2L+0T+0P End Term Exam: 2 Hours

Course Outcomes: On completion of course, Student will be able to:

C301.1 Understand the principle of engineering economy
C301.2 Understand causes, classification, cost and measurement of an accident
C301.3 Understand the need of construction planning and resources
C301.4 Learn objective and functions of material management
C301.5 Understand about construction equipment and their management

Syllabus:

SN	Contents
1	**Introduction:** Objective, scope and outcome of the course.
2	**Engineering Economy** Principle of Engineering Economy, Minimum cost point analysis, Breakeven point analysis, Depreciation and depletion
3	**Safety in construction** Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report, safety measure: (a) For storage and handling of building materials. (b) Construction of elements of a building (c) In demolition of buildings; Safety lacuna in Indian scenario. Fire safety provisions as per NBC.
4	**Construction Planning** Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control; **Materials Management:** Objective and functions of material Management
5	**Construction Equipment and Management** Earth Moving Equipment-Bull dozers tractor pulled scrapers Power shovels Draglines clamshells; cranes; Hoes, Trenching machine types Hauling Equipment; Drilling, Blasting and Tunneling Equipment; Pile Driving Equipment

Text books:

1. Construction Equipments& Management by R.L. Purifoy, Tata Mc Graw Hill.

Reference Books:

1. Building Construction by Bindra& Arora; Dahnpat Rai & Sons.
2. Construction Equipments by Mahesh Verma, Metropolitan Book Co

5CE4-02: STRUCTURE ANALYSIS-I

Credit: 2
2L+0T+0P

Max. Marks: 100(IA: 20, ETE: 80)
End Term Exam: 2 Hours

Course Outcomes:

C302.1 To calculate the static and kinematic indeterminacy of structure

C302.2 To analyze of indeterminate structure using area moment method, conjugate beam method and three moment's theorem

C302.3 To analyze of statically indeterminate structures using slope-deflection and moment-distribution method

C302.4 To explain the basic concept of structural vibration and its mathematical models.

C302.5 To explain the undamped free, damped, force vibration theories for single degree of freedom system.

Syllabus:

SN	Contents
1	Introduction: Objective, scope and outcome of the course.
2	Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames& portal with & without sway etc.), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem. Analysis of prop cantilever structures, Analysis of Indeterminate Structure (fixed and continues beams) using Area moment method, Conjugate beam method, Three moments Theorem.
3	Analysis of Statically Indeterminate Structures using Slope-deflection method a nd Moment-distribution method applied to continuous beams and portal frames with and without inclined members
4	**Vibrations:** Elementary concepts of structural vibration, Mathematical models, basic elements of vibratory system. Degree of freedom. Equivalent Spring stiffness of springs in parallel and in series. **Simple Harmonic Motion**: vector representation, characteristic, addition of harmonic motions, Angular oscillation. **Undamped free vibration of SDOF system**: Newton's law of motion, D Albert's principle, deriving equation of motions, solution of differential equation of motion, frequency & period of vibration, Amplitude of motion; Introduction to damped and forced vibration.

Text Books:

1. Strength of materials & mechanics of structures: Vol-I by Dr. B.C. PunmiaLaxmi publications (P)

5CE4-03: DESIGN OF CONCRETE STRUCTURES

Credit: 3
3L+0T+0P

Max. Marks: 150(IA: 30, ETE: 120)
End Term Exam: 3 Hours

Course Outcomes:

C303.1 **Understand design philosophies of beam by limit state and working state methods**
C303.2 **Analyze and design of beams for flexure using working stress & limit state design methods.**
C303.3 **Check beams for shear and bond and serviceability for deflection using limit state method.**
C303.4 **Analyze and design of one way and two way slabs using limit state method**
C303.5 **Analyze and design of column, footing and Torsion by limit state method**

Syllabus:

SN	Contents
1	Introduction: Objective, scope and outcome of the course.
2	Fundamental concepts of design of RC members, assumptions. Types and function of reinforcement. Introduction to various related IS codes, Characteristic load and characteristic strength. **Working Stress Method:** Working stress design philosophy. Analysis and Design of singly reinforced rectangular beam section for flexure.
3	**Limit State Design:** Limit state design philosophy. Assumptions, Analysis and design of singly reinforced, doubly reinforced rectangular beams and flanged beams for flexure using codal provisions for simply supported, cantilever, fixed and continuous beams.
4	**Limit state of serviceability for deflection**: control of deflection as per codal provisions of empirical coefficients. **Limit state of collapse in shear**: Types of shear reinforcement and its detailing, analysis and design of shear reinforcement for prismatic sections. **Limit state of collapse in bond**: concept of bond stress, anchorage length and development length. Detailing and curtailment of Reinforcement as per codal provisions.
5	**Slabs:** Analysis and design of one way and two way slabs using LSM, Detailing of reinforcement. Check for shear and deflection.
6	**Columns:** Short and long columns, their structural behavior. Analysis and design of axially loaded short columns, using LSM. Analysis of eccentrically loaded short columns. Introduction to Pu- Mu interaction curves and their use for eccentrically loaded columns. **Footings:** Analysis and design of Isolated column footing for axial load. Introduction to combined footing for two columns (without Central beam) for axial loads using LSM.
7	**Torsion:** Analysis and Design of beams for torsion as per codal Method.

Text Books:

1. Design of steel structure by N. Subramanian, Oxford University Press.
2. Limit state design structure S.K. Duggal, TMH publications
3. Design of steel structure by S. Bhavikatti, I.K. international pvt. Ltd.

5CE4-04: GEOTECHNICAL ENGINEERING

Credit: 3
3L+0T+0P

Max. Marks: 150(IA: 30, ETE: 120)
End Term Exam: 3 Hours

Course Outcomes: Objective of the course is to make student able to:

C304.1	**Understand the engineering and index properties of soil and classification of soil.**
C304.2	**Determine the permeability of soil by laboratory and field methods**
C304.3	**Understand working and representation of direct shear test, unconfined compression test and tri axial test.**
C304.4	**Discuss compaction and consolidation of soil**
C304.5	**Understand the stability analysis of finite and infinite slopes**

Syllabus:

SN	Contents
1	Introduction: Objective, scope and outcome of the course.
2	Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc. Inter- relationships of the above. Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits, void ratio and density index. Mineral structures, structures of IlliteMontmorillonites and kaolinite and their characteristics. Darcy's law of permeability of soil and its determination in laboratory. Stresses in soil mass: total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quicksand phenomenon. Classification of soil for general engineering purposes: particle size and I.S. Classification systems.
3	Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box. Tri-axial and unconfined compression test apparatuses. Principles of soil compaction, laboratory compaction tests; Proctor's test, Stresses in Soil under surface loading: Bossinesq's and Westergaard's analysis for vertical pressure and its distribution in a soil mass. Vertical stresses due to concentrated loads, Isobar diagram, Vertical stress distribution on a horizontal plane. Influence diagram, Vertical stresses at a point under circular and rectangular loaded area. Approximate methods of Obtaining vertical pressure due to surface loading. Newmark's chart,
4	Compressibility and Consolidation: Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy Terzaghis one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co- efficient of consolidation. Pre-consolidation pressure and its determination. Normally, over and under consolidated soils. Methods of predicting Settlement and its rate. Total and differential Settlement.
5	Stability of Slopes: Classifications of slopes, Stability analysis of infinite slopes.

