The National Institute of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
Recognised by AICTE, New Delhi, Grant-in-Aid by Government of Karnataka,
Accredited by NAAC, New Delhi

BLOWN UP SYLLABUS

2021-22

II Year B.E.

Department of Civil Engineering

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TABLE OF SCHEME AND EXAMINATION FOR III & IV SEMESTER (2021 Batch)

III Semester												
Sl. No	**Course Code**	**Course Title**	**Category**	**Teaching Department**	**Teaching Hours / Week**				**Examination**			**Credits**
					Theory Lecture	**Tutorial**	**Practical / Drawing**	**Self-study Component**				
					L	**T**	**P**	**S**	**CIE Marks**	**SEE Marks**	**Total Marks**	
1	21MA3C01	Mathematics 3	BSC	MAT	3	0	0	0	50	50	100	3
2	21CV3C01	Building Materials and Construction	PC	CIV	3	0	0	0	50	50	100	3
3	21CV3C02	Mechanics of Fluids			3	2	0	0	50	50	100	4
4	21CV3C03	Surveying			3	0	2	0	50	50	100	4
5	21CV3C04	Mechanics of Deformable Bodies			3	2	0	0	50	50	100	4
6	21CV3L01	Metal and Timber Testing Lab			0	0	2	0	50	50	100	1
7	21BG3C02	Biology for Engineers	PI	Completed during II Sem Vacation					50	50	100	2
8	21KA3H01 / 21CI3H01	Kannada/CIPE	HSC	HSC	1	--	--	--	50	0	--	0
9	21CV3A01	AEC 3 -Drawing of Building Components	AEC	CIV	0	0	2	0	50	50	100	1
10	21CV3U01	Social Connect & Responsibility	UHV	CIV	--	--	--	--	--	--	--	0
TOTAL												**22**

Lateral Entry Students

11	21MA3N01	Additional Maths 1	BSC	MAT	2	2	0	0	100	0	100	0

IV Semester													
Sl. No	**Course Code**	**Course Title**	**Category**	**Teaching Department**	**Teaching Hours / Week**				**Examination**			**Credits**
					Theory Lecture	**Tutorial**	**Practical / Drawing**	**Self-study Component**				
					L	**T**	**P**	**S**	**CIE Marks**	**SEE Marks**	**Total Marks**	
1	21MA4C01	Mathematics 4	BSC	MAT	3	0	0	0	50	50	100	3
2	21CV4C01	Applied Hydraulic Engineering	PC	CIV	3	0	0	0	50	50	100	3
3	21CV4C02	Concrete Technology			3	0	0	0	50	50	100	3
4	21CV4C03	Structural Analysis			3	2	0	0	50	50	100	4
5	21CV4C04	Water Supply and Treatment			3	0	2	0	50	50	100	4
6	21CV4L01	Fluid Mechanics Laboratory			0	0	2	0	50	50	100	1
7	21KA4H01/ 21CI4H01	Kannada/CIPE	HSC	HSC	1	--	--	--	50	0	--	0
8	21CV4A01	AEC 4 - Computer Aided Drawing	AEC	CIV	0	0	2	0	50	50	100	1
9	21CV4U01	Universal Human Values & Prof. Ethics	UHV	CIV	1	0	0	--	50	0	--	1
10	21CV4I01	Summer Internship 1	PI	CIV	Completed during II/III Sem Vacation				100	0	100	2
TOTAL												**22**

Lateral Entry Students

11	21MA4N01	Additional Maths 2	BSC	MAT	2	2	0	0	100	0	100	0

COURSE CODE: 21MA3C01

COMPLEX ANALYSIS, TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

(CIV/MECH/IP)

Credits: 3 **Total: 40 Hrs** **L:T:P (3:0:0)**

SEE: 100 Marks **CIE: 50 Marks**

SEE Hours: 3 hours **Max. Marks:100**

Prerequisites if any	Calculus and ordinary differential equations
Learning objectives	The goal of this course is **I.** To facilitate the students to apply the concept of analytic functions to solve flow problems and also evaluate complex line integrals **II.** To enable the students to find the sum of infinite series using Fourier series and finding certain integrals using Fourier transforms **III.** To form and aid the solutions of partial differential equations

Course Outcomes:

On the successful completion of the course, the student will be able to

COs		**Bloom's level**	**Expected attainment level %**
CO1	Apply the concept of analytic functions to solve fluid flow problems, find the images of certain plane curves under the given conformal transformation and compute complex line integrals using Cauchy's theorems.	Apply	60
CO2	Translate the periodic function of period 2*l* in terms of Fourier series, half range series.	Apply	60
CO3	Compute Fourier and Inverse Fourier transforms of functions	Apply	60
CO4	To form partial differential equations and solve homogeneous and non homogeneous partial differential equations	Apply	60

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-
CO2	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-
CO3	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-
CO4	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-

S – Strong (3) M – Medium(2) L – Low (1)

Course Structure

	Module – 1: Complex Variables-1	**No. of Lecture Hours**	**No. of Tutorial Hours**	**Self Learning Hours**
1.1	Function of a complex variable, Analytic function, Cauchy - Riemann equations in Cartesian and polar forms, properties of analytic functions (no proof).	4	Nil	Nil
1.2	Construction of analytic functions in cartesian form – application problems.	3	Nil	Nil
1.3	Conformal Mapping –definition, discussion of $w=e^z$, $w = z + (a^2 / z)$ for $z \neq 0$.	2	Nil	Nil
	Module-II: Complex Variables-2			
2.1	Complex line integral, properties.	2	Nil	Nil
2.2	Cauchy's theorem– problems	1	Nil	Nil
2.3	Cauchy's integral formula – problems	2	Nil	Nil
2.4	Taylor's series expansion, Laurent's series expansion– problems	2	Nil	Nil
	Module-III: Fourier Series			
3.1	Periodic functions, Fourier series, Dirichlet's conditions for a Fourier series, Euler's Fourier coefficients.	1	Nil	Nil
3.2	Fourier series of even and odd functions of period $2l$– continuous and discontinuous functions	2	Nil	Nil
3.3	Half range Cosine series	2	Nil	Nil
3.4	Half range sine series	1	Nil	Nil
3.5	Practical harmonic analysis	2	Nil	Nil
	Module-IV: Fourier Transforms			
4.1	Infinite Fourier Transforms	2	Nil	Nil
4.2	Fourier cosine and sine transforms	2	Nil	Nil
4.3	Inverse sine and cosine Transforms	3	Nil	Nil
	Module-V: Partial Differential Equations			
5.1	Formation of PDE by eliminating arbitrary functions, classification of PDE	2	Nil	Nil
5.2	Solution of non-homogeneous PDE by direct integration	1	Nil	Nil
5.3	Solution of homogeneous PDE by seperation of variables	1	Nil	Nil
5.4	Various possible solutions of one dimensional wave equation and heat equation, Applications	3	Nil	Nil
5.5	Solution of Lagrange's PDE-simple problems	2	Nil	Nil
	Total No. of Lecture Hours	40		
	Total No. of Tutorial Hours		Nil	Nil
	Total No. of Self learning Hours			Nil

