Department of Civil Engineering

GEETANJALI INSTITUTE OF TECHNICAL STUDIES, UDAIPUR

तमसो मा ज्योतिर्गमय्

Darkness to Light

COURSE DESCRIPTION

BACHELOR OF TECHNOLOGY

Academic Session = 2020-21

Rajasthan Technical University, Akelgarh, Kota, Rajasthan 32401

Table of Contents   Page No.

Vision of Department

Create an academic ambience to develop civil engineering professionals with technical competencies to meet society and industry needs.

Mission of Department

1. To inculcate among students with fundamentals of basic sciences & engineering required for civil engineering.
2. To impart and empower the quality education required for development of the society and industry.
3. To provide state-of-the-art resources that contributes to ethical & congenial learning environment.

Programme Educational Objectives (PEOs)

PE01: Our graduates will be professionally competent in their chosen career and use appropriate techniques and modern Engineering tools in executing projects.

PE02: Analyze and design Civil engineering systems with social awareness and responsibility.

PE03: To Produce Engineers, on the principles of sustainable development, who will understand how engineering projects affect society and the environment.

PE04: Exhibit professionalism, ethical approach, communication skills, team work in their profession and understand the need for lifelong learning for a successful professional career.

Programme Outcomes (POs)

1. **Engineering Knowledge:** Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

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

3. **Design/ Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

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

5. **Modern Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

7. **Environment and Sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams and in multi disciplinary settings.

10. **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.

11. **Project Management and Finance:** Demonstrate knowledge and understanding of 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.

12. 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.

PSO's (Program Specific Outcomes)

1) **Social Commitment:** Graduates will be able to apply their fundamental technical knowledge for sustainable development of country through green and low cost construction.

2) **Professional Skills:** Students will be able to analyse and design various engineering problems using advance techniques and software as per codal provisions.

3) **Career in Industry/Entrepreneurship:** Graduates will be able to apply their innovative ideas to make their careers in various industries and promote them to become professional entrepreneurial.

SCHEME OF TEACHING AND EXAMINATION

Teaching and Examination Scheme
1ˢᵗ Semester: B.Tech
Common to all branches of UG Engineering & Technology

SN	Category	Course Code	Course Title	Hours			Marks			Cr
				L	T	P	IA	ETE	**Total**	
1	BSC	1FY2-01	Engineering Mathematics-I	3	1	-	40	160	**200**	**4**
2	BSC	1FY2-02/ 1FY2-03	Engineering Physics/ Engineering Chemistry	3	1	-	40	160	**200**	**4**
3	HSMC	1FY1-04/ 1FY1-05	Communication Skills/ Human Values	2	-	-	20	80	**100**	**2**
4	ESC	1FY3-06/ 1FY3-07	Programming for Problem Solving/ Basic Mechanical Engineering	2	-	-	20	80	**100**	**2**
5	ESC	1FY3-08/ 1FY3-09	Basic Electrical Engineering/ Basic Civil Engineering	2	-	-	20	80	**100**	**2**
6	BSC	1FY2-20/ 1FY2-21	Engineering Physics Lab/ Engineering Chemistry Lab	-	-	2	30	20	**50**	**1**
7	HSMC	1FY1-22/ 1FY1-23	Language Lab/ Human Values Activities and Sports	-	-	2	30	20	**50**	**1**
8	ESC	1FY3-24/ 1FY3-25	Computer Programming Lab/ Manufacturing Practices Workshop	-	-	3	45	30	**75**	**1.5**
9	ESC	1FY3-26/ 1FY3-27	Basic Electrical Engineering Lab/ Basic Civil Engineering Lab	-	-	2	30	20	**50**	**1**
10	ESC	1FY3-28/ 1FY3-29	Computer Aided Engineering Graphics/ Computer Aided Machine Drawing	-	-	3	45	30	**75**	**1.5**
11	SODE CA	1FY8-00							**25**	**0.5**
Total									**1025**	**20.5**

L = Lecture, **T** = Tutorial = Practical, **IA**=Internal Assessment**, ETE**=End Term Exam, **Cr**=Credit

2nd Semester: B.Tech.
Common to all branches of UG Engineering & Technology

SN	Category	Course Code	Course Title	Hours			Marks			Cr
				L	T	P	IA	ETE	Total	
1	BSC	2FY2-01	Engineering Mathematics-II	3	1	-	40	160	**200**	**4**
2	BSC	2FY2-03/ 2FY2-02	Engineering Chemistry/ Engineering Physics	3	1	-	40	160	**200**	**4**
3	HSMC	2FY1-05/ 2FY1-04	Human Values/ Communication Skills	2	-	-	20	80	**100**	**2**
4	ESC	2FY3-07/ 2FY3-06	Basic Mechanical Engineering/ Programming for Problem Solving	2	-	-	20	80	**100**	**2**
5	ESC	2FY3-09/ 2FY3-08	Basic Civil Engineering/ Basic Electrical Engineering	2	-	-	20	80	**100**	**2**
6	BSC	2FY2-21/ 2FY2-20	Engineering Chemistry Lab/Engineering Physics Lab	-	-	2	30	20	**50**	**1**
7	HSMC	2FY1-23/ 2FY1-22	Human Values Activities and Sports/ Language Lab	-	-	2	30	20	**50**	**1**
8	ESC	2FY3-25/ 2FY3-24	Manufacturing Practices Workshop/ Computer Programming Lab	-	-	3	45	30	**75**	**1.5**
9	ESC	2FY3-27/ 2FY3-26	Basic Civil Engineering Lab/Basic Electrical Engineering Lab	-	-	2	30	20	**50**	**1**
10	ESC	2FY3-29/ 2FY3-28	Computer Aided Machine Drawing/ Computer Aided Engineering Graphics	-	-	3	45	30	**75**	**1.5**
11	SODE CA	1FY8-00							**25**	**0.5**
Total									**1025**	**20.5**

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

2nd Year – 3rd Semester

SN	Category	Course Code	Course Title	L	T	P	Exam Hrs	IA	ETE	Total	Cr
THEORY											
1	BSC	3CE2-01	Advance Engineering Mathematics -I	3	0	0	3	30	120	**150**	**3**
2	HSMC	3CE1-02/ 3CE1-03	Technical Communication /Managerial Economics & Financial Accounting	2	0	0	2	20	80	**100**	**2**
3	ESC	3CE3-04	Engineering Mechanics	2	0	0	2	20	80	**100**	**2**
4	PCC	3CE4-05	Surveying	3	0	0	3	30	120	**150**	**3**
5		3CE4-06	Fluid Mechanics	2	0	0	2	20	80	**100**	**2**
6		3CE4-07	Building Materials and Construction	3	0	0	3	30	120	**150**	**3**
7		3CE4-08	Engineering Geology	2	0	0	2	20	80	**100**	**2**
			Sub Total	17	0	0		170	680	**850**	**17**
PRACTICAL & SESSIONAL											
8	PCC	3CE4-21	Surveying Lab	0	0	3		45	30	**75**	**1.5**
9		3CE4-22	Fluid Mechanics Lab	0	0	2		30	20	**50**	**1**
10		3CE4-23	Computer Aided Civil Engineering Drawing	0	0	3		45	30	**75**	**1.5**
11		3CE4-24	Civil Engineering Materials Lab	0	0	2		30	20	**50**	**1**
12		3CE4-25	Geology Lab	0	0	2		30	20	**50**	**1**
13	PSIT	3CE7-30	Industrial Training	0	0	1		30	20	**50**	**1**
14	SOD E CA	3CE8-00	Social Outreach, Discipline & Extra Curricular Activities	0	0	0		0	25	**25**	**0.5**
			Sub- Total	0	0	13		210	165	**375**	**7.5**
			TOTAL OF III SEMESTER	17	0	13		380	845	**1225**	**24.5**

2nd Year – 4th Semester

		Course			**Contact hrs/week**			**Marks**				**Cr**
SN	**Category**	**Code**	**Title**	**L**	**T**	**P**	**Exam Hrs**	**IA**	**ETE**	**Total**		

THEORY

SN	**Category**	**Code**	**Title**	**L**	**T**	**P**	**Exam Hrs**	**IA**	**ETE**	**Total**	**Cr**
1	BSC	4CE2-01	Advance Engineering Mathematics -II	2	0	0	2	20	80	**100**	**2**
2	HSMC	4CE1-03/ 4CE1-02	Managerial Economics & Financial Accounting/ Technical Communication	2	0	0	2	20	80	**100**	**2**
3	ESC	4CE3-04	Basic Electronics for Civil Engineering Applications	2	0	0	2	20	80	**100**	**2**
4	PCC	4CE4-05	Strength of Materials	3	0	0	3	30	120	**150**	**3**
5		4CE4-06	Hydraulics Engineering	3	0	0	3	30	120	**150**	**3**
6		4CE4-07	Building Planning	2	0	0	2	20	80	**100**	**2**
7		4CE4-08	Concrete Technology	3	0	0	3	30	120	**150**	**3**
		Sub Total		17	0	0		170	680	**850**	**17**

PRACTICAL & SESSIONAL

SN	**Category**	**Code**	**Title**	**L**	**T**	**P**	**Exam Hrs**	**IA**	**ETE**	**Total**	**Cr**
8	PCC	4CE4-21	Material Testing Lab	0	0	2		30	20	**50**	**1**
9		4CE4-22	Hydraulics Engineering Lab	0	0	2		30	20	**50**	**1**
10		4CE4-23	Building Drawing	0	0	3		45	30	**75**	**1.5**
11		4CE4-24	Advanced Surveying Lab	0	0	2		30	20	**50**	**1**
12		4CE4-25	Concrete Lab	0	0	3		45	30	**75**	**1.5**
13	SODE CA	4CE8-60	Social Outreach, Discipline & Extra Curricular Activities	0	0	0		0	25	**25**	**0.5**
		Sub- Total		0	0	12		180	145	**325**	**6.5**
		TOTAL OF IV SEMEESTER		17	0	12		350	825	**1175**	**23.5**

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exam 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	SODE CA	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**

3rd Year 6th Semester

		THEORY									
SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exam Hrs	IA	ETE	Total	
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**
1 1		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	SODE CA	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**

4th Year 7th Semester

SN	Category	Course Code	Course Title	THEORY								
				Hours Per Week			Marks					Cr
				L	T	P	Exam Hrs	IA	ETE	Total	
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**

4th Year 8th Semester

SN	Category	Course Code	Course Title	THEORY							
				Hours Per Week			Marks				Cr
				L	T	P	Exam Hrs	IA	ETE	Total	
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**

Course Outcomes

1FY2-01: ENGINEERING MATHEMATICS-I

Credit: 4   **Max. Marks: 200 (IA: 40, ETE: 160)**
3L+1T+0P   **End Term Exam: 3 Hours**

Course Outcomes:

CO11201.1   Learner will be skilled to estimate volume and surface area of the solid formed by revolution of different curves. Also workout definite integral through Beta and Gamma functions.

CO11201.2   Students will be familiar with the concept of sequence, monotonic sequence, Cauchy's sequence and infinite series. Also workout various method to test convergence and divergence of sequence and infinite series

CO11201.3   Learner will be competent to express a function in term of a series of sine and cosine.

CO11201.4   Students will be able to estimate maxima and minima of multivariable functions using the concept of partial differentiation. Further workout limit, continuity and differentiability of two variable functions

CO11201.5   Learner will be skilled in the technique to evaluate double and triple integration and able to apply the knowledge to determine area, volume, centre of mass and centre of gravity. Further workout vector differentiation and vector integration

Syllabus:

Chapter-1
Calculus: Improper integrals (Beta and Gamma functions) and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Chapter-2
Sequences and Series: Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

Chapter-3
Fourier Series: Periodic functions, Fourier series, Euler's formula, Change of intervals, Half range sine and cosine series, Parseval"s theorem.

Chapter-4
Multivariable Calculus (Differentiation): Limit continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

Chapter-5
Multivariable Calculus (Integration): Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Centre of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.

Text Book:
1. Thomas' Calculus, George B. Thomas, Jr., Maurice D. Weir, Joel R. Hass, Pearson Educations
2. Calculus with Early Transcendental Functions, James Stewart, Cengage Lerning Publication.
3. Engineering Mathematics, C.B. Gupta, S.R. Singh and Mukesh Kumar, McGraw Hill Education.
4. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
   5. Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education.

2FY2-01: ENGINEERING MATHEMATICS-II

Credit: 4   Max. Marks: 200 (IA:40, ETE:160)
3L+1T+0P   **End Term Exam: 3 Hours**
Course Outcomes:

CO11201.1 Able to calculate rank of matrix, characteristic equation & characteristic roots & use the applicability of Caylay Hamilton Theorem to find inverse of matrix which is very important in many engineering application.

