Semester -I

Code	Subject	Cr	Hrs. /Week			Exam Hrs.	Maximum Marks				
			L	T	P		MS1	MS2	END TERM	IA	Total
Theory											
101	Engineering Mathematics-I	3	3	1	0	3	10	10	60	20	100
102	Engineering Physics	3	3	1	0	3	10	10	60	20	100
103	Communication Skills	3	3	1	0	3	10	10	60	20	100
104	Programming For Problem Solving	3	4	1	0	3	10	10	60	20	100
105	Basic Electrical Engineering	3	3	1	0	3	10	10	60	20	100
Practicals & Sessionals											
Code	Subject	Cr	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)		Total
			L	T	P		MP1 30%	MP2 30%			
106	Engineering Physics Lab	2	0	0	2	2	30	30	40		100
107	Language Lab	2	0	0	2	2	30	30	40		100
108	Computer Programming Lab	2	0	0	2	2	30	30	40		100
109	Basic Electrical Lab	2	0	0	2	2	30	30	40		100
110	Computer Aided Engg.Graphics	2	0	0	3	3	30	30	40		100
	Grand Total	**27**	**18**	**6**	**11**						**1000**

Semester -II

Code	Subject	Cr	Hrs. /Week			Exam Hrs.	Maximum Marks				
			L	T	P		MS1	MS2	ENDTERM	IA	Total
Theory											
201	Engineering Mathematics-II	3	3	1	0	3	10	10	60	20	100
202	Engineering Chemistry	3	3	1	0	3	10	10	60	20	100
203	Human Values	3	4	1	0	3	10	10	60	20	100
204	Basic Mechanical Engineering	3	3	1	0	3	10	10	60	20	100
205	Basic Civil Engineering	2	2	1	0	3	10	10	60	20	100
Practicals & Sessionals											
Code	Subject	Cr	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)		Total
			L	T	P		MP1 30%	MP2 30%			
206	Engineering Chemistry Lab	2	0	0	2	2	30	30	40		100
207	Human Values Activities	2	0	0	2	2	30	30	40		100
208	Manufacturing Practice Workshop	2	0	0	2	2	30	30	40		100
209	Basic Civil Engineering Lab	2	0	0	3	3	30	30	40		100
210	Computer Aided Machine Drawing	2	0	0	2	2	30	30	40		100
	Grand Total	**27**	**18**	**06**	**11**						**1000**

SUNRISE UNIVERSITY ,ALWAR

CIVIL ENGINEERING DEPARTMENT
2ND YEAR
SEMESTER - III

Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	END TERM	IA	Total
Theory										
3BTCE01	Advanced Engineering Mathematics-I	3	1	0	3	10	10	60	20	100
3BTCE02	Engineering Geology	3	1	0	3	10	10	60	20	100
3BTCE03	Engineering Mechanics	3	1	0	3	10	10	60	20	100
3BTCE04	Surveying	2	1	0	3	10	10	60	20	100
3BTCE05	Fluid Mechanics	3	1	0	3	10	10	60	20	100
3BTCE06	Building Material & Construction	4	1	0	3	10	10	60	20	100
Practicals&Sessionals										
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)	Total	
		L	T	P		MP1* 30%	MP2* 30%	Pr.W 40%		
3BTCE07	Surveying Lab	0	0	2	3	30	30	40	100	
3BTCE08	Fluid Mechanics Lab	0	0	2	3	30	30	40	100	
3BTCE09	Civil Engineering Material Lab	0	0	2	3	30	30	40	100	
3BTCE10	Geology Lab	0	0	2	3	30	30	40	100	
	GRAND TOTAL	18	06	08					1000	

SUNRISE UNIVERSITY

,ALWAR

CIVIL ENGINEERING DEPARTMENT
2ND YEAR
SEMESTER - IV

Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	END TERM	IA	Total
Theory										
4BTCE01	Strength of Materials	3	1	0	3	10	10	60	20	100
4BTCE02	Concrete Technology	3	1	0	3	10	10	60	20	100
4BTCE03	Hydraulics Engineering	3	1	0	3	10	10	60	20	100
4BTCE04	Building Planning	2	1	0	3	10	10	60	20	100
4BTCE05	Advance Engineering Mathematics-II	3	1	0	3	10	10	60	20	100
4BTCE06	Basic Electronics for Civil Engineering Applications	2	1	0	3	10	10	60	20	100
Practicals&Sessionals										

Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)	Total
		L	T	P		MP1* 30%	MP2* 30%	Pr.W 40%	
4BTCE07	Hydraulic Engineering Lab	0	0	2	3	30	30	40	100
4BTCE08	Building Drawing Lab	0	0	2	3	30	30	40	100
4BTCE09	Strength of Materials Lab	0	0	2	3	30	30	40	100
4BTCE10	Concrete Lab	0	0	2	3	30	30	40	100
	GRAND TOTAL	16	06	08					1000

SEMESTER – V

Code	Subject	CR.	Hrs. /Week			Exam Hrs.	Maximum Marks				
			L	T	P		MS1	MS2	END TERM	IA	Total
Theory											
5BTCE01	Construction Technology and Equipment	3	3	1	0	3	10	10	60	20	100
5BTCE02	Structure Analysis-I	3	3	1	0	3	10	10	60	20	100
5BTCE03	Design of Concrete Structures	3	3	1	0	3	10	10	60	20	100
5BTCE04	Geotechnical Engineering	3	3	1	0	3	10	10	60	20	100
5BTCE05	Town Planning	3	3	1	0	3	10	10	60	20	100
5BTCE06	Repair and Rehabilitation of Structures	2	2	1	0	3	10	10	60	20	100
Practicals & Sessionals											
Code	Subject	CR.	Hrs. /Week			Exam Hrs.	IA(60%)		EA (40%)	Total	
			L	T	P		MP1* 30%	MP2* 30%	Pr.W 40%		
5BTCE07	Concrete Structures Design Lab	2	0	0	2	3	30	30	40	100	
5BTCE08	Geotechnical Engineering Lab	2	0	0	2	3	30	30	40	100	
5BTCE09	Water Resources Engineering Design Lab	2	0	0	2	3	30	30	40	100	
5BTCE10	Industrial Training									100	
	GRAND TOTAL	25	17	06	08					1000	

SEMESTER – VI

Code	Subject	CR.	Hrs. /Week			Exam Hrs.	Maximum Marks				
			L	T	P		MS1	MS2	END TERM	IA	Total
Theory											
6BTCE01	Structural Analysis-II	3	3	1	0	3	10	10	60	20	100
6BTCE02	Environmental Engineering	3	3	1	0	3	10	10	60	20	100
6BTCE03	Design of Steel Structures	3	3	1	0	3	10	10	60	20	100
6BTCE04	Estimating & Costing	3	3	1	0	3	10	10	60	20	100
6BTCE05	Pre-Stressed Concrete	2	2	1	0	3	10	10	60	20	100
6BTCE06	Bridge Engineering	3	3	1	0	3	10	10	60	20	100
Practicals & Sessionals											
Code	Subject	CR.	Hrs. /Week			Exam Hrs.	IA(60%)		EA (40%)		Total
			L	T	P		MP1* 30%	MP2* 30%	Pr.W 40%		
6BTCE07	Environmental Engineering Design and Lab	2	0	0	2	3	30	30	40		100
6BTCE08	Steel Structure Design Lab	2	0	0	2	3	30	30	40		100
6BTCE09	Quantity Surveying and Valuation Lab	2	0	0	2	3	30	30	40		100
6BTCE10	Water and Earth Retaining Structures Design Lab	2	0	0	2	3	30	30	40		100
	GRAND TOTAL	25	17	06	08						1000