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module-1 1.1	I	Week 1	https://youtube.com/playlist?list=PLLy_2iUCG87DEfQ7Wp0B9OmAnYKBZUvfn	Video summary of each module	Video lecture will be prepared using iScribe and will be share through moodle/google classroom		C	240
1.2	I	Week 2						180
1.3	I	Week 3						120
Module-2 2.1	I	Week 4					H	120
2.2	I	Week 4					A	60
2.3	I	Week 5	https://youtube.com/playlist?list=PLLy_2iUCG87DEfQ7Wp0B9OmAnYKBZUvfn					120
2.4	I	Week 5 Week6						120
Module-3 3.1	II	Week7					L K	60
3.2	II	Week7						120
3.3	II	Week8						120
3.4	II	Week8	https://youtu.be/HoGNkZclxDU					60
3.5	II	Week9						120
Module-4 4.1	II	Week9					&	120
4.2	II	Week10					T	120
4.3	II	Week11	https://youtube.com/playlist?list=PLLy_2iUCG87DEfQ7Wp0B9OmAnYKBZUvfn					180
Module-5 5.1	III	Week11					A	120
5.2	III	Week12						60
5.3	III	Week13						60
5.4	III	Week14					L	120
5.5	III	Week14 Week15	https://youtu.be/U51lQtlzvA0				K	180

Assessment Pattern:

Bloom's level	Continuous Internal Examination			End Semester Examination
	T1 (20 marks)	T2 (20 marks)	Assignment (10 marks)	
Remember				
Understand	√	√	√	√
Apply	√	√	√	√

Text Books:

1. Higher Engineering Mathematics – B.S. Grewal, 42nd edition, Khanna Publications, 2017.
2. Advanced Engineering Mathematics - Erwin Kreyszig, wiley publications, 10th edition, 2015.

Reference Books :

1. Advanced Engineering Mathematics – H. K. Dass, Chand Publications, 2019.
2. Higher Engineering Mathematics – B. V. Ramana, Tata McGraw-Hill Publications, 2017.
3. Advanced Engineering Mathematics- Peter O Neil; Thomas, Broks/ Cole, 7th Edition, 2011.

Course Code: 21CV3C01 **Course: Building Materials and Construction**
Credits: 03 **L:3 T:0 P:0 S:0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours: 03 **Max. Marks:100**

Prerequisites if any	None
Learning objectives	1.Summarize the qualities of construction material used for construction 2. Translate knowledge of laying details of various building components 3. Translate knowledge of recycling and eco friendly construction techniques

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO 1	Describe the properties along with the uses of construction material.	Understand
CO 2	Explain the methods of construction of various building components	Understand

Mapping with POs and PSOs:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12		PSO 1	PSO 2	PSO 3
CO 1	3						2							3		
CO 2	3					1	3								3	

Course Structure

	Module – 1	No. of Lecture Hours	No. of Tutorial Hours	Self Learning Hours
1.1	Stones-Varieties of building stones	1	0	0
1.2	Qualities of good building stones.	1	0	0
1.3	Dressing of stones.	1	0	0
1.4	Selections and suitability of stones	1	0	0
1.5	Bricks-Qualities of brick earth, standard specifications for shape, size	1	0	0
1.6	Properties, testing of bricks.	1	0	0
1.7	Alternative materials- Solid and hollow blocks aerated blocks,	1	0	0
1.8	Reinforced brick work.	1	0	0
	Module – 2			
2.1	Cement-Raw materials used for manufacture of cement	1	0	0
2.2	Types and properties of cement	1	0	0
2.3	Tests on cement.	1	0	0
2.4	Fine (River sand, M sand)	1	0	0
2.5	Coarse Aggregates- Properties and uses	1		
2.6	Mortar -Materials, preparation, properties.	1	0	0

2.7	Types of Mortar	1	0	0
2.8	Reinforcing and Structural Steel-Types, properties	1	0	0
	Module – 3		0	0
3.1	Timber-Classification of timber, fundamental engineering properties of good timber	1	0	0
3.2	Defects in timber, seasoning of timber, ply wood and its uses.	1	0	0
3.3	Plastics-Types, constituents of plastic, properties,	1	0	0
3.4	Uses of plastics in building industries.	1	0	0
3.5	Paints -Constituents of oil paint, characteristics of a good paint,	1	0	0
3.6	Types of paints,	1	0	0
3.7	Varnishes – constituents of varnishes	1	0	0
3.8	Types of varnishes	1	0	0
3.9	Distemper and application to new and old surfaces	1	0	0
	Module – 4			
4.1	Sub structures: Foundations-Function and requirements of a good foundation	1	0	0
4.2	Types of foundations.	1	0	0
4.3	Super structures: Brick masonry- Different types of bonds	1	0	0
4.4	English & Flemish bond	1	0	0
4.5	Roofs- Different types of roofs	1	0	0
4.6	Types of roof coverings.	1	0	0
4.7	Flooring- Base preparation and laying details.	1	0	0
4.8	Types of flooring	1	0	0
4.9	Form work- Material for form work, Types of Formwork	1	0	0
	Module – 5			
5.1	Sustainable construction-Concept	1	0	0
5.2	Sustainable construction - need	1	0	0
5.3	Embodied energy	1	0	0
5.4	CO2 emissions in building materials	1	0	0
5.5	GRIHA	1	0	0
5.6	LEED-India	1	0	0
5.7	4R's Golden rule for waste management	1	0	0
5.8	Construction and demolition waste recycling	1	0	0
	Total No. of Lecture Hours	42		
	Total No. of Tutorial Hours		0	
	Total No. of Self learning Hours			0