CO11201.2 Students understand various methods to solve ordinary differential equation of first and higher order. Which place important role in all branches of Engineering?

CO11201.3 Students understand various methods to solve ordinary differential equation of second order with variable coefficient which is useful for solving the practical problems which arise in the industry.

CO11201.4 To understand the concept of PDE, including formation and solution of linear and non linear PDE. Further discussion about Lagrange's method, standard form and Charpit method to solve PDE

CO11201.5 To understand the classification of second order PDE including the solution of one dimensional wave and Hear equation by method of separation of variables with boundary condition.

Syllabus:
Chapter- 1
Matrices: Rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigen values and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.
Chapter- 2
First order ordinary differential equations: Linear and Bernoulli's equations, exact equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut"s type.
Chapter- 3
Ordinary differential equations of higher orders: Linear Differential Equations of Higher order with constant coefficients, Simultaneous Linear Differential Equations, Second order linear differential equations with variable coefficients: Homogenous and Exact forms, one part of CF is known, Change of dependent and independent variables, method of variation of parameters, Cauchy- Euler equation; Power series solutions including Legendre differential equation and Bessel differential equations.
Chapter- 4
Partial Differential Equations – First order: Order and Degree, Formation; Linear Partial differential equations of First order, Lagrange's Form, Non Linear Partial Differential equations of first order, Charpit"s method, Standard forms.
Chapter- 5
Partial Differential Equations– Higher order: Classification of Second order partial differential equations, Separation of variables method to simple problems in Cartesian coordinates including two dimensional Laplace, one dimensional Heat and one dimensional wave equations

Text Books:
1. Advanced Engineering Mathematics, Peter O Neil, Cengage Learning Publication.
2. Advanced Engineering Mathematics, 4th Edition, Dennis G. Zill, Warren S. Wright, Jones & Bartlett Publications.
3. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
4. Engineering Mathematics, C.B. Gupta, S.R. Singh and Mukesh Kumar, McGrawHill Education.
5. Advanced Engineering Mathematics, Jain and Iyengar, Narosa Publications.

1FY2-02/ 2FY2-02: ENGINEERING PHYSICS

Credit: 4   **Max. Marks: 200 (IA: 40, ETE: 160)**
3L+1T+0P   **End Term Exam: 3 Hours**
Course Outcomes:

CO12201.1 Understand the concept of interference and diffraction to explain various wave optical phenomena
CO12201.2 To develop the concept of quantum mechanics and apply the knowledge to 1D and 3D potential box problem
CO12201.3 Understand the concept of coherence in source of light and basics of an optical fiber: working principle and construction, NA and acceptance angle of an Optical Fiber
CO12201.4 Understand the working of a LASER and basics of material science & characterization of materials
CO12201.5 Understanding Electromagnetism with the help of Maxwell's equation and formulate the electromagnetic energy transformation theorem

Syllabus:

Chapter-1
Wave Optics: Newton"s Rings, Michelson"s Interferometer, Fraunhofer Diffraction from a Single Slit. Diffraction grating: Construction, theory and spectrum, Resolving power and Rayleigh criterion for limit of resolution, Resolving power of diffraction grating, X-Ray diffraction and Bragg"s Law.

Chapter-2
Quantum Mechanics: Introduction to quantum Mechanics, Wave-particle duality, Matter waves, Wave function and basic postulates, Time dependent and time independent Schrödinger's Wave Equation, Physical interpretation of wave function and its properties, Applications of the Schrödinger's Equation: Particle in one dimensional and three dimensional boxes.

Chapter-3
Coherence and Optical Fibers: Spatial and temporal coherence: Coherence length; Coherence time and „Q" factor for light, Visibility as a measure of Coherence and spectral purity, Optical fiber as optical wave guide, Numerical aperture; Maximum angle of acceptance and applications of optical fiber.

Chapter-4
Laser: Einstein's Theory of laser action; Einstein's coefficients; Properties of Laser beam, Amplification of light by population inversion, Components of laser, Construction and working of He-Ne and semiconductor lasers, Applications of Lasers in Science, engineering and medicine.

Chapter-5
Material Science & Semiconductor Physics: Bonding in solids: covalent and metallic bonding, Energy bands in solids: Classification of solids as Insulators, Semiconductors and Conductors, Intrinsic and extrinsic semiconductors, Fermi dirac distribution function and Fermi energy, Conductivity in semiconductors, Hall Effect: Theory, Hall Coefficient and applications.

Chapter-6
Introduction to Electromagnetism: Divergence and curl of electrostatic field, Laplace's and Poisson's equations for electrostatic potential, Bio-Savart law, Divergence and curl of static magnetic field, Faraday's law, Displacement current and magnetic field arising from time dependent electric field, Maxwell's equations, Flow of energy and Pointing vector.

Text Books:
1. Engineering Physics: Malik and Singh (Tata McGraw Hill)
2. Engineering Physics: Naidu (Pearson)
3. Optics : Ajay Ghatak (Tata McGraw Hill)
4. Concept of Modern Phyiscs: A. Baiser (Tata McGraw Hill)
5. Fundamental of Optics : Jetkins and White (Tata McGraw Hill)
6. Material Science: Smith (McGraw Hill)

1FY2-03/ 2FY2-03: ENGINEERING CHEMISTRY

Credit: 4   **Max. Marks: 200 (IA: 40, ETE: 160)**
3L+1T+0P   **End Term Exam: 3 Hours**
Course Outcomes:

CO11203.1 Differentiation between hard and soft water, solve the related numerical problems on water treatment; and its application in industries and daily life
CO11203.2 Comprehension of various types of fuel, instrumental techniques for analysis and solve the numerical problems related to it
CO11203.3 Identification of corrosion and application of its knowledge to protect the metal
CO11203.4 Developing basic knowledge of Inorganic Engineering materials viz. cement, glass, lubricants
CO11203.5 basic knowledge of organic reaction mechanism and introduction of drugs

Syllabus:

Chapter-1
Water:Common impurities, hardness, determination of hardness by complex metric (EDTA method), Degree of hardness, Units of hardness Municipal water supply: Requisite of drinking water, Purification of water; sedimentation, filtration, disinfection, breakpoint chlorination. Boiler troubles: Scale and Sludge formation, Internal treatment methods, Priming and Foaming, Boiler corrosion and Caustic embrittlement Water softening; Lime-Soda process, Zeolite (Permutit) process, Demineralization process. Numerical problems based on Hardness, EDTA, Lime-Soda and Zeolite process.

Chapter-2
Organic Fuels: Solid fuels: Coal, Classification of Coal, Proximate and Ultimate analyses of coal and its significance, Gross and Net Calorific value, Determination of Calorific value of coal by Bomb Calorimeter. Metallurgical coke, Carbonization processes; Otto-Hoffmann by- product oven method. Liquid fuels : Advantages of liquid fuels, Mining, Refining and Composition of petroleum, Cracking, Synthetic petrol, Reforming, Knocking, Octane number, Anti-knocking agents, Cetane number Gaseous fuels; Advantages, manufacturing, composition and Calorific value of coal gas and oil gas, Determination of calorific value of gaseous fuels by Junker's calorimeter, Numerical problems based on determination of calorific value (bomb calorimeter/Junkers calorimeter/Dulongs formula, proximate analysis & ultimate and combustion of fuel.

Chapter-3
Corrosion and its control: Definition and significance of corrosion, Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration corrosion and pitting corrosion. Protection from corrosion; protective coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design

Chapter-4
Annealing, Types and properties of soft glass, hard glass, borosilicate glass, glass wool, safety glass Lubricants: Classification, Mechanism, Properties; Viscosity and viscosity index, flash and firepoint,cloudandpourpoint. Emulsification and steam emulsion number.

Chapter-5
Organic reaction mechanism and introduction of drugs: Organic reaction mechanism: Substitution; SN1, SN2, Elecrophilic aromatic substitution in benzene, free radical halogenations of alkanes, Elimination; elimination in alkyl halides, dehydration of alcohols, Addition: electrophilic and free radical addition in alkenes, nucleophilic addition in aldehyde and ketones, Rearrangement; Carbocation and free radical rearrangements Drugs : Introduction, Synthesis, properties and uses of Aspirin, Paracetamol

Text Books:
1. Engineering Chemistry by Monica Jain and P C Jain, Dhanpat Rai Publishing Company
2. Engineering Chemistry Wiley, India.
3. The Chemistry and Technology of Coal, by J G Speigh, CRC Press.
4. The Chemistry and Technology of Petroleum, by J G Speigh, CRC Press

1FY1-04/ 2FY1-04: COMMUNICATION SKILLS

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

Course Outcomes:

CO11104.1 & CO12104.1 Students will be able to understand and develop communication skills and techniques which will felicitate their ability to work collaboratively with others

CO11104.2 & CO12104.2 Students will be able to use English grammar accurately that will increase their confidence in English writing and speaking

CO11104.3& CO12104.3 Students will be able to invent, draft, organize, abstract, elaborate and synthesize their own and other's ideas in formatted way

CO11104.4 & CO12104.4 Students will be able to understand literary devices after reading stories and also leran about parts of speech and vocabulary

CO11104.5 & CO12104.5 Students will be able to understand literary devices and figure of speech after reading poems and also appreciate art in all forms

Syllabus:

Chapter-1
Communication: Meaning, Importance and Cycle of Communication. Media and Types of Communication. Verbal and Non-Verbal communication. Barriers to communication. Formal and Informal Channels of Communication (Corporate Communication). Divisions of Human Communication and Methods to improve Interpersonal Communication. Qualities of good communication

Chapter-2
Grammar: Passive Voice. Reported Speech. Conditional Sentences. Modal Verbs. Linking Words (Conjunctions)

Chapter-3
Composition: Job Application and Curriculum-Vitae Writing Business Letter Writing paragraph writing. Report Writing

Chapter-4
Short Stories:v "Luncheon" by Somerset Maugham."How Much Land Does a Man Need?" by Count Leo Tolstoy. "The Night Train at Deoli" by Ruskin Bond.

Chapter-5
Poems: "No Men are Foreign" by James Kirkup. "If" by Rudyard Kipling. "Where the Mind is without Fear" by Rabindranath Tagore.

Text Books:

1. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
2. The Written Word, Vandana Singh, Oxford University Press, India.
3. Current English Grammar and Usage with Composition, R. P. Sinha, Oxford University Press, India.
4. Rodriques M. V., 'Effective Business Communication', Concept Publishing Company, New Delhi, 1992 reprint (2000).
5. Bansal, R K and Harrison J B, 'Spoken English' Orient Longman, Hyderabad.
6. Binod Mishra & Sangeeta Sharma, 'Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
7. Gartside L. 'Modern Business Correspondence, Pitman Publishing, London.

1FY1-05/ 2FY1-05: HUMAN VALUES

Credit: 2
2L+0T+0P

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

Course Outcomes:

CO11105.1 & CO12105.1 Students will understand the importance of Happiness through Identification of Human Values and Skills**.**

CO11105.2 & CO12105.1 Students will understand the role of basic human aspirations in self and people around them.

CO11105.3 & CO12105.1 Students will understand about the harmony in family, in society and practically understand the importance of trust and respect as foundational value of relationship

CO11105.4 & CO12105.1 Students will understand the interconnectedness among the four orders of nature, recyclability, coexistence and harmony at all level of existence

CO11105.5 & CO12105.1 Students will understand to be prepared for humanistic education, professional competence with ethics and humanistic universal order.

Syllabus:

Chapter-1

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education Understanding the need, basic guidelines, Self Exploration - its content and process; „Natural Acceptance" and Experiential Validation, Continuous Happiness and Prosperity- Human Aspirations, Right understanding, Relationship and Physical Facilities, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Chapter-2

Understanding Harmony in the Human Being - Harmony in Myself Understanding human being as a co-existence of the sentient „I" and the material „Body "Understanding the needs of Self („I") and „Body" - Sukh and Suvidha Understanding the Body as an instrument of „I", Understanding the characteristics and activities of „I" and harmony in „I" Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

Chapter-3

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship Understanding harmony in the Family, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) , meaning of Vishwas; Difference between intention and competence, meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, harmony in the society , Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals ,Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- from family to world family.

Chapter-4

Understanding Harmony in the Nature and Existence- Whole existence as Coexistence Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all pervasive Space. Holistic perception of harmony at all levels of existence

Chapter-5

Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, (b) Ability to identify the scope and characteristics of people-friendly and eco- friendly production systems, technologies and management models. Strategy for transition from the present state to Universal Human Order: (a). at the level of individual: as socially and ecologically responsible engineers, technologists and managers. (b). at the level of society: as mutually enriching institutions and organization.