SEMESTER – VII

Code	Subject	CR.	Hrs. /Week			Exam Hrs.	Maximum Marks				
			L	T	P		MS1	MS2	ENDTERM	IA	Total
Theory											
7BTCE01	Transportation Engineering	3	3	1	0	3	10	10	60	20	100
7BTCE02	Human Engineering and Safety	3	3	1	0	3	10	10	60	20	100
Practicals & Sessionals											
Code		CR.	Hrs. /Week			Exam Hrs.	IA(60%)		EA (40%)		Total
			L	T	P		MP1* 30%	MP2* 30%	Pr. W 40%		
7BTCE03	Road Material Testing Lab	2	0	0	2	3	30	30	40		100
7BTCE04	Professional Practices & Field Engineering Lab	2	0	0	2	3	30	30	40		100
7BTCE05	Soft Skill Lab	2	0	0	2	0	-	-	-		100
7BTCE06	Environmental Monitoring And Design Lab	4	0	0	4	0	-	-	-		100
7BTCE07	Practical training(Project stage-1)										200
7BTCE08	Seminar										200
	GRAND TOTAL	27	17	06	10						1000

SEMESTER – VIII

Code	Subject	CR.	Hrs. /Week			Exam Hrs.	Maximum Marks				
			L	T	P		MS1	MS2	END TERM	IA	Total
8BTCE01	Project Planning and Construction Management	3	3	1	0	3	20	20	80	30	150
8BTCE02	Waste And By Product Utilization	3	3	1	0	3	20	20	80	30	150
Practicals & Sessionals											
Code	Subject	CR.	Hrs. /Week			Exam Hrs.	IA(60%)		EA (40%)	Total	
			L	T	P		MP1* 30%	MP2* 30%	Pr. W 40%		
8BTCE03	Project Planning and Construction Management lab	2	0	0	2	3	30	30	40	100	
8BTCE04	Pavement Design	2	0	0	2	3	30	30	40	100	
8BTCE05	Project	4	0	0	2	0	-	-	-	200	
8BTCE06	Social Outreach, Discipline & Extra Curricular Activities	8	0	0	4	0	-	-	-	100	
	GRAND TOTAL	30	11	05	10					800	

SEMESTER –I

101EngineeringMathematics-I

SN	CONTENTS	Hours
1	**Calculus:** Improper integrals (Beta and Gamma functions) and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	8
2	**SequencesandSeries:** Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.	6
3	**FourierSeries:** Periodic functions, Fourier series, Euler's formula, Change of intervals,Half range sine and cosine series, Parseval's theorem.	6
4	**MultivariableCalculus(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.	10
5	**MultivariableCalculus(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.	10
	TOTAL	**40**

SN	CONTENTS	Hours
1	**WaveOptics:** 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.	9
2	**QuantumMechanics:** Introduction to quantum Mechanics, Wave-particle duality, Matter waves, Wave function and basic postulates, Time dependent and time independent Schrodinger's Wave Equation, Physical interpretation of wave function and its properties, Applications of the Schrodinger's Equation: Particle in one dimensional and three dimensional boxes.	6
3	**CoherenceandOpticalFibers:** 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.	4
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.	6
5	**MaterialScience&SemiconductorPhysics:** 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.	7
6	**IntroductiontoElectromagnetism:** 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 Poynting vector.	8
	TOTAL	**40**

103: Communication Skills

SN	CONTENTS	Hours
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.	7
2	**Grammar:** Passive Voice. Reported Speech. Conditional Sentences. Modal Verbs. Linking Words (Conjunctions)	7
3	**Composition:** Job Application and Curriculum-Vitae Writing. Business Letter Writing. Paragraph Writing. Report Writing.	7
4	**ShortStories:** "Luncheon" by Somerset Maugham."How Much Land Does a Man Need?" by Count Leo Tolstoy. "The Night Train at Deoli" by Ruskin Bond.	7
5	**Poems:** "No Men are Foreign" by James Kirkup. "If" by Rudyard Kipling. "Where the Mind is without Fear" by Rabindranath Tagore.	75
	TOTAL	**35**

104: Programming for Problem Solving

SN	CONTENTS	Hours
1	**FundamentalsofComputer:** 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.	**12**
2	**Numbersystem:** 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.	**12**
3	**CProgramming:** 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.	**12**
	TOTAL	**36**

105: Basic Electrical Engineering

SN	CONTENTS	Hours
1	**DCCircuits:** 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.	**8**
2	**ACCircuits:** 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.	**8**
3	**Transformers:** Ideal and practical transformer, EMF equation, equivalent circuit, losses in transformers, regulation and efficiency.	**6**
4	**ElectricalMachines:** 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.	**6**
5	**PowerConverters:** 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.	**6**
6	**ElectricalInstallations:** Layout of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, Type of earthing. Power measurement, elementary calculations for energy consumption.	**6**
	TOTAL	**40**

106:EngineeringPhysicsLab

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 fibre.
10. To study the Hall Effect and determine the Hall Voltage and Hall coefficients.

107:LanguageLab

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

108:ComputerProgrammingLab

1. To learn about the C Library, Preprocessor 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
12 Programs to input data through Command line argument

109:BasicElectricalEngineeringLab

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.

6. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

110: ComputerAidedEngineeringGraphics Lab

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.

ProjectionsofPoint&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).

ProjectionofPlanes: 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.

ProjectionsofRegularSolids: frustum and truncated solids, those inclined to both the Planes-Auxiliary Views.

SectionofSolids: 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)

OverviewofComputerGraphics: 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.

201: Engineering Mathematics-II

SN	CONTENTS	Hours

1	**Matrices:** Rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.	**10**
2	**Firstorderordinarydifferentialequations:** 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.	**6**
3	**Ordinarydifferentialequationsofhigherorders:** 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.	**12**
4	**PartialDifferentialEquations–Firstorder:** 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.	**6**
5	**PartialDifferentialEquations–Higherorder:** 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.	**6**
	TOTAL	**40**

202 : Engineering

Chemistry

SN	CONTENTS	Hours
1	**Water:** Common impurities, hardness, determination of hardness by complexometric (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.	**10**
2	**OrganicFuels:** 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.	**10**
3	**Corrosionanditscontrol:** 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.	**3**
4	**EngineeringMaterials:** Portland Cement; Definition, Manufacturing by Rotary kiln. Chemistry of setting and hardening of cement. Role of Gypsum. Glass: Definition, Manufacturing by tank furnace, significance of 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 fire point, cloud and pour point.	**10**
5	**Organicreactionmechanismandintroductionofdrugs:** 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	**7**

TOTAL	**40**

203: Human Values

SN	CONTENTS	Hours
1	**CourseIntroduction-Need,BasicGuidelines,ContentandProcessforValueEducation** 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	5
2	**UnderstandingHarmonyintheHumanBeing-HarmonyinMyself** 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.	5
3	**UnderstandingHarmonyintheFamilyandSociety-HarmonyinHuman-HumanRelationship** 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.	5
4	**UnderstandingHarmonyintheNatureandExistence-WholeexistenceasCoexistence** 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	5