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks / Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module-1 1.1	L1	Week 1	-	-		IM (PPT)	Blackboard	50
1.2	L1	Week 1	-	-		OER		50
1.3	L1	Week 1	-	-		OER		50
1.4	L1	Week 2	-	-		OER		50

1.5	L1	Week 2	-	-	Moodle LMS	-		50
1.6	L1	Week 2	-	-		-		50
1.7	L1	Week 3	-	-		-		50
1.8	L1	Week 3	-	-		-		50
Module-2 2.1	L1	Week 3	-	-		IM (PPT)		50
2.2	L1	Week 4	-	-		OER		50
2.3	L1	Week 4	-	-		OER		50
2.4	L1	Week 4	-	-		-		50
2.5	L1	Week 5	-	-		-		50
2.6	L1	Week 5	-	-		-		50
2.7	L1	Week 5	-	-		-		50
2.8	L1	Week 6	-	-		-		50
Module-3 3.1	L1	Week 6	-	-		IM (PPT)		50
3.2	L1	Week 6	-	-		OER		50
3.3	L1	Week 6	-	-		-		50
3.4	L1	Week 6	-	-		-		50
3.5	L1	Week 7	-	-		-		50
3.6	L1	Week 7	-	-		-		50
3.7	L1	Week 7	-	-		-		50
3.8	L1	Week 7	-	-		-		50
3.9	L1	Week 7	-	-		-		50
Module-4 4.1	L2	Week 8	-	-		IM (PPT)		50
4.2	L2	Week 8	-	-		OER		50
4.3	L2	Week 8	-	-				50
4.4	L2	Week 8	-	-				50
4.5	L2	Week 8	-					50
4.6	L2	Week 8	-					50
4.7	L2	Week 8	-					50
4.8	L2	Week 8	-					50
4.9	L2	Week 8	-					50
Module-5 5.1	L3	Week 9	-	-		IM (PPT)		50
5.2	L3	Week 9	-	-		OER		50

5.3	L3	Week 9	-	-		OER		50
5.4	L3	Week 9	-	-		-		50
5.5	L3	Week 9	-	-		-	Blackboard	50
5.6	L3	Week 9	-	-		-		50
5.7	L3	Week 9	-	-		-		50
5.8	L3	Week 9	-	-		-		50

Assessment Pattern:

Bloom's level	Continuous Internal Examination			Semester End Examination
	Test 1	Test 2	Assignment	
Remember	√	√	√	√
Understand	√	√	√	√

Text Books:

1. P C Varghese, "Building Materials", PHI Learning Pvt. Ltd
2. Jagadish.K.S, "Alternative Building Materials Technology", New Age International, 2007.

Reference Books:

1. S.K.Duggal, "Building Materials", (Fifth Edition) New Age International (P) Limited, 2019
2. National Building Code (NBC) of India.
3. Building Materials and Components, CBRI, 1990, India
4. M. S.Shetty, "Concrete Technology", Eight edition, S. Chand & Co. New Delhi, 2018
5. Sushil Kumar "Building Materials and construction", 20th edition, reprint 2015,Standard Publishers
6. B.C.Punmia, Ashok kumar Jain, Arun Kumar Jain, "Building Construction, Elevnth edition Laxmi Publications (P) ltd., New Delhi, 2016.
7. Rangawala S. C. "Engineering Materials", Charter Publishing House, Anand, India, 2015.

Online Resources:

1. Building materials and Construction, B. Bhattacharjee Department of Civil Engineering IIT Delhi : https://archive.nptel.ac.in/courses/105/102/105102088/
2. Energy Efficiency, Acoustics and day lighting in Building Civil Engineering, B. Bhattacharjee IIT Delhi https://archive.nptel.ac.in/courses/105/102/105102175/
3. Sustainable Materials And Green Buildings, B Bhattacharjee, Department of Civil Engineering IIT Delhi https://archive.nptel.ac.in/courses/105/102/105102195/
4. Basic Construction Materials, Manu Santhanam Department of Civil Engineering IIT MadrasIIT Madras https://archive.nptel.ac.in/courses/105/106/105106206/
5. Building Materials and Composites, Sumana Gupta, Department of Architecture and Regional Planning IIT Kharagpur,https://archive.nptel.ac.in/courses/124/105/124105013/
6. Advanced Foundation Engineering, T.G. Sitharam IISc Bangalore https://nptel.ac.in/courses/105108069

Course Code: 21CV3C02 **Course: Mechanics of Fluids**

Credits: 03 **L:T:P:S :- 3:2:0:0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	Mathematics (Differentiation and integration)
Learning objectives	1. Identify the properties of fluid as a continuum; describe fluid pressure and its measurement. 2. Solve problems on hydrostatics. 3. Use principles of mathematics to represent dynamics of fluid flow to solve problems including flow measurement.

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO1	Understand the properties of fluids and fluid statics	Understand Apply
CO2	Apply to solve kinematic problems	Apply
CO3	Apply to solve fluid dynamic problems	Apply

Mapping with POs and PSOs:

COs	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3
CO1	3	1	-	-	-	-	-	-	-	-	-	-		3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-		3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-		3	-	-

Course Structure

	Module – 1	No. of Lecture Hours	No. of Tutorial Hours	Self Learning Hours
1.1	**Properties of Fluids:** IntroductionFluid, Liquids and their properties	1	0	0
1.2	Density, Mass density, Weightdensity, Specific Volume, Specific gravity	1	0	0
1.3	Viscosity, Newton's Law of Viscosity; Types of Fluids; Effect of Temperature on viscosity; Effect of Pressure on viscosity	2	0	0
1.4	Surface tension, Pressure inside a water droplet, Pressure inside soap bubble, Pressure inside a liquid Jet	2	0	0
1.5	Capillarity, Compressibility and bulk modulus	1	0	0
1.6	Vapor pressure of liquid	1	0	0