	Stability of finite slopes by Swedish and Friction circle method. Stability analysis by Taylor's stability number, Taylor's stability number curves. . Bishop's method of stability analysis. Earth Pressure: Active, passive and earth pressure at rest. Rankine's and Coulomb's theories. Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, horizontal and inclined cohesion less back fill.
6	Bearing Capacity of Soils: Terminology related to bearing capacity, Common types of foundations. Terzaghi and Meyehoff's theory for bearing capacity. Rankine's method for minimum depth of foundation. Skempton's method. Effect of eccentricity and water table on bearing capacity. IS code method, Plate load and penetration tests for determining bearing capacity. Introduction to pile, Site Investigations: Methods of explorations. Planning of Investigations, Depth of exploration, and Number of boreholes, Undisturbed and Disturbed samples. Types of samplers. Brief description of Procedures of sampling, Transportation and Storage of samples.
	TOTAL

Text Books:

1. Soil mechanics & foundation engineering by Arora K.R., Standard publications & Distributors Delhi.
2. Soil engineering in theory & practice by Alamsingh, CBS publications & Distributors, Delhi.

5CE4-05: WATER RESOURCE ENGINEERING

Credit: 2 | Max. Marks: 100(IA: 20, ETE: 80)
2L+0T+0P | End Term Exam: 2 Hours

Course Outcomes:

C305.1 **Understand about irrigation, its sources and evaluation of its amount.**
C305.2 **Outline and design canal structures.**
C305.3 **Understand dam stability and apply the learning in related areas.**
C305.4 **Understand well irrigation and cross drainage structures.**
C305.5 **Analyze the components of hydrologic cycle.**

Syllabus:

SN	Contents
1	Introduction: Objective, scope and outcome of the course.
2	**Introduction**: Definitions, functions and advantages of irrigation, present status of irrigation in India, classification for agriculture, soil moisture and crop water relations, Irrigation water quality. Consumptive use of water, principal Indian crop seasons and water Requirements.
3	**Canal Irrigation:** Types of canals, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory) **Diversion Head works:** Design for surface and subsurface flows, Bligh's and Khosla's methods.
4	**Embankment Dams:** Suitable sites, causes of failures, stability and seepage analysis, flow net, principles of design of earth dams. **Gravity Dams:** Force acting on a gravity dam, stability requirements.
5	**Well Irrigation:** Open wells and tube wells, types of tube wells, duty of tube well water. **Cross-Drainage Structure**: Necessity of Cross- drainage structures, their types and selection, comparative merits and demerits.
6	**Hydrology:** Definition, Hydrologic cycle, measurement of rainfall, Flood hydrograph, Rainfall analysis, Infiltration, Runoff, Unit Hydrograph and its determination.

Text Books:

1. Irrigation water power & water resources Engg. By KR Arora, Standard publications & Distributors Delhi.

5CE5-11: AIR & NOISE POLLUTION AND CONTROL

Credit: 2 | Max. Marks: 100(IA: 20, ETE: 80)
2L+0T+0P | End Term Exam: 2 Hours

Course Outcomes: At the end of syllabus students will able

C306.1 **"Identify the sources and effects of air pollution, classification of air pollutants**
C306.2 **Identify Air sampling and pollution measurement methods, principles and instruments**
C306.3 **Monitor the ambient air quality.**
C306.4 **To introduce sources and effects of noise pollution, Basics of acoustics and specification of sound**
C306.5 **Understand the concepts involved in control technologies of noise**

Syllabus:

SN	Contents
1	Introduction: Objective, scope and outcome of the course.
2	Air Pollution: Air pollutants, Sources, classification, Combustion Processes and pollutant emission, Effects on Health, vegetation, materials and atmosphere, Reactions of pollutants in the atmosphere and their effects-Smoke, smog and ozone layer disturbance, Greenhouse effect.
	Air sampling and pollution measurement methods, principles and instruments, Ambient air quality and emission standards, Air pollution indices, Air Act, legislation and regulations, control principles,
	Removal of gaseous pollutants by adsorption, absorption, reaction and other methods. Particulate emission control, settling chambers, cyclone separation, Wet collectors, fabric filters, electrostatic precipitators and other removal methods like absorption, adsorption, precipitation etc. Biological air pollution control technologies, Indoor air quality.
3	Noise pollution: Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psychoacoustics and noise criteria,
	Effects of noise on health, annoyance rating schemes; special noise environments: Infrasound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices. Noise control methods

Text Books:

1. Environmental Engineering II by B.C Punmia, Arihant publications, Jodhpur
2. Sanitary Engg. By S.K Garg, Khanna publications co

5CE5-14: REPAIR AND REHABILITATION OF STRUCTURES

Credit: 2 | Max. Marks: 100(IA: 20, ETE: 80)
2L+0T+0P | End Term Exam: 2 Hours

Course Outcomes: Student will be able to

C309.1 **Deterioration of Concrete Structures and Principles of retrofitting**
C309.2 **Criteria for repair and retrofitting also understanding about materials used for repair.**
C309.3 **Design considerations Codes of practices for repair and retrofitting**
C309.4 **Retrofitting of bridges and dams and heritage structures**
C309.5 **Retrofitting of structures by seismic base isolation, case studies of retrofitting of structures.**

Syllabus:

SN	Contents
1	Introduction: Objective, scope and outcome of the course.
2	**Deterioration of Concrete Structures:** Penetrability of concrete- permeability, sorptivity, diffusion. Physical processes- abrasion, erosion. Chemical- carbonation, chloride and sulfate attack. Alkali – Aggregate Reaction. Corrosion- mechanism. **Factors affecting and Preventive measures** :for all the above, including water – proofing techniques for various conditions, sacrificial anode, corrosion resistant steel, corrosion inhibitors, protective coatings etc.
3	**Cracks in Concrete and Masonry Structures-** Types, patterns, measurement and preventive measures
4	**Assessment of Risk/Damage in Structures:** Preliminary investigation- visual, history collection etc. Detailed Investigation: core cutting, rebar locator, corrosion meter, penetration resistance, pull out tests, half–cell potential, concrete resistivity etc. Interpretation of non destructive test data from all the above tests as well as rebound hammer number and ultra sonic pulse velocity. Destructive and chemical tests- on material samples from site.
5	**Materials for Repair:** polymers and resins, self curing compounds, FRP, Ferro- cement- properties, selection criterion, cement based and polymer modified mortars etc
6	**Repair Techniques:** Grouting, Jacketing, External bonded plates- processes, limitations, design computations etc. including numerical problems. **Under Water Repair:** Processes
7	**Case Studies:** related to rehabilitation of bridge piers, heritage structures, masonry structures etc.

