Basaveshwar Engineering College, Bagalkote

Department of Civil Engineering

Scheme of Teaching and Evaluation (Academic Year 2022 - 2023)

III Semester BE

SI.	Subject	Subject Title	Credits	нс	UR	S/	EXAMINATION				
No	Code			W	/EEł	<	MARKS				
				L	Т	Ρ	CIE	SEE	Total		
1	21UMA302C	Numerical Techniques and Fourier Series	3	3	0	0	50	50	100		
2	21UCV303C	Mechanics of Materials	3	3	0	0	50	50	100		
3	21UCV304C	Concrete Technology	2	2	0	0	50	50	100		
4	21UCV305C	Building Planning and Drawing	2	1	2	0	50	50	100		
5	21UCV306C	Building Materials and Construction	2	2	0	0	50	50	100		
		Technology									
6	21UCV307C	Fluid Mechanics	3	2	2	0	50	50	100		
7	21UCV308L	Basic Materials and Concrete Testing Lab	1	0	0	2	50	50	100		
8	21UCV309L	Engineering Geology and Lab	1	0	0	2	50	50	100		
9	21UCV310L	Computer Applications in Civil	1	0	0	2	50	50	100		
		Engineering Lab									
10	21UHS324C	Universal Human Values – II	1	1	0	0	50	50	100		
11	21UHS322C	Sanskrutik Kannada	1	1	0	0	50	50	100		
	21UHS323C	Balake Kannada									
12	21UMA300M	Bridge Course Mathematics-I*	-	3	0	0	50 [*]	50*	100*		
	*										
		Total	20				550	550	1100		

21UMA302C		Credits: 3									
L:T:P - 3: 0: 0	NUMERICAL TECHNIQUES & FOURIER SERIES	CIEMarks:50									
Total Hours/Week: 3		SEEMarks:50									
	UNIT-I	10 Hrs.									
Numerical Metho	ds-I:										
Introduction to	Introduction to root finding problems, Newton-Raphson										
differences, forwa	ard and backward difference operators (no	derivations on									
relations between	operators) Newton-Gregory forward and backwar	rd interpolation									
formulae. (Witho	out proof), Lagrange's and Newton's divid	led difference									
interpolation form	nulae (without proof) Numerical differentiation u	using Newton's									
forward and backv	vard formulae-problems.										
	UNIT–II	10 Hrs.									
Numerical Metho	ds-II:										
Numerical Integra	tion: Simpson's one third rule. Simpson's three ei	ghth rule (no									
derivation of any	formulae)-problems. Numerical solution of ODE:	Taylors, Euler's									
and Modified Eul	er's method, Runge-Kutta 4th order method, I	miles predictor									
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corrector method.											
corrector method.	corrector method.										
corrector method. Fourier Series:	UNIT–III	10 Hrs.									
Fourier Series:	UNIT-III	Eourier series									
Corrector method. Fourier Series: Periodic function expansion of cont	UNIT–III s, Conditions for Fourier series expansions, tinuous and functions having finite number of	Fourier series									
corrector method. Fourier Series: Periodic function expansion of cont even and odd func	UNIT–III s, Conditions for Fourier series expansions, tinuous and functions having finite number of tions. Half-range series, practical harmonic analys	Fourier series discontinuities, is.									
corrector method. Fourier Series: Periodic function expansion of cont even and odd func	UNIT–III s, Conditions for Fourier series expansions, tinuous and functions having finite number of tions. Half-range series, practical harmonic analys UNIT–IV	10 Hrs. Fourier series discontinuities, is. 10 Hrs. 10 Hrs.									
corrector method. Fourier Series: Periodic function expansion of cont even and odd func Fourier Transform	UNIT–III s, Conditions for Fourier series expansions, tinuous and functions having finite number of tions. Half-range series, practical harmonic analys UNIT–IV s:	10 Hrs.Fourierseriesdiscontinuities,is.10 Hrs.									
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1. To understand the numerical methods of solving algebraic and transcendental equations.

- 2. To acquire the knowledge of interpolation techniques.
- 3. To understand the basic concepts of numerical differentiation, numerical integration and numerical solution of ordinary differential equations.
- 4. To understand concepts of Fourier series, and Fourier transforms.

- 1. Solve engineering problems using non-linear equations and interpolation techniques.
- 2. Solve problems using numerical differentiation and numerical integration.
- 3. Solve ordinary differential equations using numerical methods.
- 4. Solve Problems using the Fourier series.
- 5. Solve problems using the basic concept of Fourier transforms

Course Outcomes				P	rogr	Prog	Programme Specific Outcomes								
	1	2	3	4	5	1	2	3							
CO 1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 3	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 5	1	2	-	-	-	-	-								
Average	1	2	-	-	-	-	-	-	-						

21UCV303C		Cr	edits: 3
L:T:P - 3: 0: 0	MECHANICS OF MATERIALS	CIEN	Aarks:50
Total Hours/Week: 3		SEEN	/Jarks:50
			10 11mg
Circula Chucana and Ch	UNIT-I		edits: 3 larks:50 1arks:50 1arks:50 10 Hrs. sson's ple of herical 10 Hrs. ession stress 10 Hrs. stress oulli's ion to stress 10 Hrs. stress boulli's ion to stress short alay's Short Euler's heory, New Delhi, rsity press, 006.
Simple Stresses and St	trains:		· · · · · / ·
Introduction: Mechani	ical properties of materials, Stress, Strain, Hoc		isson's
Ratio, Stress-Strain Dia	agram for structural steel and non-terrous mat	erials, Princ	iple of
superposition, Elongat	ion of uniform bars, stepped bars and composi-	te bars. Nun	nerical
examples.			
			10 Hrs.
Relation amongst elas	tic constants, Volumetric strain:		
Elastic constants. Rela	tionship amongst elastic constants, Volumetric	strain, expr	ession
for volumetric strain, N	numerical examples.		
Compound Stresses:			
Introduction, Stress c	omponents on inclined planes, General two-c	dimensional	stress
system, principal plane	es and stresses. Numerical examples.		
	UNIT–III		10 Hrs.
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Bending stresses and s	shear stresses in beams:		
Bending stresses and s Review of Internal for	shear stresses in beams: ces in beams, SF,BM.SFD and BMD. Introduction	to bending	stress
Bending stresses and s Review of Internal for in beam. Assumptions	shear stresses in beams: ces in beams, SF,BM.SFD and BMD. Introduction in simple bending theory, Pure bending, deriva	to bending ation of Berr	stress noulli's
Bending stresses and s Review of Internal for in beam. Assumptions equation. section mod	shear stresses in beams: ces in beams, SF,BM.SFD and BMD. Introduction in simple bending theory, Pure bending, deriva dulus, Flexural rigidity, Beam of uniform strengt	n to bending ation of Berr th. Introduct	stress noulli's tion to
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1. Introduction to definitions, basic concepts associated with Mechanics of Materials. Analysis of uniform, stepped and composite bars subjected to axial force.

- 2. Volumetric strains and relation amongst elastic constants. Introduction to definitions and basic concepts associated with general two dimensional stress system
- 3. Introduction to definitions and basic concepts associated with distribution of bending and shear stresses in beams.
- 4. Introduction to definitions and basic concepts associated with deflection of statically determinate beams. Analysis of column and struts by Euler and Rankine theory.

After completion of the course student will be able to:

1. Determine the stresses and elongation of bars subjected to axial forces.

2.Determine change in volume and dimensions. Determine principal stresses and locate principal planes.

3.Draw bending and shear stress distribution diagrams for beams of various cross sections and for various loads.

4.Determine slope and deflection for statically determinate beams and buckling loads for columns.

Course Outcomes				Pr	ogra	amm	ne O	utco	mes				Programme Specific Outcomes					
	1	2	З	4	5	12	1	2	3									
CO 1	3	З	2	1	2	-	1	-	-	-	-	1	2	3	1			
CO 2	3	З	2	1	2	-	-	-	-	-	-	1	2	3	1			
CO 3	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1			
CO 4	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1			
Average	3	3 3 2 1 2												3	1			

Learning objectives:

21UCV304C CONCRETE TECHNOLOGY Credits: 2											
L:T:P - 2: 0: 0		CIEN	1arks:50								
Total Hours/Week: 2		SEEN	1arks:50								
			07 11#6								
Ingradiants of Congred	UNIT-I		07 H rs.								
Compart: Chamical co	ne.	vortios of co	mont								
different types of com	opt		int,								
	ent.										
Classification of aggreg	vates according to size and shane										
Characteristics of aggr	regates. Particle size and shape surface texture	snecific gra	vity of								
aggregate: hulk densit	v water absorption surface moisture bulking α	f sand delet	erious								
materials soundness	y, water absorption, surface moisture, buiking o	r sana, aciet									
Grading of aggregate	es: coarse aggregate fine aggregate and All-	in-one aggr	egate.								
fineness modulus: inte	erpretation of grading charts	כווכ מספו									
Water: Water Quality	requirements as per IS:456-2000										
	UNIT-II		06 Hrs.								
Fresh Concrete:											
Workability - Factors	affecting workability. Measurement of workab	oility –Slum	o Test.								
Flow test, Compacting	g Factor Test and Vee-bee Consistometer Test	. Segregatio	on and								
Bleeding	5	0 0									
Manufacturing proces	s of concrete - Batching, mixing, transporting, pl	acing, comp	action								
and Curing – Metho	ds of curing – Water curing, membrane curi	ng, steam	curing,								
accelerated curing											
	UNIT–III		07 Hrs.								
Hardened Concrete: T	esting of hardened concrete - Compressive stre	ength, Split	tensile								
strength and Flexural S	Strength test										
Factors affecting stree	ngth Water cement ratio, aggregate properties.	Relation be	tween								
Compressive strength	and Tensile strength, Bond strength, Modulu	is of ruptur	e and								
Elasticity.											
	UNIT–IV		06 Hrs.								
Admixtures:											
Chemical admixtures	-plasticizers, accelerators, retarders and air of	entraining a	gents.								
Mineral admixtures- F	ly ash, silica fume and rice husk ash. Water proot	fing compou	nds.								
Concrete Mix Design:											
Concept of mix design	Concept of mix design, variables in proportioning, exposure conditions. Procedure of mix										
design as per IS 1026	2:2019.Numerical examples of mix design on m	nix design fo	or OPC								
concrete mixes and Fly	/ ash concrete mixes.										
Reference Books *											
1. M.S.Shetty Concrete T	echnology Theory and Practice, S.Chand and Co,	New Delhi,	2002.								

2004.

- 3. P.Kumar Mehta & Paul J.M, Concrete Technology, Monterio Indian Concrete Institute USA-1999
- 4. IS 10262:2019 for concrete mix design.

Learning objectives:

- 1. Define and describe properties of ingredients of concrete.
- 2. Define and describe properties of Fresh Concrete. Tests on fresh concrete.
- 3. Chemical and Mineral admixtures. Mechanical and strength properties of hardened concrete.
- 4. Durability of concrete. Describe concept of concrete mix design with numerical examples.

- 1. Cement, Chemical composition, Hydration of cement. Types of cement, Manufacture of cement, Tests on cement. Importance of size, shape and texture of aggregates. Grading of aggregates. Tests on aggregates.
- 2. Fresh Concrete Workability, Measurement of workability Segregation and Bleeding, Manufacturing process of concrete.
- 3. Chemical and Mineral admixtures. Evaluate the testing procedure for hardened concrete to assess its hardened properties.
- 4. Durability of concrete ,Concrete Mix Design: Concept of mix design, Procedure of mix design as per IS 10262-2019, Numerical examples of mix design.

Course Outcomes				Prog	Programme Specific Outcomes										
	1	2	3	4	1	2	3								
CO 1	2	1	3	3	2	2									
CO 2	2	1	2	1	1	2	3	-	3	2	-	-	2 1 2		
CO 3	1	1	3		1	3	2	1	2	3	-	-	2	1	2
CO 4	3	1	1	1	-	2	1	1							
Average	2	1	2.25	1	1.33	2.25	2	1.33	1.75	2.67	-	-	2.25	1.25	1.75

21UCV305C

L:T:P - 1 : 02: 0 Total Hours/Week: 3 **BUILDING PLANNING AND DRAWING**

Credits: 2 CIEMarks:50 SEEMarks:50

UNIT-I 10 Hrs. 1. To prepare working drawings for various components of building. a. Stepped wall footing. b. Isolated RCC column footing. c. RCC dog legged stair. d. RCC open well stairs. UNIT-II 05 Hrs. 2.Functional design of buildings: (Residential, Public and Industrial), positioning of various components of buildings, orientation of buildings, building standards, bye laws, setback distances and calculation of carpet area, plinth area and floor area ratio. UNIT-III 09 Hrs. 3. Development of plan, elevation, sectional elevation, and schedule of openings from the given line diagram of residential buildings. Single Storied Building with One bed room. a. b. Single Storied Building with Two bed room. Two Storied Building c. UNIT-IV 08 Hrs. 5. Planning and development of line diagrams for following public buildings. a. Primary health center. b. Primary school building. c. Office buildings: PWD EE office, Tahshildar Office and PWD Sub-division office. 5. For a given single line diagram of a building, preparation of water supply and sanitary layouts. Reference Books * 1. Shah.M.H and Kale CM, Building Drawing, Tata Mc Graw Hill Publishing co Ltd., New Delhi,4th Edi, 2008 2. Gurucharan Singh, Building Construction, Standard Publishers & distributors, New Delhi, 4thEdn. 1989. 3. Sushil Kumar, Building Construction, Standard Publications, New Delhi, 19th Edn. May 2018National Building Code, BIS, New Delhi, Dec 1986. Learning Objectives* 1. Students will be able to comprehend various components of building such as Stepped wall footing, Isolated RCC column footing, RCC dog legged stair and RCC open well stairs. 2. Students will be learned to draw plan, elevation, and sectional elevation of Residential buildings by using the Building bye laws.

- **3.** Students will be able to draw line diagram for the public buildings.
- **4.** Students will be in a position to prepare the single line diagram for water supply and sanitary layouts.

After completion of the course student will be able to

1.After studying the course, the student is to prepare the working drawings for various components of the building such as Stepped wall footing, Isolated RCC column footing, RCC dog legged stair and RCC open well stairs.

2. Prepare the detailed drawings of Residential buildings including plan, elevation and sectional elevation.

3. Prepare the single line diagram for various public buildings like school, health center and office buildings.

4. To prepare the layouts for water supply and sanitary.

Course Outcomes					Programme Specific Outcomes										
	1	2	3	12	1	2	3								
CO 1	3	2	1	-	-	2	-	-	-	1	-	-	1	3	-
CO 2	2	1	3	-	-	3	-	3	-	2	-	3	2	3	3
CO 3	3	2	2	I	-	3	-	2	-	1	-	2	2	2	2
CO 4	2	2 2 2 2 1 - 3													3
Average	2.50	1.75	2.00	2.67	1.50	2.25	2.67								

21UCV306C

L:T:P - 2: 0: 0

Total Hours/Week: 2

BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY

Credits: 2

CIEMarks:50 SEEMarks:50

UNIT-I	05 Hrs.
Building materials: Bricks: Classification of bricks, Tests onbricks.	
Other Building Materials:	
Reinforcingsteel, Structuralsteel.	
Foundations: Preliminary investigation of soil, Safe bearing capacity of	soil,
Classification of foundations, Types of foundations.	
UNIT–II	06 Hrs.
Masonry: Definition oftermsused inmasonry, Types of bonds in brickwork, Course	d and
Uncoursed rubble masonry,Ashlar masonry.	
Stairs, doors, windows, and ventilators: Technical terms in stairs, Requiremen	tsof a
good stair, Geometric design of RCC dog legged and open well stairs (pla	n and
sectionalelevation of stairs), Doors: Different types of doors, Windows, and Ventilat	ors.
UNIT–III	06 Hrs.
Floors: Typesofflooring (Materials and methods of laying): Granolithic, Ceramic, Marble	,Polis
hedGraniteflooring,	
Roofs: FlatRoof(R.C.Flatterraced roofing), Lean to roof, Wooden truss (King po	st and
Queen post truss).	
UNIT–IV	06 Hrs.
Arch,Lintel,Chejja: Classification of arches and Lintels : Types and classifications,	Chejja,
Functions.	
Miscellaneous: Shoring, Scaffolding, Damp proof course, Plumbing, Form work	
Plastering and painting: Purpose of plastering, Materials used for plastering,	Lime
mortar, Cement Mortar, Methods of plastering, Purpose of Painting, Applicat	ion of
paints to new and old surfaces, Distemper, Plastic emulsion, Enamel Powder of	oated
painting to walls and steel surfaces, Polishing of wood surface.	
Reference Books *	
1. PunmiaB.C LaxmiBuildingConstructionPubicationsPvtLtdNewDelhi2008	
2. S.CRangalwala, BuildingConstruction, Character Publishing House, An and India 25 th 200)7.
SushilKumar,BuildingConstruction, StandardPublisher,NewDelhi2008	
4. RangawalaP.CEngineeringMaterials,ChapterPublishinghouse,AnandIndia-2014	
5. SushilKumar, Engineering Materials, Standerd Publication and Distributors, New Delhi	
Learning Objectives*	
1. Describe different building materials and their properties; determine the qua	lity of
the materials and method of using them.	
2. Describe masonry, design of staircase, Necessity, types of doors and windows	
3. Describe and assess the suitability of various scaffolding types, form work	types,
floor types and repair works for building at super structure and at substructure lev	el
4. Describeaboutlintel, chajjaandarches, methodof construction and stability analysis	ofarch
method of plastering and application of paints and finishes for different surfaces	

- 1. Assess the quality of building materials, describe the method of finding SBC of soil and evaluate the suitability of different foundations for different soil conditions.
- 2. Classifyanddescribedifferenttypesofmasonry,design(geometric)dogleggedstaircase,asses singthesuitabilityofastaircaseandclassifydifferentdoorsand windowsforbuildings.
- 3. Classify different types of floors and roofs.
- 4. Compare types of lintels, chajja and arches, describe method of construction and methodofplastering and application of paints and finishes for different surfaces.

Course Outcomes					Programme Specific Outcomes										
	1	2	3	4	PSO1	PSO2	PSO3								
CO 1	3	2	2	2	1	1									
CO 2	3	2	2	1	-	1	1	-	-	-	-	1	2	1	1
CO 3	3	2	2	1	-	1	1	-	-	-	-	1	2	1	1
CO 4	3	2	2	2	-	1	2	-	-	-	-	1	2	2	1
Average	3	2	2	1.25	1	2	1.25	1							

21UCV307C	ELUID MECHANICS	Credit	s: 3						
L:T:P - 2: 2: 0	reord mechanics	CIEMark	s:50						
Total Hours/Week: 4		SEEMark	ks:50						
	UNIT-I		11 Hrs.						
Properties of fluids	Density, Specific volume, specific weight, Re	lative density	y, and						
viscosity. Surface te	nsion and Capillarity, Newton's law of viscosi	ty, Types of	fluids:						
Newtonian & No	n-Newtonian fluids, Ideal andReal fluids.	Numerical	some						
properties,Newton's	lawofviscosity.								
Fluidpressureandit's	measurement: Derivation of Pascal's law,		and						
Hydrostaticlaw.Num	ericals. Typesofpressure.Manometersandtheirc	lassification,t	heory,						
derivation and nume	ricals, Mechanical pressure gauges and Bourdor	ı's pressurega	uge.						
	UNIT–II		14Hrs.						
Fluidstatics: Definitio	n ofTotalpressure,Centreofpressure,Derivation	of total hydro	ostatic						
force and depth of	center of pressure on a plane surface (horizon	tal, verticalin	clined <i>,</i>						
curved) andnumerica	als.								
Fluidkinematics:Lagr	angianandEulenianapproachesoffluidflowanalys	is,Classificatio	onoffl						
ows.	Continuity	equ	uation,						
DerivationofContinui	tyequation in threed imensions, Numericals. Veloc	ityand Accele	eration						
in 3D. Definitior	n and properties of velocity potentia	al function	and						
streamfunctions, stre	amline&equipotentiallineand relationbetweenth	nem. Numeric	als.						
	UNIT–III		13 Hrs.						
Fluid dynamics: Deri	ivation of Euler's equation and Bernoulli's equa	ition for ideal	ℜ						
fluids with assum	ptions and limitations. Problems on Be	ernoulli's eq	uation						
ApplicationofBernou	lli's equation topitottube and venturemeterand	Numericals.							
Pipe flow: Definitior	n, Classification of flows, HGL and TEL, major a	and minor los	ses in						
pipe flows. Derivation of equation for head loss due to friction (Darcy-We									
equation).Flow throu	equation).Flow through compound pipes, (Series Parallel, Equivalent size).Probler								
major and minor hea	ad losses and compound pipes. Water Hammer	in Pipes: Deri	vation						
for pressure rise due	to gradual and sudden closure of valve and num	nericals.							
	UNIT-IV		14 Hrs.						

Open channel flow: Definition and classification, Derivation of Chezy's and Manning's equations and Numericals. Most economical rectangular, trapezoidal and circular channel sections: Derivations and numericals.

Specific energy: Specific energy curve, Derivation of critical depth, critical velocity and minimum specific energy, Numericals. Froude's number and its significance. Hydraulic jump: derivation and numericals.

Reference Books *

1. JamesFCruise, VijayP.Singh, Elementary Hydraulics (1stEdition), Mohsan M.Sherif, Thomson Learning. April 2006.

2. K.R.AroraFluidMechanics,HydraulicandHydraulics,StandardBookHouse,NewDelhi-2007.

- 3. JohnF.Douglas FluidMechanics.PearsonEducationNewDelhi,2011.
- 4. V.L.Streeter&B.WylieFluidMechanicsLakshmiPublications,NewDelhi,2007.
- 5. H.M.RaghunathFluidMechanicsCBS PublicationNewDelhi.2008.
- 6. M.Manohar, FluidMechanics.Vol-IVikasPublishinghousePvtLtdNew Delhi, 2008.

Learning Objectives*

- 1. Tolearnbasicproperties offluids and fluid pressure measurement
- 2. To understand theprinciples of hydrostatics and kinematics
- 3. To understand thebasics of fluiddynamics and flow through pipes
- 4. To learn basic concepts of open channel flow, economical sections and specific energy
 - After completion of the course student will be able to:
 - 1. Studentsshouldbeabletousefluidpropertiesbasicsto solve fluid mechanicsproblems and compute hydrostatic pressure using various devices available
 - 2. Studentsshouldbeableapplyconceptsofhydrostaticsand kinematics toreallife fluid mechanics problems.
 - 3. Should be able to apply Bernoulli'sprincipleinfluid mechanicsproblems and computepressure heads and losses in different types of pipe connections.
 - 4. Students willbeableto design open channel sections and compute energy losses in hydraulic jumps.

Course Outcomes				F	Program		Programme Specific Outcomes								
	1	2	3	4	5	PSO1	PSO2	PSO3							
CO 1	3	2	2	1	1	1	-	-	-	-	-	-	2	2	2
CO 2	3	3	2	1	2	2	-	-	-	-	-	-	2	2	2
CO 3	3	3	2	2	2	3	-	-	-	-	-	-	2	2	2
CO 4	3	3 2 2 2 2 2												2	2
Average	3	2.5	2	1.5	1.75	-	2	2	2						

BASICMATERIALSANDCONCRETETESTING LAB 21UCV308L 1Credit(0-0-2)

- 1. Tensionteston mildsteel and HYSD bars.
- 2. Compressionteston Wood.
- 3. Torsionteston mildsteel circularsections.
- 4. Bendingtest onWood under twopoint loading.
- 5. Testson bricks.
- 6. Cement:Normalconsistency,settingtime,soundnessbyLe chateliers apparatus,Compressionstrengthtestandsieve method for fineness of cement andSpecificgravityofcement.
- 7. Freshconcrete:Workability-Slump,CompactionfactorandVee Beetest.
- 8. Hardenedconcrete:Compressionstrengthtest,Splittensiletest.

REFERENCEBOOKS:

- 1. Davis,TroxellandHawk,Testing ofEngineeringMaterials,InternationalStudentEditionMcGraw Hill Book Co. New Delhi.1982
- 2. Fenner, Mechanical Testing of Materials, George Newnes Ltd. London. 1965
- 3. HolesKA, English, Experimental Strength of Materials, Universities PressLtd. London 2010
- 4. SuryanarayanaAK, Testingof Metallic Materials, Prentice HallofIndiaPvt.Ltd.NewDelhi.2007
- 5. Methodsoftestfordeterminationofstrengthpropertiesofnaturalbuildingstone.IS1121-1, 1974.
- 6. KukrejaCB

KishoreK.RaviChawla,MaterialTestingLaboratoryManual,StandardPublishers&Distributors 1996.

7. M.L.Gambhir,Concrete Manual,DhanpatRai&Sons – New Delhi 2004.

LABORATORYASSESSMENT:

- 1. EachLaboratorysubjectisevaluated for100marks (50CIE and50SEE).
- 2. Allocationof50marksforCIE
 - Performanceandjournalwrite -up:
 - Marksforeachexperiment=30 marks/No.ofproposedexperiments.
 - OnePracticaltestfor20Marks.(5write-ups,10conduction,calculation,resultsetc. 5vivavoce)
- 3. Allocationof50marks forSEE.
 - 25%write-up,50%conduction,calculation,results etc.,25%viva-voce.

ENGINEERING GEOLOGY ANDLAB 21UCV309L 1 Credit (0-0-2)

- 1. Megascopic Identification of Minerals based on their Physical properties; Quartz and its varieties.
- 2. Megascopic Identification of Minerals based on their Physical properties; Felspars, Micas, Hornblende, Olivine, Serpentine, Asbestos, Kyanite, Talc, Garnet, Corundumand Barite.
- 3. Megascopic Identification of Minerals based on their Physical properties Carbonates and Ore minerals.
- 4. Megascopic Identification of Igneous Rocks based on Geological PropertiesGranite, Syenite, Diorite, Gabbro, Dunite, Porphyries, Dolerite, Pegmatite, Basalt and Pumice.
- 5. Megascopic Identification of Sedimentary Rocks based on Geological PropertiesSand Stone, Lime Stone, Shale, Breccia, Conglomerate and Laterite.
- 6. Megascopic Identification of Metamorphic Rocks based on Geological PropertiesGneiss, Quartzite, Marble, Slate, Phyllite, Schist and Charnockite.
- 7. Study and interpretation of standard geological maps.
- 8. Dip and Strike problems.
- 9. Borehole Problems (On Level Ground).
- 10. Thickness Problems.

REFERENCE BOOKS:

- 1. B.S.Satyanarayanswamy- Engineering Geology lab Manual, Eurasia Publication, New Delhi. 2003.
- 2. M.T.Maruthesha Reddy- Engineering Geology Practicals, New Age InternationalPvt Ltd ,1stEdn, New Delhi 2002.
- 3. N.W.Gokhale-Manual of Geological Maps, CBS Publishers & Distributors, 1st Edn, New Delhi.1987.
- 4. N.W. Gokhale- Exercises on geological Maps & Dip-Strike Problems, CBS Publishers&Distributors, 1st Edn, New Delhi.1996.
- 5. N.W.Gokhale-AGuide to Field Geology, CBS Publishers & Distributors, 1 stEdn.New Delhi.2001

LABORATORY ASSESSMENT:

- 1. Each Laboratory subject is evaluated for 100 marks (50 CIE and 50 SEE).
- 2. Allocation of 50 marks for CIE
 - Performance and journal write up:
 - Marks for each experiment = 30 marks/ No. of proposed experiments.
- 3. One Practical test for 20 Marks. (5write-ups, 10 conduction, calculation and results etc. 5vivavoce) ,Allocation of 50 marks for SEE. 25% write-up, 50% conduction, calculation, results etc., 25% viva-voce.

COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB 21UCV310L 1 Credit (0-0-2)

Microsoftexcel:ApplicationtoCivilengineeringproblems;SFD and BMD for cantilever and simply supported beams subjected to UDL throughout thespan. DesignofHorizontalCurveby Offset methodand Design of Super Elevation.

IntroductiontoAUTO CAD

Basics of Drafting: How to use AUTOCAD for drafting, Basic commands, Draw Modify Toolbars

AutoCAD: Application to Civil Engineering drawings, Preparation of drawings: Foundationcross section, Masonry Wall, Isolated Footing, Lintel, and Chejja. Different types of Doors, Windows, Staircases, BuildingPlan, Elevation and Cross sections.

LABORATORYASSESSMENT:

- 1. Laboratory is evaluated for 100 marks (CIE 50 Marks and SEE 50 Marks).
- 2. Allocation of 50marks for CIE
- Performanceandjournalwrite-up:
- Marksforeachexperiment=30marks/No.ofproposedexperiments.
- OnePracticaltestfor20Marks.(5write-up,10conduction,calculation,resultsetc.5 viva-voce)
- 3. Allocation of 50marks for SEE.
- 25%write-up,50%conduction,calculation,resultsetc.,25%viva-voce.