5	**ImplicationsoftheaboveHolisticUnderstandingofHarmonyonProfessionalEthics.Naturalacceptanceofhumanvalues** 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: At the level of individual: as socially and ecologically responsible engineers, technologists and managers. Case studies related to values in professional life and individual life.	**5**
	TOTAL	**25**

204: Basic Mechanical Engineering

SN	CONTENTS	Hours
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.	7
2	**PumpsandICEngines:** 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.	7
3	**RefrigerationandAirConditioning:** Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration and Air-conditioning.	7
4	**TransmissionofPower:** Introduction and types of Belt and Rope Drives, Gears.	7

5	**PrimaryManufacturingProcesses:** Metal Casting Process: Introduction to Casting Process, Patterns, Molding, Furnaces. Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing. Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering.	**7**
6	**EngineeringMaterialsandHeatTreatmentofSteel:** Introduction to various engineering materials and their properties.	**5**
TOTAL		**40**

205: Basic Civil Engineering

SN	CONTENTS	Hours
1	**Introductiontoobjective,scopeandoutcomethesubject**	
2	**Introduction:** Scope and Specialization of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.	**8**
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. Levelling: Instrument used, Object of levelling, Methods of levelling in brief, Contour maps.	**8**
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.	**8**
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.	**8**

6	**EnvironmentalEngineering:** 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-systemsWater 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	**8**
	TOTAL	**40**

206: Engineering Chemistry Lab

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
10. Synthesis of Aspirin/ Paracetamol

207: Human Values Activities Lab

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 technogenic 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 fulfillment 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:

list down all your important desires. Observe whether the desire is related to Self (I) or the Body. If it appears to be related to both, visualize which part of it is related to Self (I) and which part is related to Body.

PS 5:

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

PS6:

1. Chalk out some programs towards ensuring your harmony with the body - in terms of nurturing, protection and right utilization of the body.

2. Find out the plants and shrubs growing in and around your campus, which can be useful in curing common diseases.

PS7:

Form small groups in the class and make them carry out a dialogue focusing on the following eight questions related to 'TRUST';

1a. Do I want to make myself happy? 2a. Do I want to make the other happy?

3a. Does the other want to make himself/herself happy? 4a. Does the other want to make me happy?

What is the answer?

Intention (Natural Acceptance)

1b. Am I able to always make myself happy? 2b. Am I able to always make the other happy?

3b. Is the other able to always make himself/herself happy? What is the answer?

Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate yourself and others on the basis of intention/competence.

PS8:

1. Observe, on how many occasions, you are able to respect your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.
2. Also, observe whether your feeling of respect is based on treating the other as you would treat yourself or on differentiations based on body, physical facilities or belieds.

PS9:

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 balues in a difficult situation.

PS10:

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.

PS11:

Make a chart to show the whole existence as co-existence. With the help of this chart try to identify the role and the scope of some of the courses of your study. Also indicate the areas which are being either over-emphasized or ignored in the present context.

PS12:

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

PS 13:

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.

PS 14:

The course is going to be over now. It is time to evaluate what difference in your thinking it has made. Summarize the core massage of this course grasped by you. How has this affected you in terms of;

a. Thought
b. Behavior
c. Work and

d. Relization

What practical steps are you able to visualize for the transition of the society from its present state.

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.

208: Manufacturing Practices Workshop

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

209: Basic Civil Engineering Lab

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 linesusing 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.

210:Computer Aided Machine Drawing Lab

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.

SUNRISE UNIVERSITY ,ALWAR

CIVIL ENGINEERING DEPARTMENT
2ND YEAR

SEMESTER – III		
3BTCE01: Advance Engineering Mathematics-I		40hr
UNIT- I	**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.	10hr
UNIT-II	**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.	8hr
UNIT-III	**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.	10hr
UNIT-IV	**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).	7hr
UNIT-V	**Z-Transform:** Definition, properties and formulae, Convolution theorem, inverse Z-transform, application of Z-transform to difference equation.	5hr
	Text Book: 1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers. 2. Devi Prasad, An introduction to Numerical Analysis, Narosa Publication house. 3. J.N. Kapur, Mathematical Statistics, S. Chand & company Ltd. **Reference Book**: 1. Peter V. O'Neil, Advance Engineering Mathematics Thomson. 2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya.	

3BTCE02: Engineering Geology		28 hr
UNIT-I	**Introduction to objective, scope and outcome of the course.**	1hr
UNIT-II	**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.	6hr
UNIT-III	**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.	6hr
UNIT-IV	**Structural Geology:** Causes, Terminology, Classification, Recognition, Effects and Engineering consideration of Fold, Fault, Joints and Unconformities.	5hr
UNIT-V	**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.	6hr
UNIT-VI	**Remote Sensing & GIS:** Application of Remote Sensing and GIS in Various fields of Civil Engineering.	4hr
	Text Book: 1. Structural Geology by Billings. 2. Engineering Geology by Prabin Singh. 3. Petrology by Tyrll. **Reference Book**: 1. B S Sathya narayanswami, " Engineering Geology", Dhanpat Rai 2. Leggot, R.F : Geology and Engineering, McGraw Hill.	

3BTCE03: Engineering Mechanics		28hr
UNIT-I	**Introduction: objective, scope and outcome of the course.**	1hr
UNIT-II	**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.	4hr
UNIT-III	**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.	4hr
UNIT-IV	**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.	4hr
UNIT-V	**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	4hr
UNIT-VI	**Friction:** Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction	2hr
UNIT-VII	**Springs**: Stiffness of springs, springs in series and parallel, Introduction to laminated plate springs, leaf spring, close coiled helical springs, open coiled springs	2hr
UNIT-VIII	**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	7hr

3BTCE04: Surveying		42hr
UNIT-I	**Introduction: objective, scope and outcome of the course**	1hr
UNIT-II	**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	14hr
UNIT-III	**LEVELLING:** Measurements of elevations methods of levelling; direct/differential, Indirect/Trigonometrical, and Profile/Cross sectional levelling. Digital and Auto level, Errors in levelling, contours and contour lines; methods of contouring; direct and indirect, characteristics, uses, area and vol. measurements	8hr
UNIT-IV	**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	5hr
UNIT –V	**TACHEOMETRY AND PHOTOGRAMMETRY SURVEYING:** Advantages of tacheometric surveying, different systems of tacheometric measurements, Stadia system of tacheometry, distance elevation formulae for horizontal sights. Determination of tacheometric 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 Photogrammetry, flight planning.	8hr
UNIT –VI	**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.	6hr

3BTCE05: Fluid Mechanics		
UNIT –I	**Introduction to objective, scope and outcome of the course**	1hr
UNIT –II	**Fluids**: Definition, Type of fluids, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids	1hr
UNIT –III	**Properties of Fluids:** Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity	2hr
UNIT –IV	**Principles of Fluid Statics**: Basic equations, Pascal Law, Type of pressure:-atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, manometers, Bourdon pressure gauge	3hr
UNIT –V	**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	3hr
UNIT –VI	**Kinematics of Flow**: Visualisation 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	6hr
UNIT –VII	**Fluid Dynamics**: Control volume approach, Euler's equation, Bernoulli's equation and its applications, venture-meter, orificemeter, orifices & mouthpieces, time of emptying of tanks by orifices, momentum and angular momentum equations and their applications, pressure on flat plates and nozzles.	6hr
UNIT –VIII	**Laminar Flow through Pipes**: Laminar flow 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	6hr
	Text Book: 1. Fluid Mechanics by A.K. Jain. 2. Fluid Mechanics by Victor L. Streeter & E. Benjamin Wylie. 3. Fluid Mechanics by P.N. Modi& S.M. Seth. **Reference Book**: 1. Fluid Mechanics by K.R. Arora. 2. Introduction to fluid Mechanics by I.E.A. John & W.C. Haberman	