Text Books:

1. Prosperities of concrete by AM Neville, Pearson
2. Concrete Technology M.S. Shetty , S. Chand & Comp.

5CE4-21: CONCRETE STRUCTURES DESIGN

Credit: 1.5
0L+0T+3P

Max. Marks: 75(IA: 45,ETE: 30)
End Term Exam: 3 Hours

Course Outcomes:

C312.1 **Understand design philosophies of beam by limit state and working state method**
C312.2 **Analyze and design of beams for flexure using working stress & limit state design methods.**
C312.3 **Check beams for shear and bond and serviceability for deflection using limit state method.**
C312.4 **Analyze and design of one way and two way slabs using limit state method.**
C312.5 **Analyze and design of column and footing by limit state method.**

Syllabus:

SN	Contents
1	Revision of Typical problems of BMD and SFD
2	Analysis and Design of singly reinforced rectangular beam section for Flexure, based on Working stress design philosophy.
3	Analysis and Design of singly reinforced rectangular beam section for flexure, based on Limit State design philosophy
4	Analysis and Design of doubly reinforced rectangular beam section for flexure, based on Limit State design philosophy
5	Analysis and Design of flanged beam section for flexure, based on Limit State design philosophy
6	Problems on Limit state of serviceability for deflection as per codal provisions of empirical coefficients.
7	Analysis and design of prismatic sections for shear using LSD
8	Problems on limit state of collapse in bond
9	Analysis and design of one way slabs using LSM,
10	Analysis and design of two way slabs using LSM,
11	Analysis and design of short axially loaded columns
12	Analysis and design of footing
13	Analysis and Design of beams for torsion as per codal method.

REFERENCE BOOKS:

1. Illustrated Reinforced Concrete Design by Karve& Shah; Standard Publishers, Delhi.
2. Limit State Design of Reinforced Concrete by Verghese P.C.; PHI Delhi.
3. Limit State Design by Dayaratnam; Oxford and IBH Publishing House
4. Reinforced Concrete: Limit State Design by A.K.Jain; NemCahnd and Brothers, Roorkee.

5CE4-22: GEOTECHNICAL ENGINEERING LAB

Credit: 1.5 | Max. Marks: 75(IA: 45,ETE: 30)
0L+0T+3P | End Term Exam: 3 Hours

Course Outcomes: Students will be able to

C313.1 **Plot Grain size distribution curve of coarse grained soil.**
C313.2 **Determination of specific gravity, liquid limit, plastic limit, shrinkage limit.**
C313.3 **Calculate field density of soil by core cutter and sand replacement methods.**
C313.4 **Determine compaction properties, MDD and OMC, of soil.**
C313.5 **Determine shear strength parameters of soil by direct shear and unconfined compression Test.**

Syllabus:

1	Grain size distribution by sieve Analysis and Hydrometer
2	Determination of specific Gravity by Pycnometer.
3	Determination of liquid limit by Casagrande's apparatus and cone penetrometer.
4	Determination of plastic limit and shrinkage limit
5	Determination of field density by core-cutter and sand replacement method
6	Determination of compaction properties by standard Proctor Test Apparatus
7	Determination of C-Ø values by unconfined compression Test Apparatus, Direct Shear Test Apparatus and Triaxial Test.
8	To determine the differential free swell index of soil and swelling pressure of Soil.
9	To determine the CBR of soil.
10	To determine the compressibility parameters of soil by consolidation test.
11	To determine the permeability of soil by constant and falling head methods. Design as per syllabus of theory.

5CE4-23: WATER RESOURCES ENGINEERING DESIGN LAB

Credit: 1
0L+0T+2P

Max. Marks: 50(IA: 30, ETE: 20
End Term Exam: 2 Hours

Course Outcomes:

C314.1 **Design the components of diversion head works and cross drainage works.**
C314.2 **Analyze stability and design of gravity and earth dam.**
C314.3 **Analyze and design of the water distribution system and canal.**
C314.4 **Design of channels and regime by Kennedy's Theory and Lacey's Theory.**
C314.5 **Design of surface and subsurface flow.**

Design as per syllabus of theory.

6CE3-01: WIND AND SEISMIC ANALYSIS

Credit: 2
2L+0T+0P

Max. Marks: 100(IA: 20, ETE: 80)
End Term Exam: 2 Hours

Course Outcomes:

C316.1 **Explain the theory of lateral load distribution concept and structural systems phenomena.**
C316.2 **Explain the principle of building analysis and behaviour of structure during lateral loads.**
C316.3 **Apply wind & load for analyzing the structure to evaluate the response of lateral load**
C316.4 **Apply seismic load for analyzing the structure to evaluate the response of lateral load**
C316.5 **Build the understanding of Earthquake Resistant Construction as per the codal provision of Indian Standards.**

Syllabus:

SN	Contents
1	**Introduction:** Objective, scope and outcome of the course.
2	**Structural Systems:** Types of structures and Structure's forms, Symmetry and Asymmetry in building forms, Vertical and lateral load resting elements, shear walls, framed tubes and various multi- storey configurations.
3	**Design Loads:** various types of loads and relevant codes. Design loads for different types of buildings. (IS-875 part 1 & 2) & Load Flow Concept
4	**Wind Loads Analysis:** Wind loads & calculation of wind load on flat roof pitched roof and single sloped roof buildings (IS: 875-Part 3).
5	**Earthquake Load Analysis:** Earthquake loads & calculations of earthquake loads on framed structures. (IS: 1893 – Part 1).
6	**Earthquake Resistant Construction:** Typical seismic failure of masonry and RCC structures. Earthquake resistant construction of buildings, and various provisions as per IS codes; IS-4326,IS-13827, IS-13828, IS-13920, IS-13935.