Case studies related to values in professional life and individual life.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, Excel Books, 2009. ISBN: 978-9-350-62091-5
2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
4. R. Subramanian, Professional Ethics includes Human Values, Oxford Univ. Press.
5. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
6. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
7. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
8. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
9. A N Tripathy, 2003, Human Values, New Age International Publishers.
10. SubhasPalekar, 2000, How to practice Natural Farming,   Pracheen   (Vaidik) KrishiTantraShodh, Amravati.
11. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
12. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
13. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
14. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

1FY3-06/ 2FY3-06: PROGRAMMING FOR PROBLEM SOLVING

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

Course Outcomes:

CO11306.1 To get the basic knowledge of computer & problem solving through algorithms & flowchart
CO11306.2 To translate the algorithms to programs & execution (in C language)
CO11306.3 To implements conditional branching, iteration
CO11306.4 To decompose a problem into functions and to develop modular reusable code
CO11306.5 To use arrays, pointers and structures to develop algorithms and programs

Syllabus:

Chapter-1
Fundamentals of Computer: Stored program architecture of computers, Storage device- Primary memory, and Secondary storage, Random, Direct, Sequential access methods, Concepts of High-level, Assembly and Low-level languages, Representing algorithms through flowchart and pseudo code.

Chapter-2
Number system: Data representations, Concepts of radix and representation of numbers in radix r with special cases of r=2, 8, 10 and 16 with conversion from radix r1 to r2, r''s and (r-1)''s complement, Binary addition, Binary subtraction, Representation of alphabets.

Chapter-3
C Programming: Problem specification, flow chart, data types, assignment statements, input output statements, developing simple C programs, If statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement, development of C programs using above statements, Arrays, functions, parameter passing, recursion, Programming in C using these statements, Structures, files, pointers and multi file handling.

Text Books:
1. Fundamental of Computers By R. Thareja, Oxford University Press.
2. Programming in ANSI C by E Balagurusamy, Tata McGraw-Hill Education.
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI.
4. C: The Complete Reference by Herbert Schildt, McGraw-Hill Education.
5. Let us C by Yashavant P. Kanetkar, bpb publications
6. Programming in C by Thareja, Oxford University Press
7. Graphics Under C by Yashavant P. Kanetkar, bpb publications.

1FY3-07/ 2FY3-07: BASIC MECHANICAL ENGINEERING

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

Course Outcomes:

CO11307.1 & CO12307.1 Students will be able to understand the introduction of mechanical engineering and develop knowledge about steam boilers, steam turbines and power plants**.**
CO11307.2 & CO12307.2 Students will be able to conclude basics of centrifugal, reciprocation pumps and Internal Combustion Engine. Students will be able to create knowledge of various types of refrigeration and air conditioning systems with their applications.
CO11307.3 & CO12307.3 Students will be able to analyze basics of different type's power transmission systems such as belt, rope, gears and gear trains
CO11307.4 & CO12307.4 Students will be able to illustrate working of different manufacturing processes
CO11307.5 & CO12307.5 Students will be able to identify different engineering materials there, properties and various types of heat treatment processes

Syllabus:
Chapter-1
Fundamentals: Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology. Steam Boilers classification and types of steam boilers and steam turbines. Introduction and Classification of power plants

Chapter-2
Pumps and IC Engines: Applications and working of Reciprocating and Centrifugal pumps. Introduction, Classification of IC Engines, Main Components of IC Engines, Working of IC Engines and its components

Chapter-3
Refrigeration and Air Conditioning: Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration and Air-conditioning

Chapter-4
Transmission of Power: Introduction and types of Belt and Rope Drives, Gears.

Chapter-5
Primary Manufacturing Processes: Metal Casting Process: Introduction to Casting Process, Patterns, Molding, and Furnaces. Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing. Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering.

Chapter-6
Engineering Materials and Heat Treatment of Steel: Introduction to various engineering materials and their properties.

Text Books:
1. G. Shanmugam and S Ravindran, Basic Mechanical Engieering, Mc Graw hill, fourth edition.
2. K Venu Gopal and Prabhu Raja V, Basic Mechanical Engineering, Anuradha agencies pub, Chennai.

1FY3-08/ 2FY3-08: BASIC ELECTRICAL ENGINEERING

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

Course Outcomes:

CO12308.1 Ability to solve circuit using different kind of methods and theorems
CO12308.2 Ability to know the behaviors of basic electrical elements like resistor, inductor and capacitor
CO12308.3 Students will be able to know the behaviors of transformer.
CO12308.4 Students will be able to know the behaviors of AC and DC machines.
CO12308.5 Students can use electronics components in the circuit after understanding its properties. Ability to know the behavior of LT switchgear, earthling and electrical power measurement

Syllabus:
Chapter-1
DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, Series-Parallel circuits, Node voltage method, Mesh current method, Superposition, Thevenin‟s, Norton‟s and Maximum power transfer theorems.
Chapter-2
AC Circuits: Representation of sinusoidal waveforms, peak and r.m.s values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC and RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.
Chapter-3
Transformers: Ideal and practical transformer, EMF equation, equivalent circuit, losses in transformers, regulation and efficiency.
Chapter-4
Electrical Machines: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Starting and speed control of induction motor, single- phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited DC motor. Construction and working of synchronous generators.
Chapter-5
Power Converters: Semiconductor PN junction diode and transistor (BJT). Characteristics of SCR, power transistor and IGBT. Basic circuits of single phase rectifier with R load, Single phase Inverter, DC-DC converter.
Chapter-6
Electrical Installations: Layout of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, Type of earthing. Power measurement, elementary calculations for energy consumption

Text Books:
1. Basic Electrical and Electronics Engineering by Sukhija and Nagsarkar, Oxford Pub.
2. Basic Electrical & Electronics Engineering by Kothari, Nagrath, TMH
3. Basic Electrical & Electronics Engineering by V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar, Wiley India.
4. Basic Electrical & Electronics Engineering by Prasad/Sivanagraju, Cengage learning Indian Edition
5. Basic Electrical and Electronics Engineering by Muthusubrmaniam, TMH
6. Fundamentals of Electrical and Electronics Engineering by Ghosh, Smarajit, PHI India
7. Basic Electrical & Electronics Engineering by Ravish Singh, TMH
8. Electrical and Electronic Technology by Edward Hughes et al, Pearson Publication

1FY3-09/ 2FY3-09: BASIC CIVIL ENGINEERING

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

Course Outcomes:

CO12309.1 Role of civil engineer and impact of infrastructure on society will be understood to students.
CO12309.2 Principles of surveying and levelling will be known to students.
CO12309.3 Student will be able to understand about foundation and parts of building
CO12309.4 Importance of transportation and traffic engineering will be known to students.
CO12309.5 Students will understand about problem related to environment.

Syllabus:
Chapter-1
Introduction to objective, scope and outcome the subject
Chapter 2
Introduction: Scope and Specialization of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.
Chapter 3
Surveying: Object Principles & Types of Surveying; Site Plans, Plans& Maps; Scales & Unit of different Measurements.
Linear Measurements: Instruments used. Linear Measurement by Tape, Ranging out Survey Lines and overcoming Obstructions; Measurements on sloping ground; Tape corrections, conventional symbols. Angular Measurements: Instruments used; Introduction to Compass Surveying, Bearings and Longitude & Latitude of a Line, Introduction to total station.
Leveling: Instrument used Object of leveling, Methods of leveling in brief, and Contour maps.
Chapter 4
Buildings: Selection of site for Buildings, Layout of Building Plan, Types of buildings, Plinth area, carpet area, floor space index, Introduction to building byelaws, concept of sun light and ventilation. Components of Buildings & their functions, Basic concept of R.C.C., Introduction to types of foundation
Chapter 5
Transportation: Introduction to Transportation Engineering; Traffic and Road Safety: Types and Characteristics of Various Modes of Transportation; Various Road Traffic Signs, Causes of Accidents and Road Safety Measures.
Chapter 6
Environmental Engineering: Environmental Pollution, Environmental Acts and Regulations, Functional Concepts of Ecology, Basics of Species, Biodiversity, Ecosystem, Hydrological Cycle; Chemical Cycles: Carbon, Nitrogen& Phosphorus; Energy Flow in Eco-systems.
Water Pollution: Water Quality standards, Introduction to Treatment & Disposal of Waste Water. Reuse and Saving of Water, Rain Water Harvesting. Solid Waste Management: Classification of Solid Waste, Collection,Transportation and Disposal of Solid. Recycling of Solid Waste: Energy Recovery, Sanitary Land fill, On-Site Sanitation. Air& Noise Pollution: Primary and Secondary air pollutants, Harmful effects of Air Pollution, Control of Air Pollution. . Noise Pollution Harmful Effects of noise pollution, control of noise pollution, Global warming& Climate Change, Ozone depletion, Green House effect

Text Books:
1. Palancharmy, Basic Civil Engineering, McGraw Hill publishers.
2. Satheesh Gopi, Basic Civil Engineering, Pearson Publishers.
3. Ketki Ranwala Dalal, Essentials of Civil Engineering, Charotar Publishing House.

1FY2-20/ 2FY2-20: ENGINEERING PHYSICS LAB

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

Course Outcomes:

CO11220.1 & CO12220.1 Student will be able to measure the wavelength of light using Michelson's Interferometer, Newton's Ring and Diffraction Grating, dispersive power of a prism, numerical aperture of an optical fiber, coherence length as well as coherence time of a He-Ne LASER using Michelson's Interferometer and thereby learn the optical phenomena of classical and quantum wave optics.

CO11220.2 & CO12220.2 Student will be able to measure the band gap of a semiconductor material and Hall coefficient of a semiconductor by measuring it's Hall voltage and thereby learn the experimental technique to measure energy band gap and Hall coefficient of a semiconductor and learn to identify the type of semiconductor (p-type or n-type)

CO11220.3 & CO12220.3 Student will be able to measure the height of a distant object using Sextant and hence learn the use of a sextant to measure angle of inclination as well as learn the use of trigonometric ratios to find various distances.

CO11220.4 & CO12220.4 Student will be able to measure the time constant of a RC circuit, specific resistance of a wire by Carry Foster's bridge and hence learn the charging and discharging behaviour of a capacitor.

List of Experiments:

1. To determine the wave length of monochromatic light with the help of Michelson's interferometer
2. To determine the wave length of sodium light by Newton's Ring.
3. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
4. Determination of band gap using a P-N junction diode.
5. To determine the height of given object with the help of sextant.
6. To determine the dispersive power of material of a prism with the help of spectrometer.
7. To study the charge and discharge of a condenser and hence determine the same constant (both current and voltage graphs are to be plotted.
8. To determine the coherence length and coherence time of laser using He – Ne laser.
9. To measure the numerical aperture of an optical fiber.
10. To study the Hall Effect and determine the Hall Voltage and Hall coefficients

1FY2-21/ 2FY2-21: ENGINEERING CHEMISTRY LAB

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

Course Outcomes:

CO11122.1 & CO12122.1 Students will learn to pronounce and transcribe words after learning various phonetic symbols. They can also use this phonetics to improve their pronunciation.

CO11122.1 & CO12122.2 Students will get a revised knowledge of synonyms, antonyms and word formation.

CO11122.1 & CO12122.3 Students will be able to give seminar presentation on different topics and have knowledge of group discussion.

List of Experiments:

1. Determination the hardness of water by EDTA method
2. Determination of residual chlorine in water
3. Determination of dissolved oxygen in water
4. Determination of the strength of Ferrous Ammonium sulphate solution with the help of K2Cr2O7 solution by using diphenyl amine indicator
5. Determination of the strength of CuSO4 solution iodometrically by using hypo solution
6. Determination of the strength of NaOH and Na2CO3 in a given alkali mixture
7. Proximate analysis of Coal
8. Determination of the flash & fire point and cloud & pour point of lubricating oil
9. Determination of the kinematic viscosity of lubricating oil by Redwood viscometer no. 1 at different temperature Synthesis of Aspirin/ Paracetamol

1FY2-22/ 2FY2-22: LANGUAGE LAB

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

Course Outcomes:

CO11123 & CO12123.1 Students will understand the importance of happiness and prosperity through identification of human values and skills**.**
CO11123 & CO12123.2 Students will understand the role of basic human aspirations, about harmony in family, society and the importance of trust and respect.
CO11123 & CO12123.3 Students will understand about the interconnectedness among the four orders of nature, recyclability, coexistence, professional ethics and competence.

List of Experiments:

1. Phonetic Symbols and Transcriptions.
2. Extempore.
3. Group Discussion.
4. Dialogue Writing
5. Listening comprehension.