3BTCE06: Building Material & Construction		42hr
UNIT –I	**Introduction to objective, scope and outcome of the course**	1hr
UNIT –II	**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	8hr
UNIT–III	**Timber & Steel:** Timber: Definitions of related terms, Classifications and Properties, Defects in Conversion of wood, Seasoning wood, Preservation, Fire proofing, Ply woods, Fibre boards; Steel: Mild steel and HYSD steel, Properties and their use, common tests on steel.	3hr
UNIT-IV	**Mortarand Plaster:** Mortar preparation methods**:** Functions and tests & their uses in various types of pointing & plastering	2hr
UNIT –V	**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.	4hr
UNIT –VI	**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.	7hr
UNIT –VII	**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	5hr

	scaffolding	
UNIT –VIII	**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.	3hr
UNIT –IX	**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.	3hr
UNIT –X	**Stairs:** Terms used, requirements of good staircase, classification, construction details and suitability of different types of stairs, Lifts and Ramps.	2hr
UNIT –XI	**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.	4hr
	. **Text Book**: 1. B. C. Punmia, Building Construction, Laxmi Publication. 2. P. C. Varghese, Building Materials, Prentice Hall of India. 3. S. K. Duggal, Building Materials, New Age International Pvt. Ltd **Reference Book**: 1. D. S. Arora, Text book of Engineering materials, Kalyani publication. 2. D. N. Ghose, Material of Construction, Tata McGraw Hill.	

3BTCE07: Surveying Lab

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 trigonometriclevelling:
   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.

3BTCE08: Fluid Mechanics Lab

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.

3BTCE9: Civil Engineering Material Lab

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 Aluminum 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

3BTCE10: Geology Lab

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.)

SUNRISE UNIVERSITY ,ALWAR
CIVIL ENGINEERING DEPARTMENT
2ND YEAR
SEMESTER - IV

4BTCE01: Strength of Materials		42hr
UNIT-I	**Introduction:** to objective, scope and outcome of the subject	1hr
UNIT-II	**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.	5hr
UNIT-III	**Compound Stress:** Two dimensional stress system: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle &its application. Introduction to theories of failures.	6hr
UNIT-IV	**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.	8hr
UNIT-V	**Theory of simple bending**: Distribution of bending and shear stresses for simple and composite sections, Combined direct and bending stress,	8hr
UNIT-VI	**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.	6hr
UNIT-VII	**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.	4hr
UNIT-VIII	**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.	5hr

	Text Book: 1. E. P. Popov, Engineering Mechanics of Solids, Prentice hall of India Pvt. Ltd. 2. S. P. Timoshenko and D. H. Young, Elements of Strength of Materials. 3. Strength of materials by B.C.Punamia. **Reference Book**: 1. H. Shames, Introduction to Solid Mechanics, Prentice hall of India Pvt. 2. Strength of materials by Ramamurtham.	

4BTCE02: Concrete Technology		38hr
	Introduction to objective, scope and outcome of the subject	
UNIT-I	**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 and its significance. **Aggregates:** types, physical properties and Standard methods for their determination.	
	Concrete : Grade of concrete, proportioning of ingredients, water content and its quality for concrete, 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.	7hr
UNIT-II	**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, maturity concept.	
	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.	8hr
UNIT-III	**Concrete Handling in Field:** Batching, mixing, placing and transportation of concrete, equipment's for material handling, various methods their Suitability and precautions. Compaction of concrete: methods &Equipment's. Curing of concrete: various methods their suitability. Durability Of concrete.	6hr
UNIT-IV	Concrete mix deign (ACI, IS method), quality control for concrete.	
	Admixture in concrete: Chemical and mineral admixtures, their types and uses: water reducers, accelerator, retarders, water-proofing plasticizers, super Plasticizers, air-entraining agents. Use of fly ash and silica fume in concrete, Their properties and effect.	9hr
UNIT-V	**Form work:** Requirements, their types and codal guidelines for the design. Typical formworks and shuttering/centering for Columns, beams, slabs, Walls, arches and staircase. Slip and moving formwork.	
	Special types of concrete: Introduction to high strength concrete, high performance concrete, sulphate resisting concrete, under water concreting, self-compacting concrete, pumpable concrete: their salient properties and Application.	8hr
	Text Book: 1. M. Neville, J. J. Brooks, Concrete Technology. 2. R. Santhakumar, Concrete Technology. 3. Reinforced Concrete Design by P. Dayaratnam. **Reference Book**: 1.M. S. Shetty, Concrete technology- Theory & Practice. 2. M. L. Gambhir, Concrete Technology.	

4BTCE03: Hydraulic Engineering		42hr
UNIT-I	**Introduction:** to scope, objective and outcome of subject	
UNIT-II	**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	1hr
UNIT-III	**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.	4hr
UNIT-IV	**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 ndistribution in open channels.	5hr
UNIT-V	**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	4hr
UNIT-VI	**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	4hr
UNIT-VII	**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	3hr
UNIT-VIII	**Hydrology:** Definition, Hydrologic cycle, Application to Engineering problems, measurement ofrainfall, rain gauge, peak flow, flood frequency method, catchment area formulae, Floodhydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination,Estimation of run off.	8hr
UNIT-IX	**Ground Water**: Aquifers and its types, Confined and unconfined aquifer, Darcy's Law, hydraulic conductivity, transmissivity, well hydraulics.	3hr
UNIT-X	**Canal Hydraulics:** Types of canals, parts of canal irrigation system, channel alignment,assessment of water requirements, estimation of channel losses, design of channels, regime andsemi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross	4hr

	section of channels, siltcontrol in canals.	
	Text Book: 1. S. K. Som and G. Biswas, Fluid Mechanics and Fluid Machines, Tata. McGraw Hill Publishing. 2. R. J. Garde and A. C. Mirajgaokar, Engineering Fluid Mechanics, Scitech Publications India Ltd. 3. S. R. Rutham, Hydraulic Fluid Mechanics and Fluid Machines, DhanpatRai Publishing. **Reference Book**: 1. K. C. Patra, Engineering Fluid Mechanics and Hydraulic Machines, Narosa Publishing House. 2. R. K. Rajput, Fluid Mechanics & Hydraulic Machines, S. Chand & Company td. 3. Fluid Mechanics and hydraulic machines by R.K. Bansal.	