	Module – 2			
2.1	**Pressure Measurements:** Pressure of a Fluid	1	0	0
2.2	Pascal's law	1	0	0
2.3	Absolute and gauge Pressure	1	0	0
2.4	Pressurevariation in a static fluid	1	0	0
2.5	Pressure Equivalent	1	0	0
2.6	Measurement of pressure, Measurement of atmosphere pressure-Barometer, Measurement of gauge pressure at a point-Piezometer, Manometer, Simple manometers, Differential manometer, Single Column manometers, Inclined Single Column manometers, Micro manometers	2	0	0
2.7	Mechanical Gauge	1	0	0
	Module – 3			
3.1	**Hydrostatic Forces on Surfaces:** Introduction	1	0	0
3.2	Total pressure and centre of pressure	1	0	0
3.3	Horizontally immersed plane surfaces	1	0	0
3.4	Vertically immersed plane surfaces	2	0	0
3.5	Inclined immersed plane surface.	2	0	0
3.6	Curved immersed surfaces	1	0	0
	Module – 4			
4.1	**Fluid Kinematics:** Introduction, Description of fluid motion, Langrangian method, Eulerian method	1	0	0
4.2	Types of fluid motion, Steady and unsteady flow, Uniform and non-uniform flows, One- two- and three-dimension flows, Rotational and Irrotational flow, Lamina and Turbulent Flow, Compressible and Incompressible flow	1	0	0
4.3	Types of flow lines, Path line, Streak line, Stream line, Steam tube, Rate of flow or discharge	1	0	0
4.4	Continuity equation-1D	1	0	0
4.5	Continuity equation in Cartesian coordinate	1	0	0
4.6	Continuity equation in Polar coordinate	1	0	0
4.7	Circulation and velocity	1	0	0
4.8	Velocity potential	1	0	0
4.9	Stream function	1	0	0
4.10	Relationship between stream function and potential function	1	0	0
	Module – 5			
5.1	**Fluid Dynamics:** Introduction	1	0	0
5.2	Different types of heads of a liquid in motion	1	0	0
5.3	Euler equation of motion	1	0	0
5.4	Bernoulli's equation	1	0	0
5.5	Bernoulli's equation for real fluid flow	1	0	0
5.6	Practical applications of Bernoulli's equation, Venturimeter, Orifice meter, Pitot tube	2	0	0
5.7	Impossible moments equation	1	0	0
	Total No. of Lecture Hours	42		
	Total No. of Tutorial Hours		0	
	Total No. of Self learning Hours			0

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module-1 1.1	L1	Week 1	-	-	Moodle LMS	IM (PPT)	Blackboard	60
1.2	L1	Week 1	-	-		-		60
1.3	L1	Week 2	-	-		-		120
1.4	L1	Week 2	-	-		-		120
1.5	L1	Week 3	-	-		-		60
1.6	L1	Week 3	-	-		-		60
Module-2 2.1	L1	Week 3	-	-		IM (PPT)		60
2.2	L1	Week 4	-	-		-		60
2.3	L1	Week 4	-	-		-		60
2.4	L1	Week 4	-	-		-		60
2.5	L1	Week 5	-	-		-		60
2.6	L1	Week 5	-	-		-		120
2.7	L1	Week 6	-	-		-		60
Module-3 3.1	L2	Week 6	-	-		IM (PPT)		60
3.2	L2	Week 6	-	-		-		60
3.3	L2	Week 7	-	-		-		60
3.4	L2	Week 7	-	-		-		120
3.5	L2	Week 8	-	-		-		120
3.6	L2	Week 8	-	-		-		60
Module-4 4.1	L3	Week 9	-	-		IM (PPT)		60
4.2	L3	Week 9	-	-		-		60
4.3	L3	Week 9	-	-		-		60
4.4	L3	Week 10	-	-		-		60
4.5	L3	Week 10	-	-		-		60
4.6	L3	Week 10	-	-		-		60
4.7	L3	Week 11	-	-		-		60
4.8	L3	Week 11	-	-		-		60
4.9	L3	Week 11	-	-		-		60
4.10	L3	Week 12	-	-		-		60
Module-5 5.1	L3	Week 12	-	-		IM (PPT)		60
5.2	L3	Week 12	-	-		-		60
5.3	L3	Week 13	-	-		-		60
5.4	L3	Week 13	-	-		-		60
5.5	L3	Week 13	-	-		-		60
5.6	L3	Week 14	-	-		-		120
5.7	L3	Week 14	-	-		-		60

Assessment Pattern:

Bloom's level	Continuous Internal Examination			SemesterEnd Examination
	Test 1	Test 2	Assignment	
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√

Text Books:

1. C.S.P. Ojha, R. Berndtsson, and P.N. Chandramouli, “Fluid Mechanics andMachinery”, Oxford University Publication, 2010.

Reference Books:

1. P.N. Modi, Dr. S.M. SETH, “Hydraulics and Fluid Mechanics Including Hydraulics Machines”, Standard Book House.
2. R. K. Bansal, “A Textbook of Fluid Mechanics and Hydraulic Machines”, Laxmi Publications Pvt. Ltd.
3. Y.A. Cengal and J.M. Cimbala. “Fluid Mechanics”, Tata McGraw-Hill Publishing Company limited, 2006.
4. F.M. White. “Fluid Mechanics”, 5th Edition New York McGraw-Hill, 2003.

Online Resources:

1. NPTEL YouTube video: https://youtu.be/fa0zHI6nLUo

Course Code: 21CV3C03 **Course: Surveying**

Credits: 3 **L:T:P:S 3:0:2:0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	None
Learning objectives	1. Develop an understanding of the basic principles of surveying including the traditional measurements and modern techniques 2. Apply geometric and trigonometric principles to basic surveying calculations

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO1	Understand and apply principles of surveying to arrive at solutions to field problems	Understand Apply
CO2	Utilize the concept of conventional surveying for data capturing and processing	Apply
CO3	Summarize the concepts of advanced surveying methods necessary for engineering practice	Understand

Mapping with POs and PSOs:

COs	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3
CO1	3	2												3		
CO2		2			2									2		
CO3		2			3									2		

Course Structure

	Module – 1	No. of Lecture Hours	No. of Tutorial Hours	Self Learning Hours
1.1	**Introduction** Definition, objectives, and importance of surveying. Primary divisions of surveying. Classification of surveys, principles of surveying.	3	0	0
1.2	Maps, classification of maps, map scale, conventional symbols, topographic maps, map layout, Map numbering systems.	3	0	0
1.3	Theory of errors, Introduction to triangulation and trilateration. Triangulation measurements. Errors, accuracy, precision, systematic and random errors, laws of weights, RMS error.	2	0	0
	Module – 2			