Text Books:

1. Technical Communication: principles and Practice, Meenakshi Raman & Sangeeta Sharma, Oxford University Press, India.
2. Effective Technical Communication, Barun K. Mitra, Oxford University Press, India.
3. Binod Mishra & Sangeeta Sharma, 'Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
4. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
5. Bhattacharya, Indrajit, An Approach to Communication Skills, Dhanpat Rai & Co. (Pvt) Ltd., New Delhi.
6. Wright, Crissy, Handbook of Practical Communication Skills, Jaico Publishing House, Mumbai.
7. Gimson, A C, 'An Introduction to the Pronunciation of English', ELBS.

1FY1-23/ 2FY1-23: HUMAN VALUES ACTIVITIES AND SPORTS

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

Course Outcomes:

CO12105.1 Students will understand the importance of Happiness through Identification of Human Values and Skills.
CO12105.2 Students will understand the role of basic human aspirations in self and people around them.
CO11105.3 Students will understand about the harmony in family, in society and practically understand the importance of trust and respect as foundational value of relationship
CO11105.4 Students will understand the interconnectedness among the four orders of nature, recyclability, coexistence and harmony at all level of existence
CO11105.5 Students will understand to be prepared for humanistic education, professional competence with ethics and humanistic universal order.

Content:

PS 1: Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your salient achievements and shortcomings in your life? Observe and analyze them.
PS 2: Now-a-days, there is a lot of talk about many techno-genic maladies such as energy and material resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. - all these seem to be manmade problems, threatening the survival of life Earth - What is the root cause of these maladies & what is the way out in opinion?
On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, breakdown of relationships, generation gap, depression & suicidal attempts etc. - what do you think, is the root cause of these threats to human happiness and peace - what could be the way out in your opinion?
PS 3:
1. Observe that each of us has the faculty of „Natural Acceptance", based on which one can verify what is right or not right for him. (As such we are not properly trained to listen to our „Natural Acceptance" and may a time it is also clouded by our strong per-conditioning and sensory attractions).

Explore the following:
(i)　　　What is Naturally Acceptable" to you in relationship the feeling of respect or disrespect for yourself and for others?
(ii)　　　What is „naturally Acceptable" to you - to nurture or to exploit others? Is your
living in accordance with your natural acceptance or different from it?
2. Out of the three basic requirements for fulfilment of your aspirations - right understanding, relationship and physical facilities - observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.
PS 4:
1. a. Observe that any physical facility you use, follows the given sequence with time:
Necessary and tasteful - unnecessary but still tasteful - unnecessary and tasteless - intolerable
b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If not acceptable, you want it continuously and if not acceptable, you do not want it any moment!
2. List down all your important activities. Observe whether the activity is of „I" or of Body or with the participation of both or with the participation of both „I" and Body.
Observe the activities within „i". Identify the object of your attention for different moments (over a period of say 5 to 10 minutes) and draw a line diagram connecting these points. Try to observe the link between any two nodes.

PS 5:
1. Write a narration in the form of a story, poem, skit or essay to clarify a salient Human Value to the children.
2. Recollect and narrate an incident in your life where you were able to exhibit willful adherence to values in a difficult situation.

PS 6: List down some common units (things) of Nature which you come across in your daily life and classify them in the four orders of Nature. Analysis and explain the aspect of mutual fulfillment of each unit with other orders.

PS 7: Identify any two important problems being faced by the society today and analyze the root cause of these problems. Can these be solved on the basic of natural acceptance of human values? If so, how should one proceed in this direction from the present situation?

PS 8:
1. Suggest ways in which you can use your knowledge of Science/Technology/Management etc. for moving towards a universal human order.
2. Propose a broad outline for humanistic Constitution at the level of Nation.

Project:

Every student required to take-up a social project e.g. educating children in needy/weaker section; services in hospitals, NGO's and other such work i.e. social work at villages adopted by respective institute/ college.

Sports:

   a) Planning in Sports,
   b) Sports & Nutrition
   c) Yoga and Life style
   d) Measures Physical Education & Sports for CWSN (Children with Special needs - Divyang)
   e) Children & Sports
   f) Women & Sports
   g) Test & Measurement in Sports
   h) Physiology & Sports
   i) Sports Medicine
   j) Kinesiology, Biomechanics & Sports
   k) Psychology & Sports

1FY3-24/ 2FY3-24: COMPUTER PROGRAMMING LAB

Credit: 1.5   **Max. Marks: 75 (IA: 45, ETE: 30)**
0L+0T+3P

Course Outcomes:

CO11324.1 & CO12324.1 To Design, implement, test and debug programs in C

CO11324.2 & CO12324.2 To implement and learn conditional statements

CO11324.3 & CO12324.3 To implement the different types of array and its applications

CO11324.4 & CO12324.4 To imply practical applications of structure and union

CO11324.5 & CO12324.5 To implement the concept of File Handling

List of Experiments:

1. To learn about   the C Library, Pre-processor directive, Input-output statement.
2. Programs to learn data type, variables, If-else statement
3. Programs to understand nested if-else statement and switch statement
4. Programs to learn iterative statements like while and do-while loops
5. Programs to understand for loops for iterative statements
6. Programs to learn about array and string operations
7. Programs to understand sorting and searching using array
8. Programs to learn functions and recursive functions
9. Programs to understand Structure and Union operation
10. Programs to learn Pointer operations
11. Programs to understand File handling operations

Programs to input data through Command line argument

1FY3-25/ 2FY3-25: MANUFACTURING PRACTICES WORKSHOP

Credit: 1.5   **Max. Marks: 75 (IA: 45, ETE: 30)**
0L+0T+3P

Course Outcomes:

CO11325.1 & CO12325.1 Student will be able to understand the basic tools and operations of carpentry shop with preparation of a simple joint

CO11325.2 & CO12325.2 Student will be able to understand the basics of foundry shop with preparation of sand mould and casting of simple pattern

CO11325.3 & CO12325.3 Students will be able to describe the basic tools used in welding shop with preparation of lap and butt joint

CO11325.4 & CO12325.4 Students will be able to learn about various parts and operations on Lathe machine with preparation of job

CO11325.5 & CO12325.5 Students will be able to understand the various tools and operations of fitting shop with preparation of job

List of Experiments:

Carpentry Shop
1. T – Lap joint
2. Bridle joint

Foundry Shop
3. Mould of any pattern
4. Casting of any simple pattern

Welding Shop
5. Lap joint by gas welding
6. Butt joint by arc welding
7. Lap joint by arc welding
8. Demonstration of brazing, soldering & gas cutting

Machine Shop Practice
9. Job on lathe with one step turning and chamfering operations

Fitting and Sheet Metal Shop
10. Finishing of two sides of a square piece by filing
11. Making mechanical joint and soldering of joint on sheet metal

To cut a square notch using hacksaw and to drill a hole and tapping

1FY3-26/ 2FY3-26: BASIC ELECTRICAL ENGINEERING LAB

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

Course Outcomes:

CO12326.1 Students can identify basic electrical component and able to test and measure electrical quantities using digital and analog meters
CO12326.2 Students gets basic information about transformer.
CO12326.3 Student will be able to understand about star Delta connection of 3 phase transformer
CO12326.4 Students get complete information about AC & DC machine by cut out section
CO12326.5 Students get knowledge of design of different converters and LT switch gears

List of Experiments:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Transformers: Observation of the no-load current waveform on an oscilloscope. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
3. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).Phase-shifts between the primary and secondary side.
4. Demonstration of cut-out sections of machines: dc machine (Commutator - brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
5. Torque Speed Characteristic of separately excited dc motor. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform

     (c) The use of dc-ac converter for speed control of induction motor and (d) Components of LT switchgear.

1FY3-27/ 2FY3-27: BASIC CIVIL ENGINEERING LAB

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

Course Outcomes:

CO11327 & CO12327.1 To understand the linear measurement with the help of tape and chain include ranging and laying offset method.
CO11327 & CO12327.2 Measurement of bearing of line with help of compass
CO11327 & CO12327.3 To be aware of the of leveling instruments during making of longitudinal and cross section of road and also able to take the measurements using the Total Station.
CO11327 & CO12327.4 Determine various water and waste water quality parameter like pH, hardness, and turbidity and solids.
CO11327 & CO12327.5 Describe the various water supplies and sanitary fitting.

List of Experiments:

1. Linear Measurement by Tape:
   a. Ranging and Fixing of Survey Station along straight line and across obstacles.
   b. Laying perpendicular offset along the survey line
2. Compass Survey: Measurement of bearing of lines using Surveyor's and Prismatic compass
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 by Height of Instrument and Rise & Fall Method.
4. To study and take measurements using various electronic surveying instruments like EDM, Total Station etc.
5. To determine pH, hardness and turbidity of the given sample of water.
6. To study various water supply Fittings.
7. To determine the pH and total solids of the given sample of sewage.
8. To study various Sanitary Fittings.

1FY3-28/ 2FY3-28: COMPUTER AIDED ENGINEERING GRAPHICS

Credit: 1.5   **Max. Marks: 75 (IA: 45, ETE: 30)**
0L+0T+3P

Course Outcomes:

CO11328 & CO12328.1 Use the drawing instruments effectively and able to dimension the given figure.

CO11328 & CO12328.2 Understand the systematic approach for projection of points & lines.

CO11328 & CO12328.3 Able to draw the basic views related to projection of lines & planes.

CO11328 & CO12328.4 Understand the theory of section of solid & projection of

Section of solid including cylinders, cones, prism

CO11328 & CO12328.5 Understand the fundamentals of computer graphics.

Content:

Introduction: Principles of drawing, lines, type of lines, usage of Drawing instruments, lettering, Conic sections including parabola, hyperbola, Rectangular Hyperbola (General method only); Scales-Plain, Diagonal and Vernier Scales.

Projections of Point & Lines: Position of Point, Notation System, Systematic Approach for projections of points, front view & Top view of point, Position of straight lines, line parallel to Both the RPs, Line perpendicular to either of the RPs, Line inclined to one RP and parallel to the other, Line inclined to Both the RPs, Traces of a line (One drawing sheet, one assignment in sketch book).

Projection of Planes: Positions of planes, Terms used in projections of planes, plane parallel to RP, plane inclined to one RP and perpendicular to the other RP, plane perpendicular to Both the RPs, plane Inclined to Both the RPs, True shape of the plane, Distance of a point from plane, Angle between two planes.
Projections of Regular Solids: frustum and truncated solids, those inclined to both the Planes-Auxiliary Views.

Section of Solids: Theory of sectioning, section of prisms and cubes, section of pyramids and Tetrahedron section of Cylinders, section of cones, section of spheres (One drawing sheet, one assignment in sketch book)

Overview of Computer Graphics: Covering theory of CAD software [such as: The menu System, Toolbars (standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.: Isometric Views of lines, Planes, Simple and compound Solids.

Text Books:
1. Engineering Drawing Geometrical Drawing P.S.Gill , S.K.Katara & Sons
2. Engineering Drawing,Dhanarajay A Jolhe ,Tata McGraw Hill.
3. Engineering Drawing, Basant Agarwal & CM Agarwal ,Tata McGraw Hill
4. Engineering Drawing, N.D.Bhatt, Charotar Publishing House Pvt. Ltd.
5. Engineering Drawing with an introduction to AutoCAD, Dhananjay A Jolhe
6. Engineering Drawing with AutoCAD, B.V.R. Gupta and M. Rajaroy
7. AutoCAD 2017 for Engineers & Designers (Basic and Intermediate), Sham Tickoo

1FY3-29/ 2FY3-29: COMPUTER AIDED MACHINE DRAWING

Credit: 1.5   **Max. Marks: 75 (IA: 45, ETE: 30)**
0L+0T+3P

Course Outcomes:

CO11329 & CO12329.1 Use the drawing instruments effectively and able to dimension the given figure.
CO11329 & CO12329.2 Understand the systematic approach for projection of points & lines.
CO11329 & CO12329.3 Able to draw the basic views related to projection of lines & planes.
CO11329 & CO12329.4 Understand the theory of section of solid & projection of Section of solid including cylinders, cones, and prism.
CO11329 & CO12329.5 Understand the fundamentals of computer graphics.

Content:

Introduction: Principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, rules of dimensioning.

Conversion of pictorial views into orthographic views: (1 drawing sheet) Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection, missing view problems covering Principles of Orthographic Projections.

Sectional views of mechanical components: (1 drawing sheet) Introduction, cutting plane line, type of sectional views-full section, half section, partial or broken section, revolved section, removed section, offset section, sectioning conventions-spokes, web rib, shaft, pipes, different types of holes, conventions of section lines for different metals and materials.