21UHS324C		Credit	s: 1
L:T:P - 1: 0: 0	UNIVERSAL HUMAN VALUES-II	CIEMark	s:50
Total Hours/Week: 1		SEEIVIAR	s:50
	UNIT-I		04 Hrs.
Introduction to Va Facility;Understandir Education,Continuou Scenario and Methou	Ilue Education: Right Understanding;Relation ngValue Education;Self-exploration as the is Happiness and Prosperity -the Basic Human d to Fulfill the Basic Human Aspirations.	nship and Pl Process for n aspiration-C	nysical Value urrent
	UNIT–II		0 Hrs.
Harmony in the Hur Self and the Body, Di as an Instrument of with the Body, Progr	nan Being: Understanding Human being as the istinguishing between the Needs of the Self and the Self, Understanding Harmony in the Self, I amme to ensure self-regulation and Health.	Co-existence the Body, The Harmony of th	of the Body ne Self
	UNIT-III		04 Hrs.
of (Ethical) Human C and Universal Huma Production Systems based Life and Profe	Holistic Understanding : Look at Professional I Conduct; A Basis for Humanistic Education, Hur an Order;Competence in Professional Ethics;H and Management Models; Strategies for Transi ssion.	nanisticConsti HolisticTechno	veness tution logies, Value-
	UNIT–IV		04 Hrs.
Implications of the I of (Ethical) Human C and Universal Huma Production Systems based Life and Profes	Holistic Understanding : Look at Professional I Conduct; A Basis for Humanistic Education, Hur an Order;Competence in Professional Ethics;F and Management Models; Strategies for Transi ssion.	Ethics Definitiv manisticConsti IolisticTechno ition towards	veness tution logies, Value-
Reference Books *			
1.A Foundation Cour P Bagaria,2 nd Revised 2.Teachers'Manualfo RAsthana,G P Bagari 87034- 53-2	se in Human Values and Professional Ethics, R F I Edition, Excel Books, New Delhi, 2019. ISBN 97 orAFoundationCourseinHumanValuesandProfess a, 2 nd Revised Edition, Excel Books, New Delhi,	R Gaur, R Asth 8-93-87034-47 sionalEthics,RF 2019. ISBN 9	ana, G 7-1 RGaur, 78-93-
3. JeevanVidya: EkPa	richaya, A Nagaraj, Jeevan Vidya Prakashan, Am	arkantak,1999).
4. Human Values, A.I	N. Tripathi, New Age Intl. Publishers, New Delhi,	2004.	
5. The Story of Stuff(Book).		
6. The Story of My E	periments with Truth - by Mohandas Karamcha	nd Gandhi	

- 8. Slow is Beautiful Cecile Andrews
- 9. Economy of Permanence J CKumarappa
- 10. Harat Mein Angreji Raj PanditSunderlal
- 11. Rediscovering India byDharampal
- 12. Vivekananda Romain Rolland(English)

- 1. Explore holistic vision of life themselves and their surroundings.
- 2. Develop competence and capabilities for maintaining Health and Hygiene.
- 3. Analyse various problems in life, family, Society and in handling problems with Sustainable Solutions.
- 4. Apply values to their own self in different day-to-day settings in real life and in handling problems with sustainable solutions.
- 5. Adopt the value of appreciation and aspiration for excellence and gratitude for all.

Total Hours/Week: 1			SEEN	larks:50
	UNI	T-I		04 Hrs.
1.PÀ£ÁðIPÀ 'ÀA'ÀÌÈw 2. PÀ£ÁðIPÀzÀ KQÃF 3. DqÀ½vÀ ¨sÁµÉAiÀ	r : ≌ÀA¥À £ÁUÀg/ PÀgÀt : MAzÀÄ C NiÁV PÀ£ÀßqÀ - τ	ÁdAiÀÄå ¥ÀǪÀð ZÀjvÉæ - f. ªÉAPÀl¸Àħ ತಾ. ಎಲ್. ತಿಮ್ಮೇಶಮತ್ತು¥ÉÆæ. ವಿ. ಕೆ	âAiÀÄå ೇಶವಮೂರ್ತಿ	
	UNI	[- 		04Hrs.
1. ªÀZÀ£ÀUÀ¼ÀÄ :ಜೇಡರದಾ 2. QÃvÀð£ÉUÀ¼ÀÄ : 3. vÀvÀé¥ÀzÀUÀ¼ÀÄ 4. d£À¥ÀzÀ VÃvÉ : ©	ಸಿಮಯ್ಯ,ಬಸವಣ್ಣ vÀ®ètÂ,À¢gÀÄ F Ä : ,Á«gÀ PÉÆqÀ)Ã,ÀĪÀ ¥ÀzÀ	,, ಅಕ್ಕಮಹಾದೇವಿ,ಅಲ್ಲಮಪ್ರಭು,ಆಂ PÀAqÀå vÁ¼ÀÄ ªÀÄ£ÀªÉ - PÀ£ÀI UÀ¼À ¸ÀÄIÄÖ - ²±ÀÄ£Á¼À µÀjÃ¥	ಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ, PÀzÁ¸À ¥sÀ	
	UNIT	-III		04 Hrs.
 I. IAÄAPÄÄwIÄÄä£Å PÄÄgÄÄqÄÄ PÁAZÁ 	À PÀUÀÎ :r.«.f. ÁuÁ :zÀ.gÁ. ¨ÉÃA	zÉæ		
3.ಹೂಸಬಾಳನಗೀತ	: PAAªEA¥AA			
4. ಚೋಮನಮಕ್ಕಳಹಾರ	ತು : ಸಿದ್ದಲಿಂಗಯ್ಯ			
5.ಆಮರೆಈಮರೆ : ಚೆಂ	ವ್ರಶೇಖರಕಂಬಾರ			
	UNIT	–IV		04 Hrs.
 qÁ. ,Àgï JA «±ł 2 ρàφàρàä+à® ρà⁻ŕ 	ἑέñÀégÀAiÀÄå Πλ%λἂ ≧λἂνλἂί	— ªÀåQÛ ªÀÄvÀÄÛ LwºÀå :J J£ï ª Դ ¥ὰσὰΔ¥ὰσΕΔιὰἅ «⊵άῆξὰ · Ρὰι	₽ÀÄÆwðgÁªï ÃIJËɑà ©ã7	ል ዸ ዾ፟ዾዄ%ĵ
3. 'PÀ' ªÀÄvÀÄÛ '§' §g	zÀºÀ vÀAvÁæA±/	ÀUÀ¼ÀÄ&PÀ£ÀßqÀzÀ mÉʦAUï		
Reference Books *				
¥ÀoÀå¥ÀÄ,ÀÛPÀ: ,ÁA,ÀÌøwPÀ PÀ£Àß qÁ.».a. ÉÆÃgÀ°AU Prasaranga VTU, Bela	3qÀ (¸ÀA), ÀAiÀÄå & qÁ.J agavi, Karnataka	⁻ï.wªÉÄäñÀ, , 2020.		
After completion of t	he course stude	nt will be able to:		
1. «zÁåyðUÀ¼ÀÄ ¨Ë¢ zÉñÀzÀ ႓ÁĄÌÌøv PÀnÖPÉÆ¼ÀÄîvÁÛ	ÞPÀªÁV "ɼÉ wPÀ ªÁgÀ¸ÀÄ; JgÉ	AiÀÄĪÀÅzÀgÉÆA¢UÉ £ÀªÀ zÁgÀgÁV ¨É¼ÉzÀÄ 'ÁéªÀ®	ÀÄä £Ár£À A©AiÀiÁV	ªÀÄvÀÄÛ §zÀÄPÀÄ
2. PÁ£ÀßqÀ [¨] sÁµÉ C£ÀågÀ£ÀÄß CxÉl	ŁĂĂĂĹĂĂĂ <u>Êð¹PÉÆ¼ÀÄîªÀ</u>	ĂªĂĂxĂðªÁV ªÀiÁvÀ£A ▲ ªÀÄ£ÉÆÃ§® ¨É¼É¹PÉÆ¼	AqAAªÀĂzÀ <u>ÀÄîvÁÛ£É.</u>	gEÆA¢UÉ, EªÀwÛ£À

SAMSKRUTHIKA KANNADA

21UHS322C

L:T:P - 1: 0: 0

Credits: 1

CIEMarks:50

^aÀå^aÀ ÉÜAiÀİè ÀAOÃtðªÁzÀ ÁªÀiÁfPÀ ˰ÁzÀðAiÀÄÄvÀªÁzÀ £ÀqÀĪÀ½PÉAiÉÆA¢UÉ ÀA¥À£ÀÆä® ªÀåQÛAiÀiÁV gÀÆ¥ÀÄUÉÆ¼ÀÄîvÁÛ£É. 3. eÁUÀwPÀgÀtzÀÀ ,ÀAzÀ¨sÀðzÀ°è «zÁåyðUÀ¼ÀÄ ,ÀévÀAvÀæöªÁV D⁻ÉÆÃa,ÀĪÀ, ÀévÀAvÀæªÁV ÀévÀAvÀæªÁV §gÉAiÀÄÄäÀ, aAvˣÀ²Ã®gÁUÀĪÀ ĹÁªÀÄxÀåðªÀ£ÀÄß ¥ÄqÉzÀÄ, LÀªÀÄAiÉÆÃavÀªÁV LÀÆPÀÛ ¤zsÁðgÀUļÀ£ÀÄß PÉÊUÉÆ¼ÀÄîªÀ°è F CzsÀåAiÀÄ£À ¢Ã¥À,ÀÜA§ªÁVzÉ. 4. «zÁåyðUÀ¼ÀÄ EA¢£À eÁUÀwPÀ «zÀåªÀiÁ£ÀUÀ¼À£ÀÄß CxÉÊð¹PÉÆAqÀÄ, ,˻ÀiÁdzÀ°è ,ÀAWÀfëAiÀiÁV "ɼÉAiÀÄĪÀ ªÀģɯ箪À£ÀÄß ªÀÄvÅÄÛ DvÀä ÉÛöÊAiÀÄðªÀ£ÀÄß vÀÄA§ÄªÀ°è F CzsÀåAiÀÄ£À ÀÆPÀÛªÁzÀ ^aÀiÁUÀðzÀ²ðPÉAiÀiÁVzÉ. 5. vˣÀß C¹ävÉAiÀÄ °ÀÄqÀÄPÁlzÀ°ègÀÄ^aÀ ^aÀåQÛUÉ, CzÀÄ F £É®zÀ 'Áé©ü^aÀiÁ£À, ¨sÁvÀÈvÀé, ¦æÃw, Ĕ°ÁzÀðAiÀÄÄvÀªÁzÀ ªÀÄ£À,ÀÄìUÀ¼À°è Ez JA§ÄzÀ£ÀÄß «zÁåyðUÀ¼À CjvÀPÉÌvÀgÀÄvÀÛzÉ. «zÁåyðUÀ¼À°è ¥Àj ÀgÀ ¥ÀæeÉÕAiÀÄ£ÀÄß eÁUÀÈvÀUÉÆ¹⁄2¹, zÉʪÀ,ÀȶÖAiÀiÁzÀ F CªÀÄÆ®å 'ÀA¥ÀvÀÛ£ÀÄß »vÀ-ǀv˻ÁV §¼À¹PÉÆAqÀÄ ªÀÄÄA¢£À vÀ⁻ɪÀiÁjUÉ CzÀ£ÀÄß §¼ÀĪÀ½AiÀiÁV ©lÄÖ°ÉÆÃUÀĪÀ°è eÁUÀÈvÀ£ÁUÀÄvÁÛ£É.

Note:

Eligibility criteria for registration of Kannada subject: students who have studied Kannada language as one of the subjects either in tenth standard or PUC-II have to register Samskruthika Kannada.

Course Outcomes				Pr	ogra	mme	Outco	omes					Programme Specific Outcomes					
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	PSO3			
CO 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
CO 2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-			
CO 3	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-			
CO 4	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-			
CO 5	-	-	-	-	-	1	3	-	-	-	-	-	-	-	-			
Average	-	-	-	-	-	0.8	0.6	-	-	0.4	-	-	-	-	-			

21UHS323C Balako Kannada Credits: 1										
L:T:P - 1: 0: 0	Balake Kannada	CIEMark	s:50							
Total Hours/Week: 1		SEEMark	s:50							
			04.11							
	UNIT-I		04 Hrs.							
Necessity of lear	ning a local language:									
Tips to learn the	language with easy methods.									
Easy learning of a	a Kannada Language: A few tips									
Hints for correct	and polite conservation									
Key to Transcript	ion									
1. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸ್ನ	ೂಚಕ/ಸಂಬಂಧಿತಸರ್ವನಾಮಗಳುಮತ್ತುಪ್ರಶ್ತಾ	್ನರ್ಥಕಪದಗಳ	່ນ –							
Personal pronouns, posses	ssive Forms, Interrogative words									
2. ನಾಮಪದಗಳ	ಳಸಂಬಂಧಾರ್ಥಕರೂಪಗಳು,ಸಂದೇಹಾಸ್ಪದಪ್ತ	್ರಶ್ನೆಗಳುಮತ್ತು	ಸಂ							
ಬಂಧವಾಚಕ										
ನಾಮಪದಗಳು – Possess	ನಾಮಪದಗಳು – Possessive forms of nouns, dubitive question and Relative nouns									
3. ಗುಣ,ಪರಿಮಾಣಮತ್ತುವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು –										
Qualitative,										
uantitative and Colour Adjectives, Numerals										
	UNIT–II		04Hrs.							
1.ಸಂಖ್ಯಾಗುಣವಾಚ piural markers	ಕಕಗಳುಮತ್ತುಬಹುವಚನನಾಮರೂಪಗಳು – 0	rdinal numera	ls and							
2. ನ್ಯೂನ /	ನಿಷೇಧಾರ್ಥಕಕ್ರಿಯಾಪದಗಳುಮತ್ತುವರ್ಣಗು	ಣವಾಚಕಗಳ) –							
Defective/Negative	Verbs and Colour Adjective	es ಅಪೃಣೆ	8 /							
ಒಪ್ಪಿಗೆ,ನಿರ್ದೇಶನ,ಷ	ಶೋತ್ಸಾಹಮತ್ತು ಒತ್ತಾಯಅರ್ಥರೂಪಪದಗಳು	ಮತ್ತು								
3. ವಾಕ್ಯಗಳು Permis	ssion. Commands. encouraging and Urging word	ls (Imparative	words							
and sentences)	, , , , , , , , , , , , , , , , , , , ,	ч								
4.ಹೋಲಿಕೆ		(ತರ	ತಮ).							
ಸಂಬಂಧಸ ಠಿಚಕನವುತುವನು ಸ್ಥೂತಕನ್ನಡ ಯಗಳುಮತ್ತು ವಿಷೇಧಾರ್ಥಕಪದಗಳ										
ಬಳಕೆ – Comparitive	, Rilation ship, identification and Negation word	S								
	UNIT–III		04 Hrs.							
1. ಕಾಲಮತ್ತುಸಮ forms of Tense,	ಯದಹಾಗೂಕ್ರಿಯಾಪದಗಳವಿವಿದಪ್ರಕಾರಗಳು Time and Verbs	– Different ty	pes of							
2. ಸಂಭಾಷಣೆಯಲ್ಲಿದಿನೋಪಯೋಗಿಕನ್ನಡಪದಗಳು – Kannada words in Conversation										
3. ಕರ್ನಾಟಕರಾಜ್ಯ	ಮತ್ತುರಾಜ್ಯದಬಗ್ಗೆ ಕುರಿತಾದ ಇತರೆಮಾಹಿತಿಗಳು	I								
4. ಭಾಷೆಕಲಿಯಲುಏನನ್ನುಮಾಡಬೇಕುಮತ್ತುಮಾಡಬಾರದು – Do's and don'ts in learnig language										
	UNIT–IV		03 Hrs.							

1. Kannada language script part – 1
2. Kannada language script part – 1
Reference Books *
$\delta^{1/4} \dot{A} P \dot{E} P \dot{A} f \dot{A} \beta \alpha \dot{A} - "Balake Kannada" -$
Author : Dr. L Thimmesha
Published by Prasaranga,
Visvesvaraya Technological University, Belagavi, Karnataka.
Learning Objectives*
$1 (8^{1/4} \dot{A} \dot{P} \dot{F} \dot{P} \dot{A} \dot{F} \dot{A} \dot{A} \dot{A} \dot{A} \dot{A} \dot{A} \dot{A} A$
$D\lambda f \lambda R_{\alpha} \lambda = c \lambda \mu f \lambda \lambda \lambda R C \pi f h \lambda h h h h h h h h h h h h h h h h h$
r_{ALABYA} SAμελιΑΑΛΑΒ CXEED-ΓΕΛΕΑΥΑΑ, ΓΑΛΑΒΥΑΖΑ ε λ αλολ ς λ αλ: $(\cdot , \lambda \otimes i) $ $(\cdot , \lambda \otimes i)$ $(\cdot ,$
, AA*A*A±A *A1AqA®A , AZSAa*AUAAVAUZE.
2. PAŁABĄA "Atô"A1A" EA1AA §UEUE CJ"AA "AAÆr, AA"AAZAA
^a ÁÁvÁÁŮ «zÁåyðUÁ¼Á°è DAvÁjPÁ "ÁAªÁ°Á£Á
QæAiÉÄAiÀÄ£ÀÄß ªÀÈ¢ÞUÉÆ½¸ÀĪÀÅzÀÄ.
3. PÀ£ÀßqÀ 'ÀASÉåUÀ¼À §UÉUÉ CjªÀÅ ªÀÄÆr¹, CªÀÅUÀ¼À£ÀÄß
ÀªÀÄAiÉÆÃavÀªÁV §¼À,ÀĪÀ «zsÁ£ÀªÀ£ÀÄß
PÀ°1PÉÆgÀĪÀÅzÀÄ
1 fà ^a àä fárfà á A àÌawPà ^a ÉÊ a rsà ^a vÉAiàäfàäßCivàä
$ = \sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{i=1}^{n} \sum$
$C_{X} = \lambda \tilde{C}_{X} = \lambda \tilde{C}_{$
§ZAAPA®A PA [*] ,AA [*] AAZAA.
After completion of the course student will be able to:
1. «zÁåyðUÀ¼ÀÄ PÀ£ÀßqÀ ¨sÁµÉAiÀÄ£ÀÄß ĹÀÄ®¨sÀªÁV
CxÉÉð ¹ PÉÆAqÀÄ, Á [*] ÀiÁfPÀ [*] ÁV, DyðPÅ [*] ÁVDAiÀiÁ
¥ÀæzÉñÀzÀd£ÀgÉÆA¢Ů ÉC£ÉÆåãÀåªÁV ªÀåªÅ°Àj ÀÄvÁÛgÉ.
2. F ¥ÀoÁåzsÀåAiÀÄ£À¢AzÀ «zÁåyðAiÀÄÄDAiÀiÁ
¥ÀæzÉñÀUÀ¼À £ÀA©PÉ, ÀA¥ÀæzÁAiÅÄ ªÀÄvÀÄÛ
DZÀgÀuÉUÀ¼À£ÀÄß ¸ÀÄ®¨sÀªÁV CxÀðªÀiÁrPÉÆ¼Àî®Ä
,ÁzsÀåªÁUÀÄvÀÛzÉ.
3. PÀ£ÀßqÀ ¸ÀASÉåUÀ¼À ¥ÀjPÀ®à£É¬ÄAzÀ «zÁåyðAiÀÄÄ ªÁtÂdå
^a ÀåªÀºÁgÀUÀ¼À£ÀÄß ¸ÀÄ®¨sÀªÁV £ÉgɪÉÃj¸À®Ä
,ÁzsÀåªÁUÀÄvÀÛzÉ.
4. °ÀAvÀ°ÀAvÀªÁV «zÁåyðAiÀÄÄ PÀ£ÀßqÀ sÁµÉAiÀİè
§gÀªÀtÂUÉAiÀÄPÀ ⁻ ÉAiÀÄ£ÀÄß
^a ÀÄvÀÄÛNzÀÄ ^a ÀPÀ ⁻ ÉAiÀÄ£ÀÄß [·] É ¹ ⁄4É ¹ PÉÆ ¹ ⁄4ÀÄîvÁÛ£É.
5. F ¨sĂµĖĄiĂĂ ,ĂĄ¥ĂPĂð¢AzÁV «zÁåyðĄiÀÄÄ PÀŁÀßqÀ ,Á»vÀå
¥AæPAgAUA ¹ / ₄ AzA PAvE, PA ^a A£A, PAzAA§j, £AlPA ^a AAAAvAzA
PéëAvAæUA¼A°è vA£Aß C©ügÀÄaAiÀÄ£ÀÄß
°EaN ¹ PEƼAAîvAU£E
Note:

Eligibility criteria for registration of Kannada subjects: students who have not studied Kannada language as one of the subject in tenth standard or PUC-II have to register Balake Kannada.

Course Outcomes		Programme Outcomes												Programme Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	PSO3		
CO 1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-		
CO 2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-		
CO 3	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-		
CO 4	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-		
CO 5	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-		
Average	-	-	-	-	-	-	-	-	-	2.6	-	-	-	-	-		

21UMA300M		Credits	s: 3						
L:T:P - 3: 0: 0		CIEMarks	s:50						
Total Hours/Week: 3		SEEMarks	s:50						
			10 11.0						
Differential Calculus	UNIT-I		10 Hrs.						
Differential Calculus									
Review of elementa	ary calculus, Polar curves - angle between the	e radius vecto	r and						
tangent, angle betw	veen two curves, pedal equation. Taylor's and	1 Maclaurin's	series						
expansions for one v	ariable (statements only) without proof. Probler	ns							
	UNIT-II		10 Hrs.						
Partial differentiation Euler's theorem - p Jacobians–problems	on: Introduction to function of several variables problems. Total derivatives-differentiation of c	, Partial deriva omposite func	itives; tions.						
	UNIT–III		10 Hrs.						
Integral Calculus:									
Multiple integrals: Ev Beta and Gamma fu problems.	valuation of double and triple integrals. Area bound triple integrals.	unded by the c d gamma func	urve. tions-						
	UNIT–IV		10 Hrs.						
Vector Differentiation Vector Differentiation divergence-physical in	: n: Scalar and vector fields. Gradient, directional terpretation; solenoidal and irrotational vector fields	derivative; cur s- problems.	rl and						
Reference Books *									
 Maurice D weir, Joel edition, 2011. B.S. Grewal: Higher B B.V. Ramana: "Higher Erwin Kreyszing's A India Pyt Ltd 2014 	l Hass and Frank R. Giordano, "Thomas calculus" Engineering Mathematics, Khanna Publishers, 44 er Engineering Mathematics" 11 th Edition, Tata M Advanced Engineering Mathematics volume1	^{*,} Pearson, ele [,] . th Edition, 201 1cGraw-Hill, 20 and volume11	venth 7. 10 ,wiley						
	earning Objectives*								
1 Enhance learning of	Engineering Mathematics								
2. Develop, understan Mathematics.	ding, stimulate their interest, and increase	their proficien	icy in						
3. Visualizing and repro- between geometry a	esentations: learners can see abstract concepts and algebra.	; make connec	ctions						
4. Make our teaching students.	modules more active and improve the learning	ig outcomes c	of our						

5. Learn Engineering Mathematics conceptually and relationally in order to be able to apply, when they have learned

Create inquiry based learning and an opportunity to learn, practice

- 1. Apply the concepts of polar curves to solve Engineering problems
- 2. Apply the knowledge of partial differentiation to solve Engineering problems.
- 3. Apply the concepts of multiple integrals and their usage in computing the area and volumes.
- 4. Evaluate improper integrals using beta and gamma functions.
- 5. Apply the knowledge of differentiation of vectors to solve the engineering problems.

Course Outcomes				Р	rogr	amn	ne O	utco	ome	5			Prog	ramme Sj Outcome	pecific s
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 3	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 5	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-

Scheme of Teaching and Evaluation (Academic Year 2022 - 2023)

IV Semester BE

SI. No.	Subject Code	Subject Title	Credits	но		S/	EXAMINATION			
				VVEEN			IVIARKS			
				L	Т	Ρ	CIE	SEE	Total	
1	21UMA402C	Partial Differential Equations and	3	3	0	0	50	50	100	
		Statistics								
2	21UCV403C	Analysis of Determinate	3	3	0	0	50	50	100	
		Structures								
3	21UCV404C	Surveying	3	3	0	0	50	50	100	
4	21UCV405C	Hydrology	2	2	0	0	50	50	100	
5	21UCV406C	Transportation Engineering	3	3	0	0	50	50	100	
6	21UCV407L	Surveying Practice Lab	1	0	0	2	50	50	100	
7	21UCV408L	Fluid Mechanics Lab	1	0	0	2	50	50	100	
8	21UCV409L	Highway Materials Testing Lab	1	0	0	2	50	50	100	
9	21UCV410I	Internship – I	2				50	50	100	
10	21UHS421C	Constitution Of India	1	1	0	0	50	50	100	
11	21UMA400M*	Bridge Course Mathematics-II*	-	3	0	0	50 [*]	50*	100*	
		Total	20				500	500	1000	

*Mandatory Subject for lateral entry students

	PARTIAL DIFFERENTIAL EQUATIONS AND	Credits	s: 3
L:T:P - 3: 0: 0	STATISTICS	CIEMarks	s:50
Total Hours/Week: 3		SEEMark	s:50
	UNIT-I		10 Hrs.
			1011101
Partial Differential	Equations(PDE):		
Introduction to Pi	JE: Formation of PDE's by elimination of arbitrary	itrary constant	s and
functions. Solutio	n of non-nomogeneous PDE by direct integ	parivation of	on of
dimensional heat	and wave equations and solutions by the meti	bod of separati	ion of
variables	and wave equations and solutions by the meth		
	UNIT–II		10 Hrs.
Charletter and Dark			
			. 2
Curve fitting by th	e method of least squares: $y = a + bx$, $y = ab^{*}$	and $y = a + bx$	$c + cx^2$
Correlation and	regression.		
Probability: addition	on rule, conditional probability, multiplication rul	le, Baye's rule.	
	UNIT–III		10 Hrs.
Probability distribution Binomial distribution	utions: Random variables, Problems on expectations Poisson distributions and Normal distribution	ion and varianc ns	e.
	UNIT–IV		10 Hrs.
Joint Probability d	istributions:		
Concept of joint pr	obability, Joint distributions - discrete random va	ariables.	
Markov chains:			
Markov chains: Int	roduction, Probability vectors, Stochastic Matri	ces, Fixed Poin	ts and
Regular stochastic	Matrices, Markov chains, higher transition pro	obabilities, stat	ionori (
distribution of rog			ionary
	alar Markov chains and absorbing states.		ionary
eference Books *	llar Markov chains and absorbing states.		ionary
eference Books * 1. Higher Enginee	alar Markov chains and absorbing states. Pring Mathematics by Dr. B.S. Grewal, Khanna Pu	ıblishers, New E	Delhi.
eference Books * 1. Higher Enginee 2. Advanced Eng	alar Markov chains and absorbing states. Pring Mathematics by Dr. B.S. Grewal, Khanna Pu ineering Mathematics By H. K. Das, S. Chand &	iblishers, New E & company Ltd	Delhi. . Ram
eference Books * 1. Higher Enginee 2. Advanced Eng Nagar, New Delhi	ering Mathematics by Dr. B.S. Grewal, Khanna Pu ineering Mathematics By H. K. Das, S. Chand &	iblishers, New E & company Ltd	Delhi. . Ram
eference Books * 1. Higher Enginee 2. Advanced Eng Nagar, New Delhi 3. Advanced Engi	alar Markov chains and absorbing states. Pring Mathematics by Dr. B.S. Grewal, Khanna Pu ineering Mathematics By H. K. Das, S. Chand & neering Mathematics by E Kreyszig ,John Wiley &	Iblishers, New E & company Ltd & Sons.	Delhi. . Ram
eference Books * 1. Higher Enginee 2. Advanced Eng Nagar, New Delhi 3. Advanced Engi 4. Probability and India pvt.ltd 2 nd ed	alar Markov chains and absorbing states. Pering Mathematics by Dr. B.S. Grewal, Khanna Pu ineering Mathematics By H. K. Das, S. Chand & neering Mathematics by E Kreyszig ,John Wiley & d stochastic processes by Roy D. Yates and Davi ition 2012.	Iblishers, New E & company Ltd & Sons. id J. Goodman,	Delhi. . Ram wiley
eference Books * 1. Higher Enginee 2. Advanced Eng Nagar, New Delhi 3. Advanced Engi 4. Probability and India pvt.ltd 2 nd ed 5. Theory and pro	Pring Markov chains and absorbing states. Pering Mathematics by Dr. B.S. Grewal, Khanna Pu ineering Mathematics By H. K. Das, S. Chand & neering Mathematics by E Kreyszig ,John Wiley & d stochastic processes by Roy D. Yates and Davi ition 2012.	Iblishers, New E & company Ltd & Sons. id J. Goodman, aum's Series).	Delhi. . Ram wiley
eference Books * 1. Higher Enginee 2. Advanced Eng Nagar, New Delhi 3. Advanced Engi 4. Probability and India pvt.ltd 2 nd ed 5. Theory and pro	Pring Mathematics by Dr. B.S. Grewal, Khanna Pu ineering Mathematics by Dr. B.S. Grewal, Khanna Pu ineering Mathematics By H. K. Das, S. Chand & neering Mathematics by E Kreyszig ,John Wiley & d stochastic processes by Roy D. Yates and Davi ition 2012.	Iblishers, New E & company Ltd & Sons. id J. Goodman, aum's Series).	Delhi. . Ram wiley

Partial differential equations.