6CE4-02: STRUCTURAL ANALYSIS-II

Credit: 3 **Max. Marks: 150(IA: 30, ETE: 120)**
3L+0T+0P **End Term Exam: 3 Hours**

Course Outcomes:

C317.1 **To explain the concept and application of unit load method.**
C317.2 **To explain the behavior of moving load on girders using concepts of influence line.**
C317.3 **To analysis of two hinged and three hinged parabolic arches.**
C317.4 **To calculate stresses, shear center and deflection of unsymmetrical section.**
C317.5 **To analysis of multistory frames by portal, cantilever and factor methods.**

Syllabus:

SN	CONTENTS
1	**Introduction:** Objective, scope and outcome of the course.
2	Unit load method & their applications: deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames. Introduction to Energy Methods: Strain energy for gradually applied, suddenly applied and impact loads, Strain energy due to axial loads, bending, shear and torsion;. Castiglione's theorems & their applications in analysis of determinate and redundant frames up to two degree of redundancy and trussed beams; Stresses due to temperature & lack of fit in redundant frames; deflection of determinate beams, frames using energy methods
3	**Influence line diagram & Rolling load:** ILD for beams & frames, Muller- Breslau principle and its application for drawing ILD, Rolling load, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure.
4	**Arches:** analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels.
5	**Unsymmetrical bending:** Definition, location of NA, computation of stresses and deflection, shear centre and its location,
6	**Approximate methods for lateral loads:** Analysis of multistory frames by portal method, cantilever method & factor method. Analysis of determinate space trusses by tension coefficient method.

6CE4-03: ENVIRONMENTAL ENGINEERING

Credit: 3
3L+0T+0P

Max. Marks: 150(IA: 30, ETE: 120)
End Term Exam: 3 Hours

Course Outcomes: Students will be able to

C318.1	**Understand demand for water supply to households, industry and public services.**
C318.2	**Understand source of water and their quality parameter, analyse the process of treatment processes, transmission, and distribution.**
C318.3	**Understand quantity of sewage, conveyance, design of sewers, quality parameters, treatment, disposal**
C318.4	**Analyze the process of advanced treatment of water and wastewater**
C318.5	**Basic concepts of air and noise pollution, monitoring and control measures.**

Syllabus:

SN	Contents
1	**Introduction:** Objective, scope and outcome of the course.
2	**Water:** -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices. Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design. **Water Treatment**: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.
3	Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water. Sewage characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, and Standards of disposal into natural watercourses and on land, Indian standards. Sewage and Sullage, Pollution due to improper disposal of sewage, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes. Wastewater Disposal and Refuse: Disposal of sewage by dilution, Self- Purification of streams, sewage disposal by irrigation sewage farming, waste water reuse.
4	Air-Composition and properties of air, Quantification of air pollutants , Monitoring of air pollutants, Air quality standards, Control measures for Air pollution
5	Noise-Basic concept, measurement and various control methods.

6CE4-04: DESIGN OF STEEL STRUCTURES

Credit: 3
3L+0T+0P

Max. Marks: 150(IA: 30, ETE: 120)
End Term Exam: 3 Hours

Course Outcomes: Students will be able to

C319.1	**Explain the fundamental of steel structures and calculate the plastic moment of different cross-sections.Design and analysis the various members of steel under combined forces**
C319.2	**Design and analysis the bolted connections, welded .tension members and compression members.**
C319.3	**Design of beams: simple and compound sections. including for web buckling, web crippling, lateral torsional buckling.**
C319.4	**Design and analysis of column bases and various members of steel under combined forces**
C319.5	**Design of plate girder,gantrygirder,roof trusses members and foot over bridges.Introduction to Pre Engineered Buildings.**

Syllabus:

SN	Contents
1	**Introduction:** Objective, scope and outcome of the course.
2	Types of Steels and their broad specifications. Structural steel forms- hot rolled, tubular, light gauge etc and their applicability. Classification of cross sections as per IS 800-2007- Plastic, compact, semi compact and slender- characteristics
3	Plastic analysis of steel structures, fundamentals, shape factor, static and mechanism method of analysis, bending of beams of uniform cross sections (any shape)
4	Connections: Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings with IS provisions
5	Tension Members: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded members.
6	Compression Members: Types of buckling, Imperfection factor, Buckling curves for different cross sections as per IS. Design of compression members: Axially loaded members including made up of angle section: single and in pair; built up columns including design of lacings and battens as per IS.
7	Beams: Design of beams: simple and compound sections. Design of laterally supported and unsupported beams including for web buckling, web crippling, lateral torsional buckling.
8	Member design under combined forces: Compressive load and Uniaxial moment. tension and Uniaxial moment
9	Column Bases: Design of column bases for axial and eccentric compressive loads: Slab and gusseted base.

10	Design of plate girder: Design of welded and bolted sections including web and flange splicing, horizontal, intermediate and bearing stiffeners. Shear strength determination by post critical and tension field action methods. End panel design options and procedure as per IS 800. Curtailment of flange plates. Connections for flange plate to flange angles and flange angles to web, etc. Design of welded connections
11	Design of gantry girder
12	Design of roof trusses members for combined forces, wind loading etc. Purlin design
13	Introduction to Pre Engineered Buildings, characteristics and their applications.
14	Introduction of truss girder bridges-its members including portal and sway bracings etc. Design aspects of foot over bridges.

3- Design of Steel Structures by S. Bhavikatti, I.K. International Pvt. Ltd.
4- Design of Steel Structures by V.L. Shah, Structures Publications.

6CE4-05: ESTIMATING & COSTING

Credit: 2 | Max. Marks: 100(IA: 20, ETE: 80)
2L+0T+0P | End Term Exam: 3 Hours

Course Outcomes: Students will be able to

C320.1	**To understand knowledge of quantity surveying and will become familiar with modes of measurement and utility of various types of estimates.**
C320.2	**To understand the use of current schedule of rates and quantitative resource allocation for the rate analysis.**
C320.3	**To extend the knowledge of detailed estimate preparation for various civil engineering works.**
C320.4	**To calculate cost of works acknowledging overhead charges, contingencies, work charge establishment and percentage of various services.**
C320.5	**To understand utility, purpose and concepts involved in the building valuation.**

Syllabus:

Chapter-1

Introduction: Objective, scope and outcomes of the course.

Chapter- 2

Purpose and importance of estimates, principle of estimating, Method of taking out quantities of items of work. Mode of measurements, measurement sheet; bill of quantities.

Chapter- 3

Estimating: Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimate for different projects.