Fasteners and other mechanical components: (Free hand sketch) Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation bolts etc., keys, types of keys, cotter and knuckle joints. Riveted joints, rivets and riveting, type of rivets, types of riveted joints etc. Bearing: Ball, roller, needle, foot step bearing. Coupling: Protected type, flange, and pin type flexible coupling. Other components: Welded joints, belts and pulleys, pipes and pipe joints, valves etc.

Overview of Computer Graphics: (2 drawing sheets) Covering theory of CAD software such as: The menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Command Line (Where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.: Isometric Views of Lines, Planes, Simple and compound Solids.

3CE2-01: ADVANCE ENGINEERING MATHEMATICS-I

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

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

Course Outcomes:

CO23201.1 To demonstrate the concept of interpolation including numerical differentiation and numerical integration of a function using trapezoidal, Simpson's one third and three eight rule

CO23201.2 To provide the idea of numerical solution of ordinary differential equation of first order using Euler's, Modified Euler's, Mille's, Adams predictor-corrector and Runga Kutta method

CO23201.3 To provide the basic idea of Laplace transform and their application to solve ordinary and partial differential equation with boundary conditions

CO23201.4 To provide the concept of Fourier transform including sine and cosine transform and their application to solve wave and diffusion equation using Fourier transforms

CO23201.5 The knowledge of Z-transform provides skill to analyze discrete system

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 Maths Vol-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: 20, ETE: 80)**

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

Course Outcomes:

CO23102.1 Understand the meaning and importance of technical communication and different technical styles

CO23102.2 Practice the unique qualities of professional rhetoric and writing style, such as sentence conciseness, clarity, accuracy, honesty, avoiding wordiness or ambiguity, using direct order organization, readability, coherence and transitional devices.

CO23102.3 Recognize, explain, and use the formal elements of specific genres of organizational communication: white papers, memorandums, web pages, wikis, blogs, business letters, and promotional documents.

CO23102.3 Recognize, explain, and use the formal elements of specific genres of organizational communication: white papers, recommendation and analytical reports, proposals.

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,

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. Medhavi jain, Dr. Rita Arora.
2. Dr. Rajendra Ladiya

3CE3-04: ENGINEERING MECHANICS

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

CO23304.1 Determine the resultant force and moment for a given force system

CO23304.2 Analyze planar and spatial systems to determine the forces in members of trusses, frames

CO23304.3 Determine the centroid and moment of Inertia of bodies and composite sections

CO23304.4 Apply the concept of virtual work on various engineering problems & able to understand the calculation of work as well as energy required in a system

CO23304.5 Analyze planar systems related to friction

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. Punmia Laxmi Publications (p) Ltd

3CE4-05: SURVEYING

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

CO23405.1 To make students understand the basics of linear and angular measurement
CO23405.2 To make students understand the measurement of level and contour maps
CO23405.3 To introduce different Types of curves, setting out of curves
CO23405.4 To brief students to different systems of tachometric measurements
CO23405.5 To Setting out works & 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 Punamia Laxmi Publications (P) Ltd.
2. Surveying volume-I & II by K.R. Arora

3CE4-06: FLUID MECHANICS

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

CO23406.1 Definition and types of fluid will be understood to student.

CO23406.2 Different properties of fluid will be known to student.

CO23406.3 Measurement of pressure by different manometers known to students

CO23406.4 Computation of hydrostatic and hydrodynamic forces will be possible.

CO23406.5 Student will be able to derive the governing equations of fluid flow in kinematic

CO23406.6 Practical implementation and derivation of Bernoulli's equation & Momentum Equation will be known to students. Students will become familiar with properties and behaviour of fluid while flowing through pipes.

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-centre and 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: 150 (IA: 30, ETE: 120)**
3L+0T+0P   **End Term Exam: 3 Hours**

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

CO23407.1 Figure out various types, tests and properties of stones, bricks and lime used in construction of civil engineering structures.
CO23407.2 Describe the use and tests for timber and steel materials and use of different paints, varnishes and plaster.
CO23407.3 Students will become familiar with various building components and their requirements, methods of construction & purposes.
CO23407.4 Remedial measures like damp proof will be known to students and also known about foundation.
CO23407.5 Students will become familiar with the staircase, partition wall and 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 & Subhajit Saraswati, 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: 20, ETE: 80)**
2L+0T+0P   **End Term Exam: 2 Hours**

Course Outcome:

CO23408.1 Learn about Geology; understand internal structure of the Earth and Weathering
CO23408.2 To learn about Rocks, their formation, texture, classification
CO23408.3 Demonstrate different processes of geological formation and their effects on structures
CO23408.4 Use various principles of geology for site selection & mitigation of natural hazards for dams and tunnel and Perform subsurface analysis by using different geophysical methods
CO23408.5 Utilize modern techniques like remote sensing and GIS for various geological requirements

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 Chenna Kesavulu- 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: 75 (IA: 45, ETE: 30)**

0L+0T+3P

Course Outcome:

CO23421.1 Students will be able to measure the length and bearing of a line by using Chain/ Tape and compass

CO23421.2 Demonstration of different levelling techniques by using levelling instruments

CO23421.3 Student will be able to measure horizontal and vertical angles. Also calculation of height of any objects like- building, Tower etc

CO23421.4 Fundamentals of tachometer will be understood

CO23421.5 It makes the student will be able to understand working and operation of surveying equipments like- Total station, auto level, Compass, planimeter and plane table

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: 50 (IA: 30, ETE: 20)**

0L+0T+2P

Course Outcome:

CO23422.1 Student will be able to apply Study on various pressure measuring devices & velocity distribution in pipes

CO23422.2 Able to apply the knowledge on Verify the Bernoulli's theorem Theory with Practical implementation and Student will be able to perform the Venturi-meter & Orifice-meter

CO23422.3 Student will be able to determine Metacentric Height with Neat Sketch

CO23422.4 To be able the Determine Main Coefficient Cc, Cv, Cd of an orifice & Coefficient Cd of a mouthpiece. Also To perform appropriate the Coefficient Cd of a V-notch

CO23422.5 To be able to determine the viscosity of a given fluid

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 C_c, C_v, C_d of an orifice.
7. To determine C_d of a mouthpiece.
8. To determine C_d 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: 75 (IA: 45, ETE: 30)**

0L+0T+3P

Course Outcome:

CO23423.1 This practical will help the students to understand about the Autodesk software, various CAD- tools and details about the AutoCAD software. Students will learn the basic command to work with the CAD tools. Students will learn the basic command to work with the CAD tools

CO23423.2 To understand the various bonds in the masonry construction and their plan and elevations

CO23423.3 Understanding and drawing of the front elevation of the building. Drawing plans of the building along with its cross sections using CAD tools

CO23423.4 Learning about different Doors and Windows used in building construction. Learning about, Pointing Arches Lintels and Floors in building construction

CO23423.5 To impart Knowledge about various components of dog legged stairs and its drawing using CAD tool. Understanding Different types of roofs in building construction and their drawings

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: 50 (IA: 30, ETE: 20)**

0L+0T+2P

Course Outcome:

CO23424.1 To give knowledge about various engineering properties of stones, bricks, tiles and timbers
CO23424.2 Developing understanding in the students about the use of fly ash in the construction
CO23424.3 Producing awareness about the different types of steel and aluminium sections used in construction of steel structures
CO23424.4 Interaction with the hollow blocks and their advantages in building design
CO23424.5 To know about stone slurry and their uses in construction, Specific discussion and awareness about Kota stone slurry

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: 50 (IA: 30, ETE: 20)**

0L+0T+2P

Course Outcome:

CO23425.1 The students will get the basic knowledge about minerals and rocks by their origin and engineering properties
CO23425.2 Be able to identify and classify minerals and rocks using basic geologic classification systems
CO23425.3 Ability to categorize Geological features through wooden Models
CO23425.4 To understand the geological maps and language for the discussion on geological reports to resolve civil engineering issues
CO23425.5 Ability to apply geological principles to rock masses and Dip & 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: 20, ETE: 80)**

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

Course Outcomes:

CO24201.1 Students understand to apply concepts of probability

CO24201.2 Students will be able to use discrete and continuous probability distributions, including requirements, mean and variance, and making decision

CO24201.3 Students are able to apply different probability distribution to identify and solve real life problem

CO24201.4 Students are able to analyzing the pair of variable are related or not, and predict the future value by using the regression equations

CO24201.5 Student use the statistical test to developing better management system and providing good services or results in their future life journey

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 Maths Vol-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   **Max. Marks: 100 (IA: 20, ETE: 80)**
2L+0T+0P   **End Term Exam: 2 Hours**

Course Outcomes:

CO24103.1 Understand the Economic Concepts and Conventions and will realize the Need for managerial concepts

CO24201.2 Understand the practical application of demand and supply

CO24201.3 Will be able to analyze the how to increase demand of different companies

CO24201.4 Students will be able to identify economic problems in competitive market

CO24201.5 Students will be able to understand the concept of financial accounting

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

Course Outcomes:

CO24102.1 Understand the meaning and importance of technical communication and different technical styles

CO24102.2 Practice the unique qualities of professional rhetoric and writing style, such as sentence conciseness, clarity, accuracy, honesty, avoiding wordiness or ambiguity, using direct order organization, readability, coherence and transitional devices

CO24102.3 Recognize, explain, and use the formal elements of specific genres of organizational communication: white papers, memorandums, web pages, wikis, blogs, business letters, and promotional documents

CO24102.4 Recognize, explain, and use the formal elements of specific genres of organizational communication: white papers, recommendation and analytical reports, proposals

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: 20, ETE: 80)**
2L+0T+0P   **End Term Exam: 2 Hours**
Course Outcomes:

CO24304.1 Develop the understanding of number system and its application in digital electronics, Demorgan's theorem, Logic Gates, half and full adder circuits, R-S flip flop, J-K flip flop

CO24304.2 Understanding the semiconductor device such as diode and transistor

CO24304.3 Describe the use of various electrical/electronic instruments, their block diagram, applications, and principles of operation used in civil engineering, standards errors, data acquisition system and processing

CO24304.4 Understand various sensor and remote sensing technique used in civil engineering

CO24304.5 Understand the concept of digital image processing

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

Course Outcomes:

CO24405.1 Understanding about prismatic, non-prismatic and composite members. Development of stresses and respective strains in the materials. Thermal stresses and problems associated with it

CO24405.2 The mathematical formulation to be used in order to find out the resultant stress out of a set of stresses in a 2-D plane. Students will get to know about Mohr's principle for determination of principal stresses

CO24405.3 To develop understanding about the thing happened when a beam is subjected to transverse loads. Being familiar with the bending moment, shear force and axial thrust as a response of loading with deflection

CO24405.4 Practical considerations and graphical representations of the bending and shear stresses developed across any cross section of the beam

CO24405.5 Students will understand about torsion and columns

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. Punmia Laxmi Publications (p) Ltd.

4CE4-06: HYDRAULICS ENGINEERING

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

CO24406.1 Understand basics of subject and will acquire knowledge of dimension analysis and various models

CO24406.2 Get knowledge of turbulent flow and boundary layer theory

CO24406.3 Know about various open channel flow (Rectangular, trapezoidal, V-notch etc.) and also about velocity distribution in open channels, gradually varied flow, rapidly varied flow, hydraulic jump and various correction factors

CO24406.4 Learn about impact of free jet and various hydraulic machines and their principle

CO24406.5 Know in detail about ground water, hydrology (hydrograph, hyetograph, runoff etc.), canal hydraulics, its type, design and various theories

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: 20, ETE: 80)**
2L+0T+0P   **End Term Exam: 2 Hours**

Course Outcomes:

CO24407.1 Students will get to know about the scopes and how this subject is helpful in civil engineering. Students will become familiar with different types of building

CO24407.2 Students will learn about sun path, sun shading and various devices. Students will know about various comfort and climate conditions

CO24407.3 Students will learn the concept of orientation and orientation criteria for tropical climate. Building Bye Laws and NBC Regulations will be known to students

CO24407.4 Principles of Planning and Vastu Shastra will be understood. Functional design and Accommodation requirements of buildings and safety provision required in building as per rules and guidelines will be known to students

CO24407.5 Students will be aware of various Functional Design and Accommodation Requirements of Non Residential Buildings. Students get to know the various services of building (lighting, acoustic, fire fighting provisions etc.)