2. To acquire knowledge about predictions preferably on the basis of mathematical equations.

To understand the principal concepts about probability.

- 1. Understand a variety of partial differential equations and solve by exact methods.
- 2. Derive heat and wave equations and solve by the method of separation of variables.
- 3. Understand the concepts of curve fitting and probability.
- 4. Apply the concepts of probability distributions.
- 5. Apply the concept of Markov Chain for commercial and industry purpose.

Course Outcomes				P	rogr	amn	ne O	utco	ome	5			Programme Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO 1	1	2	-	1	-	-	-	-	-	-	-	-	-	-	-	
CO 2	1	2	-	1	-	-	-	-	-	-	-	-	-	-	-	
CO 3	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	
CO 4	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	
CO 5	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	
Average	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	

21UCV403C
L:T:P - 3: 0: 0
Total Hours/Week: 3

ANALYSIS OF DETERMINATE STRUCTURES

Credits: 3 CIEMarks:50 SEEMarks:50

	UNIT-I	12 Hrs.
	Introductory Concepts : Structural systems, Forms of structures. One, two and dimensional structures. Compatibility and Constitutive relations. Material Geometric linearity and nonlinearity. Determinate and indeterminate structures- E of Indeterminacy (Static and Kinematic).	three- I and Degree
	Deflection of beams by Moment-Area & Conjugate beam methods: Moment theorems and conjugate beam theorems. Analysis of statically determinate beam Numerical problems	t area Jeams.
	UNIT–II	12 Hrs.
	Deflection of beams and trusses by strain Energy methods: Strain Energy Complementary strain energy, Strain energy due to axial load, bending Princi virtual work; Castigliano's theorems- I. Numerical problems on deflections of sta determinate beams using Castigliano's theorem-I and unit load methods Deflect trusses.	y and ple of itically ion of
	UNIT–III	08 Hrs.
	levels; determination of thrust, shear and bending moment. Analysis of Cables: Analysis of cables under point load and udl, length of or supports at same and different levels	cables,
	UNIT–IV	08 Hrs.
	Rolling Loads and Influence Lines: Rolling Loads, Influence line diagram for reasonant force and bending moment at a section for simply supported beams due to loads and uniformly distributed loads. Uses of Influence lines for analysis of supported beam for single and several point loads, uniformly distributed loads	action, point simply
Refere	ence Books *	
1.	B C Punmia, Ashok Kumar Jain, Aran Kumar Jain Theory of structures Vol-I Publications, New Delhi-2004	& II Laxmi
2.	C S Reddy-Basic Structural Analysis, 2 Edition, Tata Mc Graw Hill, New Delhi-2003.	
3.	Ramamrutham, R Narayan-Theory of structures, Dhanpt Rai Publishing Company, 8 Delhi-2008	Edition New
Learn	ng objectives:	
1.	Introduction to definitions, basic concepts associated with structural systems. statically determinate beams for slopes and deflections by moment–area and conj	Analysis of ugate beam

method.

- 2. Determine slopes and deflections for statically determinate beams and trusses by Castigliano's theorem-I and by unit load method.
- 3. Introduction to definitions, basic concepts associated parabolic three hinged arches and cables. Analysis under point loads and UDL.
- 4. Introduction to definitions and basic concepts associated with influence lines. Analysis of simply supported beams under rolling load.

- 1. Compute degree of static and kinematic indeterminacy of structures and determine slopes and deflections for statically determinate beams.
- 2. Analyze statically determinate beams and trusses for deflections.
- 3. Analyze three hinged parabolic arches and cables for internal forces.
- 4. Draw influence lines and determine SF and BM due to rolling loads on simply supported beams.

Course				Ρ	rog	ram	me	Ou	tco	mes			Programme Specific Outcomes					
Outcomes	1	1 2 3		4	5	6	7	8	9	10	11	12	1	2	3			
CO 1	3	3	2	1	2	-	-	-	-	-	1	1	2	3	1			
CO 2	3	3	2	1	2	-	-	-	-	-	1	1	2	3	1			
CO 3	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1			
CO 4	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1			
Average	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1			

21UCV404C		Credits: 3
L:T:P - 3: 0: 0	SURVEYING	CIEMarks:50
Total Hours/Week: 3		SEEMarks:50

UNIT-I	101 Hrs.
Introduction: Definition of surveying, Objectives and importance of s	surveying.
Classification of surveying, Principles of surveying, Units of measurements, Chain	and tape
types, Surveying measurements and errors	
Measurement of Directions and Angles: Compass survey: Basic definitions, r	neridians,
bearings,magnetic and True bearings. Prismatic and surveyor's compasses, t	emporary
adjustments, declination. Quadrantal bearing system, whole circle bearing syst	em, local
attraction.	
UNIT–II	10 Hrs.
Levelling: Basic terms and definitions, Methods of levelling-Spirit levelling,	Types of
levels-Dumpy level, auto level, digital and laser levels-Instrument setup, Boo	oking and
reduction of levels-HI method, Rise and fall method. Differential levelling, profile	levelling,
fly levelling, check levelling, reciprocal levelling, Numerical problems.	
Contouring: Contours definition and characteristics, Methods of contouring, Inte	erpolation
of contours, contour gradient, contours uses.	
UNIT–III	10 Hrs.
Theodolite Survey: Theodolite and types, Fundamental axes and parts of Veni	re Transit
theodolite, uses of theodolite, Temporary adjustments, measurement of horizon	tal angles
(Repetition and reiteration methods) and vertical angles, Trigonometric	Levelling:
Determination of Heights and Distances: of an accessible object , Inaccessible	object by
single plane and double plane methods, Numerical problems.	
UNIT–IV	10 Hrs.
Tachometry: Basic principle, types of tacheometry, Instruments and accessorie	es used in
tacheometry, distance equation for horizontal and inclined line of sight in fixed s	tadia hair
method, numerical problems.	
Curves: Simple curves: Types, Elements, Designation of curves, Setting out	of simple
curves by linear methods (numerical problems on offsets from long chord	& chord
produced method), Setting out curves by Rankine's deflection angle method, N	Numerical
problems.	
Reference Books *	
1. S.K. Duggal, "Surveying Vol. I & II", Tata McGraw Hill Publishing Co. Ltd. New D	elhi.
2. R Subramanian, Surveying and Leveling, Second edition, Oxford University	y Press, New
Delhi.	
3. David Clerk, Plane and Geodetic Surveying Vol1 and Vol2, CBSpublishers	

- 4. B Bhatia, Remote Sensing and GIS, Oxford University Press, New Delhi.
- 5. T.M Lillesand, R.W Kiefer, and J.W Chipman, Remote sensing and Image interpretation, 5th edition, John Wiley and Sons India
- 6. James M Anderson and Adward M Mikhail, Surveying theory and practice, 7th Edition, Tata McGraw HillPublication
- 7. Kang-tsung Chang, Introduction to geographic information systems, McGraw Hill HigherEducation.

Learning objectives:

- 1. Understand the basic principles of Surveying Learn Linear and Angular measurements to arrive at solutions to basic surveying problems.
- 2. Student will come to know the use of leveling instrument to find the elevation at different points on earth with respect to datum and contours
- 3. Student will come to know the measuring and reading of Horizontal and vertical angles in trigonometric surveying.
- 4. Student willunderstand the difference of theodolite and tacheometry setting of different horizontal curves in roads, railway, canal and terrain using surveying instruments

- 1. Students will get the knowledge of basics of surveying and basic instruments used in civil engineering surveys and Application of compass surveying for measurement of areas, bearing and distance along with the direction.
- 2. Finding the elevation, elevation differences and heights of different objects under different conditions.
- 3. In finding the elevations of different targets with respect to instruments under different conditions and relative position of different targets with respect to given point.
- 4. Setting of curves by different methods for different alignments.

Course Outcomes				Ρ	rog	ram	ime	Ou	tcor	nes	Programme Specific Outcomes					
	1	2	3 4 !		4 5		7	8	9	10	11	12	1	2	3	
CO 1	3	3	2	1	2	-	-	-	I	-	-	1	2	3	1	
CO 2	3	3	2	1	2	-	-	-	I	-	-	1	2	3	1	
CO 3	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1	
CO 4	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1	
Average	e 33				2	-	-	-	-	-	-	1	2	3	1	

		C	redits: 2		
L:T:P - 2: 0: 0	ENGINEERING HYDROLOGY	CIEN	CIEMarks:50		
Total Hours/Week: 2		SEEI	Marks:50		
	UNIT-I		06 Hrs.		
Precipitation: Types of by rainfall hyetograph a curves (Brief discussion networks-definition, fi and coefficient of variarithmetic mean method Infiltration: Process, Windex, φindex Horton	In the precipitation, data analysis-study of characterists and Depth Area Duration (DAD) methods Intensity in only) Measurement of rainfall by tipping bucket nding optimum number of rain gauges by samp dation methods, ; computation of average depth d, isohyetal method, numerical on above concepts. UNIT–II measurement-using double ring infilterometer, s equation; Evaporation, Pan evaporation, em	stics of rain y Duration method, , le standard of precip , infilterion pirical equ	If all storm Frequency rain gauge deviation itation by 06 Hrs. n indices- ations for		
estimating evaporation defn, measurement usin	-Meyer's method, Rohwer's formula, Numericals g Lysimeter (Brief discussion of theory only, no n	,Evapo-trai umericals)	nspiration-		
	UNIT-III				
Runoff and Hydrogra	phs: Rainfall runoff process, runoff calculation	n using fu	07 Hrs.		
Runoff and Hydrogra relation for precipitati infilteration indices, Es for small catchment Numericals	phs: Rainfall runoff process, runoff calculation on and discharge in a basin, using runoff constimation of concentration time of a catchment u areas, Unit Hydrograph (UH), its analysis,	n using fu oefficient sing rationa S-curve h	07 Hrs. ndamental and using al formula ydrograph		
Runoff and Hydrogra relation for precipitati infilteration indices, Es for small catchment Numericals	phs: Rainfall runoff process, runoff calculation on and discharge in a basin, using runoff constimation of concentration time of a catchment u areas, Unit Hydrograph (UH), its analysis, UNIT-IV	n using fu oefficient sing rationa S-curve h	07 Hrs. ndamental and using al formula ydrograph 07 Hrs.		
Runoff and Hydrogra relation for precipitati infilteration indices, Es for small catchment Numericals Floods –Definition, g Rational method, env analysis-Determination method involving risk Groundwater Hydro transmissibility, specifi aquifers, Darcy's law acuifer (without rechar	control phs: Rainfall runoff process, runoff calculation on and discharge in a basin, using runoff calculation stimation of concentration time of a catchment u areas, Unit Hydrograph (UH), its analysis, UNIT-IV eneral causes of floods, Determination of peak fl elop curves method, Concept of return period, n of discharges for different frequency floods factor only, Numericals, logy: Defn of ground water, basic terms- permetic fic yield, zones of ground water, Aquifer Types on ground water flow velocity for , laminar floor	n using fu oefficient sing rationa S-curve h ood discha flood free by prob eability, po (theory or ow in unco	07 Hrs. ndamental and using al formula ydrograph 07 Hrs. rge by puency ability rosity, ability		

3.R.K.Sharma , T.K.Sharma, "Irrigation Engineering (Including Hydrology),S Chand Publications, -Revised Edition-2007, New Delhi.

4.Dr.K.Subramanya, "Engineering Hydrology", McGGrawhill publications, 5th edition-September-2020, New Delhi

Reference Books *

- 1. Santosh.Kumar.garg ,"Irrigation Engineering and Hydraulic Structures ", Khanna Publications, ,Volume-II, 1st edition,2006 ,New Delhi.
- 2. Ventee Chow ,**"open Channel Hydraulics**", **McGGrawhill publications** , 2nd edition, January-2009
- 3. David.Keith.Todd "**Ground water Hydrology**", Wieley Publications, 3rd edition,2005
- 4. NPTEL NOTES ON Water resources engineering and Ground water Management.

Learning objectives:

- 1. Understand concepts of hydrology, Hydrological cycle and its components.
- 2. Understand basics of infiltration and evapotrnspiration processes
- 3. Learn the concepts of surface runoff and hydrographs
- 4. Learn basic concepts of Floods, peak flood and groundwater hydrology

- 1. measure and quantify precipitation
- 2. measure and compute infiltration evaporation and transpiration
- 3. Estimate runoff and generate hydrographs
- 4. Perform Flood routing and estimate peak floods and flow to borewells.

Course Outcomes				P		Programme Specific Outcomes									
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	PSO3
CO 1	3	2	2	1	1	1	-	-	-	-	-	-	2	2	2
CO 2	3	3	2	1	2	2	-	-	-	-	-	-	2	2	2
CO 3	3	3	2	2	2	3	-	-	-	-	-	-	2	2	2
CO 4	3	2	2	2	2	2	-	-	-	-	-	-	2	2	2
Average	3	2.5	2	1.5	1.75	2	-	-	-	-	-	-	2	2	2

21UCV406C	
L:T:P - 3: 0: 0	

Total Hours/Week: 3

TRANSPORTATION ENGINEERING

Credits: 3

CIEMarks:50

SEEMarks:50

UNII-I	10 Hrs.
Introduction: A brief idea about the historical development of road construction i and abroad. Importance of transportation modes-characteristics-comparis different modes. Highway development in India- Jayakar committee, recommend and implementation- Central Road Fund CRF, Indian Roads Congress IRC, Centra research institute CRRI Highway planning, alignment and surveys: Road types features of 3 rd twenty-yea development plan and problems, present scenario of road development in INDIA	n India on of dations Il Road ar road (NHDP
& PMGSY) and in Karnataka (KSHIP & KRDCL) road development plan 2021. F controlling alignment-ideal alignment. Engineering surveys for highway loc problems on phasing and classification, road patternsPlanning surveys-master saturation system.	-actors ations- · plan-
UNIT–II	10 Hrs.
geometricelements, highway cross section elements. Pavement surface character camber, width of carriage way, shoulder width, formation width, right of way, cross section of roads Highway Geometric design 2: Sight Distances-Types and importance. Des horizontal and vertical alignment- Numerical problems on above (No. derivat formulae)	ign of typical ign of tion of
UNIT-III	10 Hrs.
UNIT–III Highway Materials: Properties and requirement of sub grade Soil- Tests on Soil and Plate load tests). Properties and requirement of road aggregates, Bitume Emulsion-cut back (Tests are not included). Pavement Design: Types of Pavements, Component parts of flexible and pavements and there functions, ESWL and its determination (Graphical method examples	10 Hrs. Is (CBR In Tar- Id rigid only)-
UNIT–III Highway Materials: Properties and requirement of sub grade Soil- Tests on Soil and Plate load tests). Properties and requirement of road aggregates, Bitume Emulsion-cut back (Tests are not included). Pavement Design: Types of Pavements, Component parts of flexible and pavements and there functions, ESWL and its determination (Graphical method examples UNIT–IV	10 Hrs. Is (CBR Image: CBR Image: Second Second Image: Second Sec
UNIT–III Highway Materials: Properties and requirement of sub grade Soil- Tests on Soil and Plate load tests). Properties and requirement of road aggregates, Bitume Emulsion-cut back (Tests are not included). Pavement Design: Types of Pavements, Component parts of flexible and pavements and there functions, ESWL and its determination (Graphical method examples UNIT–IV Highway Construction:General specification and construction of Earth road. roads, WBM roads, Bituminous roads, cement concrete pavements. Highway drainage and Economics: Surface and subsurface drainages system for types and its functions. Highway user benefits-VOC. Highway Costs- Economics a by annual cost method and benefit cost ratio methods. BOT and BOOT concepts	10 Hrs. s (CBR en Tar- d rigid only)- 07 Hrs. Gravel r road- nalysis

Learning objectives:

- 1. Introduced to history and development of roads and study on fixing up of an alignment for roads and engineering surveys
- 2. To teach the design concepts of geometric elements of roads for safe operation of vehicles.
- 3. To make the student to understand importance of highway materials to be used for roads and tests to be carried out.
- 4. To make the student to understand construction methods of different roads and design of surface and sub surface drainages.

- 1. Over all idea about historical development and present scenario of road and road development in India will help student to design and plan for the better roads. Knowledge of fixing up of ideal alignment for roads will help in finalizing the new road alignments in the professional life
- 2. By adopting proper geometric designs and geometric standard in design of roads will result in safe movement of traffic with reduced accidents
- 3. Better quality road materials and adopting appropriate design methods with IRC standards will help to design long lasting pavements
- 4. Knowledge of Road construction methodology for different category of roads are useful in constructing better quality of roads. Highway economics will help to do cost benefit analyse of any road infrastructure project by which it will be clear in decision making, whether to take-up the project or not.

Course Outcomes		Programme Outcomes Programme Sp Outcomes										pecific es			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1
CO 2	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1
CO 3	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1
CO 4	3	3	2	1	2	-	-	-	-	-	-	1	2	3	1
Average	3 3 2 1 2 - - - 1										1	2	3	1	
SURVEYING PRACTICE LAB UCV407L 1 Credit (0-0-2)

- 1. Demonstration of basic surveying instruments like (Chain, Tape ect...)
- 2. Setting out hexagon by compass

3. Levelling

Differential Levelling Fly levelling and Fly back leveling Reciprocal leveling, Profile and cross section levelling Contouring

4. Theodolite

Measurement of Horizontal and vertical angles Determination of elevation of an object: Base accessible Determination of distance and elevation of an object: Base In-accessible- Single Plane

1. Total Station

Introduction \rightarrow Taking Out Basic Measurements (SHV, REM, MLM)

- 2. Total Station Station Orientation, Back sighting, Instrument Synchronization, Data Recording.
- 3. Works on Total Station

Area Measurement Topographic survey Set out Parallel Lines

4. Downloading an contour map compilation only

REFERENCE BOOKS:

- 1. B.C. Punmia, Surveying, Vol. 1 Laxmi Publications, New Delhi.2005
- 2. A.M. Chandra, Plane Surveying, Vol-1, Newage International [®] Ltd. 2nd Edn 2006
- 3. K. R. Arora, Plane Surveying, S. Chand and Company Ltd., New Delhi. Laboratory 1998
- 4. Dr.K.R.Arora, Plane and Advanced Surveying, Standerd Book House, New Delhi, 7th Edition-2009
- 5. GIS and Remote Sensing by Angireddi- 3rd Edition, Indian Publications, Hyderabad-2014.

LABORATORY ASSESSMENT:

- 1. Each Laboratory subject is evaluated for 100 marks (50 CIE and 50 SEE).
- 2. Allocation of 50 marks for CIE
 - Performance and journal write up:
 - Marks for each experiment = 30 marks/ No. of proposed experiments.
 - One Practical test for 20 Marks. (5write-ups, 10 conduction, calculation, results etc. 5viva-voce)
- 3. Allocation of 50 marks for SEE.
 - 25% write-up, 50% conduction, calculation, results etc., 25% viva-voce.

FLUIDMECHANICSLAB 21UCV408L 1Credit(0-0-2)

LISTOF EXPERIMENTS:

- 1. CalibrationofOrifice.
- 2. Calibrationofmouthpiece.
- 3. Calibrationoftriangularnotches.
- 4. Calibrationofrectangularnotches.
- 5. Calibrationoftrapezoidalnotches.
- 6. Calibration of ogee and broad creasted weirs.
- 7. CalibrationofVenturimeterandOrificemeter.
- 8. Experimentsonmajorandminorlossesinthepipes.
- 9. Impactofjetontheflatandhemisphericalvanes.

TEXTBOOKS:

- 1. R.KBansal, Fluidmechanics, LaxmiPublications; Tenthedition, 2018.
- 2. PNModiandSMSethFluidmechanicsandHydraulicMachinesby,Standardbookhouse; 22nd edition,2017.
- 3. Bireshwar Majumdar, Fluidmechanicslabmanualby: PHILearning, 2ndedition 2015.
- 4. K.L.Kumar. "EngineeringFluidMechanicsExperiments" EurasiaPublishingHouse.

LABORATORYASSESSMENT:

Eachlaboratorysubjectisevaluatedfor100marks(50CIEand50 SEE)

- 1. Allocationof50marksforCIE"PerformanceandJournalwrite upMarksforeachexperiment= 30marks/ No ofproposed experiments.
- 2. Onepraticaltestfor20marks.(5write-up,10conduction,calculation,resultsetc5 viva-voice).
- 3. Allocation of 50 marks for SEE25% write-up, 50% conduction, calculation, results etc25% viva-voice

HIGHWAY MATERIALS TESTNG LAB 21UCV409L 1Credit (0-0-2)

1. Sand: Density , Zoning , Specific gravity and water absorption

- 2. **Aggregates**: Crushing, abrasion, impact and Shape tests (Flaky, Elongation, Angularity number) Specific gravity and water absorption
- 3. **Bituminous materials and mixes:** Specific Gravity, Penetration, Ductility, Softening point, Flash and fire point, Viscosity and Marshall Stability tests
- 4. Subgrade soil: CBR Test

REFERENCE BOOKS:

- 1. Relevant IS Codes & IRC Codes
- 2. High way Material Testing Lab Manual By New Chand & Brothers
- 3. Minimum Ten Experiments are to be completed.
- 4. Candidate has to perform two experiments in the Semester End Examination

LABORATORYASSESSMENT:

- 1. Each Laboratory subject is evaluated for 100 marks (50 CIE and 50 SEE).
- 2. Allocation of 50 marks for CIE
 - Performance and journal write up:
 - Marks for each experiment = 30 marks/ No. of proposed experiments.
 - One Practical test for 20 Marks. (5 write-up, 10 conduction, calculation, results etc., 5 viva-voce)
- 3. Allocation of 50 marks for SEE.
 - 25% write-up, 50% conduction, calculation, results etc., 25% viva-voce.

INTERNSHIP - I 21UCV410I Credit (0-0-2)

Objectives:

- 1. As the students are at the verge of learning technical aspects and have limited time period of internship, it is preferable to expose students to polygonal activities instead of one type of activity.
- 2. The activity/activities that is/are done should ignite the inquisitiveness to learn, enhance the knowledge, thinking ability and imagination, planning, application of mind, execution ability, innovation attitude, listening and understanding, vocabulary, personal expression, public speaking, written communication, oral presentation of the subject matter, acquire leadership qualities and teamwork requirements, responsiveness, ethics, etc.

Content of Activities:

- 1. Learning at Departmental Lab/Tinkering Lab/ Institutional workshop.
- 2. Learning MS Word, Excel, Microsoft equations, MS drawing tools, MS Power point, etc.
- 3. Essay competitions: Both in Kannada and English on technical topics already studied.
- 4. Survey and study of published literature on the assigned topic: Technical paper survey, preparation of synopsis. Exposure to technical paper publications.
- 5. Athletics and Sports.
- 6. Internship in Disaster Management.
- 7. Industrial visits/Small Scale Industries/Factories/Cottage Industries/substation visit/short project tour, etc., and submission of report.

Course Outcomes

- 1. Explore career alternatives prior to graduation
- 2. Integrate theory and practice
- 3. Develop communication, interpersonal and other critical skills in the job interview process
- 4. Learn to appreciate work and its function in the economy.
- 5. Build a record of work experience.

Evaluation:

Student's Diary

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. The students shall record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any, and activities carried out. It should contain the sketches and drawings related to the observations made by the students. The daily training diary should be signed after every day or at least twice a week by the Faculty/ in charge of the section (external expert) where the student has been working.

Student's Diary should be submitted by the students along with attendance record. It shall be evaluated on the basis of the following criteria:

- 1. Regularity in the maintenance of the diary.
- 2. Adequacy and quality of information recorded.
- 3. Drawings, sketches and data recorded.
- 4. Thought process and recording techniques used.

5. Organization of the information

Internship report:

After completion of Internship, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learnt in the training period along with the internship outcomes. The training report should be signed by the mentor.

The Internship report shall be evaluated on the basis of following criteria and/or other relevant criteria pertaining to the activity completed.

- 1. Originality.
- 2. Adequacy and purposeful write-up.
- 3. Organization, format, drawings, sketches, style, language etc.
- 4. Practical applications, relationships with basic theory and concepts taught in the appropriate course.
- 5. Variety and relevance of learning experience.

Assessment Rubrics:

Proposed Document as Evidence :

- 1. Students dairy
- 2. Internship report along with the certificate issued, if any.

ASSESSMENT RUBRICS (Allotted marks decide the letter grade).