Chapter- 4

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)

Chapter- 5

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

Chapter- 6

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

6CE5-12: SOLID AND HAZARDOUS WASTE MANAGEMENT

Credit: 2
2L+0T+0P

Max. Marks: 100(IA: 20, ETE: 80)
End Term Exam: 2 Hours

Course Outcomes: Students will be able to

C322.1 **To understand the basic components of swm.**
C322.2 **Process to collect the solid waste.**
C322.3 **To characteristics the properties of solid waste and waste processing.**
C322.4 **Introduction of hazardous waste and disposal.**
C322.5 **Treatment and disposal of solid waste and understanding the latest rules related to swm.**

Syllabus:

SN	Contents
1	**Introduction:** Objective, scope and outcome of the course.
2	**Introduction to SWM:** Definition of waste and solid waste, classification solid waste, sources of solid waste, its composition, factors affecting waste generation, traditional methods of waste collection and disposal
3	**Waste Collection:** Components of waste collection, waste collection containers, their characteristics, types, waste collection vehicles, collection frequency, collection route, transfer stations
4	**Solid Waste Characterization:** Physical characteristics, chemical characteristics and biological characteristics of solid wastes **Waste Processing**: Size reduction, factors affecting size reduction, size reducing equipment, volume reduction, equipment for volume reduction, waste minimization, waste hierarchy, 3 R principle
5	**Hazardous Waste:** Definition, sources, classification, collection, segregation, treatment and disposal methods **Radioactive Waste, E-Waste, Biomedical Waste:** Definition, sources, classification, segregation, management and disposal methods
6	**Treatment and Disposal of Solid Waste:** Composting, Vermicomposting, biogas production, thermal treatment, incineration, pyrolysis, gasification, biological treatment, Sanitary land filling, land fill leach ate and gas management **Latest Advances and Rules** related to SWM, Hazardous Waste, Plastic Waste and E-Waste Management

6CE5-16: GEOGRAPHIC INFORMATION SYSTEM & REMOTE SENSING

Credit: 2
2L+0T+0P

Max. Marks: 100(IA: 20, ETE: 80)
End Term Exam: 2 Hours

Course Outcomes: Students will be able to

C326.1 **Understand and applying the basic concept and methods of photogrammetry.**
C326.2 **Understand the process of remote sensing.**
C326.3 **Analyze different types of platforms, sensors and their characteristics, Orbital parameters of a satellite, Multi concept in Remote Sensing.**
C326.4 **Understand and rememberthe concepts of image Interpretation.**
C326.5 **Application of Geographic Information System (GIS).**

Syllabus:

SN	CONTENTS
1	**Introduction:** Objective, scope and outcome of the course.
2	**Photogrammetric:** Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs, Aerial camera and photo- Theodolite, Scale of a Photograph, Tilt and Height displacements, Stereoscopic vision and stereoscopes, Height determination from parallax measurements, Flight planning, Maps and Map substitutes and their uses.
3	**Remote Sensing:** Introduction and definition of remote sensing terms, Remote Sensing System, Electromagnetic radiation and spectrum, Spectral signature, Atmospheric windows.
4	Different types of platforms, sensors and their characteristics, Orbital parameters of a satellite, Multi concept in Remote Sensing.
5	**Image Interpretation:** Principles of interpretation of aerial and satellite images, equipments and aids required for interpretation, ground truth – collection and verification, advantages of multi date and multiband images. Digital Image Processing concept.
6	**Geographic Information System (GIS) :** Introduction & applications of GIS in map revision, Land use, Agriculture, Forestry, Archaeology, Municipal, Geology, water resources, Soil Erosion, Land suitability analysis, change detection.

Text Books:

1. Remote Sensing and GIS: B. Bhatta- Oxford Publishers.

6CE4-21: Environmental Engineering Design and Lab

Credit: 1.5
0L+0T+3P

Max. Marks: 75(IA: 45, ETE: 30)
End Term Exam: 3 Hours

Course Outcomes: Students will be able to

C327.1 **Understand about the water quality parameters and their permissible limits as per the standards.**
C327.2 **Analyze the physical tests to be conducted for the water before supply.**
C327.3 **Analyze chemical tests to be conducted for the water before supply.**
C327.4 **Accumulate the information about water supply fittings.**
C327.5 **Calculate physical chemical properties by lab experiments for sewage sample.**
Understand biological reaction of sewage sample"

Design

1. Population forecasting and water demand
2. Water Quality parameters
3. Design of Sedimentation tanks, coagulation and flocculation tanks
4. Design of rapid and slow sand filters
5. Design of disinfection units and transmission systems
6. Design of Sewer lines and storm water systems
7. Design of aerobic and anaerobic treatment unit
8. Design of suspended and attached growth systems

Lab

1. Physical Characterization of water: Turbidity, Electrical Conductivity, pH
2. Analysis of solids content of water: Dissolved, Settleable, suspended, total, volatile, inorganic etc.
3. Alkalinity and acidity, Hardness: total hardness, calcium and magnesium hardness
4. Optimum coagulant dose
5. Chemical Oxygen Demand (COD)
6. Dissolved Oxygen (D.O) and Biochemical Oxygen Demand (BOD)
7. Break point Chlorination
8. Bacteriological quality measurement: MPN,

6CE4-22: Steel Structures Design

Credit: 1.5
0L+0T+3P

Max. Marks: 75(IA: 45, ETE: 30)
End Term Exam: 3 Hours

Course Outcomes: Students will be able to

C328.1	**"Explain the fundamental of steel structures and calculate the plastic moment of different cross-sections. Design and analysis the various members of steel under combined forces**
C328.2	**Design and analysis the bolted connections, welded .tension members and compression members.**
C328.3	**"Design of beams: simple and compound sections. including for web buckling, web crippling, lateral torsional buckling. "**
C328.4	**Design and analysis of column bases and various members of steel under combined forces**
C328.5	**Design of plate girder,gantrygirder,roof trusses members and foot over bridges.Introduction to Pre Engineered Buildings**

Analysis and design Problems as per different topics of syllabus of theory 6CE4 -05, with latest version of IS 800 and other relevant IS codes. In addition to numerical problems, following exercises:

1. Case study of foot over bridges/truss- Girder Bridge in vicinity /home town of the students, preferably in groups of 8-10 students. A report including photographs marked with names and section details of different members in it (maximum limit of words: 1 0 0 0).

2. Case study of a structure using tubular sections or light gauge sections in vicinity /home town of the students, preferably in groups of 8-10 students. A report including photographs marked with names, size and section details of different members in it (maximum limit of words: 1000).