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	**Vastu Shastra 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** (A) Lighting and ventilation, doors and windows, lifts. (B) Acoustics, sound insulation and noise control. (C) 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: 150 (IA: 30, ETE: 120)**
3L+0T+0P   **End Term Exam: 3 Hours**
Course Outcomes:

CO24408.1 Introduction of various technologies used in construction and scope of this subject. Students will get to know about various ingredients of concrete Identification of different types of aggregates and their classification as per IS. Knowledge about concrete as a man made construction material, its design and different constituents

CO24408.2 Properties of hardened concrete such as strengths, permeability, creep, shrinkage, factors influencing, Standard tests on fresh and hardened concrete as per IS code. Different types of properties of concrete in its fresh and hardened state. Learning about the testing of fresh and hardened concrete to evaluate its different properties following Indian standards. Practical knowledge about Non-destructive tests and their field application. Comparison of these techniques over conventional methods of testing

CO24408.3 To aware the students about the basic concreting operations involved in the field and laboratories. Students will know about the Importance of concrete durability and its relation with age of a building

CO24408.4 To makes aware about different types of admixtures used in the field and their suitability in different conditions. Meta kaolin and fly ash as a recyclable material in concrete. Learning about the Indian standard procedure used for mix design of concrete

CO24408.5 To provide knowledge about different types of formwork and their functions.To guide about the special type of concrete required as per the regional conditions of the site. Students will get to know about the high performance concrete and self compacting concrete its properties and needs.

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, Dahnpat Rai & Sons.
2. Concrete Technology by Nevillee & Brooks, Pearson Education.
3. Concrete Microstructure P.K. Metha, Tata Mc Graw Hill.
4. Concrete Technology- A. S. Santhakumar, Oxford University Press

4CE21: MATERIAL TESTING LAB

Credit: 01   **Max. Marks: 50 (IA: 30, ETE: 20)**

0L+0T+2P

Course Outcomes:

After the completion of this course, Students will be able

CO24421.1: To apply the knowledge of mechanical properties viz. stress strain relations, hardness, toughness & fatigue on mild steel and HYSD bars

CO24421.2: To find the compressive strength of cement and concrete cubes for finding their grades.

CO24421.3: To understand the behaviour of wooden beams under flexural loading by using three point loading test using UTM.

CO24421.4: To find the stiffness of various types of springs.

CO24421.5: To understand the behaviour and failure type of shafts made of different materials under torsion.

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: 50 (IA: 30, ETE: 20)**

0L+0T+2P

Course Outcomes:

CO24422.1: The students will be able to conduct experiments in pipe flows for head losses and measure the frictional losses in fluid flow.

CO24422.2: The students will be able to conduct experiment for Venturimeter and Broad crested weir to determine the Coefficient of discharge.

CO24422.3: To understand the practical knowledge in verification of principles of momentum equation.

CO24422.4: The students will acquire the practical aspects of Manning's & Chezy's coefficient of roughness for the bed of a given Channel.

CO24422.5: Ability to present experimental results using characteristics curve of hydraulic jump and velocity distribution in open channel flow.

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: 75 (IA: 45, ETE: 30)**

0L+0T+3P

Course Objective:

CO24423.6 To understand the set of drawings required at any construction site.

CO24423.2 Learning of the basic planning principles and utilities required in the planning of a primary health centre and primary school.

CO24423.3 Learning of the basic planning principles and utilities required in the planning of a post office & bank building.

CO24423.4 Learning of the basic planning principles and utilities required in the planning of a college library.

CO24423.5 Learning of the basic planning principles and utilities required in the planning of a cinema theatre &rest house building.

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: 50 (IA: 30, ETE: 20)**

0L+0T+2P

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

CO24424.1 To measure horizontal and vertical angles by Theodolite

CO24424.2 To measure the height of building by trigonometry levelling

CO24424.3 To understand the fundamentals of total station also able to measurement of area of a traverse

CO24424.4 To analyse braced quadrilateral

CO24424.5 To prepare the map of given area by plane tabling

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: 75 (IA: 45, ETE: 30)**

0L+0T+3P

Course Objectives:

CO24425.1: To determine the fineness of Cement by Blaine's air permeability test & Soundness of cement by Le-chatelier apparatus.

CO24425.2: To determine the flexural strength of Concrete along with workability of given concrete mix by slump test & Permeability of Concrete.

CO24425.3: To determine the specific gravity of fine aggregate (sand) by Pycnometer & bulking of fine aggregate and to draw curve between water content and bulking.

CO24425.4: Sieve analysis of coarse aggregates and fine aggregates.

CO24425.5: To design concrete mix of M-20 grade M-40 grade with super plasticizer in accordance with I S 10262 & determine the optimum dose of super plasticizers by Flow table test.

CO24425.6: Study of Core cutter, UPV & Rebound Hammer equipment.

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, ETE: 80)

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

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

CO35301.1	Understand the economic aspects of engineering.
CO35301.2	Understand the risk involve in any construction work and learn about the safety measures at the site.
CO35301.3	Plan a construction project into various stages of work.
CO35301.4	Manage different materials which are used at the time of any construction work.
CO35301.5	Understand the work of heavy used in various construction projects.

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

61

5CE4-02: STRUCTURE ANALYSIS-I

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

Course Outcomes:
CO35402.1 To determine the indeterminacy of any structure
CO35402.2 To analyze indeterminate beams by using Area moment method, Conjugate beam method, Three moments theorem
CO35402.3 To analyze a Statically Indeterminate beams and portal frames by using slope deflection method
CO35402.4 Analyze a Statically Indeterminate beams and portal frames by using moment distribution method
CO35402.5 Determines the effect of vibration on an undamped 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 and 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. Punmia Laxmi publications (P)

5CE4-03: DESIGN OF CONCRETE STRUCTURES

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

Course Outcomes:

CO34403.1 To give knowledge about general design considerations

CO34403.2 Understanding of the concept of various design philosophies and practicing problems based on working stress method of design for flexure

CO34403.3 Understanding of the concept and practicing problems based on limit state method of design for flexure

CO34403.4 To control deflection in RCC beams subjected to various loading and supporting conditions. Understanding of bond and anchorage principles for RCC beams and design of RCC beam subjected to shear. Analyze and Design one-way and two way slab

CO34403.5 Design of RCC columns and footings by limit state method of design. To analyze and design of beams subjected to torsion

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

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

CO35404.1	Understanding and analysis of properties of the soil and study of classification of soil.
CO35404.2	Understand about the stresses in the soil and study of compaction of soil.
CO35404.3	Capable to understand compressibility & consolidation in the soil.
CO35404.4	Carry out the analysis of slope stability of embankment. Understanding of concept of Earth pressure in the soil.
CO35404.5	Analyze the safe bearing capacity in the soil and soil investigation

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 Illite Montmorillonites 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 Alam singh, 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:

CO35405.1 Students will able to understand the surface and subsurface irrigation also basic requirements of irrigation and various irrigation techniques, requirements of the crops

CO35405.2 Understand about the design of canal and the basics of design of unlined and lined irrigation canals design

CO35405.3 Distribution systems for canal irrigation

CO35405.4 Students will able to the concept of open well and tube well& Various Stream flow measurements techniques

CO35405.5 Various components of hydrologic cycle that affect the movement of water in the earth various components of hydrologic cycle that affect the movement of water in the earth

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

CO35511.1 To know the different air pollutants and their effects on the atmosphere

CO35511.2 Be familiar with techniques of removal of air pollutants by different methods and know about the different technologies for improving air qualities

CO35511.3 known different sources of noise pollution, their effects on the health and controlling methods

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.

5CE5-12: DISASTER MANAGEMENT

Credit: 2   **Max. Marks: 100 (IA: 20, ETE: 80)**

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

Course Outcomes: Students will be able to

CO35512.1 Get an exposure to disasters, their significance, types & Comprehensive understanding on the concurrence of Disasters and its management

CO35512.2 Understand the relationship between vulnerability, disasters, disaster prevention, risk reduction and the basic understanding of the research methodology for risk reduction measures

CO35512.3 Get the knowledge of humanitarian Assistance before and after disaster

CO35512.4 Know disaster management theory (cycle, phases)

CO35512.5 Know concepts, principles, skills pertaining to Planning, Organizing, Decision making and Problem solving methods for Disaster Management

SN	Contents
1	Introduction: Objective, scope and outcome of the course.
2	**Introduction:** Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Natural and Manmade Disasters, Disaster and Development, and Climate Change.
3	**Types of Disasters, their occurrence/ causes, impact and preventive measures:** **Geological Disasters**: earthquakes, landslides, tsunami, mining;
	Hydro-Meteorological Disasters: floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves.
	Biological Disasters: epidemics, pest attacks, forest fire.
	Technological Disasters: chemical, industrial, radiological, nuclear.
	Manmade Disasters: building collapse, rural and urban fire, road and rail accidents.
	Disaster profile of Indian continent, Mega Disasters of India and Lessons Learnt. Risk mapping.
4	**Disaster Management Cycle**: Disaster Management Cycle and its components: Pre disaster and post disaster, Paradigm Shift in Disaster Management. Safety tips for various types of disasters.
5	**Disaster management system in India:** Disaster Management Act 2005, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter- Governmental Agencies.

Text / Reference Books:

1. D B N Murthy Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.
2. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015

5CE5-13: TOWN PLANNING

Credit: 2   **Max. Marks: 100 (IA: 20, ETE: 80)**

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

Course Outcomes: At the end of course will be able to

CO35513.1 Understand the basic principle of town planning, Growth and patterns of town development, distribution of land use, conditions of site for ideal town also understand the type, principles and advantages of zoning

CO35513.2 Understand the basics of Civic Surveys, its Definition, Necessity, collection of data, Types of surveys, methods adopted to collect data, Drawings, reports etc

CO35513.3 Design residential building with appropriate requirements also understand the classification principle of design, town center, grouping of public buildings

CO35513.4 Comprehend about the Classification of industry, Concentration of industry, requirements of the industry, Industrial townships, Specify the causes of Slums, its effects and way to clear Slum

CO35513.5 Understand the Objects of re-planning, defects of existing town, data required for re-planning, Urban Renewal projects, De-centralization and Re-centralized, Garden city concept overview

SN	Contents
1	Introduction: Objective, scope and outcome of the course.
2	Introduction: Definition of town planning, Evolution of towns, Objects of town planning, Economic Justification for town planning, Principles of town planning, Necessity of town planning, Origin, Growth and patterns of town development, distribution of land use, site for ideal town, powers required to enforce T.P. scheme
3	Civic Surveys: Definition, Necessity, collection of data, Types of surveys, methods adopted to collect data, Drawings, reports.
4	Zoning: Definition, Use of land, Objects of zoning, Principles of zoning, Aspects, Advantages & Importance zoning, Transition zone, Zoning powers, Maps for zoning
5	Importance and Demand of housing, Classification, requirements and design of residential building, Housing agencies, Housing problems in India.
6	Slums: Causes, characteristics and effects of slums, Slum clearance.
7	Industries: Classification of industry, Concentration of industry, requirements of the industry, Industrial townships.
8	Public Buildings: Location, classification principle of design, town center, grouping of public buildings. Town Planning, CL-SPP/CL-DDU/Nadiad, Gujarat, INDIA 4
9	Re-planning of existing towns: Objects of re-planning, defects of existing town, data required for re- planning, Urban Renewal projects, De-centralization and Re-centralized, Garden city concept Overview.

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

CO35514.1 Be aware of various physical and chemical deterioration in concrete structure and preventing measurement

CO35514.2 Understand the reasons of cracks and there types in concrete and masonry structure

CO35514.3 Gain knowledge about different assessment methods of damage structure including NDT methods

CO35514.4 Describe the important materials which are used in repair process of structure with their properties and advantages or feasibility

CO35514.5 Understand the various important repair techniques with their process and limitations with various case studies

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.

5CE5-15: GROUND IMPROVEMENT TECHNIQUES

Credit: 2   **Max. Marks: 100 (IA: 20, ETE: 80)**

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

Course Outcomes: Students will be able to

CO35515.1 Comprehend the soil by weathering process and basic purpose as well principles of Ground improvements

CO35515.2 Understand the theory of compaction along with its laboratory tests

CO35515.3 Understand the method of densification by deep compaction

CO35515.4 Make a review on modification using stone column and Pre-compression by preloading with vertical drains

CO35515.5 Make a review on techniques of grounding and their methods and soil reinforcement and understand miscellaneous methods of Soil stabilization

SN	Contents
1	**Introduction:** Objective, scope and outcome of the course.
2	**Introduction**: Formation of soil- Mechanical Weathering, Chemical weathering, types of soil-Residual soil, Transported soil, Regional soil Deposit in India, Difficult soils- Expansive soil, Collapsible soil, organic soil etc. Purpose and Principles of Ground Improvements.
3	**Densification by Compaction Near Surface**: Theory of compaction, Laboratory compaction tests; compaction in field, Effect of compaction on different soil properties, Factor affecting compaction in field, Measurement of density in field.
4	**Densification by Deep Compaction:** (a) Vibration methods- Vibro compaction, Vibro floatation, Vibratory probes method, blasting. (b) Displacement methods- Sand compaction piles; Dynamic Compaction.
5	**Modification Using Stone Columns:** **Introduction**- Failure mechanism, load carrying capacity, settlement analysis, installation technique, Geo-synthetic –encased stone columns, Mechanism of encasement, field control of stone columns **Pre-Compression and Vertical Drain**: Applicability and types of pre compression. Purpose and mechanism of pre-compression by pre loading. Design procedure of pre-compression by preloading. **Pre-compression by preloading with vertical drains**- Principles, Advantages, and disadvantages of Vertical drains, Type of Vertical drains, Installation, Monitoring and Instrumentation of Vertical drains.
6	**Modification by Grouting**: Purpose, principles and classification of grouts and their properties. Desirable characteristics of grout, Grouting methods, Planning and Operation of grouting, control of grouting operations and monitoring.
	Modification by Soil Reinforcement: Purpose of reinforced earth, Mechanism of reinforced soil, Failure mechanism of reinforced earth, Advantages of reinforced earth. Application of Reinforced Earth, Design methods of reinforced earth wall-(a) Check for External stability. Check for Internal stability.
7	**Miscellaneous Methods of Soil stabilization:** Lime stabilization, Cement stabilization, bituminous stabilization, chemical stabilization.