2.1	**Surveying Measurements and Traverse Survey** Distance measurement, Introduction to EDM, basic concepts, measurement of distance using phase difference.	3	0	0
2.2	Measurement of directions, Meridians, bearings, magnetic and true bearings.	3	0	0
2.3	Compass, Vernier theodolite, fundamental axes, temporary adjustments, measurement of horizontal and vertical angles (introduction only).	2	0	0
2.4	Traverse, types, procedures, control establishment. Latitudes and departures, rectangular coordinates, Bowditch (compass) rule for traverse adjustment, area of a traverse.	4	0	0
	Module – 3			
3.1	**Levelling** Basic terms and definitions, Methods of levelling, instruments, auto level, digital and laser levels.	2	0	0
3.2	Booking and reduction of levels, plane of collimation and rise-fall methods, Profile levelling, numerical problems.	4	0	0
3.3	Trigonometric levelling: single plane and double plane methods (no numerical).	2	0	0
	Module – 4			
4.1	**Measurement of Areas and Volumes** Measurement of area from offsets, mid ordinate rule, trapezoidal and Simpson's one third rule (simple numerical problems).	3	0	0
4.2	Measurement of volumes, trapezoidal and prismoidal formula (simple numerical problems).	3	0	0
4.3	Contours: characteristics and uses. Volumes from contours (no numerical)	2	0	0
	Module – 5			
5.1	**Recent Advances in Surveying** Total station, components, adjustments, uses of total station, measurement of coordinates and heights. Geographical coordinate system and projected coordinate system.	3	0	0
5.2	Introduction to Global Positioning Systems, segments of GPS, working principle, types of GPS surveying and applications.	2	0	0
5.3	Introduction to air borne laser terrain mapping systems.	1	0	0
	Total No. of Lecture Hours	42		
	Total No. of Tutorial Hours		0	
	Total No. of Self learning Hours			0

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module-1 1.1	L1	Week 1	-	-	**Moodle LMS**	IM – PPT OER	**Chalk and Talk**	50
1.2	L1	Week 2	-	-		OER		50
1.3	L1	Week 2	-	-		IM		50
Module-2 2.1	L1	Week 3	-	-		IM - PPT		50
2.2	L1	Week 4	-	-		IM		50
2.3	L1	Week 5	-	-		IM -OER		50
2.4	L1	Week 6	-	-		IM -OER		50

Module-3 3.1	L2	Week 7	-	-		IM – PPT OER		50
3.2	L2	Week 8	-	-		IM -OER		50
3.3	L2	Week 9	-	-		IM		50
Module-4 4.1	L2	Week 10	-	-		IM – PPT OER		50
4.2	L2	Week 11	-	-		IM		50
4.3	L2	Week 12	-	-		IM		50
Module-5 5.1	L1	Week 13	-	-		IM - PPT		50
5.2	L1	Week 13	-	-		OER		50
5.3	L1	Week 14	-	-		IM		50

Assessment Pattern:

Bloom's level	Continuous Internal Examination			Semester End Examination
	Test 1	Test 2	Assignment	
Remember	✓	✓	-	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓

List of experiments

1. Determination of distance between two inaccessible points using compass and accessories
2. Auto level
   Determination of reduced levels of points using auto level (simple leveling)
3. Determination of reduced levels of points using auto level (differential leveling)
4. To conduct profile leveling and cross sectioning, plotting
5. Vernier theodolite
   (a) Study of parts of a Vernier theodolite
   (b) Measurement of horizontal angle by repetition and reiteration methods
6. Total Station
   Introduction to total station, components, temporary adjustments
7. Horizontal and sloping distance measurement using total station
8. Measurement of horizontal and vertical angles using total station.
9. Determination of heights of buildings/towers/power line (remote elevation measurement), determination of distance between two points (missing line measurement) using total station.
10. Orientation of total station using compass and measurement of magnetic bearings, Measurement of coordinates (N, E, Z) of various points from one instrument position.

11. Detailed survey of an area including creation of job file, selecting appropriate point codes, measurement of coordinates, downloading of data and preparation of contour map. (2 classes)
12. Demonstration of GPS and Distomat instrument

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
1	L1	Week 1	-	-	Moodle LMS	Lab Manual	Lab experiments	120
2	L1	Week 2	-	-		Lab Manual		120
3	L1	Week 3	-	-		Lab Manual		120
4	L2	Week 4	-	-		Lab Manual		120
5	L2	Week 5	-	-		Lab Manual		120
6	L2	Week 6	-	-		Lab Manual		120
7	L1	Week 7	-	-		Lab Manual		120
8	L1	Week 8	-	-		Lab Manual		120
9	L1	Week 9	-	-		Lab Manual		120
10	L2	Week 10	-	-		Lab Manual		120
11	L3	Week 11 and 12	-	-		Lab Manual		240
12	L3	Week 13	-	-		Lab Manual		120

Assessment Pattern:

Bloom's level	Continuous Internal Examination	Semester End Examination
Remember	-	-
Understand	-	-
Apply	-	-
Analyze	✓	✓
Evaluate	✓	✓

Text Books:

1. K.R. Arora, "Surveying Vol. 1" Standard Book House, New Delhi. – 2019.
2. K.R. Arora, **"Surveying (Vol. 2 & 3)"** Standard Book House, New Delhi. – 2018.

Reference Books:

1. S.K. Roy, "Fundamentals of Surveying", Prentice Hall of India New Delhi-2010.
2. James M. Anderson, Edward M. Mikhail, "Introduction to Surveying" Mc Graw Hill Book Company, NY. – 2009.

3. B.C. Punmia, Ashok K. Jain, Arun K. Jain, “Surveying Vol.1 & 2”, Laxmi Publications pvt. Ltd., New Delhi – 2016.
4. Manoj K Arora and R.C. Badjatia, “Geomatics Engineering” Nem Chand and Bros. Roorkee – 2011.