6CE4-23: QUANTITY SURVEYING AND VALUATION

Credit: 1 Max. Marks: 50(IA: 30, ETE: 20)
0L+0T+2P End Term Exam: 2 Hours

Course Outcomes: Students will be able to

C329.1	**"To understand knowledge of quantity surveying and will become familiar with modes of measurement and utility of various types of estimates.**
C329.2	**To understand the use of current schedule of rates and quantitative resource allocation for the rate analysis.**
C329.3	**To extend the knowledge of detailed estimate preparation for various civil engineering works.**
C329.4	**To calculate cost of works acknowledging overhead charges, contingencies, work charge establishment and percentage of various services.**
C329.5	**To understand utility, purpose and concepts involved in the building valuation.**

Content:

1. Preliminary Estimate (Plinth Area and Cubic Content)
2. Detailed Estimate of buildings (Long wall-Short wall and Centre line method)
3. Rate Analysis of different Items of Works (Earthwork, Concrete Work, DPC, Stone masonry, Brickwork, RCC, Roofing, Flooring, and Finishing etc.)
4. Earthwork Calculation for Roads, Irrigation Canals and Channels (cutting and filling)
5. Valuation of Buildings and Properties

6CE4-24: WATER AND EARTH RETAINING STRUCTURES DESIGN

Credit: 1
0L+0T+2P

Max. Marks: 50(IA: 30, ETE: 20)
End Term Exam: 2 Hours

Course Outcomes: Students will be able to

C330.1 **Design the continous beam and understanding of moment redistribution in continous beam.**
C330.2 **Design the curved beam.**
C330.3 **Design of circular domes.**
C330.4 **Design of Water Tanks and Towers.**
C330.5 **Design and stability analysis of retaining wall.**

Syllabus:

SN	Contents
1	**Continuous Beams:** Analysis and Design of continuous beams using coefficients (IS Code), concept of moment redistribution
2	**Curved Beams:** Analysis and design of beams curved in plan.
3	**Circular Domes:** Analysis and design of Circular domes with u.d.l. & concentrated load at crown.
4	**Water Tanks and Towers:** Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging.
5	**Retaining walls:** Analysis and design of Cantilever Retaining Walls: Introduction to counter fort and buttress type retaining walls, their structural behavior and stability analysis.

Text Books:

1. Foundation Engg. By K.R. Arora

6CE4-25: FOUNDATION ENGINEERING

Credit: 1
0L+0T+2P

Max. Marks: 50(IA: 30, ETE: 20)
End Term Exam: 2 Hours

Course Outcomes: Students will be able to

C331.1	**Design of isolated shallow, combined footings and design of raft foundation.**
C331.2	**Design of pile foundations**
C331.3	**Design of wells and casions.**
C331.4	**Design of machine foundation.**
C331.5	**Design of retaining structure.**

List off Experiments:

1. Design of isolated shallow footings, combined footings, raft foundations.
2. Design of pile foundations.
3. Design of wells and cassions.
4. Design of machine foundation.
5. Design of retaining structures etc

7CE4-01: TRANSPORTATION ENGINEERING

Credit 3 | Max. Marks: 150(IA: 30, ETE: 120)

3L+0T+0P | End Term Exam: 3Hours

Course Outcomes: Students will be able to

C401.1 **Understand the importance & characteristics of road transport.**

C401.2 **Design of various roads with proper alignment based on planning principles, survey data as per IRC Codes.**

C401.3 **Discuss the knowledge of highway materials & construction of various types of roads and identify the problems associated with roads & remedies for same.**

C401.4 **Describe and understand the various components of railway track.**

C401.5 **Understand the various components of airport and harbours.**

Syllabus:

SN	Contents
1	**Introduction:** Objective, scope and outcome of the course
2	**Highway planning and alignment:** Different modes of transportation – historical Development of road construction- Highway Development in India –Classification of roads- Road pattern– Highway planning in India- Highway alignment - Engineering Surveys for alignment – Highway Project- Important Transport/Highway related agencies in India. PMGSY project. Introduction about IRC, NRRDA
3	**Geometric Design of highways:** The highway crosses sectional elements- Camber-Sight Distance - Types of sight distances -Design of horizontal alignments - Super elevation, Widening of Pavements on horizontal curves- transition Curves- Design of Vertical alignments – Gradients- summit and Valley Curves- Recommendations of IRC Codes of Practice.
4	**Highway Materials:** Desirable Properties, Testing Procedures, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly- ash/pond- ash. Role of filler in Bituminous mix, materials of filler. Specifications of DLC and PQC for rigid pavement
5	**Highway Construction and Equipments:** Methods of constructing different types of roads viz. Earth roads, Stabilized roads, WBM, WMM roads, earthen embankments, DLC and embankments with fly ash. Bituminous roads and Concrete roads. Berms and Shoulders, Features of rural roads including those in PMGSY. Hot mix plant for Bituminous roads- components, layout, control panel, quality assurance. Highway construction of rigid and flexible pavements including types of road rollers, specifications of compaction of different layers of bituminous roads, modern pavers for CC roads. Roller compacted concrete road construction
6	**Design of flexible and rigid pavements as per IRC:** IRC provisions including those of IRC 37, IRC 58
7	**Introduction of Railway Engineering:** Types and Selection of Gauges, Selection of Alignment, Ideal Permanent Ways and Cross- sections in different conditions, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast, Rail Fastenings.
8	**Introduction of Airports and Harbours: Airport Engineering: -** Introduction: Requirements to Airport Planning, Airport Classifications, Factors in Airport Site Selection, Airport Size. Planning of Airport: Requirements of Airport- Terminal Area, Runway Length etc. **Harbours:** history of water transportation, modern trends in water transportation, components of harbour, classification of harbours. Ports and docks.

Text / Reference Books:	
1	Highway Engineering by Khanna SK & CG Justo, Nem Chand & Brothers, Roorkee.
2	Highway Engg. By LR Kadyali, Khanna Tech Publications, Delhi.
3	Specifications for Roads & Bridges by Ministry of Road Transport & Highways and Indian Road Congress.
4	Railway Engineering by Satish Chandra and MM Agarwal, Oxford University Press, Delhi.
5	Railway Engineering by Saxena SC and Arora SP, DhanpatRai Publishers, Delhi.
6	S C Rangwala, airport engineering, Charotar publication house.
7	Gautam H. Oza, Dock &Harbour Engineering, Charotar publication House.

7AG6-60.2: Environmental Engineering and Disaster Management

Credit 3 | Max. Marks: 150(IA: 30, ETE: 120)

3L+0T+0P | End Term Exam: 3Hours

Course Outcomes: Students will be able to

C402.1` **To understand the natural environment and its relationships with human activities.**
C402.2 **To apply the fundamental knowledge of science and engineering to assess environmental and health risk.**
C402.3 **Domestic waste water quantity, characteristics, disposal in urbanand rural areas.**
C402.4 **Acquire skills for scientific problem-solving related to air, water, noise & landpollution.**
C402.5 **Introduction to types of disasters, importance of disaster management.**

Syllabus:

SN	Contents
1	Introduction: Objective, scope and outcome of the course. (This compulsory for all course)
2	Importance of safe water supply system. Domestic water requirements for urban and rural areas. Sources of Water supply. Intakes and transportation of water
3	Drinking water quality. Indian Standards of drinking water. Introduction to water treatment for safe drinking, Importance of sanitation.
4	Domestic waste water: quantity, characteristics, disposal in urban and rural areas. Sewer: types, design discharge and hydraulic design. Introduction to domestic wastewater treatment.
5	Solid waste: quantity, characteristics and disposal for urban and rural areas. Introduction to air pollution. Types of pollutants, properties and their effects on living beings. BIS standards for pollutants in air and their abetments. Introduction to various disaster, Importance of disaster management.