21UHS421C		Credits: 1
L:T:P - 1: 0: 0	CONSTITUTION OF INDIA	CIEMarks:50
Total Hours/Week: 3		SEEMarks:50

UNIT-I	04 Hrs.
Introduction Indian constitution: The Salient Features of the	Indian
Constitution.Preamble to the Constitution of India.Fundamental Rights, Di	rective
Principles of State policy and Fundamental Duties.	
UNIT–II	04 Hrs.
The Union and State Governments: The Union Executive, The Union Legislature and	nd The
Union Judiciary - The Supreme Court ofIndia.	
UNIT–III	04 Hrs.
The Indian State Government: The State Executive, The State legislature and The Judiciary TheLocal Government: Local Government-Panchayat raj system with s reference to 73 rd and Urban Local Self Govt. with special reference	e State special to74 th
Amendment	
UNIT–IV	03 Hrs.
Electionprovisions, Emergencyprovisions, Amendment of the constitution:	
Reference Books *	
1. Durga Das Basu(D. D.Basu), "Introduc	tion to the
constitution of India", (Student Edition), 19th edition, Prentice-Hall EEE, 2008.	
2. Engineering Ethics: Charles Harries	J. R. and
2. Engineering Ethics: Charles Harries Michard and Michael J. Rabins	J. R. and
2. Engineering Ethics: Charles Harries Michard and Michael J. Rabins After completion of the course student will be able to:	J. R. and
2. Engineering Ethics: Charles Harries Michard and Michael J. Rabins After completion of the course student will be able to: 1. UnderstandandexplainthesignificanceofIndianConstitutionasthefundamentalla	J. R. and
 Engineering Ethics: Charles Harries Michard and Michael J. Rabins After completion of the course student will be able to: UnderstandandexplainthesignificanceofIndianConstitutionasthefundamentalla land. 	J. R. and
 Engineering Ethics: Charles Harries Michard and Michael J. Rabins After completion of the course student will be able to: UnderstandandexplainthesignificanceofIndianConstitutionasthefundamentalla land. Exercisehisfundamentalrightsinpropersenseatthesametimeidentifieshis response 	J. R. and wof the nsibilities in
 Engineering Ethics: Charles Harries Michard and Michael J. Rabins After completion of the course student will be able to: UnderstandandexplainthesignificanceofIndianConstitutionasthefundamentalla land. Exercisehisfundamentalrightsinpropersenseatthesametimeidentifieshis response nationalbuilding. 	J. R. and wof the nsibilities in
 Engineering Ethics: Charles Harries Michard and Michael J. Rabins After completion of the course student will be able to: UnderstandandexplainthesignificanceofIndianConstitutionasthefundamentalla land. Exercisehisfundamentalrightsinpropersenseatthesametimeidentifieshis respon nationalbuilding. Analyse the Indian political system, the powers and functions of the Union, Sta 	J. R. and wof the nsibilities in te and Local
 Engineering Ethics: Charles Harries Michard and Michael J. Rabins After completion of the course student will be able to: UnderstandandexplainthesignificanceofIndianConstitutionasthefundamentalla land. Exercisehisfundamentalrightsinpropersenseatthesametimeidentifieshis response nationalbuilding. Analyse the Indian political system, the powers and functions of the Union, Sta Governments in detail. 	J. R. and wof the nsibilities in te and Local

21UMA400M	BRIDGE COURSE MATHEMATICS	Credits: 3	lits: 3					
L:T:P - 3: 0: 0		CIEMa	rks:50					
Total Hours/Week: 3		SEEMa	rks:50					
			10.11=					
Differential Equation	UNIT-I		IU Hrs.					
	IS-1:		t					
Ordinary differential	equations of first order: Variable seperable, Ho	mogeneous.Ex	act					
form and reducible	to exact differential equations. Linear and Ber	noulli s'equatio	on.					
	UNIT–II		10 Hrs.					
Differential Equation	ıs-2:							
Second and higher c	order linear ODE's with constant coefficients-In	verse differen	tial					
operator, method of	variation of parameters (second order); Cauch	y's and Legend	dre					
homogeneous equat	ions.	-						
	UNIT–III		10 Hrs.					
Laplace Transform:	Laplace Transform:							
Introduction, Definit	tion of Laplace Transform, Laplace Transfo	orm of standa	ard					
functions, Properties	s: Shifting, differentiation, Integral and division	on by t. Perio	dic					
function, Heaviside's	Unit step function.							
	UNIT–IV		10 Hrs.					
Inverse Laplace trans	sforms:							
Properties, Convoluti	on theorem, Solutions of linear differential equa	ations.						
Reference Books *								
1. B.S. Grewal : Hig	ner Engineering Mathematics, Khanna Publisher	s, 44 th Edition,2	2017.					
2. Erwin Kreyszing'	s Advanced Engineering Mathematics volume	I and volume	II, wiley					
India Pvt.Ltd., 2014.								
3. Elementary Diffe	erential Equations by Earl D. Rainville and Pl	nillip E, Bedie	nt, Sixth					
Edition								
4. Erwin Kreyszing's	Advanced Engineering Mathematics, wiley India	Pvt.Ltd.,2014						
Learning objectives:								
1. Enhance learning of I	Engineering Mathematics.							
Study basic concepts	of differential equations and Laplace transforms	5.						
After completion of the cou	rse student will be able to:							
1. Solve first order first	degree differential equations.							
2. Solve second and hig	her order linear differential equations.							
3. Apply Laplace transfo	orms for standard functions and its properties							
4. Apply Inverse Laplace	e transforms for standard functions							
5. Solve differential equ	ations using Laplace transform method							
·	<u> </u>							

Course Outcomes				Рі	rogra	amn	ne C)utc	ome	S			Progra C	amme Sp Dutcomes	ecific
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 3	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 5	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-

Scheme and Syllabus of 3rd year 2021 – 22 admitted batch

			V semester								
Sl. No	Category	Subject Code	Subject Title	Credits	HC W)UR EEK	S/ K	EXAMINATION MARKS			
1101					L	T	P	CIE	SEE	Total	
1.	PCC	21UCV501C	Analysis of Indeterminate Structures	3	3	0	0	50	50	100	
2.	PCC	21UCV502C	Geotechnical Engineering	3	3	0	0	50	50	100	
3.	PCC	21UCV503C	Water treatment and Supply Engineering	3	3	0	0	50	50	100	
4.	PEC	21UCV5XXE	Professional Elective Course – I	3	3	0	0	50	50	100	
5.	OEC	21UCV5XXN	Open Elective Course – I	3	3	0	0	50	50	100	
6.	PCC	21UCV506L	Geotechnical Engineering Lab	1	0	0	2	50	50	100	
8.	INT	21UCV507I	Summer Internship – II	3		NA		50	50	100	
9.	AEC	21UHS521C	Quantitative Aptitude and Professional Skills	2	2	0	0	50	50	100	
			Total	21	17	0	2	400	400	800	

Prof	essional Ele	ective Course –	·I	Ope	n Elective C	Course – I	
Sl. No.	Category	Subject Code	Subject Title	Sl. No.	Category	Subject Code	Subject Title
1.	PEC	21UCV511E	Alternative Building Materials and Technologies	1.	OEC	21UCV522N	Green Building Technology
2.	PEC	21UCV512E	Advanced Surveying	2.	OEC	21UCV523N	Remote Sensing and GIS
3.	PEC	21UCV513E	Irrigation Engineering	3.	OEC	21UCV524N	Air Pollution and Control
4.	PEC	21UCV514E	Traffic Engineering				

2	21UCV501C	ANIAL VOIC OF INDEPEDMINATE	Credit	s: 3								
]	L:T:P - 3 : 0 : 0 ANALYSIS OF INDETERMINATE CIE Mar Total Hours/Week: 3 STRUCTURES SEE Mar											
Tot	tal Hours/Week: 3		SEE Marl	ks: 50								
				10 11								
		UNIT-I	6 1 1 1	10 Hrs.								
	Slope Deflection Me	ethod: Introduction, sign convention, development	of slope defle	ection								
	plane frames including	continuous beams including settlements, Analysis a sway frames with kinematic indeterminacy ≤ 3	or orthogonal	rigid								
	plane frames meruding			10 Hrs								
	Moment Distribution	n Method: Introduction. Definition of terms. Deve	elopment of me	ethod.								
	Analysis of continuou	s beams with support yielding, Analysis of orthogon	al rigid plane fr	rames								
	including sway frames	s with kinematic indeterminacy ≤ 3	C I									
		UNIT-III		8 Hrs.								
	Kani's Method: In	troduction, Concept, Relationships between ber	nding moment	and								
	deformations, Analysi	is of continuous beams with and without settlements	, Analysis of fr	rames								
	with and without sway	Y										
		UNIT-IV		12 Hrs.								
	Flexibility matrix, A indeterminacy ≤ 3 Matrix Method of A continuous using system	Analysis of continuous beams using system ap Analysis (Stiffness Method): Introduction, Stiffness em approach, with kinematic indeterminacy ≤ 3	proach, with matrix, Analy	static sis of								
Refer	ence Books *											
1.	B C Punmia, A K Publications, New I	Jain and A K Jain- Theory of structures, 12 Delhi, 2004.	2th edition, L	axmi								
2.	Pandit G S, Gupta S Hill Publishing Com	S P and Gupta R- Theory of Structures, 2nd edit: npany Ltd, New Delhi, 2008.	ion, Tata McC	braw-								
3.	Negi L S and Jangić Ltd, New Delhi, 200	l R S- Structural Analysis, Tata McGraw-Hill Pu)4	ublishing Com	ipany								
4.	K.U. Muthu, H.Naren Pvt. Ltd.	dra etal, "Indeterminate Structural Analysis", IK Inte	ernational Publi	shing								
Cours	e Outcomes**											
1.	Determine the momen and subsidence using	nt in indeterminate beams and frames having variab slope defection method	le moment of in	nertia								
2.	Determine the moment distribution method.	at in indeterminate beams and frames of no sway and	sway using mo	oment								
3. 4.	Construct the bending Construct the bendin method.	moment diagram for beams and frames by Kani's m g moment diagram for beams using flexibility n	ethod. nethod and stif	ffness								

Course Outcomes					Progra	mm	e Outco	omes (PO	Os)					Proş Spe Outo (PS	gram cific comes SOs)
	1	2	3	4	5	6	7	8	9	10	1 1	12	1	2	3
CO1	1	2		2		1				1					
CO2		2		2		3									
CO3			3				3								
CO4			3	3	3			3							

21UCV502C		Credit	s: 3
L:T:P - 3:0:0	SOIL MECHANICS	CIEMark	ks:50
Total Hours/Week: 3		SEEMarl	ks:50
	UNIT-I		10Hrs.
Numerical Problems Indexproperties- Definitionsandtheirde consistency limits ar BIS soil classification ClayMineralogy:Soil water, base-ex- Kaolinite,IlliteandMo	etermination, particlesizeanalysis(sieveandHydron nd indices, Plasticity chart. Activity of clay, Fiel n (IS: 1498-1970). Numerical Problems Istructure, Soil-Watersystem, Electrical diffused change capacity, Clay mineral ontmorilloniteandtheirapplicationinEngineering	neter ana Ididentification oublelayer,ads Isandtheirstruc	alysis) ntests, sorbed ctures-
	UNIT-II		10 Hrs.
Flow Through So permeabilityanditsde ofstratified soils, Se CapillaryPhenomena Problems. Seepage Analysis: L characteristics and a phreaticline (Casagra	oils: Darcy's law-assumption and validit termination(laboratory),factorsaffectingpermeabi epage velocity, superficial velocity and coeffic , Numerical Problems. Effective Stress – The aplace equation, assumptions, derivation and lir applications. Flow nets for sheet piles and belo ande's method–with and without toe filter)	y, coefficier lity,permeabil ient of perco ory and Num nitations. Flow w the dam se	nt of ity lation, herical wnets- ection,
	UNIT-III		10 Hrs.
CompactionOfSoil:P tests, factors affect compaction cor numberofpasses,Proc Consolidation Of dimensionalconsolida consolidated, underc and its determination a _v , m _v and C _v), Time	rincipleofcompaction, StandardandModifiedproct ing compaction, effect of compaction on sentrol- compactive effort, lift ctor'sneedle. Numerical Problems Soil: Definition, Mass-spring analogy, ation theory, assumptions, derivation and lim consolidated and over consolidated soils, pre-con- n byCasagrande's method. Consolidation charac rate of consolidation. Numerical Problems.	or's comp oil properties thickness Terzaghi's itations. Non nsolidation pr teristics of so	action s,Field and one rmally essure il (C _c ,
	UNIT-IV		10 Hrs.
Shear Strength of S coulomb theory, con strengthparameters, andThixotropyofclay sion test, Triaxial drainageconditions. N Bearing Capacity o bearing capacity by Factors affecting Be bearing capacity of so	Soils: Concept of shear strength, Mohr's stren twentional and modified failure envelops, Total factors affecting shear strength of MeasurementofshearparametersDirectsheartest, compression test and vane shear test, Te Numerical Problems. If Shallow Foundation- Types of foundations Terzaghi's and BIS method (IS: 6403), Mod aring capacity of soil. Effect of water table and oil.	ngth theory, and effective soils, Sens inconfinedcor st under dif , Determinati es of shear fa d/or eccentric	Mohr- shear itivity npres ferent on of ailure, ity on
Reference DOOKS *			
1. GopalRanjanandA.S NewAgeInternationa	.R.Rao,BasicandAppliedSoilMechanics- ll(P)Ltd., New Delhi Forth Edition 2022.		

- B.C.Punmia, Ashok.K.JainandArun.K.Jain, SoilMechanicsandFoundationEngg.-LaxmiPublications Co., New Delhi.17thedition 2017.
- 3. BrajaM.DasandNagaratnamSivakugan,PrinciplesofGeotechnicalEngineering-ClEngineeringIndia NinthEdition 2022.
- 4. V.N.S.Murthy, SoilMechanicsandFoundationEngineering-CBSPublishers&DistributorsNew Delhi, Fourth edition, 2018.
- 5. VenkatrahmaiahC.GeotechnicalEngineeringNewAgeInternational(P)Ltd.,NewDelhiFifth Edition 2017.
- 6. IqbalH.KhanTextBookofGeotechnicalEngineering-PHI,IndiaSecondEdition2005.
- 7. JosephBowles,FoundationAnalysisandDesign-McGrawHillPub.Co.NewYorkFifthEdition 2001.
- 8. Craig's, Soil Mechanics 9th Edition, CRC Press, 2019
- 9. Karl Terzagi and Ralph B. Peck, Soil Mechanics in Engineering Practice 3rd edition 2019.
- 10. T. Whitman Lambe and Robert V. Whitman, Soil Mechanics, Wiley India Pvt. Ltd. 2008

Course Outcomes**

After completion of the course student will be able to

- 1. analyse and interpret soil properties and clay mineralogy to effectively apply engineering principles in practical scenarios.
- 2. apply Darcy's law, seepage phenomena, and utilize flow nets to solve practical engineering problems related to flow through soils and seepage analysis.
- 3. apply the principles of compaction and consolidation to effectively control soil behavior in engineering projects.
- 4. Determine settlement of soils and utilize testing methods to find shear strength parameters.

Course Outcomes (CO)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1						1				2
CO2	2	1										2
CO3	3	2		1				1				2
CO4	2	2		1				1				2

21UCV503C		Credit	ts: 3
L:T:P - 3 : 0: 0	WATER TREATMENT AND SUPPLY	CIEMark	as:50
Total Hours/Week: 3	ENGINEERING	SEEMarl	ks:50
	UNIT-I		10 I r s
Quality of water:	Wholesome, potable and palatable water, wa	aterborne dise	eases.
Examination of V	Water - Objectives – Physical, chemical an	d Microbiolo	gical
Examinations. Drin	king water standards-BIS & WHO guidelines. I	Health signific	cance
of Fluoride, Nitrate	s and heavy metals like Mercury, Cadmium, Ars	senic etc. Sam	pling
of water and types of	of water sampling.		
Water demand a	nd quantity: Types of water demand - dom	estic, institut	ional,
commercial, public	e, and water losses. Estimation of Fire dema	nd and Per-o	capita
demand- factors aff	ecting. Numerical problems.		
If Study Component: S	ources of water and different intake structures.		
	UNIT-II		10 Hrs
Population foreca demand of water, design period. Num Sedimentation: In Theory of settling, circular, rectangula	sting: Different methods with merits & demo peak factors, design periods. Design period, fa erical problems. troduction, objectives, types of settling, factor settling velocity, Stroke's equation, types of settl r tanks.	erits, variation ctors affectin s affecting se ling tanks, des	ns in g for ettling. sign of
Modern water sup supply scheme. Self Study Compo	oply scheme: Necessity, planning and execution nent: Treatment flow-charts for surface and grou	n of modern modern modern modern modern modern modern modern modern modern modern modern modern modern modern m	water
Modern water sup supply scheme. Self Study Compo	oply scheme: Necessity, planning and execution nent: Treatment flow-charts for surface and grou UNIT–III	n of modern modern modern modern modern	water 10H

Coagulation and Flocculation: Coagulant aided sedimentation: Objectives, common coagulants, factors affecting, jar test, chemical feeding, flash mixing, Flocculation and clari-flocculation.

Filtration: Slow-sand, rapid-sand and pressure filters including construction, operation, cleaning and design (excluding under drainage system), Numerical Problems. Operational troubles in filters.

Disinfection: Types of disinfectants, chlorination, chlorine demand, residual chlorine,

use of bleaching powder, Numerical Problems. Minor methods of disinfection.

Self Study Component: Different methods of coagulant feeding, inlet and outlet arrangement

for sedimentation tanks

UNIT-IV

Miscellaneous Treatment Methods: Softening- Lime soda process and Zeolite process, Numerical problems. Reverse Osmosis & Membrane Filtration. Removal of Iron and Manganese. Colour, odour and Taste removal. Fluoridation, Defluoridation and Desalination.

10 Hrs.

Distribution Systems: System of supply, service reservoirs and their capacity determination, Numerical problems, Pipe appearances, pipefitting, Layout of water supply pipes in buildings.

Self Study Component : Nalgonda and Prasanti Techniques for defluoridation

Reference Books *

- 1. **Environmental Engineering-**Howard S. Peavy, Donald R. Rowe, George Tecno Bano Glous, McGraw Hill International Edition, 2017.
- 2. Environmental Engineering-I B.C. Punmia & Ashok Jain, Lakshmi Publications (P)Ltd.
- 3. Water supply Engineering S.K.Garg, Khanna Publishers, New Delhi.
- 4. **Manual on Water supply and treatment** –CPHEEO, Ministry of Urban Development, New Delhi.
- 5. **Water Supply and Sanitary Installations,** Panchadhari. A.C., New Age International Publishers, New Delhi.
- 6. **Handbook on Water Supply and Drainage,** SP 35 (1987): (with Special Emphasis on Plumbing) [CED 24: Public Health Engineering.]

Course Outcomes

After completion of the course student will be able to

- Apply knowledge of basic science for testing and analyze the drinking water quality 1. parameters from public health consideration as per standards.
- 2. Analysis of forecasting population to determine total quantity of water to meet demands of the community.
- 3. Design various water treatment units to remove selected impurities in raw water
- 4. Select miscellaneous treatment methods and analyze the community pipe network of water distribution.

	Cour	se .	Art	icu	ılat	ior	n M	atı	rix	(C	AM)	
Sl.	Course Outcomes	Program outcomes (PO's)											
No.	(CO's)	1	2	3	4	5	6	7	8	9	10	11	12
01	CO1	3	3		2			3	2				2
02	CO2	3	2					2					2
03	CO3	2	2	3				3					2
04	CO4	2	3					3					2

UCV511E	ΔΙΤΕΡΝΑΤΙΛΕ		Credi	ts: 3						
L:T:P - 4 : 0: 0		ECHNOLOGIES	CIEMarl	ks:50						
Total Hours/Week: 3		SEEMa								
	UN	IT-I		10 Hrs.						
Energy in building materi Embodied energy and life Green concepts in build requirements, Rainwater harvesting, En Requirements for building	als, Environmental -cycle energy, Glob lings, Green buildi wironmental friendl gs of different clima	issues concerned to building r bal warming and construction ing ratings – IGBC and LF y and cost effective building t tic regions.	naterials, ndustry, ED manuals - echnologies,	– mandatory						
	UNI	T–II		10 Hrs.						
Fibre Reinforced Concreto Fibers organic and synth Shear and Tension condit	e (FRC) -Fibers- met etic, Properties an ions. Numerical Pro	al and synthetic, Properties a d applications, behavior of F blems on FRC.	nd applications RC member ur	nder Flexure,						
	UNI	T–III		10 Hrs.						
of terrocement members, Building materials from a	properties of ferroc gro and industrial w	ement members, vastes ,Types of agro wastes, '	Types of indust	rial and mine						
wastes, Properties and app	olications.		• •							
wastes, Properties and app	olications.	T-IV	Filler slabs. Co	10 Hrs.						
wastes, Properties and app Alternative Building Te beam panel roofs Prefabricated structures building components, Adv Reference Books *	olications. UNI cchnologies: Alterna s: Introduction, Nee vantages.	T–IV te Roofing Systems: -Concepts, d, equipments used, method o	Filler slabs, Co	10 Hrs. Omposite						
wastes, Properties and app Alternative Building Te beam panel roofs Prefabricated structures building components, Adv Reference Books * 1. KS Jagadish, H	Dilications. UNI schnologies: Alterna s: Introduction, Nee vantages. 3 V Venkatarama R	T–IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao,	Filler slabs, Co f casting prefab	10 Hrs. omposite oricated						
wastes, Properties and app Alternative Building Te beam panel roofs Prefabricated structures building components, Adv Reference Books * 1. KS Jagadish, H Materials and	Dications. UNI schnologies: Alterna s: Introduction, Nee vantages. 3 V Venkatarama R Technologies", Nev	T–IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao, v Age International publicatio	Filler slabs, Co f casting prefab "Alternative Bu	10 Hrs. omposite oricated ailding						
Wastes, Properties and app Alternative Building Te beam panel roofs Prefabricated structures building components, Adv Reference Books * 1. KS Jagadish, H Materials and 7 2. RJS Spence ar	Dications. UNI schnologies: Alterna s: Introduction, Nee vantages. 3 V Venkatarama R Technologies", Nev ad DJ Cook, "Buildi	T–IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao, v Age International publicatio	Filler slabs, Co f casting prefab "Alternative Bu ns. ountries", Wile	10 Hrs. omposite oricated uilding						
wastes, Properties and appendix of the second se	Dications. UNI schnologies: Alterna s: Introduction, Nee vantages. 3 V Venkatarama R Technologies", Nev ad DJ Cook, "Buildi Jomes Rating Syste	T–IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao, v Age International publication ing Materials in Developing C m. CII publications	Filler slabs, Co f casting prefab "Alternative Bu ns. ountries", Wile	10 Hrs. omposite oricated uilding y pub.						
 wastes, Properties and appendix of the second sec	plications. UNI schnologies: Alterna s: Introduction, Nee vantages. 3 V Venkatarama R Technologies", Nev ad DJ Cook, "Buildi Homes Rating System	T–IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao, v Age International publicatio ing Materials in Developing C m, CII publications	Filler slabs, Co f casting prefab "Alternative Bu ns. ountries", Wile	10 Hrs. omposite oricated uilding y pub.						
wastes, Properties and appendix and app	Dications. UNI schnologies: Alterna s: Introduction, Nee vantages. 3 V Venkatarama R Technologies", Nev ad DJ Cook, "Buildi Iomes Rating Syste odes.	T–IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao, v Age International publicatio ing Materials in Developing C m, CII publications	Filler slabs, Co f casting prefab "Alternative Bu ns. ountries", Wile	10 Hrs. omposite oricated uilding y pub.						
wastes, Properties and appendix of the search panel roofs Alternative Building Telebeam panel roofs Prefabricated structures building components, Advantation Reference Books * 1. KS Jagadish, H Materials and ' 2. RJS Spence ar 3. IGBC Green H 4. Relevant IS Components	plications. UNI echnologies: Alterna s: Introduction, Nee vantages. 3 V Venkatarama R Technologies", Nev ad DJ Cook, "Buildi Iomes Rating Syste odes.	T–IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao, v Age International publicatio ing Materials in Developing C m, CII publications	Filler slabs, Co f casting prefab "Alternative Bu ns. ountries", Wile	10 Hrs. omposite oricated ailding y pub.						
Wastes, Properties and appendix of the second se	Dications. UNI echnologies: Alterna s: Introduction, Nee vantages. 3 V Venkatarama R Technologies", Nev ad DJ Cook, "Buildi Iomes Rating Syste odes.	T-IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao, v Age International publicatio ing Materials in Developing C m, CII publications	Filler slabs, Co f casting prefab "Alternative Bu ns. ountries", Wile	10 Hrs. omposite oricated uilding y pub.						
Wastes, Properties and app Alternative Building Te beam panel roofs Prefabricated structures building components, Adv Reference Books * KS Jagadish, H Materials and ' RJS Spence ar IGBC Green H Relevant IS Co Course Outcomes** After studying this components in the studying this components in the studying this components in the studying this components in the studying this components in the studying this components in the studying this components in the studying this components in the studying this components in the studying this components in the studying this components in the studying this components in the studying this components in the studying this components in the studying the	Dilications. UNI Schnologies: Alterna S: Introduction, Nee vantages. 3 V Venkatarama R Technologies", Nev ad DJ Cook, "Buildi Iomes Rating Syste odes.	T-IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao, v Age International publicatio ing Materials in Developing C m, CII publications be able to:	Filler slabs, Co f casting prefab "Alternative Bu ns. ountries", Wile	10 Hrs. omposite oricated uilding y pub.						
Wastes, Properties and appendix of the second se	Dilications. UNI Schnologies: Alterna S: Introduction, Nee vantages. 3 V Venkatarama R Technologies", New ad DJ Cook, "Buildi Iomes Rating Syste odes.	T-IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao, v Age International publicatio ing Materials in Developing C m, CII publications be able to: l issues concerned to building	Filler slabs, Co f casting prefab "Alternative Bu ns. ountries", Wile materials and o	10 Hrs. omposite oricated uilding y pub. cost effective						
 wastes, Properties and appendix and	plications. UNI echnologies: Alterna s: Introduction, Nee vantages. 3 V Venkatarama R Technologies", Nev ad DJ Cook, "Buildi Iomes Rating Syste odes. course, students will ns of Environmenta es;	T-IV te Roofing Systems: -Concepts, d, equipments used, method o eddy and K S Nanjunda Rao, v Age International publication ing Materials in Developing C m, CII publications be able to: al issues concerned to building	Filler slabs, Co f casting prefab "Alternative Bu ns. ountries", Wile materials and o	10 Hrs. omposite oricated uilding y pub. cost effective						

3. Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner.

4. Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material.

Course Outcomes	Programme Outcomes (POs)											Prog Outc	ram Specific omes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	2	2	-	1	-	-	-	-			
CO2	2	2	3	-	2	1	-	I	-	I	-	-			
CO3	2	2	3	-	3	-	-	-	1	-	-	-			
CO4	2	1	1	-	2	1	-	-	1	-	-	1			

UCV512E		Credits: 3
L:T:P - 4 : 0: 0	ADVANCED SURVEYING	CIEMarks:50
Total Hours/Week: 3		SEEMarks:50

				011		- -					<u> </u>	
Total station,	GPS,	DGPS,	Drone	survey	-	Introduction,	Types	of	EDM	instrument	s,	Working
principle, App	lication	ns.										

10 Hrs

LINIT-I

UNIT-II 10 Hrs. Measurement of area: Cross staff survey, co-ordinates method, planimeter and digital planimeter. Measurement of volumes-trapezoidal and prismoidal formulae. Measurement of volume by mid ordinate method, trapezoidal and prismoidal formulae.

UNIT–III											
Aerial Photogrammetry: Uses, Aerial photographs, Definitions, Scale of vertical photogr	aph, Ground										
Co-ordinates, Derivation of Relief Displacements formula, Ground control, Procedure of a	erial survey,										
overlaps and pocket and mirror Stereoscope, Derivation of Parallax equations, and	d numerical										
problems.											

Digital Photogrammetry: Introduction, need, instruments used for digital photogrammetry

UNIT–IV	10 Hrs.
Remote Sensing: fundamentals of Remote Sensing. Electromagnetic Spectrum. Proces	s of remote
sensing. Types of reflections, Energy Interactions with earth atmosphere and surface featu	ires, spectral
reflectance curves-For Vegetation, soil & water, Idealized Remote Sensing System	

Geographical Information System: Components, concept, Data acquisition for GIS input-Spatial and Non spatial data, rectification, processing, verification & Data Editing, Storage and Output.

Reference Books *

- 1. B.C. Punmia, Surveying, Vol. 1, 16th Edition, Laxmi Publications, New Delhi.2005
- 2. S. S. Bhavikatti, 'Surveying & Leveling Vol-I', I. K. International New Delhi, 2008
- 3. S.K. Duggal, "Surveying Vol. I & II", Tata McGraw Hill Publishing Co. Ltd. New Delhi.
- 4. R Subramanian, Surveying and Leveling, Second edition, Oxford University Press, New Delhi.
- 5. David Clerk, Plane and Geodetic Surveying Vol1 and Vol2, CBS publishers
- 6. B Bhatia, Remote Sensing and GIS, Oxford University Press, New Delhi.
- 7. T.M Lillesand, R.W Kiefer, and J.W Chipman, Remote sensing and Image interpretation, 5th edition, John Wiley and Sons India
- 8. James M Anderson and Adward M Mikhail, Surveying theory and practice, 7th Edition, Tata McGraw Hill Publication.

Course Outcomes**

After completion of the course student will be able to

1.Obtain distances and elevations in total station, conduct topographic surveys and generate profile drawings, apply the concept of drone in civil engineering surveys,

2. Determine areas and volumes of different terrains using different mathematical approaches

3 Generate Large Scale topographic maps for roads, irrigation works etc...

4. Interpret the satellite images for identifying various features on the ground, prepare base maps in soft copy and hard copy format, use the same for Land Use planning.