Online Resources:

1. Surveying OER by NPTEL
   https://nptel.ac.in/courses/105107122
2. GPS and GNSS OER by Penn State
   https://www.e-education.psu.edu/geog862/home.html
3. Geometry of Vertical Image OER by Penn State
   https://www.e-education.psu.edu/geog892/node/657
4. Surveying lab - Virtual Labs by Ministry of Education Under the National Mission on Education through ICT http://sl-iitr.vlabs.ac.in/

Course Code: 21CV3C04 **Course: Mechanics of Deformable Bodies**

Credits: 04 **L:T:P:S – 3:2:0:0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours: 03 **Max. Marks: 100**

Prerequisites if any	Engineering Mechanics
Learning objectives	1. Understand the concept of stress and strain for different materials and strength of structural elements. 2. Understand the development of internal forces and resistance mechanism for one dimensional and two-dimensional structural elements. 3. Analyse and understand different internal forces and stresses induced due to representative loads on structural elements. 4. Evaluate the behaviour of members under torsion.

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	**Course Outcomes**	**Bloom's level**
CO1	***Analyse*** the behaviour of various structural elements subjected to direct and shear stresses for one-dimensional and two-dimensional stress systems.	Analyse
CO2	***Draw*** the bending moment and shear force at any section for statically determinate beams and **determine** deflection	Apply
CO3	***Compute*** stresses due to bending moment and shear force.	Apply
CO4	***Analyse*** the behaviour of solid and hollow shafts subjected to pure torsion.	Analyse

Mapping with POs and PSOs:

COs	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3
CO1	2	2												3		
CO2	2	2												3		
CO3	3	2												3		
CO4	3	2												3		

Course Structure

	Module – 1	No. of Lecture Hours	No. of Tutorial Hours	Self Learning Hours
1.1	Direct stress, linear strain, elasticity, Hooke's law, stress strain behaviour of mild steel	02		NA
1.2	Deformation of axially loaded members, bars of varying section, tapering bars, behaviour of composite sections	02	02	
1.3	Poisson's ratio, volumetric strain, generalized Hooke's law	02	02	
1.4	State of simple shear, elastic constants and relationship amongst them	02		
	Module – 2			NA
2.1	Stress components on inclined planes	02	02	
2.2	Generalized two-dimensional stress system, principal planes and stresses, shear planes and shear stresses	03	02	
2.3	Mohr's circle of stress	03	02	
	Module – 3			NA
3.1	Types of beams, forces on cross-section of a beam	01		
3.2	Definition - Shear force (SF) and Bending moment (BM), relationship amongst load, shear force & bending moment	02	02	
3.3	Drawing SF & BM for statically determinate beams	05	04	
3.4	Moment curvature relationship, deflection of statically determinate beams using Macaulay's method	02		
	Module – 4			NA
4.1	Theory of simple bending, definition of section modulus, modulus of rupture	01		
4.2	Computations of bending stresses	02	02	
4.3	Definition of shear flow, equation of shear stresses in rectangular sections	02	02	
4.4	Equation of shear stresses in circular and symmetrical built-up sections	02		
4.5	Shear stresses in non-symmetrical built-up sections	03	02	
	Module – 5			NA
5.1	Introduction to theory of torsion, theory of torsion for circular sections	01	02	
5.2	Definition of polar modulus, power transmitted by solid circular shafts	02	02	
5.3	Power transmitted by hollow circular shafts	03	02	
	Total No. of Lecture Hours	42		
	Total No. of Tutorial Hours		28	
	Total No. of Self learning Hours			NA

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform / LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module-1 1.1	1	Week 1			Google Forms/ Moodle Gurukul	IM- Blackboard teaching/PowerPoint presentations (if needed)/OER	QUIZ	100
1.2	1	Week 1 & Week 2						100
1.3	1	Week 2						100

1.4	1	Week 3						100
Module-2 2.1	1	Week 3 & Week 4			Google Forms/ Moodle Gurukul	IM- Blackboard teaching/PowerPoint presentations (if needed)/OER	QUIZ	100
2.2	1	Week 4 & Week 5						150
2.3	1	Week 5 & Week 6						150
Module-3 3.1	1	Week 6			Google Forms/ Moodle Gurukul	IM- Blackboard teaching/PowerPoint presentations (if needed)/OER	Simple problems solving using Excel	50
3.2	1	Week 6 & Week 7						100
3.3	1	Week 7, Week 8 & Week 9						250
3.4	1	Week 9						100
Module-4 4.1	1	Week 9			Google Forms/ Moodle Gurukul	IM- Blackboard teaching/PowerPoint presentations (if needed)/OER	QUIZ	50
4.2	1	Week 10						100
4.3	1	Week 10 & Week 11						100
4.4	1	Week 11						100
4.5	1	Week 12						150
Module-5 5.1	1	Week 13			Google Forms/ Moodle Gurukul	IM- Blackboard teaching/PowerPoint presentations (if needed)/OER	QUIZ	50
5.2	1	Week 13						100
5.3	1	Week 14						150

Assessment Pattern:

Bloom's level	**Continuous Internal Examination**			**Semester End Examination**
	Test 1	**Test 2**	**Assignment**	
Remember				
Understand				
Apply	✓	✓	✓	✓
Analyze	✓	✓	✓	✓
Evaluate				
Create				

Text Books:

1. Basavarajaiah and Mahadevappa, **"Strength of Materials"**-CRC Press, 3rd Edition - 2018.

Reference Books:

1. S.B. Jurnarkar and Dr. H.J. Shah, **"Mechanics of Structures Vol-I"** – Charotar Publishing house, 26th Edition - 2005
2. M.N. Shesha Prakash, G.S.Suresh, **"Text book of Mechanics of Materials"**, PHI, Learning Pvt. Ltd., New Delhi-2011.
3. P.N. Chandramouli **"Fundamentals of Strength Materials"** PHI Learning Pvt. Ltd., New Delhi – 2012.
4. Beer and Johnston, **"Mechanics of Materials"**- Tata McGraw Hill Publishing Company Limited, 3rd Edition – 2004.
5. L.S. Srinath, Prakash Desayi, N. Srinivas Murthy and S AnanthaRamu, **"Strength of Materials"**- Macmilan India Limited, 1st Edition - 1997.
6. I.B.Prasad, **"Strength of Materials"**- Khanna Publishers, 12th Edition - 2006.
7. B.C. Punmia, Ashok Jain and Jain, **"Mechanics of Materials"**- Laxmi Publications, 1st Edition - 2006.
8. Popov E.P and Todar A Balan, **"Engineering Mechanics of solids"** - Pearson/Prentice Hall, 2nd Edition - 2006.