Text Book:

1- Ground Improvement Techniques   by Purushottam Raj, Tata Mc Graw Hills, Delhi.

REFERENCE BOOKS

1.   Text book of Geostatic Engineering by Gulhati & Dutta, Tata Mc Graw Hills, Delhi.
2.   Principles of Foundation Engg by B.M. Das, Thomson, Books/Cole.
3.   Foundation Design Manual By N.V Nayak, Dhanpat Rai and Sons.
4.   Soil Engineering in Theory and Practice Vol. III by Alam Singh CBS Publishers

5CE5-16: ENERGY SCIENCE AND ENGINEERING

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

Course Outcomes: Students will be able to

CO35516.1 Understand environmental issues related to energy
CO35516.2 Acquire adequate knowledge of different energy sources
CO35516.3 Learn about the different technologies of energy conservation
CO35516.4 Know about various civil engineering projects connected with energy sources
CO35516.5 Understand the concept of green and sustainable structures in civil engineering

SN	Contents
1	Introduction: Objective, scope and outcome of the course.
2	Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues; Introduction to energy systems and resources; Introduction to Energy, sustainability & the Environment
3	Energy Sources: Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil- bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems
4	Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and Sustainability
5	Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.
6	Engineering for Energy conservation: Concept of Green Building and Green Architecture; Green building concepts; LEED ratings; Identification of energy related enterprises

5CE4-21: CONCRETE STRUCTURES DESIGN

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

CO35421.1 Solve typical loading problems for SFD & BMD. There will be better understanding about design philosophy in RCC and particularly about working stress method of design & limit state method of design

CO35421.2 Aware about the shear cracks and design of beam for shear. Practical problems of space concerned can be managed by the student as a structural designer

CO35421.3 Learn about one way & two way slab design for field problems. Understanding about the RCC Columns, isolated footings etc. and their structural design for field problems

CO35421.4 Design of beam against torsion, which can occur in deep beams which are generally found in industries. Students will be able to understand the load carrying mechanism of a RCC member by knowing the Bond in concrete

CO35421.5 Know about serviceability needs of a building

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; Nem Cahnd and Brothers, Roorkee.

5CE4-22: GEOTECHNICAL ENGINEERDING 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

CO35422.1 Conduct the laboratory test for the determination of index properties of soil

CO35422.2 Evaluate compaction characteristics required for field application by standard Proctor Test Apparatus

CO35422.3 Perform and interpret unconfined compression test, direct shear tests and Triaxial test and estimate the shear strength parameters

CO35422.4 Get the knowledge about the procedures of determination of differential free swell index of soil and swelling pressure of soil

CO35422.5 Acquire the knowledge about the procedures of determination of CBR test of soil

CO35422.6 Conduct the experiment of one-dimensional compression tests and different permeability tests

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

Course Outcomes: Students will be able to
CO35423.1 Understand the surface and subsurface irrigation
CO35423.2 Analyze the water distribution system
CO35423.3 Study about the design of channel
CO35423.4 Understand the concept of open well and tube well
CO35423.5 Estimation of runoff and flood hydrograph

Design as per syllabus of theory.

6CE3-01: WIND AND SEISMIC ANALYSIS

Credit: 2   **Max. Marks: 100(IA: 20, ETE: 80)**

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

Course Outcomes: Students will be able to

CO36301.1 Understand to the structures subjected to wind and earthquake loads and respective Indian Standards

CO36301.2 Understand to the structures subjected to wind and earthquake loads and respective Indian Standards

CO36301.3 Specify design loads for different types of buildings as per IS Codes &understanding of Load Flow Concept in structures

CO36301.4 Have the knowledge of wind loading on different structures and calculate the wind loads with the help of IS: 875 (Part -3)

CO36301.5 Have a basic knowledge of earthquakes, effect of earthquake on buildings, and calculating earthquake load as per IS: 1893 (Part- 1)

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.

REFERENCE BOOKS

IS : 875, Part I, II & III

IS : 1893

IS : 4326

IS : 13920

6CE4-02: STRUCTURAL ANALYSIS-II

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

Course Outcomes: Students will be able to

CO36402.1 Analyze effect of rolling load using Influence Line method

CO36402.2 Analyze the determinate & indeterminate beams and frames using unit load and energy methods

CO36402.3 Analysis and design of arches

CO36402.4 Understand the concept of unsymmetrical Bending

CO36402.5 Calculate the lateral loads on multi-storey frames using approximate methods

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.

REFERENCE BOOKS

1-Design of Steel Structures by N. Subramanian, Oxford University Press.

2. Limit state Design of Steel Structures: S K Duggal, TMH publication

6CE4-03: ENVIRONMENTAL ENGINEERING

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

Course Outcomes: Students will be able to

CO36403.1 Gain the knowledge of Sewage characteristics and conduct test on (BOD, COD, TOD, Solids and TOD)

CO36403.2 Understand process of collection of sewage

CO36403.3 Understand the different sewage treatment process

CO36403.4 Understand how to dispose and reuse waste water

CO36403.5 Understand how to prevent Air pollution and noise pollution

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.

Text Book:

1- Water Supply by S.K. Garg, Khanna Publishing Co.

REFERENCE BOOKS

1. Environmental Engineering by Peavy, H.S., Rowe D.R. and Techobanoglous, Mc Graw Hill, Book Company.
2. 3Manual of Water Supply and Water Treatment, Ministry of Urban Development, Govt.of India.

6CE4-04: DESIGN OF STEEL STRUCTURES

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

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

Course Outcomes: Students will be able to

CO36404.1 Know about their responsibilities, objectives as a structural steel designer and scope of the course work. Comprehend the structural behavior of various steel structural elements, their types and plastic analysis

CO36404.2 Design the various connections used in steel structures. Analyze and design tension members using simple and built-up sections

CO36404.3 Analyze and design of compression members using simple and built-up sections. Analyze and design beam and their connection

CO36404.4 Analyze and design the member subjected to combined loading and the column bases. Design a plate girder using various stiffening techniques, and understand the concept of design of a gantry girder

CO36404.5 Design of roof trusses members subjected to various force combinations. Develop in the knowledge about the truss girder bridges and foot over bridges. Comprehend the Pre Engineered Buildings, their characteristics and applications

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.

REFERENCE BOOKS

1-Design of Steel Structures by N. Subramanian, Oxford University Press.

2. Limit state Design of Steel Structures: S K Duggal, TMH publication

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: 30, ETE: 120)**
2L+0T+0P   **End Term Exam: 3 Hours**
Course Outcomes: Students will be able to

CO36405.1 Gain the knowledge and purpose of the estimate and principle behind it

CO36405.2 Understand the different types of estimates and calculations for this

CO36405.3 Gain knowledge about the rate and quantity analysis

CO36405.4 Understand the process of measurement of estimation of different items

CO36405.5 Gain knowledge valuation and its concept and rent analysis

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.

Text Book:

1- Estimating & costing by B.N.Dutta, UBS Publishers & Distributers.

REFERENCE BOOKS

1. 2- Estimating Costing Specification & Valuation in Civil Engg. M .Chakroborty, Bhakti Vedanta, Book Trust, delhi.

2. 3.Quantity Surveying and Valuation by S.C. Rangawala , Charotar Publishing House.

6CE5-11: PRESTRESSED CONCRETE

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

Course Outcomes: Students will be able to

CO36511.1 Comprehend the different pre and post tensioning devices

CO36511.2 Analyze stresses in beams

CO36511.3 Understand different losses occur during the process of pre and post tensioning

CO36511.4 Calculate the deflection of pre and post tensioning concrete members

CO36511.5 Analyze and design pre stress concrete section

SN	CONTENTS
1	**Introduction:** Objective, scope and outcome of the course.
2	**Introduction:** Basic concepts of Pre-stressing and its advantages. Materials for pre-stressed concrete. Tensioning devices. Pre- tensioning and post tensioning systems.
3	**Analysis of Pre-stress and Bending Stresses:** Assumptions, Flexural analysis of pre-stressed rectangular and unsymmetrical T section. Concept of load balancing.
4	**Losses of Pre-stress:** Losses due to - elastic deformation of concrete, successive tensioning of curved cable, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip.
5	**Deflection of Pre-stressed Concrete Members:** Effect of tendon profile and associated factors in continuous members. Computation of deflection in pre-stressed concrete members.
6	**Design of Pre-stressed Concrete Sections:** Flexural Shear and Torsional strength using simplified code procedure (IS-1343-2012). Design of simply supported Pre-stressed Concrete Sections for flexure.

Text Books:

1. Prestressed Concrete by T.Y.Lin and Burn; John Wiley & Sons.

6CE5-12: SOLID AND HAZARDOUS WASTE MANAGEMENT

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

Course Outcomes: Students will be able to

CO36512.1 Comprehend methodologies of the solid waste management

CO36512.2 Comprehend the different waste collection techniques and characteristics of waste

CO36512.3 Understand waste processing and various equipments used in waste management

CO36512.4 Understand various methods of classification, segregation and management of hazardous waste

CO36512.5 Understand the process of treatment and disposal of the waste

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

REFERENCE BOOKS

1-Solid Waste Engineering Principles and Management Issues by G.Technobanogious H.Theisen & R.Blssen, Mc Graw Hill Book Co.

2.Solid Waste Management by C.L.Mantell, Mc Graw Hill Book Co.

3. Solid Waste Management in Developing Countries by Bhide& Sunrashen PHI.

6CE5-13: TRAFFIC ENGINEERING AND MANAGEMENT

Credit: 2   **Max. Marks: 100(IA: 20, ETE: 80)**

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

Course Outcomes: Students will be able to

CO36513.1 Understand the traffic planning and road way characteristics including PIEV theory

CO36513.2 Conduct surveys for different traffic operations

CO36513.3 Design traffic signals, intersection and traffic rotary

CO36513.4 Understand different causes of accidents and there prevention measures

CO36513.5 Understand various method of traffic management

SN	CONTENTS
1	Introduction: Objective, scope and outcome of the course.
2	Traffic Planning and Characteristics: Road Characteristics – Road user characteristics–PIEV theory–Vehicle–Performance characteristics – Fundamentals of Traffic Flow.
3	Traffic Surveys: Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including non-motorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses – Methods, interpretation and presentation –Level of service –Concept, applications and significance.
4	Traffic Design and Visual Aids: Intersection Design – channelization, Rotary intersection design – Signal design – Coordination of signals —Grade separation– Traffic signs including VMS and road markings – Significant roles of traffic control personnel– Networking pedestrian facilities & cycle tracks.
5	Traffic Safety and Environment: Road accidents – Causes, effect, prevention, and cost–Street lighting–Traffic and environment hazards –
6	Traffic Management: Area Traffic Management System – Traffic System Management (TSM) with IRC standards–-Traffic Regulatory Measures-Travel Demand Management (TDM) – Direct and indirect methods – Congestion and parking pricing – All segregation methods- Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education.

REFERENCE BOOKS:

1.Highway Engineering by Khanna SK & CG Justo, Nem Chand and Brothers, Roorkee.
2-Highway Engg. by L.R. Kadiyali, Khanna Tech Publications, Delhi.
3- Specification for Roads & Bridges by Ministry of Road Transports & Highways and Indian Road Congress.