4BTCE04: Building Planning		28hr
		1hr
UNIT-I	**Introduction:** to scope, objective and outcome of subject	1hr
UNIT-II	**Introduction**: Types of buildings, criteria for location and site selection, site plan and its detail.	2hr
UNIT-III	**Sun Consideration :** Different methods of drawing sun chart, sun shading devices, design of louvers	3hr
UNIT-IV	**Climatic and comfort Consideration**: Elements of climate, global climate, climatic zones of India, thermal comfort, bioclimatic chart	3hr
UNIT-V	**Orientation:** Meaning, factors affecting orientation, orientation criteria for tropical climate.	1hr
UNIT-VI	**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.	3hr
UNIT-VII	**Principles of Planning:** Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc.	3hr
UNIT-VIII	**Vastu Shasta In Modern Building planning:** Factors considered in Vastu, site selection, orientation, planning and design of residential buildings, school/hospital	3hr
UNIT-IX	**Functional Design And Accommodation Requirements Of Non Residential Buildings:** viz-school buildings, rest house, primary health centers, post office etc.	3hr
UNIT-X	**Services in Buildings** (A) Lighting and ventilation, doors and windows, lifts. (B) Acoustics, sound insulation and noise control. (C) Fire fighting provisions	6hr

4BTCE05: Advance Engineering Mathematics=II		26hr
		1hr
UNIT-I	**Introduction:** Objective, scope and outcome of the course.	7hr
UNIT-II	**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	13hr
UNIT-III	**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.	12hr

4BTCE06: Basic Electronics for Civil Engineering Applications		28hr
UNIT-I	**Introduction:** to objective, scope and outcome of the subject	1hr
UNIT-II	**Basic Electronics**: Number systems & Their conversion used in digital electronics, Demorgan's theorem, Logic Gates, half and full adder circuits, R-S flip flop, J-K flip flop.	2hr
UNIT-III	Introduction to Semiconductors, Diodes, V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations.	3hr
UNIT-IV	**Instrumentation**: mechanical, electrical, electronic system and their Calibration, Use of automatic and digital levels, electronic theodolites, total stations; Control surveys using GNSS, Total station and traversing methods (adjustment and computations of coordinates).	4hr
UNIT-V	**Measurement errors**: Gross error and systematic errors, absolute and relative errors, accuracy, precision, resolution and significant figures. Full-field measurements	2hr
UNIT-VI	**Data acquisition system and data processing**: analog systems, digital systems using personal computers, dynamic measurement, numerical and graphical data processing and archiving.	3hr
UNIT-VII	**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	5hr
UNIT-VIII	**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.	5hr
UNIT-IX	**Digital Image Processing**: Digital image, introduction to digital image processing, pre-processing, enhancement, classification, accuracy assessment.	3hr

4BTCE07: Material Testing Lab.	
	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
4BTCE08: Hydraulic Engineering Lab	
	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.
4BTCE09: Building Drawing Lab.	
	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 Center 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
4BTCE10: Advanced Surveying Lab.	
	List of Experiments 1. To measure the horizontal and vertical angles by Theodolite. 2. To determine the Height of an object by trigonometric leveling (Instruments in same vertical plane). 3. To determine the Height of an object by trigonometric leveling (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

4BTCE11: Concrete Lab	
	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 I S 10262. 10. To design concrete mix of M-40 grade with super plasticizer in accordance with I S 10262.

	11. To determine the Permeability of Concrete. 12. Study of Core cutter, UPV & Rebound Hammer equipment.

SEMESTER - V		
5BTCE01: Construction Technology and Equipment (Cr, L:T:P:-3,3:1:0)		**36hr**
	Objective: To understand the scope and outcome of construction technology.To get proper knowledge about Safety in construction and Safety measure.To explore the Need of construction planning and its Management.	
UNIT-I	**Introduction:** Objective, scope and outcome of the course.**Engineering Economy:** Principle of Engineering Economy, Minimum cost point analysis,Breakeven point analysis, Depreciation and depletion	8hr
UNIT-II	**Safety in construction:** Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report,	8hr
UNIT-III	**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 safetyprovisions as per NBC.	8hr
UNIT-IV	**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	6hr
UNIT-V	**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 Tunnelling Equipment; Pile Driving Equipment	6hr

5BTCE02: Structure Analysis-I **(Cr, L:T:P:-3,3:1:0)**		38hr
	Objective: To know the structural vibration and Simple Harmonic Motion.To understand the scope and outcome of Structure Analysis.To analyze Indeterminate Structures. .	
UNIT-I	Introduction: Objective, scope and outcome of the course. 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.	8hr
UNIT-II	Analysis of prop cantilever structures, Analysis of Indeterminate Structure (fixed and continues beams) using Area moment method.	8hr
UNIT-III	Analysis of Indeterminate Structure (fixed and continues beams) using Conjugate beam method, Three moments Theorem.	8hr
UNIT-IV	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	6hr
UNIT-V	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 Almbert‟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.	8hr

5BTCE03: Design of Concrete Structures –I (Cr, L:T:P:-3,3:1:0)		38hr
	Objective: To understand the scope and outcome of the Concrete Structures. To evaluate the role of the Limit state of serviceability for deflection and collapse in shear. To assess the structural behavior of concrete structures.	
UNIT-I	**Introduction:** Objective, scope and outcome of the course 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. **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.	8hr
UNIT-II	**Limit state of serviceability for deflection:** control of deflection as per codal provisions ofempirical coefficients. **Limit state of collapse in shear:** Types of shear reinforcement and its detailing, analysis anddesign of shear reinforcement for prismatic sections. Limit state of collapse in bond: concept of bond stress, anchorage length and developmentlength. Detailing and curtailment of reinforcement as per codal provisions.	6hr
UNIT-III	**Slabs:** Analysis and design of one way and two way slabs using LSM, Detailing ofreinforcement. Check for shear and deflection.	8hr
UNIT-IV	**Columns:** Short and long columns, their structural behaviour. 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.	8hr
UNIT-V	**Footings:** Analysis and design of Isolated column footing for axial load. Introduction tocombined footing for two columns (without central beam) for axial loads using LSM. **Torsion:** Analysis and Design of beams for torsion as per codal method.	8hr

5BTCE04: Geotechnical Engineering **(C-3, (Cr, L:T:P:-3,3:1:0)**		38hr
	Objective: To understand the scope and outcome of the Geotechnical Engineering.To solve Compressibility and Consolidation of soil.To analyze the Bearing Capacity of Soils.	
UNIT-I	**Introduction:** Objective, scope and outcome of the course. 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.	6hr
UNIT-II	Mohr‟s circle of stress, shearing strength of soil, parameters of shear strength, Coulomb‟s failureenvelope, 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,	8hr
UNIT-III	**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, coefficient 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.	8hr
UNIT-IV	**Stability of Slopes:** Classifications of slopes, Stability analysis of infinite slopes. Stability of finite slopes by Swedish and Friction circle method.	8hr

	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.	
UNIT-V	**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, Number of boreholes, Undisturbed and Disturbed samples. Types of samplers. Brief description of procedures of sampling, Transportation and Storage of samples.	8hr

5BTCE05: Town Planning **(Cr, L:T:P:-3,3:1:0)**		36hr
	Objective: To understand the scope and outcome of the Town Planning.To study the Civic Surveys and Zoning.To get the knowledge about Public Buildings and Re-planning of existing towns.	
UNIT-I	Introduction: Objective, scope and outcome of the course. 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	8hr
UNIT-II	Civic Surveys: Definition, Necessity, collection of data, Types of surveys, methods adopted to collect data, Drawings, reports. Zoning: Definition, Use of land, Objects of zoning, Principles of zoning, Aspects, Advantages & Importance zoning, Transition zone, Zoning powers, Maps for zoning	8hr
UNIT-III	Importance and Demand of housing, Classification, requirements and design of residential building, Housing agencies, Housing problems in India. Slums: Causes, characteristics and effects of slums, Slum clearance.	6hr
UNIT-IV	Industries: Classification of industry, Concentration of industry, requirements of the industry,Industrial townships. Public Buildings: Location, classification principle of design, town center, grouping of publicbuildings. Town Planning, CL-SPP/CL-DDU/Nadiad, Gujarat, INDIA 4	6hr
UNIT-V	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 conceptoverview. .	8hr