Course Outcomes	Programme Outcomes (POs)											Prog Outc	Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	2	2	-	-	-	-	-	-			
CO2	3	2	3	-	2	1	-	-	-	-	-	-			
CO3	3	2	3	-	3	I	-	-	1	-	-	-			
CO4	2	1	1	-	2	1	-	-	1	-	-	1			

UCV513E		Credits: 3
L:T:P - 3 : 0: 0	Irrigation Engineering	CIEMarks:50
Total Hours/Week: 3		SEEMarks:50
	UNIT-I	10 Hrs.
Irrigation Engineering - Int	troduction: Necessity, benefits and ill effects of irri	gation, and its history of
development, Water Resource	es of India and its Demand in Various Sectors Types	of Irrigation, Techniques
of water distribution in the f	arm, quality of irrigation water, Definition of gross	command area, cultural
Water requirement of Crops	s: Soil water system consumptive use duty del	ta and hase period and
problems factors affecting a	and methods to improve duty. Variation of duty it	a and base period, and
seasons in india, irrigation eff	iciencies, frequency of irrigation and numericals.	r a canar notwork, crop
	UNIT-II	10 Hrs.
Canals: Classifications, Regi	me theory, Design of canals cross sections by Lacey	's and Kennedy's method,
Cross section of irrigation ca	nals, Balanced depth, fixing L-section and design co	onsiderations and design.
Cross Drainage works: Type	es, Design considerations, Fluming of canal by M	litra's and Chaturvedis's
formulae. Design problems of	f aqueduct and super passage only.	
	UNIT-III	10Hrs.
Dams and Reservoirs		
Investigation for reservoir si	ite, storage zones, determination of storage capacit	ty using mass curve for
specific yield, economical hei	ght of dam.	ing the costion Dringing!
stresses Stability analysis by	analytical methods and problems	ing the section, Principal
Gravity Dam II. Joints keys a	and water stops. Drainage galleries. Grouting Constru	uction of Galleries
Earthen Dams: Types, Constr	uction. Causes of failure of earthen dams. Seepage co	ontrol measures.
	UNIT-IV	10 Hrs.
Irrigation Project Plannir	ng and Economics	
Project Appraisal, impleme	entation, monitoring and evaluation, Financial A	nalysis of an Irrigation
Project, Scheme Investmen	nt Analysis, Irrigation Project budget and Cost	s, Basic Concepts and
Terminologies in Economic	c Analysis. Numerical problems.	-
Reference Books *		
1. Irrigation Engineeri	ing and Hydraulic Structures" by Santosh	Kumar Garg, Khanna
Publishers, 2015 (7th	n edition), ISBN: 978-8174092456.	
2. "Irrigation Engineeri	ng" by N.N. Basak, Prentice-Hall of India Pvt. L	.td., 2012 (2nd edition),
ISBN: 978-8120345	309.	
3. "Principles of Irrigat	ion Engineering" by V. T. Chowdhury, Prentice-	-Hall of India Pvt. Ltd.,
2004 (1st edition), IS	SBN: 978-8120323185.	
4. "Irrigation Water Ma	anagement" by A.M. Michael, New Age Interna	tional Publishers, 2012
(1st edition), ISBN:	978-8122434679.	
5. "Irrigation and Wat	er Resources Engineering" by G.L. Asawa, N	New Age International
Publishers, 2010 (4th	n edition), ISBN: 978-8122414602.	
Course Outcomes** (Stud	lents will be able to	
1. Able to classify and d	esign the canals longitudinal sections and cross dr	ainage works.
2. To comprehend vario	ous aspects of gravity dam analysis and design	-
•		

- 3. To be able to understand concepts of construction and failure in earthen dams and design of major spillways.
- 4. To know concepts canal falls and regulator works and apply the knowledge in their design

Course Outcomes		Programme Outcomes (POs)											Prog Outco	Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	3	2	-	2	2	-	-	-	-	-	-				
CO2	3	2	3	-	2	1	-	-	-	-	-	-				
CO3	3	2	3	-	3	-	-	-	1	-	-	-				
CO4	2	1	1	-	2	1	-	-	1	-	-	1				

UCV514E		Credits: 3
L:T:P - 3 : 0: 0	Traffic Engineering	CIEMarks:50
Total Hours/Week: 3		SEEMarks:50

Introduction: Definition-Objective Scope of Traffic Engineering. Road User and Vehicle Characteristics Static and Dynamic characteristics- Power performance of vehicles- Resistances to the motion of vehicles-Reaction time of driver- Problems of above

UNIT-II

UNIT-I

10 Hrs.

10 Hrs.

Traffic Parameter Studies and Analysis: Various types of traffic engineering studies, data collection, Objectives and Method of study. Definition of study area- Sample size- Data Collection and Analysis-Interpretation of following Traffic Studies- Volume, Spot Speed study, presentation of spot speed data problems on spot speed, Speed and Delay study Origin and Destination. Parking-on Street and off Street Parking, Accidents-Causes, Analysis (collision with parked vehicle only) Measures to reduce Accident,

Traffic Flow Theories: Traffic flow theory Green shield theory Goodness of fit correlation and regression analysis (linear only)- Queuing theory Car following theory relevant Problems on above. Traffic Regulation-Driver, Vehicle and Road controls- Traffic Regulations- One Way- Traffic Signs- Traffic Markings-Canalization, Classified traffic volume at intersections, PCU, Traffic Rotary elements, analysis of capacity of rotary

Traffic Control: Traffic operation Traffic Signals-Vehicle actuated and synchronized signals Signal Coordination – Intelligent Transport system- Webster's method of signal Design, IRC Method, Street lighting Road Side Furniture.

Reference Books *

- 1. Khanna and Justo., "Highway Engineering" Nemchand Bros
- 2. L.R. Kadiyali., "Traffic Engineering and Transport Plankling". Khann Publisher.
- 3. Matson, Smith and Hurd.," Traffic Engineering ", McGraw Hill and Co
- 4. Traffic flow theory Drew McGraw Hill Co.,

REFERENCE BOOKS:

- 1. Pignataro.," Traffic Engineering"., Prentice Hall
- 2. Highway capacity Manual-2000
- 3. An Introduction to Transportation Engineering, Jotin Khistey and Kent Lall, PHI.
- 4. Traffic Engineering-Mc Shane and Roess, PHI

Scheme of Examination: Student has to answer five questions selecting at least one question from each

UNIT-III

UNIT-IV

10 Hrs.

10 Hrs.

UNIT out of eight.

Course Outcomes**

After completion of the course student will be able to

- 1. Able to analyze the vehicles behavior and reaction time of driver
- 2. Able to interpretate the traffic data in analyzing different vehicular speeds. Able to provide different parking facilities and analyze the accidents and give the remedial measures
- 3. Understand the traffic flow behavior able to design rotary and channelization
- 4. Design the signals by different methods and understands ITS

Course Outcomes		Programme Outcomes (POs)											Prog	gram Specific comes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	3	2	-	2	2	-	-	-	-	-	-				
CO2	3	2	3	-	2	1	-	-	-	-	-	-				
CO3	3	2	3	-	3	-	-	-	1	-	-	-				
CO4	2	1	1	-	2	1	-	-	1	-	-	1				

21UCV521N
L:T:P - 3 : 0: 0
Total Hours/Week: 3

GREEN BUILDING TECHNOLOGY

erealts: e
CIE Marks: 50
SEE Marks: 50

Credits: 3

	UNIT-I	10 Hrs.
eek: 3		SEE Mark

Introduction of green building, Concept of green building, History of green building, Need of green building in present scenario, Importance of green building Merits and demerits, Classification of green building, Assessment methods Global assessment and certification, Local assessment, LEED (Leadership in energy and environmental design) GRIHA (Green Rating for Integrated Habitat Assessment), IGBC (Indian Green Building Council) and Green star rating systems.

UNIT-II

10 Hrs.

Principles and elements of design of green building; Sustainability: concept and reality Climate responsive process of design: Climatic zones, design sequence, shelter or form, land form, vegetation, water bodies, street widths, open spaces, ground character, plan form, orientation, roof form Shading devices and their effect.

Thermal comfort inside the building: Factors affecting, indices, cooling and heating requirement, Heat transmission through building sections, thermal performance of building sections, simple calculation for U value and insulation thickness Day lighting Ventilation.

			U	NIT	–IV				10	Hrs.	
Water	conservation:	3	R's	for	water	conservation,	rain	water	harvesting,	low	flov

fixtures, grey water recycling Material conservation: concept of embodied energy, low energy materials, sustainable materials, alternative materials Concept of carbon emission and its reduction

Bureau of energy efficiency: Functions, policies, guidelines, Energy Conservation Building Code, Study of existing green buildings.

REFERENCE BOOKS**

- 1. Climate responsive architecture (A design hand book for energy efficient buildings), Arvind Krishnana, Simos Yannas, Nick Baker, S V Szokolay, McGraw hill Education, Seventh reprint, 2013.
- Renewable Energy and Environment -A Policy Analysis for India, H, Ravindranath, K Usha Rao, B Natarajan, P Monga, Tata McGraw Hill, 2000.Energy and the Environment, JM Fowler, McGraw Hill, New York, 2nd Edition, 1984.IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian Green Building Council Publishers.
- 3. GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.
- 4. Non-Conventional Energy Resources by G. D. Rai, Khanna Publishers.
- 5. Sustainable Building Design Manual, Vol.1 and 2, TERI, New Delhi 2004.
- 6. Mike Montoya, Green Building Fundamentals, Pearson, USA, 2010.
- Charles J. Kibert, Sustainable Construction Green Building Design and Delivery, John Wiley &Sons, New York, 2008.
- Regina Leffers, Sustainable Construction and Design, Pearson / Prentice Hall, USA, 2009.
- 9. Handbook on functional requirements of buildings (SP41), BIS, New Delhi, 1987.
- 10. Energy Conservation building code (ECBC), Bureau of energy efficiency, 2011.

Course Outcomes**

After completion of the course student will be able to

- 1. understand, recognize, and evaluate green building's significance, principles, and advantages and disadvantages in sustainable construction.
- gain a comprehensive understanding of green building design principles and sustainability concepts, with a focus on climate-responsive design processes, shading devices, and their effects on building performance.
- 3. proficiently optimize thermal comfort, daylighting, and ventilation in buildings, creating sustainable and comfortable indoor environments.
- 4. understand and apply water and material conservation techniques, grasp the concept of embodied energy and carbon emissions reduction, and analyze existing green buildings and the role of the Bureau of Energy Efficiency.

^{*} Books to be listed as per the format with decreasing level of coverage of syllabus ** Each CO to be written with proper action word and should be assessable and

quantifiable															
Course Outcomes			Р	rog	Program Specific Outcomes (PSOs)										
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	2	3	2	-	-	-	2		2	
CO2	3	2	-	-	-	1	3	2	-	-	-	2		2	
CO3	3	2	-	-	-	-	3	2	1	-	-	2		2	
CO4	2	2	-	-	-	1	3	2	1	-	-	2		2	

21UCV522N	REMOTE SENSING AND GIS	Credits: 3
L:T:P - 3 : 0: 0	(OPENELECTIVE)	CIEMarks:50
Total Hours/Week: 3		SEEMarks:50

UNIT-I	10 Hrs.
UNIT-1	
Basics: Fundamentals of Remote Sensing, Electromagnetic Spectrum, Process of rem	ote sensing,
Types of reflections, Energy Interactions with earth atmosphere and surface featur	es, spectral
reflectance curves-For Vegetation, soil & water, Idealised Remote Sensing System	_

Sensors: Definition, Sensor Parameters, Types, Choice of sensor, Optical Remote Sensing, Across and Along track scanning systems.

Platforms: Definition, Space borne platform attitudes (only definitions, No Problems).

UNIT-II

Indian Remote Sensing Programme: Definition and Objectives

Satellite Specifications for IRS-1C, 1D, CARTOSAT-1 & CARTOSAT-2 - Ikonos, Quickbird, Risat.

			-							-
Visual	Image	Interpretation:	Definition,	Objectives,	Keys	&	Elements	of	Visual	Image
interpre	tation.									

Digital Image Processing (DIP):(No problems/programming on DIP) Definition, Image Rectification & Restoration, image enhancement (contrast manipulation-Grey Level Thresholding, Level Slicing only), Supervised Image Classification using minimum distance to means classifier algorithm- GIS integration –stages & procedure., Image Filtering (spatial filters) -Low Pass and High pass image filters.(Brief discussion only, no problems or programming)

Applications of REMOTE sensing in urban applications and water resource management

UNIT-III

Maps and Projections

Map Projections Plane and geodetic, latitude and longitude map projections, types of map projections Spheroid, Datum (WGS84 Datum) and UTM (No Problems) GIS:

History, Definition, Components, concept, Data acquisition for GIS input-Spatial (Vector, Raster & Surface data) & Non spatial data, rectification, processing, verification & Data Editing, Storage and Output.

GIS functions in vector and raster data- Input, Analysis and out put

GIS Analysis (Vector Data- Buffering & Overlay analysis using overlay operators)

GIS Analysis (Raster Data-Local Operations and neighbourhood using arithmetic, Logical and Overlay operators)

Cartography-Definition, basic map layout, significance of cartography

Data Standards in GIS errors, precision and accuracy-Definition and Types

UNIT-IV

10 Hrs.

10 Hrs.

10 Hrs.

Advanced Concepts: LIDAR, Virtual GIS. (Brief Discussion only) GPS.- Definition, working principle, segments and uses (Brief Discussion only) Procedure of Compiling: geology map of a district.

Applications of GIS and Remote Sensing:

- 1) Identifying suitable site for urban development
- 2) Planning of network for sewage collection and transport (laying of sewer lines)

3) Ground water Vulnerability assessment.

4) Land Use Land Cover mapping (LU/LC).

Drainage Patterns-Definition, Types, significance.

Reference Books *

- 1. B Bhatia, Remote Sensing and GIS, Oxford University Press, New Delhi.
- T.M Lillesand, R.W Kiefer, and J.W Chipman, Remote sensing and Image interpretation, 5th edition, John Wiley and Sons India
- 3. Geographical Information Systems, C.P.Lo and Albert Yoing, 2nd edition, Preintice hall publications-2005

Course Outcomes**

The student will be able to

1.Explore the advantages of remote sensing and procedure of using satellite image for various civil engineering applications.

2. Apply, Method of rectifying and acquiring required data from satellite image and carry out analysis to get object specific results.

3. Integrate data from various data sources and extract relevant information related to geography, by performing GIS data analysis.

4. Use recent technologies like GIS and RS, for civil engineering applications, to meet project/work requirements in short time and on large scale.

Course Outcomes		Programme Outcomes (POs)												Program Specific Outcomes (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO1	3	3	2	-	2	2	-	-	-	-	-	-					
CO2	3	2	3	-	2	1	-	-	-	-	-	-					
CO3	3	2	3	-	3	-	-	-	1	-	-	-					
CO4	2	1	1	-	2	1	-	-	1	-	-	1					

21UCV523N		Credit	ts: 3							
L:T:P - 4 : 0: 0	Air Pollution and Control	CIE Mark	<s: 50<="" th=""></s:>							
Total Hours/Week: 4		SEE Marl	ks: 50							
	UNIT-I		10 Hrs.							
Introduction.										
Definition. Sources.	classification and characterization	of air pc	ollutants.							
Effects of air pollut	ion on health vegetation & materials	s Atmosph	nere and							
water bodies. Photo-chemical Smog.										
water boares, i noto c	UNIT-II		10 Hrs.							
Meteorology:										
Temperature lanse rat	e & stability wind velocity & turbulen	ice nlume l	behavior							
measurement of met	eorological variables, wind rose diag	grams. Plui	me Rise.							
estimation of effective	we stack height and mixing depths.	Developme	nt of air							
quality models-Gauss	ian dispersion model	I								
	UNIT-III		10 Hrs.							
Sampling: Sampling of particulate and gaseous pollutants (Stack, Ambient & indoor air pollution), Monitoring and analysis of air pollutants (PM _{2.5} , PM ₁₀ , SO _x , NO _x , CO NH ₂) and Air pollution emission standards										
	UNIT-IV		10 Hrs.							
Control Techniques:										
Air pollution control	devices, equipment and their design.	Particulat	e matter							
and gaseous pollutant	s- settling chambers, cyclone separator	rs, scrubber	s, filters							
& ESP Including Nu	imerical problems	,	,							
	prociems									
Reference Books *										
Text Books:										
 M. N. Rao and H V H. C. Perkins, "Air Mackenzie Davis Engineering" McGrav 	N Rao, "Air pollution", Tata Mc-G rapollution". Tata McGraw Hill Publicat and David Cornwell, "Introduction w-Hill Co.	w Hill Publ ion to Envir	lication. onmental							
Keterence Books:1. Noel De Nevers, "A	Air Pollution Control Engineering", Wa	aveland Pr	Inc.							

2. Anjaneyulu Y, "Text book of Air Pollution and Control Technologies", Allied Publishers

Course Outcomes**

Course outcomes:

After studying this course, students will be able to:

1. Identify the major sources of air pollution and understand their effects on health and environment.

2. Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.

3. Ascertain and evaluate sampling techniques for atmospheric and stack pollutants.

4. Choose and design control techniques for particulate and gaseous emissions.

* Books to be listed as per the format with decreasing level of coverage of syllabus ** Each CO to be written with proper action word and should be assessable and quantifiable

Course			1	Programme Specific											
Outcomes		Programme Outcomes											Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	PSO3
CO 1	1	2	1								1	1	2		
CO 2	1	1	2								2	1	2		
CO 3	1	2	1								1	1	2		
CO 4	1	1	1								2	1	2		
Ave Attainment	1	1.5	1.25								1.2	1	2		

21UCV506L-GEOTECHNICAL ENGINEERING LABORATORY

Pre-requisites: Geotechnical Engineering I

Course Outcomes

The student will be able to

CO1: To estimate index properties of soils (coarse and fine)

CO2: To estimate index properties of soils (coarse and fine)

CO3: To estimate shear strength of soils by direct shear test, triaxial shear test, vane shear test & unconfined compressive test

CO4: To estimate the engineering properties of the soils by density test, CBR test permeability test and consolidation test

List of experiments:

- 1. Specific gravity of coarse and fine grained soils
- 2. Sieve analysis
- 3. Atterberg's limits and indices
- 4. Determination of field density (a) sand replacement method, (b) Core cutter method
- 5. Determination of coefficient of permeability by (a) Constant head method, (b) Variable head method
- 6. Consolidation test
- 7. Compaction test (a) IS light compaction test, (b) IS heavy compaction test
- 8. California Bearing Ratio test
- 9. Direct shear test
- 10. Triaxial shear test
- 11. Unconfined compressive strength test
- 12. Laboratory vane shear test

References:

- 1. Relevant Indian standard codes
- 2. Geotechnical Laboratory Manual
- **3**. SP 36-1 (1987): Compendium of Indian Standards on Soil Engineering: Part-1 Laboratory Testing of Soils for civil Engineering Purposes.
- 4. SP 36-2 (1988): Compendium of Indian Standards on Soil Engineering: Part-2 Field Testing of Soils For Civil Engineering Purposes.

L	Т	Р	С
0	0	3	2

	VI semester												
Sl.	Category	Subject Code	Subject Title	Credits	HO WE	URS/ EK	/	EXAMINATION MARKS					
10.		-			L	Т	Р	CIE	SEE	Total			
1.	BSC	21UMA601C	Numerical Methods in Civil Engineering	3	3	0	0	50	50	100			
2.	PCC	21UCV602C	Design of RC Structures3300						50	100			
3.	PCC	21UCV603C	Design of Steel Structures	3	3	0	0	50	50	100			
4.	PEC	21UCV6XXE	Professional Elective Course - II	3	3	0	0	50	50	100			
5.	OEC	21UCV6XXN	Open Elective Course - II	3	3	0	0	50	50	100			
6.	OEC	21UCV6XXN	Open Elective Course - III	3	3	3 0 0			50	100			
7.	PCC	21UCV604L	Environmental Engineering Lab	1	0	0 0 2			50	100			
8.	PCC	21UCV605L	Computer Aided Analysis and Detailing of RC Structures Lab1002					50	50	100			
9.	MP	21UCV606P	Mini Project (Extensive Survey Project)	2		NA			50	100			
10.	HSSM	21UBT621C	Environmental Studies	1	1	0	0	50	50	100			
			Total	23	22	0	4	500	500	100			

		Open Electiv	e Course - II	Open Elective Course - III					
Sl. No	Category	Subject Code	Subject Title		Category	Subject Code	Subject Title		
1.	OEC	21UCV631N	Occupational Health and Safety	1.	OEC	21UCV642N	Green Building Technology		
2.	OEC	21UCV632N	Project Management and Economics	2.	OEC	21UCV643N	Remote Sensing and GIS		
3.	OEC	21UCV633N	Disaster Management	3.	OEC	21UCV543N	Process Economics and Plant Design		

21UMA601C	NUMERICAL TECHNIQUES AND	Credits: 3							
L:T:P - 3 : 0: 0	STATISTICAL ANALYSIS IN CIVIL ENGINEERING	CIE Marks: 50							
Total Hours/Week: 3		SEE Marks: 50							
	LINIT-I	10Hrs							
Introduction: Historical development of numerical techniques. Pole in investigations, research									
and design in the field of Civil Engineering Application of Solution of Linear System of									
Equations To Civil Engineering Problems									
Development of simultaneous equations from problems in construction planning slope deflection									
method applied to beams frames and truss analysis using Gaussian elimination method. Gauss-									
Jordan matrix inversion me	thod Gauss-Siedel method Cholesky decompose	sition method.							
	UNIT-II	10 Hrs.							
Application of Root Fin	ding To Civil Engineering Problems: Deve	lopment of non-linear							
algebraic and transcender	tal equations from problems in hydraulics	irrigation engineering							
structural engineering and	environmental engineering using Bisection	method and Newton-							
Raphson method.	environmental engineering aoing Disection								
Application of Numerical	Integration for Solving Simple Beam Problem	18							
Computation of area of B	MD drawn for statically determinate beams by	V Trapezoidal rule and							
Simpson's one third rule.		I. I. I. I. I. I. I. I. I. I. I. I. I. I							
1	UNIT-III	10 Hrs.							
Application of Finite Difference Techniques In Structural Mechanics:									
i) Introduction, expression	n of derivatives by finite difference, backward	d differences, forward							
differences and central diffe	erences.	,							
ii) Application of finite dif	ference method to analysis of Statically determ	inate beams, Statically							
indeterminate beams, Buck	ling of columns.	•							
	UNIT-IV	10 Hrs.							
Application of probability	v and probability distribution in Civil Enginee	ring problems:							
Review of basic probability concepts, measures of central value (mean, median, mode),									
Probability distributions inc	cluding Binomial, Poisson, Normal, test of hypot	hesis, chi-square test.							
Reference Books *									
1 I D Saarbarough Nu	umarical Mathematical Analysis 6th adition Out	ord and IDU Naw							
D_{a} D_{b} 2005	imerical Mathematical Analysis, our edition, Oxf	oru anu idir new							
2 Mario Salvadori Numarical Mathada in Engineering DUI 1061									
 Main Sarvatori- Tunnerical Methods in Engineering, 1111, 1201. M K Jain S R K Jyengar and R K Jain- Numerical Methods for Scientific and Engineering 									
computation New Publications New Delhi 2012									
4 S S Sastry- Introductory Methods of Numerical Analysis 5th edition PHI New Delhi									
2012.									
5. E Balagurusamy - Nu	umerical Methods, Tata Mc Graw Hill, 2017.								
6. H C Saxena - Examp	6. H C Saxena - Examples in Finite Differences and Numerical Analysis, S Chand & Co. New								
Delhi, 1975.									
7. Probability concepts in Engineering, Alferdo H S Ang and Wilson H Tang, 2 nd Edition, John									
Wiley and Sons,									

- 8. Probability and Statistics for Engineers Richard A Johnson
- 9. Probability and Statistics for Science and Engineering G Shankar Rao

Course Outcomes**

After completion of the course student will be able to

- 1. Solve linear system of equations related to civil engineering problems using Gauss elimination, Gauss-Siedel, Gauss-Jordan matrix inversion, Cholesky's decomposition methods. Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.
- 2. Find roots of non-linear algebraic and transcendental equations related to civil engineering problems using bisection and Newton-Raphson method.
- 3. Solve differential equations by finite difference method for determinate and indeterminate beams and buckling of columns.
- 4. Apply probability and probability distributions, such as the binomial, Poisson, and normal distributions, as well as measures of central value and dispersion, in solving civil engineering problems and conducting hypothesis testing.

*Books to be listed as per the format with decreasing level of coverage of syllabus ** Each CO to be written with proper action word and should be assessable and quantifiable

Course Progra Outcomes						ramme Outcomes								Programme Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO 1	3	3											2	1	1	
CO 2	3	3											2	1	1	
CO 3	3	3	3	3									1	1	1	
CO 4	3			2									2	2	1	
Average	3	3	3	2.5									1.75	1.25	1	

	Civil Engineering Department	G 14							
21UCV602C	DESIGN OF RC STRUCTURES	Credits: 3							
L:T:P - 3 : 0: 0	DESIGN OF RC STRUCTURES	CIE Marks	:: 50						
Total Hours/Week: 3		SEE Marks	3: 50						
	UNIT-I		11 Hrs						
General features reinforced concrete: of Introduction, Design loads, Materials for reinforced									
concrete, Code requirements of reinforcements, Elastic theory of RC sections, Moment of resistance									
of section, Balanced, under reinforced and over reinforced section.									
Principles of limit state design and ultimate strength of RC section: Philosophy of Limit state									
design, Principles of limit states, Factor of safety, Characteristic and design loads, Characteristic and									
design strength, General a	design strength, General aspects of ultimate strength, Stress block parameters for limit state of								
collapse, Ultimate flexural	strength of rectangular sections, Ultimate flex	ural strength c	of flanged						
sections, Ultimate flexural	strength of doubly reinforced sections, Ultima	ite shear streng	th of RC						
sections, Ultimate torsional	strength of RC sections, Concepts of developme	ent length and a	inchorage,						
Analysis examples for rec	tangular sections, flanged sections, doubly rel	inforced, sectio	ons, snear						
strength and development lo	ength.		11 TT						
			II Hrs.						
Limit state: General asp	pects, Deflection limits in IS: 456-2000, Ca	alculation of	deflection						
(Theoretical method), Crac	cking Serviceability in structural concrete men	ibers. Design o	of beams:						
Practical requirements of a	n RCC beam, Size of the beam, Cover to the Re	einforcement, S	spacing of						
bars, Design procedure, Cri	tical sections for moments and		•						
Shear, Anchorage of t	Shear, Anchorage of bars: check for development length, Reinforcement requirements,								
Slenderness limits for bear	Slenderness limits for beams to ensure lateral stability, Design examples for simply supported and								
canthever beams (rectangui			00 II						
Degign of glaba: Introducti	on Conserved consideration of design of slabs. De	atangular alaha							
in one direction Restance	ular slabs spanning in two directions for vario	us boundary o	onditions						
Design of simply supported	I slabs cantilever slabs	us boundary c	onunions,						
Design of columns: Gene	ral aspects. Effective length Loads on column	s Slenderness	limits for						
columns. Minimum eccent	ricity. Design of short axially loaded columns.	Design of colum	nn subject						
to combined axial load and	uniaxial moment using SP 16.		in subject						
	UNIT-IV		09 Hrs.						
Design of footings: Introdu	uction, Load for foundation, Design basis (limit	state method),	Design of						
isolated square or rectangul	ar footing for axial load.		-						
Design of stair case: General features, types of stair case, Loads on stair cases, effective span as per									
IS codal provisions, distribution of loading on stairs, design of stair cases.									
Reference Books *									
1. Unnikrisnnan and Devadas Menon, Design of reinforced concrete structures, PHI, New Delhi. 2013.									
2. Karve S.R. and Shah V.L, Limit state theory and design of reinforced concrete, Vidyarthi									
Prakashan, Pune. 2017.									
3. A.K. Jain, Limit state method of design, Nemchand and Bros, Roorikee, Jan 2012.									
4. Park and Paulay, Reinforced concrete, John Wiley & Sons. 1975.									
5. Kong and Evans, Reinforced and prestressed concrete, ELBS, London									
6. H.J. Shah, Reinforced concrete Vol. I, Charotor Publishing House, Anand. Jan 2016.									
7. IS: 456-2000, SP-24, SP-1	7. IS: 456-2000, SP-24, SP-16.								
Note: Use of IS: 456-2000 is permitted and SP-16 to be used in design of columns only).									
Course Outcomes**

After completion of the course student will be able to

1. Students will have the knowledge of methods of design of RC sections & will analyse the different RC sections.

2. Student will be able to solve the problems related to serviceability conditions and design different beam sections.

3. Student will be able to design different slab and columns.

4. Student will able to design staircase and isolated footing footings.

*Books to be listed as per the format with decreasing level of coverage of syllabus ** Each CO to be written with proper action word and should be assessable and quantifiable

Course Outcomes		Programme Outcomes													Programme Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO 1	3	3											2	1			
CO 2	3	3											2	2			
CO 3	3	3	3	3									2	2			
CO 4	3			2									2	1			
Average	3	3	3	2.5									2	1.5			