Online Resources:

1. OER, Strength of Materials web course by IIT Roorkee https://nptel.ac.in/courses/112107146
2. OER, Strength of Materials video course by IIT Kharagpur https://nptel.ac.in/courses/105105108/

Course Code: 21CV3L01 **Course: Metal and Timber Testing Laboratory**

Credits: 1 **L:T:P:S – 0:0:2:0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours: 03 **Max. Marks: 50**

Prerequisites if any	NA
Learning objectives	1. Understand and apply the concepts of force in tension, compression, shear, bending, torsion, indentation and impact to study the behaviour of metals. 2. Understand and apply the concepts of compression and bending to study the behaviour of timber.

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO1	*Determine* the mechanical properties of metals &timber	Apply

Mapping with POs and PSOs:

COs	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12		PSO 1	PSO 2	PSO 3
CO1	2	2							1	1		1		2		1

List of experiments

1. Tension test on Mild steel
2. Tension test on HYSD Bars
3. Compression test on Mild Steel
4. Compression test on Cast Iron
5. Compression test on Wood
6. Torsion test on Mild Steel (Circular Sections)
7. Bending test on Timber under two-point loading
8. Bending test on Mild Steel under two-point loading
9. Impact test on Mild Steel (Charpy & Izod), Shear Test on Mild Steel
10. Hardness tests on ferrous and non-ferrous metals – Brinell's, Rockwell and Vicker's

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
1	1	Week 1			Virtual Lab Experiments	Blackboard teaching, OER	Conduction of Experiments	100
2	1	Week 2						100
3	1	Week 3						100
4	1	Week 4						100
5	1	Week 5						100
6	1	Week 6						100
7	1	Week 7						100
8	1	Week 8						100
9	1	Week 9						100
10	1	Week 10						100

Assessment Pattern:

Bloom's level	Continuous Internal Examination	Semester End Examination
Remember		
Understand	✓	✓
Apply	✓	✓

Reference Books:

1. Davis, Troxell and Hawk,**" Testing of Engineering Materials"**- – McGraw Hill Book Co., International Student Edition, New Delhi. – 1982.
2. Suryanarayana A.K., **"Testing of Metallic Materials"** - Prentice Hall of India Pvt. Ltd. New Delhi – 2007.
3. Relevant IS Codes.
4. Kukreja C.B. Kishore K. Ravi Chawla, **"Material Testing Laboratory Manual"** - Standard Publishers & Distributors - 1996.

Online Resources:

1. OER, Virtual Labs, https://www.vlab.co.in/broad-area-civil-engineering

Course Code: 21BG3C02 **Course: Biology for Engineers**
Credits: 2 **L: T: P: S: 2:0:0:0**
CIE: 50% Marks **SEE: 50% Marks**
SEE Hours: 2 **Max. Marks: 50**

Prerequisites if any	Basic Knowledge of Biology at intermediate level
Learning objectives	1. Understand evolution of life forms and their diversity in environment. 2. Understand building blocks of living organisms and their basic functions. 3. Knowledge of engineering biology as applied to Civil Engineering.

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

COs	Course Outcomes	Bloom's level
CO1	Explain functional elements of living organisms and their significance in environment.	Understand & Apply
CO2	Elucidate basic metabolic and catabolic activities with growth kinetics of microorganisms.	Understand & Apply
CO3	Apply the concepts of biology in solving Civil Engineering problems including wastewater treatment.	Understand & Apply

Mapping with POs and PSOs:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3
CO 1		2												2		
CO 2			2					2							2	
CO 3									3							

Course Structure

	Module 1: Introduction	No. of Lecture Hours	No. of Tutorial Hours	Self-Learning Hours
1.1	Functional Elements of Biology, Scope and relevance of biology in Engineering,	1	0	0
1.2	Importance of biology including its potential applications in the environment,	1	0	0
1.3	Origin of life, Evolution of Life forms biological classification, Cell as a fundamental Unit of Life	1	0	0
1.4	RNA and DNA Laws of Inheritance, Gene Interactions,	1	0	0

1.5	Multiple Alleles – Hardy Weinberg Principle, Genetic Disorders	1	0	0
1.6	Introduction to Biotechnology and Bio-Informatics.	1	0	0
	Module 2: Basics of biology as applied to Civil Engineering			
2.1	Chemical Composition of living forms , Carbohydrates, Proteins and Lipids, Bio-Enzymes	2	0	0
2.2	Metabolic and Catabolic Activities, Photosynthesis and Respiration.	1	0	0
2.3	Fermentation (aerobic and anaerobic decomposition),	1	0	0
2.4	Microorganisms, Growth Kinetics,	2	0	0
2.5	Culture Media, Immunology and Immunity, Stem Cells	2	0	0
2.6	Biomagnification and Bio Safety in the Field of Public Health Engineering	2	0	0
	Module 3: Applications of Biology in Civil Engineering			
3.1	Biological treatment of Municipal Sewage, Biological treatment of wastewater from small communities	1	0	0
3.2	DEWATS, Concept of Constructed Wetlands, Self-Purification of Streams	2	0	0
3.3	Composting of Bio-degradable waste, Aerobic and Anaerobic Methods, Vermicomposting	2	0	0
3.4	Bio-remediation, Role of Biology in mitigating Pollution	2	0	0
3.5	Building Construction and Pest Control	2	0	0
3.6	Bio-Concrete , Biosensors	1	0	0
	Total No. of Lecture Hours	**26**	0	
	Total No. of Tutorial Hours		0	0
	Total No. of Self learning Hours			0

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	ICT Tool/ Platform/LMS	Face-to-face Mode		Duration in minutes
				Resource (OER/ URL/ IM/ CP)	Activity	
Module-1 1.1	**I**	**1**	**Moodle LMS**	**IM –PPT OER**	**CHALK & TALK**	**50**
1.2	**I**	**1**				**50**
1.3	**I**	**2**				**50**
1.4	**I**	**2**				**50**
1.5	**I**	**3**				**50**
1.6	**I**	**3**				**50**
Module 2 2.1	**II**	**4**		**IM –PPT OER**		**50**
2.2	**II**	**5**				**50**
2.3	**II**	**5**				**50**
2.4	**II**	**6**				**50**
2.5	**II**	**7**				**50**
2.6	**II**	**8**				**50**

Module 3 3.1	**III**	**9**		**IM –PPT**		**50**
3.2	**III**	**9**				**50**
3.3	**III**	**10**				**50**
3.4	**III**	**10,11**		**OER**		**50**
3.5	**III**	**11, 12**				**50**
3.6	**III**	**13**				**50**