6CE5-14: BRIDGE ENGINEERING

Credit: 2   **Max. Marks: 100(IA: 20, ETE: 80)**

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

Course Outcomes: Students will be able to

CO36514.1 To know about the scope of bridge engineering

CO36514.2 Acquire adequate knowledge of class of roads different types of bridges

CO36514.3 Analyze and design of steel bridges

CO36514.4 Analyze and design reinforced concrete culvert

CO36514.5 Analyze and design of bearings for slab bridges and girder bridges as per IRC 83

(Part II)

SN	CONTENTS
1	**Introduction:** Objective, scope and outcome of the course.
2	**Introduction:** Type of bridges & classification of road & railways bridges. IRC & Railway loadings for bridges, wind load & Earthquake forces. : Expansion joints.
3	**Steel bridges**: Introduction to Design of through type &deck type steel bridges for IRC loading. Design of through type truss bridges for railway loadings.
4	**Reinforced concrete culverts & bridges:** Reinforced concrete slab culvert, T-beam bridges-courbons & Hendry-Jaegar methods.
5	**Bearings**: Bearings for slab bridges and girder bridges. Elastomeric bearings, design concepts as per IRC 83 (Part II).

Text Books:

1. Bridge Engineering by Ponnuswamy; Tata Mc Graw Hill
2. Bridge Engineering by Johnson Victor; Oxford and IBH Publishers

6CE5-15: ROCK ENGINEERING

Credit: 2   **Max. Marks: 100(IA: 20, ETE: 80)**

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

Course Outcomes: Students will be able to

CO36515.1 Understand engineering classification of Rocks

CO36515.2 Understand engineering properties and laboratory test on rocks

CO36515.3 Conduct in situ tests on Rocks

CO36515.4 Understand strength of rock in confined and unconfined condition

CO36515.5 Conduct bearing capacity of rocks and understand grouting and rock bolting

SN	Contents
1	**Introduction:** Objective, scope and outcome of the course.
2	**Engineering Classification of Rocks**: Objectives, Intact rock classification, Rock mass Classification. Terzaghi's, Rock load classification, Austrian classification, Deere's rock quality classification, rock structure rating concept, RMR classification, and Q classification. Inter relation between Q and RMR.
3	**Engineering Properties and Laboratory Tests on Rocks:** Porosity, Density, Moisture content, Degree of saturation, Co-efficient of permeability, Durability, Compressive strength, Tensile strength, Shear strength, elasticity, Plasticity Deformability. Sampling and Samples Preparations, Uniaxial Compressive strength, Tensile Strength – Brazilian test, Shear strength test – Direct Shear test and Punch shear test, Triaxial Test, Flexural strength.
4	**In-situ Tests on Rocks**: Necessity of Insitu test, Plate load test for deformability, Field Shear test **Jointed Rocks:** Rocks Joint properties, Joint properties, Joint Roughness Co-efficient, Scale effects, Dilation, Orientation of Joints, Gouge, Joint Intensity, Uniaxial Compressive strength of Jointed Rocks.
5	**Strength of Rocks in Unconfined Condition**: Ramamurthy Strength Criteria, Singh and Rao Strength Criteria, Kulatilake Methodology, Barton Methodology. **Strength of Rocks in Confined Condition:** History of Hoek and Brown Failure Criterions, Parabolic Strength Criteria. **Bearing Capacity of Rocks:** Bearing capacity of intact rocks, jointed rocks, IS Code methodology, Singh and Rao Method and latest methodologies.

REFERENCE BOOKS

SN	Name of Authors /Books /Publisher
1	Rock Engg. For Engineers by B.P. Verma, Khanna Publishers.
2	Rock Engg. By Bhawani Singh, Elsevier Science Ltd.
3	Foundation on Rocks by Duncan C.Wyllie, Spon Press.
4	Engineering in Rock for Slopes, Foundation and Tunnels, by Ramamurthy, PHI Delhi.
5	IS Codes on Rocks

6CE5-16: GEOGRAPHIC INFORMATION SYSTEM & REMOTE SENSING

Credit: 2   **Max. Marks: 100(IA: 20, ETE: 80)**

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

Course Outcomes: Students will be able to

CO36516.1 Understand and use remote sensing techniques

CO36516.2 Use process and interpret data and images

CO36516.3 Understand the multi concept in remote sensing

CO36516.4 Understand the principle of interpretation of aerial and satellite images

CO36516.5 Understand and use geographic information system

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

Course Outcomes: Students will be able to

CO36421.1 Know about Physical Characterization of water: Turbidity, Electrical Conductivity, pH, Alkalinity and acidity, Hardness: total hardness, calcium and magnesium hardness

CO36421.2 Analysis of solids content of water: Dissolved, Settleable, suspended, total, volatile, inorganic etc

CO36421.3 Understand the optimum coagulant dose, break point chlorination, bacteriological quality measurement: MPN

CO36421.4 Know about Chemical Oxygen Demand (COD), Dissolved Oxygen (D.O) and Biochemical Oxygen Demand (BOD)

CO36421.5 Understand forecast the population and water demand of any area using various methods

CO36421.6 Design of systems and units

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

<u>Course Outcomes:</u> Students will be able to

CO36422.1 Understands about different types of steel section according to IS 800-2007 & the structural behavior of various steel structural elements and their plastic behavior

CO36422.2 Get the knowledge in the design of various connections. & tension members

CO36422.3 learn about analysis and design of compression members using built-up sections and design of beam and their connection

CO36422.4 Get to know about Analysis and design of the column bases

CO36422.5 Make a case study on existing foot over bridges/truss- Girder Bridge

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

CO36423.1 Make a Preliminary Estimate Plinth Area and Cubic Content using plan data and images

CO36423.2 Prepare a detailed Estimate of buildings using long wall-Short wall and Centre line method

CO36423.3 Calculate the Rates of different Items of Works viz. Earthwork, Concrete Work, DPC, Stone masonry, Brickwork, RCC, Roofing, Flooring, and Finishing etc

CO36423.4 Understand and use Earthwork Calculation for Roads, Irrigation Canals and Channels (cutting and filling)

CO36423.5 Understand and finding the Valuation of Buildings and Properties

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

Course Outcomes: Students will be able to
CO36424.1 Analyze and design of continuous beam
CO36424.2 Analyze and design of beams curved in plan
CO36424.3 Analyze and design of circular domes
CO36424.4 Analyze and design Water tanks and towers
CO36423.5 Analyze and design Retaining walls

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

Course Outcomes: Students will be able to

CO36423.1 Analyse and design of continuous beam

CO36423.2 Analyse and design of beams curved in plan

CO36423.3 Analyse and design of circular domes

CO36423.4 Analyse and design Water tanks and towers

CO36423.5 Analyse and design Retaining walls

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

CO47401.1 Understand different modes of transportation, road planning and various engineering survey for alignment

CO47401.2 Design of highways as per IRC

CO47401.3 Know properties of highway materials and also study about various equipments

CO47401.4 Design of flexible and rigid pavements as per IRC

CO47401.5 Understand basics of railway, airport and harbours

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, Dhanpat Rai Publishers, Delhi.
6	S C Rangwala, airport engineering, Charotar publication house.
7	Gautam H. Oza, Dock &Harbour Engineering, Charotar publication House.

7CH6-60.2: SUSTAINABLE ENGINEERING

Credit: 3
3L+0T+0P

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

Course Outcomes: Student will be able to

CO476-60.2.1: Understand the meaning of sustainable engineering and sustainability. He/she will be able to relate the meaning with its engineering aspects.

CO476-60.2.2: Understanding about the need of sustainability, nexus between technology and sustainable development, challenges for sustainable development. How countries are planning for sustainable development of the world. Understanding about the various environmental legislations in India

CO476-60.2.3: Know about, air and water pollution along with other local and global environmental problems and their consequences in sustainable development, concept of 3R & carbon trading. Learning about the environmental impact analysis and life cycle analysis

CO476-60.2.4: Development in the knowledge of habitat considering its sustainable aspects, students will be able to identify the sustainable materials for construction, sustainable cities, sustainable transport and various energy sources and their impact on sustainable development.

CO476-60.2.5: Understanding about the sustainable urbanization and industrialization, industrial ecology and industrial symbiosis.

Chapter-1
Introduction: Objective, scope and outcome of the course

Chapter-2
Sustainability - Introduction, Need and concept of sustainability, Social environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Environmental legislations in India - Water Act, Air Act.

Chapter-3
Air Pollution, Effects of Air Pollution: Water pollution- sources, Sustainable wastewater treatment, Solid waste - sources, impacts of solid waste, Zero waste concept, 3 R concept. Global environmental issues- Resource degradation, Climate change, Global warming, Ozone layer depletion, Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon foot print. Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking, Environment Impact Assessment (EIA) - Procedures of EIA in India

Chapter-4
Basic concepts of sustainable habitat, Green buildings, green materials for building construction, material selection for sustainable design, green building certification, Methods for increasing energy efficiency of buildings. Sustainable cities, Sustainable transport. Energy sources: Basic concepts-Conventional and non- conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy.

Chapter-5
Green Engineering, Sustainable Urbanisation, industrialisation and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis.

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

CO47421.1 Identify the Engineering properties of aggregates

CO47421.2 Understand properties, Strength and test of bitumen

CO47421.3 Make mix concrete and determine the strength of Dry lean concrete

CO47421.4 Know about proportion of bitumen, filler, fine aggregates, and coarse aggregates to produce a bitumen mix

CO47421.5 Understand the suitability of aggregate for road construction by testing of aggregate

List of Experiments:

1. Aggregate Impact Test
2. To determine the Angularity Number, Flakiness Index & Elongation Index of 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

CO47422.1 Understand different types of knots

CO47422.2 Get knowledge about Site plan, index plan, layout plan, plinth area, floor area of buildings

CO47422.3 Understand layout plan of building and bar bending schedule

CO47422.4 Know about building components and different buildings class

CO47422.5 Make valuation of building, properties and also understand how to work at height with safety.

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 tips

7CE4-23: SOFT SKILLS LAB

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

0L+0T+2P

Course Outcomes:

CO47423.1: Students will be able to know about their individual skills that will help them to grow and transform as valuable person. It will also help students to identify the aim of their life and fulfill it.

CO47423.2: Students will be able to prepare themselves to appear for a job and increase their communication skills and employability.

CO47423.3: Students will be able to deal with negativity, identify adverse situations and enhance problem solving skills. They will be able to improve their professional and social conduct.

CO47423.4: It will help students to finalize their career, make important decision and determined to achieve the goals of their life.

CO47423.5: This will help to give each student a realistic perspective of work, importance of collaboration and cooperation in professional world.

CO47423.6: Students will be able to manage and value time and learn how to prioritize work according to requirement. They will inculcate the ability of not giving-up when faced with a challenge.

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.

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

0L+0T+2P

Course Outcomes:

CO47424.1 To be aware of the Design of Various units of water and sewerage treatment plants

CO47424.2 Demonstration of air pollution monitoring instruments namely, High volume sampler also gains knowledge about SPM, PM10andPM2.5

CO47424.3 Demonstration of noise pollution monitoring equipment namely, modular precision sound level meter

CO47424.4 Gain knowledge about Noise and air quality monitoring for Traffic/Residential locality and its effect on the environment

CO47424.5 Understand the Latest technology for management of municipal solid waste, e-waste, bio-medical waste and their prevalent rules and regulations

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, $PM_{10}$and$PM_{2.5}$.
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:

CO48401.1 Understand construction planning and function of project management with project development process

CO48401.2 Students will know about Project Scheduling & project management network techniques: CPM and PERT

CO48401.3 Able to calculate optimum project duration & Project Cost

CO48401.4 Students will know about Contract Management

CO48401.5 Understand the knowledge of safety in construction & management

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

CO486-60.2.1 Understanding disasters and hazards related issues social and environmental

CO486-60.2.2 Understand about Natural disaster

CO486-60.2.3 Understand about Man-made Disasters

CO486-60.2.4 Know management roll in mitigating Disaster in Indian Textile Industries

CO486-60.2.5 Know roll of production people in Disaster Management

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

CO48421.1 Understand the net present value, benefit cost ratio, internal rate of return

CO48421.2 Know about Types of contracts – Tenders, tender form, submission and opening of tenders, measurement book, muster roll, piecework agreement and work order

CO48421.3 Prepare drafting of tender documents, special terms and conditions. Then after drafting of tender notices for different types of works

CO48421.4 Design Different models of PPP like BOT, BOOT etc. & Arbitration

CO48421.5 Preparation & design of bar diagram& 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

CO48422.1 Carry out mix design for bitumen and concrete (DLC & PQC).

CO48422.2 Understand the vehicular loading patterns, factor affecting design & performance of pavement.

CO48422.3 Design methodology for flexible pavement according to IRC: 37 & other guidelines.

CO48422.4 Design methodology for rigid pavement according to IRC: 58 & other guidelines.

CO48422.5 Understand the specialization 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