210C vousc Design of Steel Structures Hrs/Week : 03 Image: Constructure of the structure of the st	v3-Creatts (3:0:0)								
Hrs/Week : 03 UNIT - I Total Hours: 40 UNIT - I Introduction: Advantages & Disadvantages of steel structures, Loads & Load combir method of design, section classification. Plastic behavior of structural steel: Introduction, Plastic theory, plastic hinge concept, p									
Total Hours: 40 UNIT - I Introduction: Advantages & Disadvantages of steel structures, Loads & Load combiner method of design, section classification. Plastic behavior of structural steel: Introduction, Plastic theory, plastic hinge concept, p	CIE Marks:50								
UNIT - I Introduction: Advantages & Disadvantages of steel structures, Loads & Load combir method of design, section classification. Plastic behavior of structural steel: Introduction, Plastic theory, plastic hinge concept, p	SEE Marks:50								
Introduction : Advantages & Disadvantages of steel structures, Loads & Load combine method of design, section classification. Plastic behavior of structural steel : Introduction, Plastic theory, plastic hinge concept, p	10 Hrs								
method of design, section classification. Plastic behavior of structural steel : Introduction, Plastic theory, plastic hinge concept, p	ations, Limit State								
Plastic behavior of structural steel: Introduction, Plastic theory, plastic hinge concept, p									
	lastic collapse load,								
condition of plastic analysis, theorem of plastic collapse, methods of plastic analysis,	plastic analysis of								
continuous beam.									
UNIT – II	10 Hrs								
Bolted Connections: Introduction, Behavior of bolted joints, design strength of ordinary	black bolts, simple								
connections, moment resistant connections, beam to beam connections.									
Welded Connections: Introduction, advantages of welding, types and properties of welds, t	ypes of joints, weld								
symbols, weld specifications, effective area of welds, design of fillet welds, moment re	sistant connections,								
continuous beam to beam connections.									
UNIT - III	10 Hrs								
Design of Compression members: Introduction, failure modes, Behavior of compression m	ember, sections								
used for compression members, effective length, design of compression members, Columns	including built up								
sections Laced and Battened systems, slab base connections.	0 1								
UNIT - IV	10 Hrs								
Design of Tancian members. Introduction Types of tension members, factors officing the	atronath of tancion								
initiation, beam types, section emissification, design of interany supported and unsupport	d boums.								
Reference Books:									
1. N. Subramanian, Design of Steel Structures, Oxford Publications, 2008									
2. Ramachandra, Design of Steel Structures, Standard Book House, New Delhi, 2016.									
3. Duggal, S. K, Design of Steel Structure, Tata McGraw Hill Publications, 2017.									
4. Punmia, B. C, Comprehensive Design of Steel Structures, Laxmi Publications, 2015.									
5. Karve, Design of Steel Structures (Limit State Method), Structures Publications, Pune.									
6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house Pvt. Ltd, 2012									
 6. Bhavikatti S.S. Design of Steel Structures (Limit State Method), I K International Publishing house 7. Nagi Design of Steel Structures Tate McGraw Hill Publications, New Dalbi, 2nd Edition, 2017. 	7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017.								
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. 	CODE BOOKS								
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007. Steel tables (to be supplied in examinations). 									
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) OUESTION PAPER PATTERN FOR SEE 									
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) QUESTION PAPER PATTERN FOR SEE O. No. 1 is compulsory 									
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) QUESTION PAPER PATTERN FOR SEE Q. No. 1 is compulsory Total of Eight Ouestions with two from each unit to be set uniformly covering the entire sville 	abus.								
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) QUESTION PAPER PATTERN FOR SEE Q. No. 1 is compulsory Total of Eight Questions with two from each unit to be set uniformly covering the entire syll. Each Question should not have more than four sub divisions. 	abus.								
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) QUESTION PAPER PATTERN FOR SEE Q. No. 1 is compulsory Total of Eight Questions with two from each unit to be set uniformly covering the entire syll. Each Question should not have more than four sub divisions. Any FOUR Full questions are to be answered choosing at least one from each unit. 	abus.								
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) QUESTION PAPER PATTERN FOR SEE Q. No. 1 is compulsory Total of Eight Questions with two from each unit to be set uniformly covering the entire syll. Each Question should not have more than four sub divisions. Any FOUR Full questions are to be answered choosing at least one from each unit. Course Outcomes: After completion of the course students will be able to understand 	abus.								
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) QUESTION PAPER PATTERN FOR SEE Q. No. 1 is compulsory Total of Eight Questions with two from each unit to be set uniformly covering the entire syll. Each Question should not have more than four sub divisions. Any FOUR Full questions are to be answered choosing at least one from each unit. Course Outcomes: After completion of the course students will be able to understand Different types of loads and their combinations along with an approach to plastic analysis 	abus.								
 6. Bhavikati S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) QUESTION PAPER PATTERN FOR SEE Q. No. 1 is compulsory Total of Eight Questions with two from each unit to be set uniformly covering the entire syll. Each Question should not have more than four sub divisions. Any FOUR Full questions are to be answered choosing at least one from each unit. Course Outcomes: After completion of the course students will be able to understand Different types of loads and their combinations along with an approach to plastic analysis sections with limit state approach. 	abus. in designing the stee								
 6. Bhavikati S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) QUESTION PAPER PATTERN FOR SEE Q. No. 1 is compulsory Total of Eight Questions with two from each unit to be set uniformly covering the entire syll. Each Question should not have more than four sub divisions. Any FOUR Full questions are to be answered choosing at least one from each unit. Course Outcomes: After completion of the course students will be able to understand Different types of loads and their combinations along with an approach to plastic analysis sections with limit state approach. Different types of bolts and welds with their connections to different members in a joint. 	abus.								
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) QUESTION PAPER PATTERN FOR SEE Q. No. 1 is compulsory Total of Eight Questions with two from each unit to be set uniformly covering the entire syll Each Question should not have more than four sub divisions. Any FOUR Full questions are to be answered choosing at least one from each unit. Course Outcomes: After completion of the course students will be able to understand Different types of loads and their combinations along with an approach to plastic analysis sections with limit state approach. Different types of bolts and welds with their connections to different members in a joint. Design the compression members along with different built up sections like lacings and batter 	abus. in designing the steel								
 6. Bhavikatti S.S, Design of Steel Structures (Limit State Method), I K International Publishing house 7. Negi, Design of Steel Structures, Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2017. CODE BOOKS IS-800-2007, Steel tables (to be supplied in examinations) QUESTION PAPER PATTERN FOR SEE Q. No. 1 is compulsory Total of Eight Questions with two from each unit to be set uniformly covering the entire syll Each Question should not have more than four sub divisions. Any FOUR Full questions are to be answered choosing at least one from each unit. Course Outcomes: After completion of the course students will be able to understand Different types of loads and their combinations along with an approach to plastic analysis sections with limit state approach. Different types of bolts and welds with their connections to different members in a joint. Design the compression members along with different built up sections like lacings and batter of the set of t	abus. in designing the steel								

	CO MAPPING WITH PO'S AND PSO'S														
	PO	РО	РО	РО	РО	РО	РО	РО	РО	PO 10	РО	PO 12	PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	1010	11	1012	1	2	3
CO 1	3	3	3			2		3				2		2	
CO 2	3	3	3			2		3				2		2	
CO	3	3	3			2		3				2		2	

3										
CO4	3	3	3	 	2	 3	 	 2	 2	

21UCV604L		Credits: 1
L:T:P - 0 : 0: 2	ENVIRONMENTAL ENGINEERING LAB	CIE Marks: 50
Total Hours/Week: 4		SEE Marks: 50

I. Tests on Water Quality

i. Physical Parameters

- 1) To find the colour of a given sample of water.
- 2) To find the turbidity of a given sample of water.
- 3) To determine the conductivity of a given sample of water.
- 4) To determine the temperature of a given sample of water.

ii. Chemical Parameters

1) To find out total dissolved solid, settle able solids, suspended solids and volatile solids of the given sample

- 2) To determine the pH value of a given sample of water.
- 3) To determine the acidity of a given sample of water.
- 4) To determine the carbonate, bicarbonate, and hydroxide alkalinity of a sample.
- 5) To find out the concentration of chlorides in the given sample of water.
- 6) To estimate the hardness of the given sample of water by standard EDTA method.
- 7) To determine the sulphate of a given sample of water.
- 8) To determine the fluoride of a given sample of water.
- 9) To determine the Iron of a given sample of water.
- 10) To determine residual chlorine in a given sample of water.
- 11) To determine chlorine demand for the given sample of water.
- 12) To determine nitrate in a given sample of water.
- 13) To determine dissolved oxygen in a given sample of water.

iii. Bacteriological Parameters

- 1) To determine MPN of coliforms of the given sample.
- 2) Microbial Examination of Water Samples Using the Membrane Filtration Technique.

II. Tests on Sewage

1) To determine biochemical oxygen demand (BOD) exerted by the given waste water sample

2) To determine Chemical oxygen demand (COD) exerted by the given waste water sample

III. Other Tests

- 1) To determine the optimum dose of alum required to treat the given water.
- 2) To determine the percentage of chlorine present in the given bleaching powder.

References *

- 1. Manual of Water and Wastewater Analysis- NEERI Publication 1988.
- 2. Standard methods for Examination of Water and Wastewater Analysis APHA, AWWA. 2011.
- 3. Manual for Sewer and Sewerage, Central Public Health & Environmental Engineering Organization, Ministry of Housing and Urban Development, Govt. of India.
- 4. Manual for water supply and treatment, Central Public Health & Environmental Engineering Organization, Ministry of Housing and Urban Development, Govt. of India.

Course Outcomes**

After completion of the course student will be able to

1. Able to determine the physical, chemical and biological parameters for drinking purpose as per BIS standards.

- 2. Analyze the test results and recommend the water for its potability.
- 3. Identify and characterize wastewater using standard methods.
- 4. Analyze the test results and recommend wastewater for its disposal.

* Books to be listed as per the format with decreasing level of coverage of syllabus ** Each CO to be written with proper action word and should be assessable and quantifiable

Course Outcomes		Programme Outcomes (POs)												Program Specific Outcomes (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO1	3	3	2	2	2	2	2	-	2	1	-	2	3	2	3		
CO2	3	3	2	2	1	1	2	-	1	1	-	2	3	2	2		
CO3	3	3	2	2	2	1	2	-	2	1	-	2	3	2	3		
CO4	3	2	-	-	-	-	-	-	-	-	-	-	2	2	-		

1UCV605L		01-Credits								
	COMPUTER AIDED ANALYSIS AND DETAILING	(0:0:2)								
Hrs/Week: 03	OF RC STRUCTURES LAB	CIE Marks:50								
Total Hours: 40		SEE Marks:50								
	PART – A (STAAD-Pro)	10 Hrs								
ANALYSIS AND	DESIGN SOFTWARES: Analysis and Design of struc	tural Engineering								
components using com	mmercially available Software's: Cantilevers, Simply supported	ed beams, Propped								
Cantilevers, Fixed and	d Continuous Beams. 2D Portal frames - Single and Multistor	ied.								
	PART – B (AUTO CAD)	10 Hrs								
1. Drawing of the Lag	y out plan of Residential Building showing position of the colu	imns, beams and								
footing.										
2. Drawing and Detail	iling of RC Lintels, Beams and Slab (One way, Two way and	Cantilever)								
3. Drawing and Detail	iling of RC Stair									
Reference Books:										
N. Krishna Raju, Stru	uctural design and drawing Reinforced concrete and steel,	2 nd edition, 2004,								
University Press, Hyde	erabad.									
Training manuals, Use	er manuals and relevant code books									
I ahanatany agagama										
Laboratory assessme	III:									
1. Laboratory subject	is evaluated for 100 marks (50 CIE and 50 SEE).									
2. Allocation of 50 III	arks for CIE									
Morles for each our	outhat while - up. -20 merily/No. of proposed superiments									
One Prestical test	for 20 Marks (5 marks for write up 10 marks for conduction	aplaulation								
	for 20 Marks. (5 marks for write-up, 10 marks for conduction,	calculation,								
results etc.	nortes for SEE									
5. Allocation of 50 m	3. Allocation of 50 marks for SEE.									
25% write-up, 50% conduction, calculation, results etc., 25% viva-voce										
5 Students will be able to use software skills in a professional set up to automate the work and										
J. Students will D	e able to use software skills in a professional set up to automat	e the work and								
C Students will b	cycle time for completion of the work.									
6. Students will b	6. Students will be able to draw the RC elements and detail it.									

BVV Sangha's Basaveshwar Engineering College (Autonomous), Bagalkot Civil Engineering Department Professional Elective Course – II

21UCV611E		Credits: 3								
L:T:P - 3 : 0 : 0	MATRIX METHOD OF STRUCTURAL ANALYSIS	CIE Marks: 50								
Total Hours/Week: 3		SEE Marks: 50								
	UNIT-I	11 Hrs								
Definitio	ns and Concents: Comparison of classical matrix and appro	aximate methods of								
structural	analysis System approach versus Element approach de	egrees of freedom								
coordinat	e systems, stiffness and flexibility coefficients, Flexibi	lity and stiffness								
Flexibilit	memoas. Flexibility Method: Introduction, element flexibility matrix Principle of									
contragra	dience, construction of member and structure flexibility matri	ix, determination of								
member	forces. Procedure for analysis of indeterminate struct	tures: analysis of								
continuou	is beams and	,								
plane frar	nes.									
	UNIT–II	11 Hrs.								
Flexibilit	y Method Continued: Analysis of indeterminate structures	s: analysis of plane								
trusses.										
Stiffness	Method: Introduction, element stiffness matrix, Principle of	of contragradience,								
construct	ion of member and structure stiffness matrix, determin	nation of member								
displacem	nents, solution procedure, Analysis of indeterminate structur	res: continuous								
beams.										
	UNIT–III	9 Hrs.								
Stiffness	Method continued: Analysis of indeterminate structures	: plane frames and								
plane trus	sses.									
	UNIT-IV	9 Hrs.								
Direct St stiffness boundary continuou	tiffness Method: Introduction, transformation of variables, matrix for member of truss and continuous beams. Globa conditions, computation of internal forces, analysis of us beams.	, transformation of al stiffness matrix, plane trusses and								
Reference	Books *									
 William Weaver Jr. and James M Gere – Matrix Analysis of Framed Structures, CBS Publishers and distributors, New Delhi, 2018. Kassimali Aslam – Matrix Analysis of Structures, Cengage Learning Custom Publishing, Boston USA, 2011. 										
3. Neville A CRC Pres	M, Ghali A- Structural Analysis: A Unified Classical and ss, 2009.	Matrıx Approach,								

Course	Outc	ome	S**												
1. Knowle	wledge of definitions, basic concepts, comparison of classical and matrix methods,														
force a	nd o	lispl	isplacement methods, system and element approach methods. Evaluate												
membe	r for	ces for continuous beams and plane frames by force transformation method.													
2. Evaluat	e me	member forces for trusses by flexibility matrix method. Knowledge ofconcepts													
associa	ed with stiffness matrix method. Evaluate member forces for continuous beams														
by disp	lacement transformation method.														
3. Evaluat	e me	ember forces for plane frames and trusses by displacement transformation													
method															
4. Knowledge of basic concepts associated with direct stiffness method. Evaluate member															
forces for continuous beams and trusses by direct stiffness method															
Course		Programme Outcomes (POs)Program													
Outcomes														Specific	
														Outcome	'S
														(PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	3	2	3	3	-	-	-	-	-	-	2	2	2
CO 2	3	3	3	3	3	3	-	-	-	-	-	-	2	2	2
CO 3	3	3	3	3	3	3	-	-	-	-	-	-	2	2	2
CO 4	3	3	3	3	3	3	-	-	-	_	-	-	2	2	2
Average	3	3	3	2.75	3	3	-	-	-	-	-	-	2	2	2

	GROUND IMPROVEMENT	Cred	Credits: 3								
L:T:P - 3 : 0: 0	TECHNIQUES	CIEMa	rks:50								
Total Hours/Week: 3		SEEMa	ırks:50								
	UNIT-I		10Hrs								
Introduction: Prind improvement develo affecting ground im Soil improvement application to grant considerations - in techniques vibro eq of verification of vi	ciples and objectives of ground improvement and opments. Classification of ground improvement to provement. ts without additives - dynamic compaction - ular soils - cohesive soils - depth of improvement aduced settlements - compaction using vibrato puipment - the vibro compaction and replacement bro techniques - vibro systems and liquefaction	l History of g techniques, I equipment nt - environ ory probes - nt process -	ground Factors used - mental vibro control								
	UNIT-II		10 Hrs.								
and introduction to bio technical stabilization, Gravel, sand, stone columns- construction techniques Hydraulic modification : Filters, Control of ground water seepage, Sand drains and wick drains, Well point system, Vertical drains, Electro osmosis and its application in ground improvement.											
	UNIT-III		10 Hrs.								
Chemical modifica clay or silt with lin fly ash columns.	ntion - lime stabilization - lime column method - s ne - bearing capacity of lime treated soils - cont	stabilization trol methods	of soft –lime								
Grouting - commo operations, applica limitations. Plant for geometry and prope	nonly used chemicals for grouting, grouting ations. Compaction grouting – introduction, or preparing grouting materials. Jet grouting- jet erties of treated soils and applications.	systems, g applicatio t grouting p	Grouting - commonly used chemicals for grouting, grouting systems, grouting operations, applications. Compaction grouting – introduction, application and limitations. Plant for preparing grouting materials. Jet grouting- jet grouting process,								
	UNIT-IV 10 Hrs										
Soil improvement using reinforcing elements - introduction to reinforced earth - load transfer mechanism and strength development. Anchored earth nailing reticulated micro piles, soil dowels, soil anchors and reinforced earth walls. Geotextiles - polymer type geotextiles, woven geotextiles, non woven geotextiles. Geo grids - physical and strength properties - behaviour of soils on reinforcing with geotextiles - effect on strength, bearing capacity, compaction and permeability.											
Soil improvement load transfer mecha micro piles, soil do type geotextiles, we strength properties strength, bearing ca	using reinforcing elements - introduction to anism and strength development. Anchored earth wels, soil anchors and reinforced earth walls. Geo oven geotextiles, non woven geotextiles. Geo gr - behaviour of soils on reinforcing with geoto pacity, compaction and permeability.	reinforced nailing retio otextiles - po rids - physic extiles - eff	10 Hrs. earth - culated olymer cal and fect on								
Soil improvement load transfer mecha micro piles, soil do type geotextiles, we strength properties strength, bearing ca Reference Books *	using reinforcing elements - introduction to anism and strength development. Anchored earth wels, soil anchors and reinforced earth walls. Geo oven geotextiles, non woven geotextiles. Geo gr - behaviour of soils on reinforcing with geote pacity, compaction and permeability.	reinforced nailing retio otextiles - p rids - physic extiles - eff	10 Hrs. earth - culated olymer cal and fect on								

Pub.

- 3. Koerner R M., Construction and Geotechnical Methods in Foundation Engineering, McGrawHill Pub Co New York, 1985.
- 4. Hausmann, M R, Engineering Principles of Ground Modifications, McGraw Hill Pub Co NewYork, 1990.
- 5. Ingles O G and Metcalf J B., Soil Stabilisation: Principles and practice, Butterworths, London, 1972.
- 6. Nelson J D and Miller D J., Expansive soils, John Wiley and sons. Inc new, 1992.
- 7. Hausmann, M.R. (1990). Engineering Principles of Ground modification. McGraw-Hill Inc., USA
- 8. Mooseley, M.P. and Kirsch, K. (2004). Ground Improvement. 2nd Edition, Spon Press, Taylor and Francis Group, London, United Kingdom
- Jie Han. (2015) Principles and practice of Ground Improvement techniques 1st Edition, John Wiley and sons

Course Outcomes**

After completion of the course student will be able to

- 1. Suggest the soil properties without additives by using techniques like vibro compaction, dynamic tamping, compaction piles etc... and characterize the problematic soils
- 2. enhance the properties of soil in field using thermal, preloading, surface compaction Gravel, hydraulic techniques, stone columns.
- 3. explore the concept of soil chemical modification techniques and grouting system
- 4. recognize the need for Soil reinforcement technique like reinforcement with strip, insitu ground reinforcement, ground anchors and soil nailing etc... and geosynthetics

Course Outcome				Pro	gra	mr	ne (Jut	Programme Specific Outcomes						
S	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	3	2	3	3	-	-	-	-	-	2	2	2	2
CO 2	3	3	3	3	3	3	-	-	-	-	-	2	2	2	2
CO 3	3	3	3	3	3	3	-	-	-	-	-	2	2	2	2
CO 4	3	3	3	3	3	3	-	-	-	-	-	2	2	2	2
Average	3	3	3	2.75	3	3	-	-	-	-	-	2	2	2	2

21UCV613E: MASONRY STRUCTURES Credits 03 (3-0-0)

UNIT-I

MASONRY UNITS, MORTARS, TYPES AND MASONRY CONSTRUCTION: Brick,

stone, concrete block, stabilized mud block masonry units-strength, modulus of elasticity, and initial rate of absorption (IRA) of brick, classification and properties of mortar, workability of fresh mortar, water retentivity of mortar, stress-strainbehavior of mortar, selection of mortars. Defects and errors in masonry construction, cracks in masonry, types, reasons for cracking and remedial measures.

STRUCTURAL MASONARY: Introduction, stresses in masonry in compression, factors influence compressive strength of masonry; effect of unit strength, unit height, hollowness and moisture absorption, effect of mortarstrength, plasticity, joint thickness, type of masonry loading, modular ratio of unit and mortar and direction of loading. Strength formulae and mechanism of failure for masonry prism subjected to direct compression.

DESIGN CONSIDERATIONS: Boundary conditions and the effective height of wall in the design of masonry wall and column; effective length of wall based onconditions of support and, effective thickness for solid wall, cavity wall with and without stiffeners; slenderness ratio; assessment of eccentricity of loading on walls.

UNIT-II

PERMISSIBLE STRESSES: Permissible compressive stress in masonry wall, stress reduction, area reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses in masonry wall.

UNIT-III DESIGN OF MASONRY WALLS: Reduction of basic compressive strength to allow slenderness ratio and eccentricity; elastic buckling of brittle columns. Design of load bearing masonry for building up to three storeys using IS: 1905-1987.

DESIGN OF SOLID WALLS:Design of axially loaded unstiffened solid wall; determination of safe load carrying capacity of wall. Design of solid wall with piers. solid wall supported at the ends by cross wall.

UNIT-IV

DESIGN OF CAVITY WALL: Design of cavity wall with and without piers. Design of cavity wall with cross wall. Determination of safe load carrying capacity of cavity wall.

05 Hrs

DESIGN OF FREE-STANDING WALL: Transverse load acts perpendicular to plane of wall. Lateral load acts in the plane of wall. Design of free-standing walls with and without staggered, design of masonry tabular structure representing a chimney.

05 Hrs

05 Hrs

04 Hrs

04 Hrs

05 Hrs

05 Hrs

05 Hrs

TEXT BOOKS

- 1. Brick and Reinforced Brick Structures Dayaratnam P.: Oxford & IBH, 1987
- 2. Alternative Building Materials and Technologies, K S Jagadish, B V Venkatarama Reddy, K S Nanjunda Rao 2008
- 3. Design of Masonry structures Sinha B.P Davies S.R: E & FN spon 1997

REFERENCE BOOKS:

- 1. Structural Masonry Henry, A.W.: Macmillan Education Ltd, 1990
- 2. IS 1905-1987 Code of practice for structural use of un-reinforced masonry (3rd revision) BIS, New Delhi.
- 3. SP 20 (S&T)-1991, Hand book on Masonry design and construction (1st revision) BIS, New Delhi.

QUESTION PAPER PATTERN FOR SEE

- 1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
- 2. Each question should not have more than four subdivisions.
- 3. Any five full questions are to be answered choosing at least one from each unit.
- 4. Use of IS: 1905-1987 code is allowed.

Sl.	Course Objectives	Course Outcomes
No		After studying the student will be able to
1	Students will be able comprehendmasonry units, materials, types & masonry construction also strength and stability of masonry.	Identify various materials used in masonry, their characteristics and the influence of various parameters on the stability of concentrically loaded masonry walls. Factors influence the compressive strength of masonry.
2	Students will learn boundary conditions and the effective height, length and thickness of wall in the design of masonry wall and column; slenderness ratio.	Determine the slenderness ratio of walls and reduction factors. To evaluate the permissible stresses.
3	Students will be able comprehend load considerations for masonry and design of axially loaded solid walls.	Analyse the reduction of basic compressive strength due to slenderness ratio and eccentricity, elastic buckling of brittle columns.Design of masonry up to three storeys.
4	Students will be able comprehend design of cavity walls and free- standing walls.	Design the cavity wall. Design the free- standing walls subjected to wind load perpendicular to plane of wall, and load acts in the plane of wall.

21UCV614E		Credits:	3				
L:T:P - 3 : 0: 0	FOUNDATION ENGINEERING	CIEMarks::	50				
Total Hours/Week: 3		SEEMarks:	:50				
	· · · · · · · · · · · · · · · · · · ·	·					
	UNIT-I]	10 Hrs.				
Subsurface exploration boring, sounding test methods. Types of samplers, sample of boreholes - typical to structures and soil e	ation: Importance of exploration program, methests, geophysical methods-electrical resistivity and of samples-undisturbed, disturbed and repredisturbance, area ratio, recovery ratio, clearant bore log. Number and depth of boring for various exploration report.	ods of exploration d seismic refraction esentative samp and stabilization us civil engineerion	on: ion oles of ing				
Stress distribution concentrated load, c distribution diagram	n in soils : Introduction, Boussinesq's and We circular and rectangular load, equivalent point loans and contact pressure and Newmark's chart.	estergaard's theo ad method, pressi	ory ure				
	UNIT–II		10Hrs.				
Stability of earthDefinition of factormethod and Taylor'Lateral earth pressure coeearth pressure coeassumptions and linsoil only) –Culmancohesionless soils, e	 Definition of factor of safety, Stability of finite slopes - method of slices, Fellineous method and Taylor's stability number. Lateral earth pressure: Active and passive earth pressures, earth pressure at rest, earth pressure coefficient. Earth pressure theories - Rankine's and Coulomb's – assumptions and limitations, graphical solutions for active earth pressure (cohesionless soil only) –Culmann's and Rebhann's methods lateral earth pressure in cohesive and cohesionless soils, earth pressure distribution. 						
	UNIT-III	3	10Hrs.				
Bearing capacity of proportioning found Settlement of fou Computation of im total settlements (IS	of soil: field methods of determining bearing lation, - SPT and plate load test. indations: Settlement- Types of settlements mediate and consolidation settlement, permissil 8 8009 part 1).	capacity of so and importan ble differential a	oil, nce, and				
	UNIT-IV		10Hrs.				
Pile foundations:pile in cohesionlessWell FoundationsComponents of wellCauses and remedie	Types and classification of piles, load carrying by static and Dynamic formulas, negative skin fi s: Introduction, Different shapes and charac Il foundation. Forces acting on well foundation as of tilts and shifts.	capacity of sing tiction. teristics of we build block sing of we	gle ells. ells.				
Reference Books *							
 Jonathan Knappett a 2019. Braja M. Das and N 	and R.F.Craig,Craig's Soil Mechanics- CRC Press agaratnamSivakugan, Principles of Geotechnical	ssNinth Edition	1-				

Engineering India Ninth Edition 2018.

- 3. V.N.S. Murthy, Soil Mechanics and Foundation Engineering- CBS Publishers & Distributors New Delhi 2018.
- 4. VenkatrahmaiahC.Geotechnical Engineering New Age International (P) Ltd., New Delhi Fifth Edition 2017.
- 5. Iqbal H. Khan Text Book of Geotechnical Engineering- PHI, India Second Edition 2005.
- 6. Joseph Bowles, Foundation Analysis and Design- McGraw Hill Pub. Co. New York Fifth Edition 2001.
- 7. Alam Singh and Chowdhary G.R., Soil Engineering in Theory and Practice CBS Publishers and Distributors Ltd., NewDelhi 1992.
- 8. P. C. Varghese, "Foundation Engineering", PHI Publisher 2005.
- 9. Swami saran, Analysis and Design of sub structures 2nd edition 2018, oxford & IBH Co Pvt. Ltd.

Course Outcomes**

After completion of the course student will be able to

- 1. investigate the soil profile and Determine the vertical stresses below different shapes of footing
- 2. check the stability of the slopes and compute the lateral earth pressure on retaining wall.
- 3. calculate the bearing capacity of soil and proportionate the footing
- 4. determine the design parameters of expansive soil and examine the various deep foundation.

Course			Programme Specific Outcomes												
Outcomes	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	-	-	-	-	-	-	-		-	-	2	2	1	-
CO 2	3	1	-	-	-	-	-	-	-	-	-	2	2	1	1
CO 3	3	2	2	2	-	-	-	-	-	-	-	2	2	1	1
CO 4	3	2	2	2	-	-	-	-	-	-	-	2	2	1	1
Average	3	1.6	2	2	-	-	-	-	-	-	-	2	2	1	1

COURSE ARTICULATION MATRIX:

21UCV615E		Credits: 3
L:T:P - 3 : 0: 0	WASTEWATER TREATMENT ENGINEERING	CIE Marks: 50
Total Hours/Week: 3		SEE Marks: 50

UNIT-I

10 Hrs.

Introduction: Necessity for sanitation, Sewerage systems and their suitability.

Estimation of Wastewater flows: wet and dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system; computation of sewage and storm discharge.

Sewerage Characteristics: Sewage Sampling. Physical, Chemical and Biological characteristics, with emphasis on DO, BOD & COD, Effluent standards, impacts of disposal. Sludge characterization.

UNIT-II

10 Hrs.

Design of Sewers: Types of sewers, factors affecting the selection of material for sewer construction, materials for sewers, joints in sewers, shapes of sewers, Self-cleansing and non-scouring velocities, Laying of sewers, joints and testing of sewers, ventilation and cleaning of sewers.

Sewage Treatment: Flow diagram of municipal wastewater treatment plant.