5BTCE06: **Repair and Rehabilitation of Structures**		30hr
Objective: To understand the scope and outcome of the Repair and Rehabilitation of Structures.To know the Factors affecting and Preventive measures and Cracks in Concrete and MasonryStructures.To know the Materials for Repair and Under Water Repair.		
UNIT-I	**Introduction:** Objective, scope and outcome of the course. **Deterioration of Concrete Structures:** Penetrability of concrete permeability, sorptivity, diffusion. Physical processes- abrasion, erosion. Chemical- carbonation, chloride and sulfateattack. Alkali – Aggregate Reaction. Corrosion- mechanism.	6hr
UNIT-II	**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. **Cracks in Concrete and Masonry Structures**- Types, patterns, measurement and preventivemeasures	6hr
UNIT-III	**Assessment of Risk/Damage in Structures:** Preliminary investigation-visual, history collectionetc. 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.	6hr
UNIT-IV	**Materials for Repair:** polymers and resins, self curing compounds, FRP, ferro-cement-properties, selection criterion, cement based and polymer modified mortars etc **Repair Techniques:** Grouting, Jacketing, External bonded plates processes, limitations, designcomputations etc. including numerical problems.	6hr
UNIT-V	**Under Water Repair:** Processes **Case Studies:** related to rehabilitation of bridge piers, heritage structures, masonry structuresetc.	6hr

5BTCE07: Concrete Structures Design Lab

(Cr, L:T:P:-2,0:0:2)

	Objective: To understand the design procedures of Concrete Structures.To Analyze and Design different beams, slabs and footings.
	1. Revision of Typical problems of BMD and SFD 2 .Analysis and Design of singly reinforced rectangular beam section for flexure, based onWorking stress design philosophy. 3. Analysis and Design of singly reinforced rectangular beam section for flexure, based on LimitState design philosophy. 4 .Analysis and Design of doubly reinforced rectangular beam section for flexure, based on LimitState design philosophy. 5.Analysis and Design of flanged beam section for flexure, based on Limit State designphilosophy Problems on Limit state of serviceability for deflection as per codal provisions of empiricalcoefficients. 6.Analysis and design of prismatic sections for shear using LSD. 7.Problems on limit state of collapse in bond. 8.Analysis and design of one way slabs using LSM. 9.Analysis and design of two way slabs using LSM. 10.Analysis and design of short axially loaded columns. 11.Analysis and design of footing. 12.Analysis and Design of beams for torsion as per codal method. .
5BTCE08: Geotechnical Engineering Lab **(Cr, L:T:P:-2,0:0:2)**	
	Objective: To study the soil and its engineering properties. To determine different tests on soil.
	1. Grain size distribution by sieve Analysis and Hydrometer2 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 TestApparatus and Triaxial Test. To determine the differential free swell index of soil and swelling pressure of soil. To determine the CBR of soil.

	To determine the compressibility parameters of soil by consolidation test. To determine the permeability of soil by constant and falling head methods. Design as persyllabus of theory.

5BTCE09: Water Resources Engineering Design Lab

(Cr, L:T:P:-2,0:0:2)

	Objective: To understand the scope and outcome of Water Resource Engineering. To study the Canal Irrigation. Embankment Dams and Well Irrigation.To evaluate Hydrologic cycle and measurement of rainfall.
	To establish steady uniform flow conditions in the Laboratory flume and to determineChezy‟s coefficient “C” and Manning‟s Coefficient “n”. To investigate the relationship between E & Y in a rectangular channel. To study the flow characteristics over a hump/weir. To study the characteristics of hydraulic jump developed in the laboratory flume.

5BTCE10: Industrial Training

(Cr, L:T:P:-2,0:0:2)

	Objective: To acquire and apply fundamental principles of engineering.To identify, formulate and present model problems.To identify, formulate and model problems and find engineering solution based on asystems approach.

SEMESTER - VI		
6BTCE01: Structural Analysis-II **(Cr, L:T:P:-3,3:1:0)**		36hr
	Objective: To understand the scope and outcome of the Structural Analysis. To solve problems using different methods like Unit load method and Energy Methods.To analyze of multistory frames and space trusses.	
UNIT-I	**Introduction:** Objective, scope and outcome of the course. **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.	8hr
UNIT-II	**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.	6hr
UNIT-III	**Arches:** analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels.	6hr
UNIT-IV	**Unsymmetrical bending:** Definition, location of NA, computation of stresses and deflection, shear centre and its location,	8hr
UNIT-V	**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	8hr

6BTCE02: Environmental Engineering **I (Cr, L:T:P:-3,3:1:0)**		38hr
	Objective: To understand the scope and outcome of Environmental Engineering.To analyze Water Treatment and Sewage.To evaluate the composition and properties of air and noise.	
UNIT-I	**Introduction:** Objective, scope and outcome of the course. 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.	8hr
UNIT-II	Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.	6hr
UNIT-III	**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, Standards of disposal into natural watercourses and on land, Indian standards.	8hr
UNIT-IV	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.	8hr
UNIT-V	**Air** -Composition and properties of air, Quantification of air pollutants, Monitoring of airpollutants, Air quality standards, Control measures for Air pollution **Noise**-Basic concept, measurement and various control methods Urban Roads and their role in economic developments.	8hr

6BTCE03: Design of Steel Structures (Cr, L:T:P:-3,3:1:0)		38hr
	Objective: To understand the scope and outcome of the Steel Structures.to solve problems related to Connections, Tension Members, Compression Members, etc.To evaluate solutions for different type of steel structures.	
UNIT-I	**Introduction:** Objective, scope and outcome of the course. 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 Plastic analysis of steel structures, fundamentals, shape factor,static and mechanism method of analysis, bending of beams of uniform cross sections (any shape) **Connections:** Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings with IS provisions	8hr
UNIT-II	**Tension Members:** Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded members. **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.	6hr
UNIT-III	**Beams:** Design of beams: simple and compound sections. Design of laterally supported andunsupported beams including for web buckling, web crippling, lateral torsional buckling. **Member design under combined forces:** Compressive load and uniaxial moment. tension anduniaxial moment **Column Bases:** Design of column bases for axial and eccentric compressive loads: Slab andgusseted base.	8hr
UNIT-IV	**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.	8hr

UNIT-V	**Design of gantry girder** Design of roof trusses members for combined forces, wind loading etc. Purlin design.Introduction to Pre Engineered Buildings , characteristics and their applications. Introduction of truss girder bridges-its members including portal and sway bracings etc. Designaspects of foot over bridges.	8hr

6BTCE04: Estimating & Costing **(Cr, L:T:P:-3,3:1:0)**		36hr
	Objective: Impart the knowledge of estimating, costing and valuation for civil engineering structures.Prepare and evaluate contract documents.Identify and differentiate between the two types of estimate.	
UNIT-I	Introduction: Purpose and importance of estimates, principles of estimating, Methods of taking out quantities of items of work, Mode of measurement, measurement sheet and abstract sheet; bill of quantities, Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.	6hr
UNIT-II	Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work, Current schedule of rates. (C.S.R.)	8hr
UNIT-III	Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works and earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.	8hr
UNIT-IV	Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.	8hr
UNIT-V	Valuation: Purposes, depreciation, sinking fund, scrap value, year‟s purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.	6hr
	Reference Books Recommended: 1.“Estimating and Costing” by B. N. Dutta, UBS Publisher. 2.“Estimating and Costing” by Rangwala, Charotar Publishing House.	