7CE4-21: ROAD MATERIAL TESTING LAB

Credit 1 Max. Marks: 50(IA: 30, ETE: 20)

0L+0T+2P

Course Outcomes: Students will be able to

C403.1 **Understand the importance and determination of physical properties of aggregates.**

C403.2 **Understand the importance and determination of physical properties of bitumen.**

C403.3 **Evaluate and analyze the suitability of materials from data collected by physical tests done on aggregates.**

C403.4 **Evaluate and analyze the suitability of materials from data collected by physical tests done on bitumen.**

C403.5 **Design of different bituminous layers of flexible pavement and compare their results with IRC/MORTH recommendations.**

List of Experiments:

1. Aggregate Impact Test
2. To determine the Angularity Number, Flakiness Index & Elongation Indexof aggregates
3. Los Angeles Abrasion Test
4. Aggregate Crushing Value Test
5. Standard Tar Viscometer Test for given bitumen sample
6. Ductility Test for a given bitumen sample
7. To determine the softening point for given sample of bitumen.
8. Marshall Stability Test
9. Float Test
10. Preparation of Dry lean concrete mix and testing of its strength

7CE4-22: PROFESSIONAL PRACTICES AND FIELD ENGINEERING LAB

Credit 1 Max. Marks: 50(IA: 30, ETE: 20)

0L+0T+2P

Course Outcomes: Students will be able to

C404.1	**Understand the Different types of Knots Site plan, index plan, layout plan, plinth area, floor area of buildings**
C404.2	**Understand the Foundation plan layout infield**
C404.3	**Analysis of Bar bending schedule**
C404.4	**Understand the Specifications- For different classes of building and Civil Engineering works**
C404.5	**Understand the Valuation of buildings and properties**

List of Experiments:

1. Different types of Knots
2. Site plan, index plan, layout plan, plinth area, floor area of buildings
3. Foundation plan layout infield
4. Bar bending schedule
5. Specifications- For different classes of building and Civil Engineering works
6. Specifications of building components
7. Valuation of buildings and properties
8. Work at heights – scaffolding and ladders use, type of scaffolds, safety requirements, design and load factors, defects and inspection norms, type of ladders, upkeep, defects and good maintenance

7CE4-23: SOFT SKILLS LAB

Credit 1 Max. Marks: 50(IA: 30, ETE: 20)

0L+0T+2P

Course Outcomes:

C405.1 **Understand the meaning, process and importance of communication and overcome communication barriers.**
C405.2 **Demonstrate correct usage of grammar.**
C405.3 **Write cohesive paragraphs, reports and letters.**
C405.4 **Analyze the short stories of renowned authors.**
C405.5 **Analyze the content and comprehending the appropriate use of language and literary terms.**

Syllabus:

1. **SOFT SKILLS**- Introduction to Soft Skills, Aspects of Soft Skills, Identifying your Soft Skills, Negotiation skills, Importance of Soft Skills, Concept of effective communication. SELF-DISCOVERY- Self-Assessment, Process, Identifying strengths and limitations, SWOT Analysis Grid.
2. **PREPARING CV/RESUME** – Introduction, meaning, difference among bio-data, CV and resume, CV writing tips. Do's and don'ts of resume preparation, Vocabulary for resume, common resume mistakes, cover letters, tips for writing cover letters.
3. **INTERVIEW SKILLS** - Introduction. Types of interview, Types of question asked, Reasons for rejections, Post-interview etiquette, Telephonic interview, Dress code at interview, Mistakes during interview, Tips to crack on interview, Contextual questions in interview skills, Emotional crack an interview, Emotional intelligence and critical thinking during interview process.
4. **DEVELOPING POSITIVE ATTITUDE** – Introduction, Formation of attitude, Attitude in workplace, Power of positive attitude, Examples of positive attitudes, Negative attitudes, overcoming negative attitude and its consequences,
5. **IMPROVING PERCEPTION**- Introduction, Understanding perception, perception and its application in organizations.
6. **CAREER PLANNING** – Introduction, Tips for successful career planning, Goal setting immediate, short term and long term, Strategies to achieve goals, Myths about choosing career.
7. **TEAM BUILDING AND TEAM WORK** - Introduction, Meaning, Characteristics of an effective team, Role of a Team Leader, Role of Team Members, inter group Collaboration Advantages, Difficulties faced, Group Exercises-Team Tasks and Role- Play, Importance of Group Dynamics.
8. **TIME MANAGEMENT**: The Time management matrix, apply the Pareto Principle (80/20 Rule) to time management issues, to prioritize using decision matrices, to beat the most common time wasters, how to plan ahead, how to handle interruptions , to maximize your personal effectiveness, how to say "no" to time wasters, develop your own individualized plan of action.
9. **STRESS MANAGEMENT** – Introduction, meaning, positive and negative stress, Sources of stress, Case studies, signs of stress, Stress management tips, Teenage stress. Group discussion practice on current topics, Quantitative aptitude and reasoning preparation.

Text / Reference Books:	
1	Butterfield, Jeff, 'Soft Skills for Everyone', Cengage Learning, New Delhi, 2010.
2	G.S. Chauhan and Sangeeta Sharma, 'Soft Skills', Wiley, New Delhi, 2016.
3	Klaus, Peggy, Jane Rohman& Molly Hamaker, 'The Hard Truth About Soft Skills', Harper Collins E-books, London, 2007.
4	S.J. Petes, Francis, 'Soft Skills and Professional Communication', Tata McGraw Hill Education, New Delhi, 2011.
5	Dr. R. S. Aggarwal, Quantitave aptitude & reasoning, S Chand & company ltd.
6	Dr. R. S. Aggarwal, A modern approach to Verbal & Non-verbal reasoning, S Chand & company ltd.

7CE4-24: ENVIRONMENTAL MONITORING AND DESIGN LAB

Credit 1 Max. Marks: 50(IA: 30, ETE: 20)

0L+0T+2P

Course Outcomes:

C406.1 **Design Sewer Water Treatment Plant and Sewage Treatment Plant**
C406.2 **Determination of SPM, PM10 and PM2.5.**
C406.3 **Demonstration of noise pollution monitoring equipment namely, modular precision sound level 2 meter**
C406.4 **Understand the Air quality monitoring and Noise quality monitoring**
C406.5 **Understand the Latest technology for management of municipal solid waste**

Design:

1. Sewer design and estimation of Waste/Storm water by software.
2. Design of Water Treatment Plant and Sewage Treatment Plant
3. Design of Oxidation pond, stabilization pond and aerated lagoons.
4. Design of aerobic and an aerobic digester.