Primary treatment: Screening, grit chambers, skimming tanks, primary sedimentation tanks-theory and design. Numerical Problems.

UNIT-III

Secondary Treatments: Fixed film bioprocess-Trickling filter theory and design, Suspended growth system-Activated sludge process-Theory and design, Low-cost wastewater treatment - Septic tank, Sludge digestion tanks, Oxidation Pond and Oxidation ditches.

Tertiary Treatment of Sewage; Decentralized Sewage Treatment & Reuse.

UNIT-IV

Sewage Disposal: Dilution method - self-purification phenomenon. Streeter-Phelp's equation, Oxygen sag curve, Zones of purification, Land treatment: Sewage farming, sewage sickness, Numerical Problems on Disposal of sewage.

Sludge treatment methods: thickening, Sludge drying beds, Sludge Conditioning and Dewatering.

Self Study: Sewer Appurtenances: Catch basin, manholes, flushing tanks, oil and grease traps, Drainage traps. Basic principles of house drainage, typical layout plan showing house drainage

10 Hrs.

10 Hrs.

connections, maintenance of house drainage.

Reference Books *

- 1. Environmental Engineering, Peavy H. S., Rowe D. R. and George Tchobanoglous, McGraw-HillInternational.
- 2. Water Supply and Sewerage, McGhee T. J., McGraw-Hill Inc.,
- 3. Garg, S.K., "Environmental Engineering", Vol. 1 & II Khanna Publishers, New Delhi, 2005.
- 4. APHA, Standard Methods Examination of Water and Wastewater, American Public Health Association, Washington DC, 1995.
- 5. Waste water Engineering Treatment and Reuse, Metcalf & Eddy, McGraw Hill Education, 2017,4th Edition.
- 6. CPCB, Guide Manual: Water and Wastewater Analysis.

Course Outcomes**

After completion of the course student will be able to

- 1. Assess the quality and quantity of wastewater and to study the sewage characteristics.
- 2. Design the components of wastewater treatment systems.
- 3. Study the secondary treatment of wastewater and tertiary treatment of Sewage.
- 4. Design and plan suitable engineering systems for sludge treatment and disposal.

* Books to be listed as per the format with decreasing level of coverage of syllabus ** Each CO to be written with proper action word and should be assessable and quantifiable

Course Outcomes				Pro		Prog Outo	Program Specific Outcomes (PSOs)								
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	1	1	3	3	-	-	-	-	2	2	3	3
CO2	3	-	-	3	2	3	3	-	-	-	-	1	3	2	3
CO3	2	2	1	2	2	3	3	-	-	-	-	2	2	2	2
CO4	3	3	3	2	2	2	3	-	-	-	-	1	3	3	3

21UCV616E		Credits: 3
L:T:P - 3 : 0: 0	Railway and Airport Engineering	CIEMarks:50
Total Hours/Week: 3		SEEMarks:50

UNIT-I Railway Planning: Significance of Road, Rail, Air and Water transports - Coordination of all modes to achieve sustainability – Elements of permanent way, - Rails, Sleepers, Ballast, rail fixtures and fastenings, – Track Stress, coning of wheels, creep in rails, defects in rails Route alignment surveys, conventional and modern methods- - Soil suitability analysis - Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings (Explanation & Sketches of Right- and Left-hand turnouts only).

UNIT-II

UNIT-III

UNIT-IV

Railway Construction and Maintenance: Earthwork - Stabilization of track on poor soil, Calculation of Materials required for track laying – Construction and maintenance of tracks – Modern methods of construct ion & maintenance - Railway stations and yards and passenger amenities- Urban rail - Infrastructure for Metro, Mono and underground railways.

Airport Planning: Air transport characteristics, airport classification, airport planning: objectives, c o m p o n e n t s, layout characteristics, and socio-economic characteristics of the catchment area, criteria for airport site selection and ICAO stipulations, typical airport layouts, Parking and circulation area.

Airport Design: Runway Design: Orientation, Wind Rose Diagram, Runway length, Problems on basic and Actual Length, Geometric design of runways, Configuration and Pavement Design Principles, Elements of Taxiway Design, Airport Zones, Passenger Facilities and Services, Runway and Taxiway Markings and lighting.

Reference Books *

1. Y.H. Huang, Pavement Analysis and Design, Prentice Hall, New Jersey, 2003.

2. R. Horonjeff and F.X. Mckelvey, Planning andDesign of Airports, McGraw Hill, New York, 1994. 3. S.C. Sexena and S.P. Arora, A Text Book of Railway Engineering, Dhanpat Rai & Sons, New Delhi, 1998.

4. W.W. Hay, Railroad Engineering, Wiley, New York, 1988.

Course Outcomes**

After completion of the course student will be able to

1. Acquires capability of choosing alignment and also design geometric aspects of railway system, runway and taxiway.

2. Suggest and estimate the material quantity required for laying a railway track and also will be able to determine the hauling capacity of a locomotive.

3. Develop layout plan of airport, harbour, dock and will be able relate the gained knowledge to identify

10 Hrs.

10 Hrs.

10 Hrs.

10 Hrs.

required type of visual and/or navigational aids for the same. **4.** Apply the knowledge gained to conduct surveying, understand the tunnelling activities.

*Books to be listed as per the format with decreasing level of coverage of syllabus ** Each CO to be written with proper action word and should be assessable and quantifiable

Course Outcomes			Р	rog	Program Specific Outcomes (PSOs)										
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1															
CO2															
CO3															
CO4															

Open Elective Course - II

21UCV631C		Credits: 3								
L:T:P - 3:0:0	OCCUPATIONAL HEALTH AND SAFETY	CIE Marks: 50								
Total Hours/Week: 3		SEE Marks: 50								
	UNIT-I	10 Hrs.								
Safety Policy. Occup Safety administration - La investigation, invest role in accident invest	and Control Principles: Safety, History and dev pational safety and Health Act (OSHA), Occup two governing OSHA and right to know. Acc tigation plan, Methods of acquiring accident stigation	elopment, National ational Health and cident – causation, facts, Supervisory								
	UNIT-II	10 Hrs.								
Workspace Envelo Programs. Hazard Analysis – Emergene Fire Prevention and P of Enclosures, early Electrical Safety, Pre	ps, Visual Ergonomics, Ergonomic Stand cognition and Analysis, Human Error An cy Response - Decision for action – purpose and Protection: Fire Triangle, Fire Development and detection of Fire, Classification of fire and D oduct Safety: Technical Requirements of Produ	lards, Ergonomic alysis, Fault Tree l considerations l its severity, Effect Fire Extinguishers. act safety.								
	UNIT-III	10 Hrs.								
Health Considerations at Workplace: types of diseases and their spread, Health Emergency. Personal Protective Equipment (PPE) – types and advantages, effects of exposure and treatment for engineering industries, municipal solid waste. Environment management plans (EMP) for safety and sustainability										
	UNIT-IV	9 Hrs.								
Occupational Health a Handling of chemica and labs, Construct Plants, precast plan workers, managers,	and Safety Considerations: Water and wastewater al and safety measures in water and wastewater ion material manufacturing industries like cents, and construction sites. Policies, roles and and supervisors	er treatment plants, er treatment plants ment plants, RMC responsibilities of								
Kelefelice Dooks "										
 Goetsch D.L., (1999 Managers", Pren tic Heinrich H.W., (20 McGraw-Hill Book National Safety Co Safety and Poll utio Colling D.A., (199 New Delhi. Della D.E., and C Nostrand Reinhold 	9), "Occupational Safety and Heal th for Technolo ce Hall. 007), "Industrial Accident Prevent ion - A So Company puncil and Associate (Data) Publishers Pvt. Ltd., on Control Handbook 0), "Industrial Safety Management and Technolo Giustina, (1996), "Safety and Environmental	gists, Engineers and eientific Approach", (1991), "Industrial ogy", Prentice Hall, Management", Van								
	International Thomson Publishing Inc.									

After completion of the course student will be able to

- 1. Understand occupational hazards, safety principles, OSHA regulations, accident causation, and investigation methods, enabling them to ensure workplace safety and effectively investigate accidents as supervisors.
- 2. Apply ergonomic principles for task analysis and prevention of hazards, demonstrate knowledge of fire prevention and protection, including fire development and early detection, and possess the skills to ensure electrical safety and comply with product safety requirements.
- 3. recognize and prevent disease transmission, utilize appropriate PPE, mitigate exposure effects in engineering and waste management, and develop environment management plans for safety and sustainability in the workplace.
- 4. grasp occupational health and safety in water treatment, construction material manufacturing, and construction sites, and understand their respective roles and responsibilities for workplace safety.

Course Outcomes (CO)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2		2				3
CO2						2		2				3
CO3						2	3	2				3
CO4						2	3	2				3
Average						2	3	2				3

21UCV632N Credits: 3 L:T:P - 3 : 0 : 0 PROJECT MANAGEMENT AND ECONOMICS CIE Marks: 50 Total Hours/Week: 3 UNIT-I 10 I Concepts of Project Management: Concepts of projects, characteristics of project, Phases of project life cycle, Tools and techniques for project management, Computer based project management. Project planning and estimating: Feasibility report, Preparation of cost estimation, Evaluation of the project profitability. 10 Planning Projects: Defining the project scope, Project scope checklist, Project priorities, Work Breakdown Structure (WBS), Integrating WBS with organization, coding the WBS for the information system. 10 Scheduling Projects: Purpose of a project schedule, historical development, how project schedules are limited and created, develop project schedules, uncertainty in project schedules, Gantt chart. Network Analysis: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path	Hrs. , , Hrs.									
L:T:P - 3 : 0 : 0 PROJECT MANAGEMENT AND ECONOMICS CIE Marks: 50 Total Hours/Week: 3 UNIT-I 10 I Concepts of Project Management: Concepts of projects, characteristics of project, Phases of project life cycle, Tools and techniques for project management, Computer based project management. Project planning and estimating: Feasibility report, Preparation of cost estimation, Evaluation of the project profitability. 10 Planning Projects: Defining the project scope, Project scope checklist, Project priorities, Work Breakdown Structure (WBS), Integrating WBS with organization, coding the WBS for the information system. 10 Scheduling Projects: Purpose of a project schedule, historical development, how project schedules are limited and created, develop project schedules, uncertainty in project schedules, Gantt chart. Network Analysis: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path	Hrs.									
Total Hours/Week: 3 SEE Marks: 50 UNIT-I 10 I Concepts of Project Management: Concepts of projects, characteristics of project, Phases of project life cycle, Tools and techniques for project management, Computer based project management. Project planning and estimating: Feasibility report, Preparation of cost estimation, Evaluation of the project profitability. UNIT-II 10 Planning Projects: Defining the project scope, Project scope checklist, Project priorities, Work Breakdown Structure (WBS), Integrating WBS with organization, coding the WBS for the information system. Scheduling Projects: Purpose of a project schedule, historical development, how project schedules are limited and created, develop project schedules, uncertainty in project schedules, Gantt chart. Network Analysis: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path	Hrs.									
UNIT-I 10 I Concepts of Project Management: Concepts of projects, characteristics of project. Phases of project life cycle, Tools and techniques for project management, Computer based project management. Project planning and estimating: Feasibility report, Preparation of cost estimation, Evaluation of the project profitability. Image: Defining Projects: Defining the project scope, Project scope checklist, Project priorities, Work Breakdown Structure (WBS), Integrating WBS with organization, coding the WBS for the information system. Image: Schedules are limited and created, develop project schedules, uncertainty in project schedules, Gantt chart. Network Analysis: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path	Hrs.									
Concepts of Project Management: Concepts of projects, characteristics of project. Phases of project life cycle, Tools and techniques for project management, Computer based project management. Project planning and estimating: Feasibility report, Preparation of cost estimation, Evaluation of the project profitability. 10 Planning Projects: Defining the project scope, Project scope checklist, Project priorities, Work Breakdown Structure (WBS), Integrating WBS with organization, coding the WBS for the information system. Scheduling Projects: Purpose of a project schedule, historical development, how project schedules are limited and created, develop project schedules, uncertainty in project schedules, Gantt chart. Network Analysis: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path	, Hrs.									
Evaluation of the project profitability. 10 UNIT–II 10 Planning Projects: Defining the project scope, Project scope checklist, Project priorities, Work Breakdown Structure (WBS), Integrating WBS with organization, coding the WBS for the information system. Scheduling Projects: Purpose of a project schedule, historical development, how project schedules are limited and created, develop project schedules, uncertainty in project schedules, Gantt chart. Network Analysis: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path	Hrs.									
UNIT-II10Planning Projects: Defining the project scope, Project scope checklist, Project priorities, Work Breakdown Structure (WBS), Integrating WBS with organization, coding the WBS for the information system.Scheduling Projects: Purpose of a project schedule, historical development, how project schedules are limited and created, develop project schedules, uncertainty in project schedules, Gantt chart. Network Analysis: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path	Hrs.									
 Planning Projects: Defining the project scope, Project scope checklist, Project priorities, Work Breakdown Structure (WBS), Integrating WBS with organization, coding the WBS for the information system. Scheduling Projects: Purpose of a project schedule, historical development, how project schedules are limited and created, develop project schedules, uncertainty in project schedules, Gantt chart. Network Analysis: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path 	7									
 Planning Projects: Defining the project scope, Project scope checklist, Project priorities, Work Breakdown Structure (WBS), Integrating WBS with organization, coding the WBS for the information system. Scheduling Projects: Purpose of a project schedule, historical development, how project schedules are limited and created, develop project schedules, uncertainty in project schedules, Gantt chart. Network Analysis: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path method (CPM) to find the expected completion time of a project, floats; PERT for finding expected duration of an activity and project, determining the probability of completing a project, predicting the completion time of project; crashing of simple projects. 										
UNIT–III 10	Hrs.									
Resourcing Projects: Abilities needed when resourcing projects, estimate resource needs, creating staffing management plant, project team composition issues, Budgeting Projects: Cost planning, cost estimating, cost budgeting, establishing cost control. Project Quality Planning and Project Kickoff: Development of quality concepts, project quality management plan, project quality tools, kickoff project, baseline and communicate project management plan.										
UNIT-IV 10	Hrs.									
 Engineering Economics: Introduction, project feasibility report, basic concepts of economic analysis, Interest and time value of money: concept of simple and compound interest, interest formula for single payment, equal payment and uniform gradient series. Comparison of alternatives: Present worth, future worth, annual equivalent, capitalized and rate of return methods, break even analysis. Problems 	f 1 1									

Reference Books *

- 1. Timothy J Kloppenborg, "Project Management", Cengage Learning, Edition 2009.
- 2. Harold Kerzner, "Project Management, A systems approach to planning scheduling and controlling", CBS publication.
- 3. S. Choudhury, "Project Management" Mc Graw Hill Education (India) Pvt.Ltd. New Delhi, 2016.
- 4. Pennington Lawrence, "Project Management", Mc Graw hill, 2010.
- 5. Moder Joseph and A. Phillips "Project Management", New York, Van Nostrand, Reinhold, 2014.
- 6. Bhavesh M. Patel, Project Management, Vikas publishing House, 2018.

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

- 1. Comprehend the concepts of project management, tools and techniques.
- 2. Plan and schedule the projects considering various engineering aspects.
- 3. Plan resources, Select quality management techniques and assess risk for the projects taking into account various engineering considerations.
- 4. Assess the profitability of the project with the help of different techniques.

Course Outcomes						Progra Specif Outcon (PSO	am fic nes s)								
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	-	-	-		3	3	2		2
CO2	3	3	2	-	-	-	-	-	-	2	3	3	3	3	2
CO3	3	3	1	-	-	1	-	3	-	2	3	3	3	3	3
CO4	3	3	1	-	-	-	-	-	-	2	3	3	2	2	2

21UCV633N		Credits: 3
L:T:P - 3 : 0: 0	DISASTER MANAGEMENT	CIEMarks:50
Total Hours/Week: 3		SEEMarks:50

UNIT-I08 Hrs.Introduction : Concepts and definitions: disaster, hazard, vulnerability, resilience, risks severity,frequency , capacity, impact, prevention, mitigation. India's natural disaster proneness and disasterprone zones

UNIT-II

Disasters classification : natural disasters (floods, draughts, cyclones, volcanoes, earthquakes, tsunamis . landslides etc.); manmade disasters(industrial pollution, artificial flooding in urban areas, nuclear radiation, transportation accidents ,terrorist strikes, etc.)

UNIT-III10 Hrs.Disaster Impacts – Disaster impacts (environmental, physical, social, ecological, economic,
political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs);
hazard locations; global and national disaster trends; climate change and urban disasters

UNIT-IV

12 Hrs.

10 Hrs.

Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Importance of disaster education and community awareness and preparedness in disaster management. Roles and responsibilities of citizens, technology, media, community, government and non government organizations in disaster management; Policies and legislation for disaster risk reduction; Disaster management system in India.

Reference Books *

- 1. R. Subramanian, 2021, Disaster Management, Vikas publishing house Pvt. Ltd., Noida, India.
- 2. A.K. Srivastava, 2021, Text book of Disaster Management, Scientific publishers, India.
- Tushar Bhattacharya, 2012, Disaster science and Management, Tata McGraw Hill publications, New Delhi, India.

- 4. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
- 5. Singh B.K., 2008, Handbook of Disaster Management: Techniques and Guidelines, RajatPublication.
- 6. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation.
- Jagbir Singh, 2007, Disaster Management, I.K International Publishing House, New Delhi.
- 8. Vinod.K.Sharma, 2013,Disaster Management, second Edn., Scientific International Pvt. Ltd., New Delhi,India.
- 9. Carter.W.Nick, 1991, Disaster Management: A Disaster Manager's Hand book, Asia Development Bank, Manila.

Government of India website on Disaster Management : www.ndmindia.nic.in

Course Outcomes**

After completion of the course student will develop competencies in:

- **CO1:** the application of disaster Concepts to management
- CO2: analysing relationship between development and disasters.

CO3: ability to understand Categories of disasters.

CO4: realization of the responsibilities to society

*Books to be listed as per the format with decreasing level of coverage of syllabus ** Each CO to be written with proper action word and should be assessable and quantifiable

Course Outcomes			Р	rog	Program Specific Outcomes (PSOs)										
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	2	2	-	-	-	-	-	-			
CO2	3	2	3	-	2	1	-	-	-	I	I	-			
CO3	3	2	3	-	3	-	-	-	1	-	-	-			
CO4	2	1	1	-	2	1	-	-	1	-	-	1			

Open Elective Course – II											
21UCV641N		Credits: 3									
L:T:P - 3 : 0: 0	GREEN BUILDING TECHNOLOGY	CIE Marks: 50									
Total Hours/Week: 3		SEE Marks: 50									

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10 Hrs. UNIT-I

Introduction of green building, Concept of green building, History of green building, Need of green building in present scenario, Importance of green building Merits and demerits, Classification of green building, Assessment methods Global assessment and certification, Local assessment, LEED (Leadership in energy and environmental design) GRIHA (Green Rating for Integrated Habitat Assessment), IGBC (Indian Green Building Council) and Green star rating systems.

UNIT–II	10 Hrs.
les and elements of design of green building: Sustainability	: concept and realit

Princip y Climate responsive process of design: Climatic zones, design sequence, shelter or form, land form, vegetation, water bodies, street widths, open spaces, ground character, plan form, orientation, roof form Shading devices and their effect.

UNIT–III	10 Hrs.
Thermal comfort inside the building: Factors affecting, indices,	, cooling and heating
requirement, Heat transmission through building sections, the	rmal performance of
building sections, simple calculation for U value and insulation t	hickness Day lighting

Ventilation.

UNIT-IV	10 Hrs.
Water conservation: 3 R's for water conservation, rain water	harvesting, low flow
fixtures, grey water recycling Material conservation: concept of	embodied energy, low
energy materials, sustainable materials, alternative materials Conce	ept of carbon emission
and its reduction	

Bureau of energy efficiency: Functions, policies, guidelines, Energy Conservation Building Code, Study of existing green buildings.

REFERENCE BOOKS**

- 11. Climate responsive architecture (A design hand book for energy efficient buildings), Arvind Krishnana, Simos Yannas, Nick Baker, S V Szokolay, McGraw hill Education, Seventh reprint, 2013.
- 12. Renewable Energy and Environment -A Policy Analysis for India, H, Ravindranath, K Usha Rao, B Natarajan, P Monga, Tata McGraw Hill, 2000.Energy and the Environment, JM Fowler, McGraw Hill, New York, 2nd Edition, 1984.IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian Green Building Council Publishers.
- 13. GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.
- 14. Non-Conventional Energy Resources by G. D. Rai, Khanna Publishers.
- 15. Sustainable Building Design Manual, Vol.1 and 2, TERI, New Delhi 2004.
- 16. Mike Montoya, Green Building Fundamentals, Pearson, USA, 2010.
- Charles J. Kibert, Sustainable Construction Green Building Design and Delivery, John Wiley & Sons, New York, 2008.
- Regina Leffers, Sustainable Construction and Design, Pearson / Prentice Hall, USA, 2009.
- 19. Handbook on functional requirements of buildings (SP41), BIS, New Delhi, 1987.
- 20. Energy Conservation building code (ECBC), Bureau of energy efficiency, 2011.

Course Outcomes**

After completion of the course student will be able to

- 5. understand, recognize, and evaluate green building's significance, principles, and advantages and disadvantages in sustainable construction.
- 6. gain a comprehensive understanding of green building design principles and sustainability concepts, with a focus on climate-responsive design processes, shading devices, and their effects on building performance.
- 7. proficiently optimize thermal comfort, daylighting, and ventilation in buildings, creating sustainable and comfortable indoor environments.
- understand and apply water and material conservation techniques, grasp the concept of embodied energy and carbon emissions reduction, and analyze existing green buildings and the role of the Bureau of Energy Efficiency.

* Books to be listed as per the format with decreasing level of coverage of syllabus ** Each CO to be written with proper action word and should be assessable and quantifiable

Course Outcomes			Р	rog	Program Specific Outcomes (PSOs)										
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	2	3	2	-	-	-	2		2	
CO2	3	2	-	-	-	1	3	2	-	-	-	2		2	
CO3	3	2	-	-	-	-	3	2	1	-	-	2		2	
CO4	2	2	-	-	-	1	3	2	1	-	-	2		2	

21UCV542N	DEMOTE SENSING AND CIS	Credits: 3
L:T:P - 3 : 0: 0	(OPENELECTIVE)	CIEMarks:50
Total Hours/Week: 3	(OI ENELECTIVE)	SEEMarks:50

UNIT-I10 Hrs.Basics: Fundamentals of Remote Sensing, Electromagnetic Spectrum, Process of remote sensing,
Types of reflections, Energy Interactions with earth atmosphere and surface features, spectral

reflectance curves-For Vegetation, soil & water, Idealised Remote Sensing System Sensors: Definition, Sensor Parameters, Types, Choice of sensor, Optical Remote Sensing, Across and

Along track scanning systems.

Platforms: Definition, Space borne platform attitudes (only definitions, No Problems).

UNIT-II

Indian Remote Sensing Programme: Definition and Objectives

Satellite Specifications for IRS-1C, 1D, CARTOSAT-1 & CARTOSAT-2 - Ikonos, Quickbird, Risat.

Visual	Image	Interpretation:	Definition,	Objectives,	Keys	&	Elements	of	Visual	Image
interpre	tation.									

Digital Image Processing (DIP):(No problems/programming on DIP) Definition, Image Rectification & Restoration, image enhancement (contrast manipulation-Grey Level Thresholding, Level Slicing only), Supervised Image Classification using minimum distance to means classifier algorithm- GIS integration –stages & procedure., Image Filtering (spatial filters) -Low Pass and High pass image filters.(Brief discussion only, no problems or programming)

Applications of REMOTE sensing in urban applications and water resource management

UNIT-III

Maps and Projections

Map Projections Plane and geodetic, latitude and longitude map projections, types of map projections Spheroid, Datum (WGS84 Datum) and UTM (No Problems) GIS:

History, Definition, Components, concept, Data acquisition for GIS input-Spatial (Vector, Raster & Surface data) & Non spatial data, rectification, processing, verification & Data Editing, Storage and Output.

GIS functions in vector and raster data- Input, Analysis and out put

GIS Analysis (Vector Data- Buffering & Overlay analysis using overlay operators)

GIS Analysis (Raster Data-Local Operations and neighbourhood using arithmetic, Logical and Overlay operators)

Cartography-Definition, basic map layout, significance of cartography

Data Standards in GIS errors, precision and accuracy-Definition and Types

UNIT-IV

10 Hrs.

10 Hrs.

10 Hrs.

Advanced Concepts: LIDAR, Virtual GIS. (Brief Discussion only) GPS.- Definition, working principle, segments and uses (Brief Discussion only) Procedure of Compiling: geology map of a district.

Applications of GIS and Remote Sensing:

1) Identifying suitable site for urban development

2) Planning of network for sewage collection and transport (laying of sewer lines)

3) Ground water Vulnerability assessment.

4) Land Use Land Cover mapping (LU/LC).

Drainage Patterns-Definition, Types, significance.

Reference Books *

- 1. B Bhatia, Remote Sensing and GIS, Oxford University Press, New Delhi.
- T.M Lillesand, R.W Kiefer, and J.W Chipman, Remote sensing and Image interpretation, 5th edition, John Wiley and Sons India
- 3. Geographical Information Systems, C.P.Lo and Albert Yoing, 2nd edition, Preintice hall publications-2005

Course Outcomes**

The student will be able to

1.Explore the advantages of remote sensing and procedure of using satellite image for various civil engineering applications.

2. Apply, Method of rectifying and acquiring required data from satellite image and carry out analysis to get object specific results.

3. Integrate data from various data sources and extract relevant information related to geography, by performing GIS data analysis.

4. Use recent technologies like GIS and RS, for civil engineering applications, to meet project/work requirements in short time and on large scale.

Course Outcomes			F	Prog	Program Specific Outcomes (PSOs)										
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	2	2	-	-	-	-	-	-			
CO2	3	2	3	-	2	1	-	-	-	-	-	-			
CO3	3	2	3	-	3	-	-	-	1	-	-	-			
CO4	2	1	1	-	2	1	-	-	1	-	-	1			

21UCV543N	Dragge Economics and Plant Design	Credits: 3
L:T:P - 3 : 0: 0	(Open Flective)	CIE Marks: 50
Total Hours/Week: 3	(Open Elective)	SEE Marks: 50

UNIT-I

UNIT-II

PROCESS DESIGN DEVELOPMENT:

Design project procedure, design information from the literature and other sources of information, flow diagrams, preliminary design and equipment design and specialization, safety factors specifications, and materials of construction.

GENERAL DESIGN CONSIDERATIONS:

Marketability of the product, availability of technology, raw materials, human resources, land and utilities, site characteristics, plant location, plant layout, plant operation and control, utilities, storage, materials handling, materials and fabrication selection. Waste disposal community factors. Safety and hazard control measures.

CAPITAL INVESTMENTS:

Fixed capital investments including land, building, equipment and utilities, installation costs.(including equipment. instrumentation. piping, electrical installation and other utilities), working capital investments.

MANUFACTURING COSTS AND PLANT OVERHEADS:

Manufacturing Costs: Direct Production costs (including raw materials, human resources, maintenance and repair, operating supplies, power and other utilities, royalties, etc.), fixed charges Plant Overheads: Administration, safety and other auxiliary services, Conceptual numerical

COST ANALYSIS:

Cost Analysis: Factors involved in project cost estimation, methods employed for the estimation of the capital investment. Estimation of working capital and

DEPRECIATION: Different type of depreciation methods of and calculations, Conceptual numerical

UNIT-IV

UNIT-III

10 Hrs.

10 Hrs.

PROFITABILITY ANALYSIS:

Methods for the evaluation of profitability. Return on original investment, interest rate of return, Cash flow diagrams. Break-even analysis. Conceptual numerical.

Reference Books *

10 Hrs.

10 Hrs.

Text Books:

1. Peters and Timmerhaus (1989) Plant Design and Economics for Chemical Engineers, 4th edn., McGraw Hill.

2. Rudd and Watson (1987) Strategy of Process Engineering, Wiley.

3. Poornima M C (2006) Entrepreneurship Development and Small Business Enterprises", Pearson education.

Reference Books:

- 1. Vasanth Desai (2007) Dynamics of Entrepreneurial Development & Management", Himalaya Publishing House.
- 2. Khanka SS (2004) Entrepreneurship Development, S Chand & Co.
- 3. Thomas W. Zimmer, Norman M. Scarborough.(2007), Essentials of Entrepreneurship and small Business Management

Course Outcomes**

Course outcomes:

After studying this course, students will be able to:

- 1. To understand the process design of plant.
- 2. To study the feasibility survey for the plant design.
- 3. To Calculate the project profitability and alternative investment
- 4. To Identify the cost analysis involved in the design of plant.