6BTCE05: Pre-Stressed Concrete **Cr, L:T:P:-2,2:1:0)**		26hr
	Objective: To understand the scope and outcome of the Pre-Stressed Concrete.To analyze of Pre-stress and Bending Stresses.To evaluate losses, deflection and design of Pre-stressed Concrete Members.	
UNIT-I	**Introduction:** Objective, scope and outcome of the course. **Introduction:** Basic concepts of Pre-stressing and its advantages. Materials for pre-stressed concrete. Tensioning devices. Pretensioning and post tensioning systems.	6hr
UNIT-II	**Introduction:** Objective, scope and outcome of the course. **Introduction:** Basic concepts of Pre-stressing and its advantages. Materials for pre-stressed concrete. Tensioning devices. Pretensioning and post tensioning systems.	6hr
UNIT-III	**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.	4hr
UNIT-IV	**Deflection of Pre-stressed Concrete Members:** Effect of tendon profile and associated factors incontinuous members. Computation of deflection in pre-stressed concrete members.	4hr
UNIT-V	**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	6hr

6BTCE 6- **Bridge Engineering**		32hr
Objective:-To understand the scope and outcome of the Bridge Engineering.To design steel bridges using Codes and IRC loading.To study different types of structures like slab culvert ,T-beam bridges , slab bridges andgirder bridges.		
UNIT-I	**Introduction:** Objective, scope and outcome of the course. **Introduction:** Type of bridges & classification of road & railways bridges. IRC & Railwayloadings for bridges, wind load & Earthquake forces. : Expansion joints.	6hr
UNIT-II	**Steel bridges**: Introduction to Design of through type & deck type steel bridges for IRC loading.Design of through type truss bridges for railway loadings.	6hr
UNIT-III	**Reinforced concrete culverts:** Reinforced concrete slab culvert	6hr
UNIT-IV	**Reinforced concrete bridges:** T-beam bridges-courbons & Hendry-Jaegar methods.	8hr
UNIT-V	**Bearings**: Bearings for slab bridges and girder bridges. Elastomeric bearings, design concepts asper IRC 83 (Part II).	6hr

6BTCE07: Environmental Engineering Design and Lab

(Cr, L:T:P:-2,0:0:02)

Objective: To understand the Population forecasting and Water Quality parameters.To examine Physical, chemical and biological Characterization of water.

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 units

6BTCE08: **Steel Structures Design Lab**

(Cr, L:T:P:-2,0:0:02)

Objective:- To understand the scope and outcome of the Steel Structures.To solve problems related to Connections, Tension Members, Compression Members, etc.To evaluate solutions for different type of steel structures.

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 :1000).
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).

6BTCE09: **Quantity Surveying and Valuation Lab**

(Cr, L:T:P:-2,0:0:02)

Objective: :- To understand the scope and outcome of the Quantity Surveying and Valuation.To solve problems of Preliminary, Detailed Estimate and Rate Analysis of buildings.To evaluate solutions related to Earthwork Calculation and Valuation of Buildings andProperties.

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.

6BTCE10: **Water and Earth Retaining Structures Design Lab**

(Cr, L:T:P:-2,0:0:02)

Objective: To understand the scope and outcome of the Water and Earth Retaining Structures design.To analyze and design continuous beams, Circular domes, etc.

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:** Analysisand design of Circular domes with u.d.l. & concentrated load atcrown.
4. **Water Tanks and Towers:** Water Tanks and Water Towers-design of rectangular, circularand Intze type tanks, column brace type staging.
5. **Retaining walls:** Analysis and design of Cantilever Retaining Walls: Introduction to counterfort and buttress type retaining walls, their structural behaviour and stability analysis.

	SEMESTER - VII	
7BTCE01: Transportation Engineering (Cr, L:T:P:-3,3:1:0)		36hr
	Objective: To understand the applications of Transportation Engineering.To study the Statistical Methods for Traffic Engineering.To know the Traffic Characteristics, Environment, Management and Road Safety.	
UNIT-I	**Introduction:** Objective, scope and outcome of the course Highway planning and alignment : Different modes of transportation – historical Development of road construction- HighwayDevelopment 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	8hr
UNIT-II	**Geometric Design of highways**: The highway crosses sectional elements- Camber- Sight Distance - Types of sight distances -Design of horizontal alignments - Super elevation, Wideningof Pavements on horizontal curves- transition Curves- Design of Vertical alignments – Gradients- summit and Valley Curves- Recommendations of IRC Codes of Practice. **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	8hr
UNIT-III	**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	6hr
UNIT-IV	**Design of flexible and rigid pavements as per IRC**: IRC provisions including those of IRC 37, IRC 58**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	6hr
UNIT-V	**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	8hr

	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. Railway Engineering by Saxena SC and Arora SP, Dhanpat Rai Publishers, Delhi. 4. S C Rangwala, airport engineering, Charotar publication house. 7 Gautam H. Oza, Dock&Harbour Engineering, Charotar publication House.	

(Cr, L:T:P:-3,3:1:0)	**7BTCE02: Human Engineering and Safety**	38hr
	Objective: Students would be able to To protect the comfort, health, safety and well-being of personnel To minimize the risk of design-induced human performance issues, which may lead to majorincidents, other adverse events, and reliability issues.	
UNIT-I	**Introduction:** Objective, scope and outcome of the course ,Human factors in system development – concept of systemsBasic processes in system development, performance reliability, humanperformance. Information input process	8hr
UNIT-II	Visual displays, majortypes and use of displays, auditory and factual displays.	8hr
UNIT-III	Measurement of energy, direct and indirect methods. Energy cost of different activities and Acceptable work load. Noise andvibration, its measurement and control.	6hr
UNIT-IV	**Anthropometry**: arrangement and utilization of work space,atmospheric conditions, heat exchange process and performance.	8hr
UNIT-V	Dangerous machine (Regulation) act, Rehabilitation andcompensation to accident victims, Safety gadgets for spraying,threshing, Chaff cutting and tractor & trailer operation etc.	8hr
	Text Book: 1. M. J. Hammer, Water and Wastewater Technology, Prentice Hall, 6th Edition, 2007. 2. H. S. Peavy, D. R. Rowe, George Tchobanoglous, Environmental Engineering. 3. S. K. Friedlander, Smoke, Dust and Haze: Fundamentals of Aerosol Dynamics. **Reference Book**: 1. Metcalf & Eddy Inc., G. Tchobanoglous, L. F. Burton, H. D. Stensel, 2. T. J. McGhee, E. W. Steel, Water Supply and Sewerage.	