Lab:

1. Demonstration of air pollution monitoring instruments namely, High volume sampler
2. Determination of SPM, PM10andPM2.5.
3. Demonstration of noise pollution monitoring equipment namely, modular precision sound level meter.
4. Air quality monitoring for Traffic/Residential locality and its effect on the environment.
5. Noise quality monitoring for Traffic/Residential locality and its effect on the environment.
6. Latest technology for management of municipal solid waste, e-waste, bio- medical waste and their prevalent rules and regulations.

Recommended Texts:	
1	Manual on Sewerage and Sewage Treatment Systems – 2013, CPHEEO, New Delhi
2	Compendium of sewage treatment technologies Published by NRCD, MoEF, GOI, 2009
3	Storm Water Management Model (SWMM) and Manual, Published by US EPA
4	IS 5182-23 (2006) published by Bureau of Indian Standards
5	IS 4758: 1968 published by Bureau of Indian Standards
6	Mo EF Guidelines and amendments as updated on http://moef.gov.in
7	CPCB Guidelines and amendments as updated on https://cpcb.nic.in

8CE4-01 PROJECT PLANNING AND CONSTRUCTION MANAGEMENT

Credit- 3 Max. Marks: 150(IA: 30, ETE: 120)

3L+0T+0P End Term Exam: 3Hours

Course Outcomes:

C409.1 Evaluate the financial evaluation of projects and project planning.
C409.2 Analyze the project scheduling.
C409.3 Identify the project cost and time control.
C409.4 Analyze about the contract management.
C409.5 Understand the safety management during construction.

Syllabus:

SN	Course Content
1	**INTRODUCTION:** Objective, scope and outcome of the course
2	**FINANCIAL EVALUATION OF PROJECTS ANDPROJECT PLANNING:** Capital investment proposals, criterions to judge the worthwhile of capital projects viz. net present value, benefit cost ratio, internal rate of return, Risk cost management, main causes of project failure. Categories of construction projects, objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process, objectives of construction project management.
3	**PROJECT SCHEDULING:** Importance of project scheduling, project work breakdown process – determining activities involved, work breakdown structure, assessing activity duration, duration estimate procedure, Project work scheduling, Sequence of construction activities, Project management techniques – CPM and PERT networks analysis, concept of precedence network analysis.
4	**PROJECT COST AND TIME CONTROL:** Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, determination of the optimum duration of a project, updating of project networks, resources allocation.
5	**CONTRACT MANAGEMENT:** Elements of tender operation, Types of tender sand contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, determination of a contract, arbitration.
6	**SAFETY AND OTHER ASPECTS OF CONSTRUCTION MANAGEMENT:** Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects.

Recommended Texts:	
1	Construction Planning & management By P S Gahlot& B M Dhir, New Age International Limited Publishers
2	Construction Project planning & Scheduling by Charles Patrick, Pearson, 2012
3 4	Construction Project Management Theory & practice --- Kumar Neeraj Jha, Pearson, 2012
5	Modern construction management--Harris, Wiley India.
6 7	Construction Management & Planning by Sengupta and Guha-Tata McGraw Hill Publication.
8	Project Management – K Nagrajan – New age International Ltd.
9	Professional Construction Institute Edition.
10	Construction Project Management Planning, Scheduling and Controlling- Chitakara- Tata McGraw Hill, New Delhi
11	Construction Planning, Equipment and Methods by R. L. Peurify

8TT6-60.2: DISASTER MANAGEMENT

Credit: 3 | Max. Marks: 150(IA: 30, ETE: 120)

3L+0T+0P | End Term Exam: 3 Hours

Course Outcomes: Students will be able to

C410.1	**Describe the basic concepts of disaster and hazards.**
C410.2	**Discuss various types of natural and man-made disasters.**
C410.3	**Explain the types of disasters, causes, impact and preventive measure.**
C410.4	**Evaluate the risk and vulnerability associated with disasters.**
C410.5	**Assess the role of production people in disaster management of Indian textile industries.**

Syllabus:

Chapter- 1

Introduction: Objective, scope and outcome of the course

Chapter- 2

Understanding disasters and hazards related issues social and environmental. Risk and vulnerability. Types of Disasters, their occurrence/ causes, impact and preventive measures

Chapter- 3

Natural Disasters- Hydro-meteorological Based Disasters like Flood, Flash Flood, Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions

Chapter- 4

Man-made Disasters: Textile Processing Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards

Chapter- 5

Management roll in mitigating Disaster in Indian Textile Industries. Roll of production people in Disaster Management.

8CE4-21: PROJECT PLANNING AND CONSTRUCTION MANAGEMENT LAB

Credit 1 Max. Marks: 50(IA: 30, ETE: 20)

0L+0T+2P

Course Outcomes: Students will able to

C411.1 **Understand about the different Types of contracts**
C411.2 **Analyze the Drafting of tender documents**
C411.3 **Analyze the Different models of PPP like BOT, BOOTetc.**
C411.4 **Design and Preparation of bar chart diagram**
C411.5 **Network Analysis using PERT and CPM**

List of Experiments:

1. Assignments on net present value, benefit cost ratio, internal rate of return
2. Types of contracts – Tenders, tender form, submission and opening of tenders, measurement book, muster roll, piecework agreement and work order.
3. Drafting of tender documents, special terms and conditions
4. Drafting of tender notices for different types of works
5. Different models of PPP like BOT, BOOT etc.
6. Arbitration
7. Preparation of bar diagram
8. Network Analysis using PERT and CPM

8CE4-22: PAVEMENT DESIGN

Credit 1 Max. Marks: 50(IA: 30, ETE:20)

0L+0T+2P

Course Outcomes: The students will be able to

C412.1 Understand the Pavement Mix Analysis.
C412.2 Understand the Pavement Basics.
C412.3 To Design of Flexible Pavements.
C412.4 To Design of Concrete Pavements.
C412.5 Understand the Specifications for rural roads.

List of Experiments:

1. Pavement Mix Analysis: Aggregate blending, bituminous mix design – Marshall Stability approach, concrete mix design for DLC and PQC with IS a code provision.
2. Pavement Basics: Types & comparison, vehicular loading pattern, factors affecting design and performance of pavements, sub grade requirements.
3. Design of Flexible Pavements: Analytical approach, flexible pavement layers, ESWL, repetitions of load, techniques of design methods, wheel load analysis, traffic analysis, stress distribution in sugared soil, Burmister's theories, group index method, CBR approach, IRC 37 and other guidelines.
4. Design of Concrete Pavements: Westergaard's approach, temperature & frictional stresses, design of expansion & longitudinal joints, design of dowel & tie bars, IRC 58 and other guidelines.
5. Specifications for rural roads: Important aspects of IRC SP 020, Rural Road Manual. NRRDA publications