* Books to be listed as per the format with decreasing level of coverage of syllabus ** Each CO to be written with proper action word and should be assessable and quantifiable

Course													Pr	ogrami	ne
Outcomes				Specific Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	PSO3
CO 1	2	2	1	1			1	1	1		2		2		
CO 2	2	1	2	1			1	1	1		3		2		
CO 3	1	2	1	2			1	1	1		2		1		
CO 4	2	1	2	2			1	1	1		3		2		
Ave Attainment	1.66	1.5	1.66	1.33			1	1	1		2.33		1.66		

BVV Sangha's Basaveshwar Engineering College, Bagalkot Department Civil Engineering 2021-22 Admitted batch

Academic Year: 2024-25

	VII semester													
Sl. No.	Category	Subject Code	Credits	HC W)UR 'EE	RS/ K	EXAMINATION MARKS							
					L	Τ	P	CIE	SEE	Total				
1.	HSSM	21UCV701C	Construction Management	3	3	0	0	50	50	100				
2.	PCC	21UCV702C	Quantity Surveying and Estimation	3	3	0	0	50	50	100				
3.	PEC	21UCV7XXE	Professional Elective Course - III	3	3	0	0	50	50	100				
4.	PEC	21UCV7XXE	Professional Elective Course - IV	3	3	0	0	50	50	100				
5.	Project	21UCV703P	Project Work	7		NA		50	50	100				
			Total	19				300	300	600				

	Pro	ofessional Elec	tive Course-III		Pro	fessional Elec	tive Course-IV
Sl. No	Category	Subject Code	Subject Title	Sl. No	Category	Subject Code	Subject Title
1.	PEC	21UCV721E	Advanced Design of RC Structures	1.	PEC	21UCV731E	Design of Pre-stressed Concrete Structures
2.	PEC	21UCV722E	Design of Bridges	2.	PEC	21UCV732E	Elements of Earthquake Engineering
3.	PEC	21UCV723E	Basics of Soil Dynamicsand Earthquake Engineering	3.	PEC	21UCV733E	Deep Foundations
4.	PEC	21UCV724E	Air Pollution and Control	4.	PEC	21UCV734E	Solid Waste Management
5.	PEC	21UCV725E	Pavement Materials and Construction	5.	PEC	21UCV735E	Pavement Design
6.	PEC	21UCV726E	Design of Irrigation Structures	6.	PEC	21UCV736E	Sediment Transport Engineering

21UCV701C
L:T:P-03:0:0
Total Hours/Week:3

CIEMarks:50

SEEMarks:50

UNIT-I

10 Hrs.

Construction industry and Management: Introduction, Value engineering, time management, Labour and material management, Contract and contractor, organization and administration, financial management.

Introduction to Engineering Economics: Basic concepts of economics analysis, Micro and Macro analysis, project feasibility, economic and financial feasibility, benefit cost ratio, interest formulae, present worth, future worth, annual equivalent, basis for comparison of alternatives, rate of return method, break even analysis, planning methods, problems on above.

UNIT – II

10 Hrs.

Construction planning: Introduction, time estimates, planning methods of projects, Bar and Milestone charts, PERT and CPM network analysis, project feasibility. Cost Model, Direct cost, indirect cost, total cost, optimum cost, optimum duration of project problems, Line of balance technique, resource allocation and updating.

UNIT – III	10 Hrs.
Construction equipments: Introduction, various earth moving equipments, hoisting	 J
equipments, concrete mixer and plants, conveyors and rollers, trenching machine	S,
equipments for highway construction, factors for selecting equipment out, special	
equipment, standard equipment, economic life.	

UNIT – IV

10 Hrs.

Work Study in Construction, safety measures bidding.

Transportation Problems: Introduction, mathematical formulation, optimal solution of Transportation problem methods for initial basic feasible solution, summary of methods of initial BFS, Northwest corner method, Lowest cost entry method, Vogel's approximation method, optimality test, Degeneracy in Transportation problems, unbalanced transportation problem

Reference Books *

1. R. Panneerselvam Engineering economics, PH1 Publications, 2010, New Delhi

2. S.C. Sharma, Construction equipment and its management, Khanna Publishers, 5th Ed, Delhi, 2016.

S. Seetharaman, Construction engineering and management by, Umesh Publishers,
 4th Ed, Delhi, 2008.

 Peurifoy & Schexnayder Construction planning equipment and methods , Tata Mc.Grawhill, 7th Ed, New Delhi, 2010

5. L.S. Srinath, EWP PERT and CPM principles and applications, Affiliated east west press Pvt. Ltd, 3rd Ed, 2001.

Course Outcomes**

At the end of course students will be able to understand importance of the construction management, time, labors, materials management. The students will be capable of understanding the value of money at the different time/periods calculate present or future worth of the money.

2. Proper allocation and updating of the resources during construction of the projects

3. Proper application and management of different construction equipments. Students understands economic life of equipments.

4. At the end of the course students will be able to understand different safety measures during construction of projects. Students will be able to find the initial feasible solution of transportation problems.

Course Outcomes	Programme Outcomes											Prog Spe Out	Programme Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	3	3	-	-	-	-	-	2	2	2	2
CO2	3	2	1	1	2	2	-	-	-	-	-	2	2	2	2
CO3	3	2	2	2	3	2	-	-	-	-	-	2	2	2	2
CO4	3	3	2	2	3	2	-	-	-	-	-	2	2	2	2
Average	3	2.5	1.75	1.75	2.75	2.25	-	-	-	-	-	2	2	2	2

COURSEARTICULATIONMATRIX

21UCV702C
L:T : P 2 :2:0
Total Hours/Week:4

UNIT-I	10 Hrs.
Estimate: Different types of estimates, study of various drawing atta with estimates. Important terms, units of measurement, abs approximate methods of estimating building, cost from materials labour equations recommended by CBRI examples.	iched stract, and
Estimation: Methods of taking out quantities and cost center line me long and short wall method. Preparation of detailed and abs estimates for the following Civil Engineering works Buildings Mas structures and framed structures with flat, sloped RCC roofs. Bu components (Beams, Columns and Column Footings, RCC Roof Sla	thod, stract sonry ilding bs).
UNIȚII	10 Hrs.
Estimates: Steel truss (Fink and Howe truss), RCC Slab culverts, m and septic tanks. Specifications: Definition of specifications, objective of writing speci-	anhole
	5. 10 Hrs.
Rate analysis: Definition and purpose. Working out quantities and for the following standard items of works earth work in different typ soils, cement concrete of different mixes, bricks and stone mas flooring, plastering, RCC works, centering and form work for diff RCC items, wood and steel works for doors, windows and ventilators Measurement of earthwork for roads : Methods for computation earthwork cross sections mid section formula, trapezoidal or average area or mean sectional are formula, prismoidal formula for different different and formula for different computations.	rates es of conry, erent c. on of e end ferent
terrains.	40.11=0
Contracts: Types of contracts essentials of contract agreement aspects, penal provisions on breach of contract. Definition of the t tender, earnest money deposit, security deposit, tender forms, te documents and types.	legal erms ender
contract document and issue of work orders. Duties and liabit termination of contract, completion certificate, quality control, right contractor, refund of deposit. Administrative approval technical san Nominal Muster roll, measurement Books procedure for recording	ities, ities, its of ction, g and

checking measurements preparation of bills of works in buildings,

specifications of items of works in building, specifications of aluminum and wooden partitions, false ceiling, aluminum and fiber doors and window, various types of claddings.

Valuation: Definitions of terms used in valuation process, Purpose of valuation, Cost, Estimate, Value and its relationship, Capitalized value. Freehold and leasehold and easement,

Reference Books *

- 1. B. N. Datta, "Estimating & Costing" UBS Publishers and Distributors, New Delhi, Jan2016.
- 2. N.Chakrabothy, "Estimating & Costing, Specification & Valuation in Civil Engg", Publishedbyauthor,Calcutta,Jan2006.
- 3. S. C. Rangwala "Estimating & Specifications", Charotar Publishing House, Anand, 17thEdition:(reprint)Jan2017.
- 4. G. S. Birdie "Estimating & Costing", Dhanpathi Rai publishing company Pvt., NewDelhi.Jan2014.

Course Outcomes**

- 1. The students at the end of the course will be capable of applying different methods of estimate, CBRI formulae for the building estimate.
- 2. Estimating cost of load bearing/ framed structures by long wall/ short wall and central line methods.
- 3. Estimating cost of the truss, culverts and septic tanks. Detailed specifications of the different items of civil works.
- 4. Finding the item rates of the different items of civil works. Working the earth work for the roads by different methods. Carrying out the civil works as per PWD forms.

Course Outcomes	Programme Outcomes									Pro e S Ou	Programm e Specific Outcomes				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	3	3	-	-	-	-	-	2	2	2	2
CO2	3	2	1	1	2	2	-	-	-	-	-	2	2	2	2
CO3	3	2	2	2	3	2	-	-	-	-	-	2	2	2	2
CO4	3	3	2	2	3	2	-	-	-	-	-	2	2	2	2
Average	3	2.5	1.75	1.75	2.75	2.25	-	-	-	-	-	2	2	2	2

COURSEARTICULATIONMATRIX

21UCV721E		Advanced Design of BC Structures	Credit	Credits:3							
	L:T:P-3:0:0	Advanced Design of RC Structures	CIE Mark	rks:50							
Тс	otal Hours/Week:3		SEE Mar	ks:50							
		UNIT - I		10 Hrs							
Desigr	n of combined footing	:									
a)	a) Slab and Beam type - Equal loading.										
b)	b) Slab and Beam type - Unequal loading.										
	UNIT - II 10 Hrs										
Desigr	n of Retaining Wall(RV	V):									
a)	Cantilever Retaining	Wall.									
b)	Counter fort Retainir	ng Wall.									
		UNIT - III		10 Hrs							
Portal	Frames: (Single Bay a	nd Single Storey)									
a)	Fixed Base.	<i>c n</i>									
b)	Hinge Base.										
		UNIT - IV		10 Hrs							
Design	n of Water Tanks:(Res	ting on Ground):									
a)	Circular tanks (Flexib	le Base).									
b)	Rectangular tanks.										
Refere	enceBooks*										
1.	Unnikrishnan and De	vadas Menon, Design of reinforced concrete st	ructures, PHI, I	New							
2	Karve S.R. and Shah	/ L. Limit state theory and design of reinforced	concrete. Vidv	arthi							
	prakashan. Pune. 20	17.	,								
3.	A.K.Jain,Limit state n	nethod of design, Nemchand and Bros, Roorisee	. Jan2012.								
4.	Parkand Paulay, Reir	forced Concrete, John Wiley & Sons. 1975.									
5.	Kongand Evans. Rein	forced and prestressed concrete, ELBS, London									
6.	H. J. Shah, Reinforce	d concrete Vol. I, Charotor Publishing House, A	nand. Jan2016								
	IS: 456-2000, SP-24, S	P-16. IS: 3370 Part I, II, III and IV.									
	(Note: Use of IS:456-2000 is permitted and SP-16 to be used in design of columns only).										
Course	CourseOutcomes**										
	r completion of the co	ourse student will be able to:									
1. 2	Students will underst	and the decign and colving technique of retaining	a walle								
2. 2	Students will apply a	and the design and solving technique of retainif	ig walls.								
л. Л	Students will docigo	and design the portal fames.									
4.	students will design	water talling.									
COURSE ARTICULATION MATRIX

Course				Programme Specific Outcomes											
Outcomes	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	1	2	1	1	3	3	1	-	-	1	1	2	3	1
CO 2	3	2	2	2	2	2	3	2	1	-	2	2	3	2	2
CO 3	3	1	2	2	-	3	3	2	3	3	3	2	1	2	2
CO 4	3	3	3	1	1	3	3	2	2	1	3	2	2	1	1
Average	3	1.75	2.25	1.5	1.33	2.75	3	1.75	2	2	2.25	1.75	2	2	1.5

Basaveshwar Engineering College, Bagalkote Department of Civil Engineering 2024-25

Subject code: 21UCV723E	BASICS OF SOIL DYNAMICS AND	Credits: 03
L:T:P - 3:0:0	EARTHQUAKE ENGINEERING	CIE marks: 50
Total hours/week:3		SEE marks: 50

UNIT 1: 10 Hrs

Historical development of soil dynamics and its importance. Effects of vibrations on foundations. Types of dynamic loads encountered in civil engineering. Occurrence of earthquakes, Types of seismic waves & their properties, and their uses in subsoil exploration. Propagation of wave in elastic medium. Problems on computation of wave velocities. Location of epicentre, Magnitude of earthquake.

UNIT II: 10 Hrs

Vibration Theory: Degrees of freedom; Vibration of Single degree of freedom systems, Undamped and damped free and forced vibrations; Natural frequency and resonance & its effects.

UNIT III: 10 Hrs

Liquefaction of soils: Occurrence of liquefaction and its significance in geotechnical engineering; factors affecting liquefaction; liquefaction analysis; measures for reducing the damage to structures due to liquefaction.

UNIT IV: 10 Hrs

Vibration Isolation: Introduction, Active and Passive Isolation and methods of vibration isolation.

Dynamic Soil Properties: Laboratory methods and field testing techniques.

Reference Books:

- 1. Das B. M. and Ramana G. V. (2011) "Principles of Soil Dynamics", 2 Edition, CENGAGE Learning, USA.
- 2. Day R. W. (2002) "Geotechnical Earthquake Engineering Handbook". McGraw Hill, NewYork.
- 3. Kameshwar Rao, (1998) "Vibration Analysis and Foundation Dynamics", Wheeler Publishing.
- 4. Kramer S. L. (1996) "Geotechnical Earthquake Engineering", Prentice Hall International Series.
- 5. Prakash S. (1981) "Soil Dynamics", McGraw Hill Book Co., New York.

- 6. Okamoto, S.(1973), "Introduction to Earthquake Engineering", John Wiley & Sons, New York.
- 7. Richarts F. E., Hall Jr. J. R. and Woods R. D. (1970) "Vibrations of Soils and Foundations", Prentice Hall International Series.
- 8. Barkan D. D. (1962) "Dynamics of Bases and Foundations", McGraw Hill Book Co., New York.

Course Outcomes:

After completion of the course student will be able to.

- 1. Acquire basic knowledge of soil dynamics and earthquake engineering.
- 2. Apply theory of vibrations to solve dynamic soil problems.
- 3. Analyse the potential of soil for liquefaction and apply mitigation techniques against it.

4. Analyse vibration isolation and apply mitigation techniques against them. Calculate the dynamic properties of soils using laboratory and field tests.

Course Outcomes	Programme Outcomes (POs) Program S Outcomes						Programme Outcomes (POs)										
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO1	3	3	3	2								3	2	3	2		
CO2	3	3	3	2								2	2	3	2		
CO3	3	3	3	2								2	2	3	2		
CO4	3	1	3	2								2	2	2	2		

21UCV726E		Credits:3
L:T : P 03:0:0	DESIGN OF IRRIGATION	CIE Marks:50
Total Hours/Week:4	SIRUCIURES	SEE Marks:50

UNIT- I	13 Hrs.
Canals: Cross section of irrigation canals, Balanced depth, fixing L-section and de	sign
Considerations and design.	
Cross Drainage works: Types, Design considerations, Fluming of canal by Mitra	's and
Chaturvedis"s formulae. Design problems of aqueduct and super passage only.	
UNITH	13 Hrs.
Gravity Dam-I Profile of the dam and forces acting, Design considerations and fixing	ng the
section, Principal stresses, Stability analysis by analytical methods and problems.	
Gravity Dam II: Joints, keys and water stops. Drainage galleries, Grouting, Constru	iction
of Galleries	
UNITHI	13 Hrs.
Earthen Dam: Types, Construction methods, Causes of failures, Design criteria,	Preliminary
section. Seepage control and slope protection, Rockfill dams.	
Spillways: Ogee and broad crested spillways, Discharge computation for simple ca	ases, Design
of profile of an Ogee spillway. Energy dissipation below spillways.	
UNITIV	13 Hrs.
Canal Falls: Types, Design of trapezoidal notch fall and Sarda fall.	
Canal Regulation works: Types, Design of cross regulator and head regulator.	
ReferenceBooks *	
1. Subramannya K. Engineering Hydrology, Tata Mc Grew Hill, 3rd edition, 2008.	
 P. Jayarami Reddy, Text book of Hydrology Laxmi Publications New Delhi, 3rd ec 2016. 	dition,
 P. Jayarami Reddy, Text book of Hydrology Laxmi Publications New Delhi, 3rd ec 2016. S.K. Garg, Irrigation Engg and Hydraulic Structures. Khanna Publications, Delhi, 1 2017. 	dition, Lst edition,
 P. Jayarami Reddy, Text book of Hydrology Laxmi Publications New Delhi, 3rd ed 2016. S.K. Garg, Irrigation Engg and Hydraulic Structures. Khanna Publications, Delhi, 1 2017. R. K. Sharma and Sharma, Hydrology and water resource Engineering, Revised E B.C. Punmia Irrigation Engineering and Design of Hydraulic Structures. Laxmi Pu NewDelhi, Sixteenth edition, 2019. 	dition, Lst edition, dition 2007 blications

Course Outcomes**

1. Able to classify and design the canals longitudinal sections and cross drainage works.

2. To comprehend various aspects of gravity dam analysis and design.

3. To be able to understand concepts of construction and failure in earthen dams and design of major spillways.

4. To know concepts canal falls and regulator works and apply the knowledge in their design.

COURSEARTICULATIONMATRIX

Course Outcomes		Programme Outcomes											Programm e Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	3	2	2	3	3	-	-	-	-	-	2	2	2	2	
CO2	3	2	1	1	2	2	-	-	-	-	-	2	2	2	2	
CO3	3	2	2	2	3	2	-	-	-	-	-	2	2	2	2	
CO4	3	3	2	2	3	2	-	-	-	-	-	2	2	2	2	
Average	3	2.5	1.75	1.75	2.75	2.25	-	-	-	-	-	2	2	2	2	

21UCV731E	DESIGN OF PRE-STRESSED	Credits:3								
	CONCRETE STRUCTURES									
L:T:P-3:0:0		CIE Marks: 50								
Total Hours/Week:3		SEE Marks:50								
UNIT - I 10Hrs										
Materials: High properties.	strength concrete and steel, stress-strain cl	haracteristics and								
Basic Principles concept, centre methods and end	Basic Principles of Prestressing: Fundamentals, Load balancing concept, stress concept, centre of thrust, pre-tensioning and post-tensioning systems, tensioning methods and end anchorages.									
	UNIT - II	10Hrs								
Analysis of sec stresses in steel Losses of prestre methods, detern	 Analysis of sections for flexure: Stresses in concrete due to prestress and loads, stresses in steel due to loads, cable profile. Losses of prestress: Various losses encountered in pretensioning and post tensioning methods, determination of jacking force. 									
	UNIT - III	10Hrs								
Deflections: Pre members. Limit State of co flexural and she	diction of short term and long term deflection bilapse and serviceability: I.S. code recommen tear resistance of sections, shear reinforcement	ons of un-cracked dations - ultimate nt. Limit state of								
serviceability-co	ntrol of deflections and cracking.									
	UNIT IV	10Hrs								
 Design of End blocks: Transmission of Prestressing pre-tensioned members, transmission length, and anchorage stress in post-tensioned members, bearing stress and bearing tensile stress in end block, Methods, I.S. code provision for the design of end block reinforcement. Design of Beams: Design of pretensioned and post-tensioned symmetrical sections, permissible stress, design of Prestressing force and eccentricity. 										

REFERENCE BOOK*

- 1. N. KrishnaRaju, Prestressed Concrete Design, McGraw Hill Publications 6th edition, 2018.
- 2. P. Dayaratnam, Prestressed Concrete Design, Medtech publishers, 7thedition,2017.
- 3. N. Rajgopalan, Prestressed Concrete Design, Narosa Publishers 2nd edition, 2010.
- 4. E. G. Nawy, Prestressed Concrete Design, Pearson publication, 2nd edition, 1995.

COURSE OUTCOMES**

- 1. Students will remember and recall materials used in PSC, their characteristics and basic principles of prestressing including pretensioning and post tensioning constructions.
- 2. Students will apply basic engineering principles to evaluate stresses due to loads in concrete and steel under flexure and shear.
- 3. Students will understand concepts and analyze the different losses and evaluate losses of prestress and deflections.
- 4. Students will understand the concepts and apply them to evaluate / estimate the ultimate resistance capacity of PSC members in flexure and shear.

COURSE ARTICULATION MATRIX

Course Outcomes		Programme Outcomes												Programme Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO1	3	2	2	2	1	2	1	1	1	2	2	2	3	3	2		
CO2	3	3	2	3	1	2	1	2	2	2	2	2	3	2	2		
CO3	3	3	3	3	2	2	1	1	2	2	2	2	2	2	3		
CO4	3	3	3	2	2	2	2	3	2	2	2	2	2	3	3		
Average	3	2.75	2.50	2.50	1.50	2	1.25	1.75	1.75	2	2	2	2.5	2.5	2. 5		

21UCV733E		Credits:3		
L:T:P -3:0:0	DEEP FOUNDATION	CIEMarks:50		
Total Hours/Week:3		SEEMarks:50		

Introduction to Foundation Engineering: Necessity, classification, Shallow Vs Deep foundation. **Pile Foundation:** Pile classification based on their friction, composition and Method of installation. Axial load carrying capacity of single pile by different methods: By use of Static bearing capacity equations and dynamic formulae. Pile load tests and Negative skin friction.

UNIT-II10HoursPile group: Group efficiency, Problems related to load on each pile: Pile group with vertical and
inclined piles (Culman's graphical method- no problems). Laterally loaded vertical piles: Pile
resistanceanddeflectionunderlateralloads, elasticmethodandUnder-reamedpiles: construction
stages.

UNIT-III

UNIT-I

Well Foundations & Caissions: Introduction, Different shapes and characteristics of wells. Components of well foundation. Forces acting on well foundation. Sinking of wells. Causes and remedies of tilts and shifts.

Drilled Piers & Caissons: Introduction, construction, advantages and disadvantages of drilled piers. Design of open, pneumatic and floating caissons. Advantages and disadvantages of floating caissons.

Foundations on expansive soils: Introduction, Definition, Identification, Mineral Structure, Index properties of expansive soils, Swell potential and swell pressure, Free swell, CNS layer, foundation treatment for structures in expansive soil.

Machine Foundations: Introduction, Types of Machine foundations, basic definitions, degree of freedom of a block foundation, general creteria for design of machine foundation.

Reference Books*

- 1. B. C. Punmia, Ashok. K. Jain and Arun. K. Jain, Soil Mechanics and Foundation Engg.-Laxmi Publications Co., New Delhi. 17thedition 2017.
- 2. Gopal Ranjan and A.S.R. Rao, Basic and Applied Soil Mechanics- New Age International(P) Ltd., New Delhi Fourth Edition 2022.
- 3. Davis and poulus-pile foundation analysis and Design 1980
- 4. P. Purushotham Raj, Soil mechanics and foundation design, Published by Dorling kidersley, pvt, Ltd 2008.
- 5. Dr. C. Venkataramaiah, Geotechnical Engineering New age Publications, Revised 3rdedition, 2010
- 6. Dr. P. C. Varghese Foundation Engineering Publisher PrenticeHallofIndia,2005.

Course Outcomes**

1. Students will get knowledge on type of foundations and classification of piles; calculatet he Load carrying capacity of single pile by different methods.

UNIT–IV

10Hours

10Hours

- 2. Students analyze and design group of pile with the efficiency.
- 3. Students will understand the well foundation, caisson types, construction methods, and address sinking & tilting issues. Understand drilled piers, caisson designs, and evaluate their advantages and disadvantages
- 4. Students will Define and identify expansive soils and their properties. Understand free swell behavior and its implications, analyze machine foundation types and design criteria, including degrees of freedom

PO1 PO2 PO3 PO4 PO5 **PO6** PO7 PO8 **PO9** PO10 PO11 PO12 PSO1 PSO2 PSO3 COs 2.5 2.25 2.25 2.75 Avg.

CO & PSO –PO Mapping

BVV Sangha's Basaveshwar Engineering College, Bagalkot Department Civil Engineering

2021-22 admitted batch

Academic Year: 2024-25

			VIII semester								
SI.	Catagowy	Subject Code	Subject Title	Credita	HO W	DUR VEE	RS/ K	EXAMINATION MARKS			
No	Category		Subject The	Creatis	L	Т	Р	CIE	SEE	Total	
1.	AEC	21UCV80XO	MOOCs (online Courses)	03	3	Ι	-	I	-	-	
2.	Seminar	21UCV802S	Technical Seminar	01	-	I	1	50	50	100	
3.	AEC	21UHS800C	Research Methodology	02	2	-	-	50	50	100	
4.	INT	21UCV804I	Research / Industrial Internship	10	-	-	-	50	50	100	
			Total	16				150	150	300	

21UHS800C		Credits:02
Hrs/Week:2:0:0	RESEARCH METHODOLOGY&IPR	CIEMarks:50
TotalHours:26Hrs	(Common to All Branches)	SEEMarks:50

CourseObjectives:

1. To understand the basics of research and its types.

- 2. To learn the concept of Literature Review, Technical Reading, Attributions and Citations.
- 3. To learn Ethics in Engineering Research.
- 4. To Integrate Intellectual Property Rights with engineering sciences to cater to R&D requirements.

UNIT -I	5Hrs
Introduction to Engineering Research	
Fundamentals of Research: Meaning, objectives, and motivation in engineering r	research.
Types of Engineering Research: Basic, applied, and translational research; identi	fying and solving
Worthwhile problems.	
Research Ethics: Ethics in engineering research and practice, types of research mi	sconduct, and
ethical issues in authorship.	
UNIT - II	5 Hrs
Literature Review and Citations	
Technical Reading & Analysis: Methods for reviewing literature, analyzing prior	art, and
synthesizing new and existing knowledge.	
Bibliographic Databases: Web of Science, Google, Google Scholar, effective sea	rch strategies.
Conceptualizing Research: Critical and creative reading, taking notes, reading ma	athematical models,
algorithms, and datasheets.	
Citations & Acknowledgments: Attribution, citation styles, impact of keywords,	citing datasets, and
knowledge dissemination.	
UNIT - III	8Hrs
Intellectual Property Rights (IPR) & Patents:	
Introduction to Intellectual Property: Concepts of property and rights, for	ns of IPR, role in
research and economic development, IP governance, and global innovation indicate	ors.
Patents: Definition, objectives, criteria for patentability, software/business method	l patents,
infringement, compulsory licensing, and government use of inventions.	-
Patent Process: Prior art search strategies, patent databases (free and paid), draftir	ng specifications
and claims, filing requirements, jurisdiction, opposition procedures, and renewal.	
Filing Requirement of patent: Patent Application Forms. Work flow chart in	obtaining Patents,
Jurisdiction of Filing Patent Application. Pre-grant & Post-grant Opposition. For	ms to be submitted,
filing mechanism through Individual patent office and PCT route. Not	eed for a Patent
Attorney/AgentRevocation. Term of Patent. Patent renewal and Fee Structur	e National Bodies
Dealing with Patent Affairs. Utility Models	
UNIT - IV	8Hrs
Copyrights, Trademarks, Industrial Design & GI	
Copyrights: Nature, subject matter, authorship, digital copyright, fair use, infring	ement.enforcement.
and international agreements.	,,
Trademarks: Meaning, functions, distinctiveness, registration non-con	nventional marks
infringement, and domain name issues.	
Industrial Design: Definition, registration process in India, infringement, and case	e laws.

Geographical Indications (GI): Acts, laws, ownership rights, registered GIs in India, protection,

certification marks, enforcement, and registration process.

IP Organizations & Policies: Overview of IP schemes, national programs, and regulatory bodies in India.

Case Studies & Applications

Patents: Case studies on Curcuma (Turmeric), Neem, and Basmati patents.

Copyright & Trademark Disputes:Interesting Copyrights Cases,Case studies (e.g., Coca-Cola vs. Bisleri, Apple vs. Samsung).

Course Outcomes:

At the end of the course student will be able to:

CO1: Integrate research methodology in engineering sciences in relevant trades.

CO2: Exhibit reflective thinking in problem solving exercises.

- **CO3:** Identify criteria to fit one's own intellectual work in particular form of IPRs and able to apply statutory provisions and procedure to protect different forms of IPRs at National and international level.
- **CO4:** Develop skill of making search using modern tools and techniques and also student is able to become patent agent by cracking patent agent exam.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	-	-		-	-	-	
CO2	-	2	2	-	1	2	2	3	-	2	-	2
C03	-	-	-	-	-	3	2	2	-	2	-	1
CO4	-	-	-	-	3	-	-	-	1	1	-	2