7BTCE03*:* **Road Material Testing Lab** **(Cr, L:T:P:-3,3:1:0)**		
	Objective: To apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.To function on multi-disciplinary teams in the area of materials testing & Ability to use the techniques, skills and modern engineering tools necessary for engineering.To understand professional and ethical responsibility in the areas of material testing.To communicate effectively the mechanical properties of materials.	
	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	

7BTCE04: Professional Practices & Field Engineering Lab		
	Objective: Students would be able to To understand the Personal and professional development of a student through activities such as industry expert lectures, industrial visits, group discussions and seminars etc.	
	1. Different types of Knots 2. Site plan, index plan, layout plan, plinth area, and 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	

(Cr, L:T:P:-3,3:1:0)	**7BTCE05: Soft Skill Lab**	36hr
	Objective: Students would be able to To know the Soft Skills Laboratory course equips students with required skills such asinterpersonal skills, communication skills, leadership skills etc.To understand the aim of training undergraduate students on employability skills to win inthe job interviews and building confidence to handle professional tasks.	
	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 AnalysisGrid.	
	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.	
	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.	
	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,	
	IMPROVING PERCEPTION- Introduction, Understanding perception, perception and its application in organizations. **CAREER PLANNING** – Introduction, Tips for successful career planning, Goal Setting immediate, short term and long term, Strategies to achieve goals, Myths About choosing career. **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 **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. **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", HarperCollins E-books, London, 2007. 4 S.J. Petes, Francis, „Soft Skills and Professional Communication", Tata McGraw HillEducation, 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.	

7BTCE06 Environmental Monitoring and Design Lab **Cr,L:T:P:-3,3:1:0)**		
	Objective: Students would be able to To provide students with theoretical and practical knowledge in various chaptersof environmental monitoring.To get a better understanding of the importance and usefulness of environmentalmonitoring in environmental studies.	
	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 anaerobic digester.	
	5. **Sewer design and estimation** of Waste/Storm water by software.	
	1. Demonstration of air pollution monitoring instruments namely, High volume sampler 2. Determination of SPM, PM10andPM2.5. 3. Demonstration of noise pollution monitoring equipment namely, modular precision soundlevelmeter. 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	

7BTCE007 Practical Training		
	□ To acquire and apply fundamental principles of engineering. □ To update with all the latest changes in technological world. □ To identify, formulate and model problems and find engineering solution based on asystems approach.	

7BTCE08: Seminar **I (Cr, L:T:P:-2,0:0:2)**		
	□ Objective- To Awareness of how to use values in improving your own professionalism. □ To Learning about personal and communication styles for team building. □ To identify, formulate and present model problems. □ To Learning management of values.	

SEMESTER -VIII		
8BTCE01: Project Planning and Construction Management **Cr, L:T:P:-3,3:1:0)**		36hr
	Objective: To analyze professional decisions based on ethical principles. To analyze construction documents for planning and management of construction processes.To analyze methods, materials, and equipment used to construct projects.	
UNIT-I	**Introduction:** Objective, scope and outcome of the course **Financial Evaluation of Projects And ProjectPlanning:** 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.	6hr
UNIT-II	**Introduction:** Objective, scope and outcome of the course **Financial Evaluation of Projects And ProjectPlanning:** 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.	6hr
UNIT-III	**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.	8hr
UNIT-IV	**Contract Management:** Elements of tender operation, Types oftenders and contracts, Contract document, Legal aspects ofcontracts, Contract negotiation & award of work, breach of contract,determination of a contract, arbitration.	8hr

UNIT-V	**Safety and Other Aspects of Construction Management:** Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects.	8hr
	1. Construction Planning & management By P S Gahlot& B M Dhir, New AgeInternationalLimited Publishers. 2. Construction Project planning & Scheduling by Charles Patrick, Pearson,2012.. 3. Construction Project Management Theory & practice --- Kumar NeerajJha, Pearson, 2012 4. Modern construction management--Harris, Wiley India. 5. Construction Management & Planning by Sengupta and Guha-TataMcGraw Hillpublication. 6. Project Management – K Nagrajan 7. Construction Project Management Planning, Scheduling and Controlling-Chitakara- TataMcGraw Hill, New Delhi 8. Construction Planning, Equipment and Methods by R. L. Peurify.	

8BTCE02: Waste and By-Product Utilization **(Cr, L:T:P:-3:3:1)**		34 hr
	Object:To protect the environment through effective waste management techniques.To protect health, well being and environment.To prevent pollution. To reduce and reuse of waste.	
UNIT – I	**Introduction:** Objective, scope and outcome of the course	8hr
UNIT – II	. **Types and formation of byproducts and waste;** magnitude of wastegeneration in different agro- processing industries; concept scopeand maintenance of waste management and effluent treatment,basics pf Waste Recycling & Resources Recovery System (WRRRS),Temperature, pH, Oxygen demands (BOD, COD), fat, oil andgrease content, metal content, forms of phosphorous and sulphurin waste waters, microbiology of waste, other ingredients likeinsecticide, pesticides and fungicides residues.	6hr
UNIT – III	Waste utilization in various industries, furnaces and boilersrun on agricultural wastes and byproducts, briquetting ofbiomass as fuel, production of charcoal briquette, generation ofelectricity using surplus biomass, producer gas generation andutilization.	6hr
UNIT–IV	Waste treatment and disposal, design, construction, operation andmanagement of institutional community and family size biogasplants, concept of vermi-composting, Pre-treatment of waste: sedimentation, coagulation, flocculation and floatation, Secondarytreatments: Biological and chemical oxygen demand for differentfood plant waste–trickling filters, oxidation ditches, activatedsludge process, rotating biological contractors, lagoons.	6hr
UNIT – V	**Tertiary treatments:** Advanced waste water treatment process-sand,coal and activated carbon filters, phosphorous, sulphur, nitrogenand heavy metals removal, Assessment, treatment and disposal ofsolid waste.	8hr

	8BTCE05: Project Planning and Construction Management Lab **(Cr, L:T:P:-2,0:0:2)**	
	Objective: Student will able to To Discuss principles of management and its functions in construction organization. To get the Knowledge of organization‟s working procedures and organizational developments and group decision making.To Identify quality of team leader and qualities of project leader.	
	1.1 Assignments on net present value, benefit cost ratio, internal rate ofreturn. 2.Types of contracts – Tenders, tender form, submission and opening of tenders, measurementbook, muster roll, piecework agreement and workorder. 3.Drafting of tender documents, special terms andconditions. 4.Drafting of tender notices for different types ofworks 5.Different models of PPP like BOT, BOOTetc. 6.Arbitration. 7.Preparation of bardiagram. 8.Network Analysis using PERT andCPM.	
	8BTCE06: Pavement Design **(Cr, L:T:P:-2,0:0:2)**	
	Objective: Student will able to To Design geometric elements of Cross Section of various types of roads.To Design geometric elements of Horizontal Alignment of Roads To Design geometric elements of Vertical Alignment of Roads. To design various devices for traffic management.	
	1. 1 **Pavement Mix Analysis:** Aggregate blending, bituminous mix design – Marshall Stability approach, concrete mix design for DLC and PQC with IS codeprovisions. **2. Pavement Basics:** Types & comparison, vehicular loading pattern, factors affecting design and performance of pavements, sub graderequirements. **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 sub-grade 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 otherguidelines. **5. Specifications for rural roads:** Important aspects of IRC SP 020, Rural Road Manual. NRRDA publications	

8BTCE05: Project • To introduce the concept and methods required for the construction of large software intensive system. • To develop a broad understanding of the discipline of software engineering and management of software system. • To provide an understanding of both theoretical and methodological issues involve in modern software engineering project management and focus strongly on practical techniques. **(Cr, L:T:P:-4,0:0:2)**	
8BTCE06: Social Outreach, Discipline & Extra CurricularActivities	

\