Assessment Pattern:

Bloom's level	Continuous Internal Examination			Semester End Examination
	Test 1	Test 2	Assignment	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓

Text Books:

1. Biology for Engineers- As per Latest AICTE Curriculum, Wiley Publications, 2018.

Reference Books:

1. Campbell, NA and Reece JB, Biology, International edition, 7th edition
2. Karp, G, Cell and Molecular Biology: Concepts and Experiments, 7th edition, Wiley, New York.
3. Suraishkumar GK, Biology for Engineers, Oxford University Press, New Delhi (2019)

Online Resources:

1. Introduction to Biology for engineers OER by NPTEL https://youtu.be/xGQmFwRqcZc
2. Evolution OER by NPTEL https://youtu.be/iUz5kukamA0
3. Cells OER by NPTEL https://youtu.be/zXxifrNp-zg
4. Biomolecules and their relation to cell structure and function OER by NPTEL https://youtu.be/Nhjo17Rgfig
5. Bio-molecules and Nucleotides OER by NPTEL https://youtu.be/ObVlAEzFcIU
6. Mendelian genetics: Mendelian inheritance principles OER by NPTEL https://youtu.be/kZ33IvQsghM

Code: 21KA3H02/ Course: Balake Kannada / **ಬಳಕೆ ಕನ್ನ ಡ**

21KA4H02 Non Credit Mandatory Course

Credits: 0 **L:T:P 1:0:0**

SEE: - **CIE: 100%**

SEE Hours:- **Max. Marks: 50**

Learning objectives	To familiarise students in the use of local language (Kannada) for a comfortable communication; also make them to speak, read and write simple kannada as per the need

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand the necessity of learning the local language for a comfortable living and to listen and understand Kannada language properly.	Remember
CO2	Speak simple Kannada to communicate with local people in their daily life	Understand
CO3	To read and write Kannada and speak in polite way	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	-	1	2	-	1		To be identified for each branch by Course Instructor			
CO2	-	-	-	-	-	-	-	-	1	3	-	1					
CO3	-	-	-	-	-	-	-	-	1	3	-	1					

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

	Module – 1	No. of Lecture Hours	No. of Tutorial Hours	Practical Hours
1.1	Introduction, Necessity of learning local language. Methods to learn the Kannada language.	1	0	0
1.2	Easy learning of Kannada Language: A few tips. Hints for correct and polite Conservation, Listening and Speaking Activities	1	0	0
1.3	Key to Transcription.	1	0	0
1.4	ವೈಯಕ್ತಿ ಕ, ಸ್ವಾ ಮ್ಯ ಸೂಚಕ/ಸಂಬಂಧಿತ ಸರ್ವನಾಮ್ಗಳು ಮ್ತು. ಪ್ರ ಶ್ನಾ ರ್ಥಕ ಪ್ದಗಳು- Personal Pronouns, Possessive Forms, Interrogative words	1	0	0
	Module – 2			
2.1	ನಾಮಪ್ದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪ್ಗಳು, ಸಂದೇಹಾಸ್ಪ ದ ಪ್ರ ಶ್ನಾ ಗಳು ಮ್ತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮ್ಪ್ದಗಳು - Possessive forms of nouns, dubitive question andRelative nouns ಗುಣ, ಪ್ರಿಣಾಮ್ ಮ್ತು ರ್ಣವಬಣಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯೆಯ ವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals	2	0	0
2.2	ಕಾರಕ ರೂಪ್ಗಳು ಮ್ತ್ತು ವಿಭಕ್ತಿ ಪ್ರ ತಯ ಯಗಳು - ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರ ತಯ ಯ - (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case	1	0	0
2.3	ಚತ್ತರ್ಥವ ವಿಭಕ್ತಿ ಪ್ರ ತಯ ಯದ ಬಳಕೆ ಮ್ತ್ತು ಸಂಖ್ಯೆಯ ವಾಚಕ - Dative Cases, and Numerals ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿ ಯಾಪ್ದಗಳು ಮ್ತ್ತು ರ್ಣವ ಗುಣವಾಚಕಗಳು - Defective/Negative Verbs and Colour Adjectives	1	0	0
2.4	ಅಪ್ಪ ಣೆ / ಒಪ್ಪ ಗೆ, ನಿದೇವಶನ, ಪ್ರೋ ತ್ಸಾ ಹ ಮ್ರೆರವ ಒರ್ರವಯ ಅರ್ಥವರೂಪ್ ಪ್ದಗಳು ಮ್ತ್ತು ವಾಕಯ ಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences) ಸ್ವಮಾನಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ಔಪಾ ತ್ಯೋಯ ವಿಭಕ್ತಿ ಪ್ರ ತಯ ಯಗಳು ಮ್ತ್ತು ಸಂಭವನೀಯ ಪ್ರ ಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication	2	0	0
2.5	"ಇರ್ ಮ್ತ್ತು ಇರಲ್ಲಿ " ಕ್ರಿ ಯಾಪ್ದಗಳು ಮ್ತ್ತು ಸಂಭಾರ್ಥಯ ಸೂಚಕ ಮ್ತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿ ಯಾ ಪ್ದಗಳು - Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs ಹೋಲ್ಲಿಕೆ (ತರತಮ್), ಸಂಬಂಧ ಸೂಚಕ ಮ್ತು. ಸ್ಥಿ ತಿ ಸೂಚಕ ಪ್ರ ತಯ ಯಗಳು ಮ್ತು. ನಿಷೇಧಾರ್ಥಕ ಪ್ರ್ಯಗಳ ಬಳಕೆ - Comparitive, Relationship, Identification and NegationWords	2	0	0
	Module – 3			
3.1	ಕಾಲ ಮ್ತ್ತು ಸಮ್ಯದ ಹಾಗೂ ಕ್ರಿ ಯಾಪ್ದಗಳ ವಿವಿಧ ಪ್ರ ಕಾರಗಳು - different typesofforms of Tense, Time and Verbs	1	0	0
3.2	ದ, -ತ್, -ತ್ತ, -ಇತ್ತ, -ಆR, -ಅಲ್ಲಿ , -ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿ ಯಾ ಪ್ರ ತಯ ಯಗಳ್ಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯ ತ್ ಮ್ತ್ತು ರ್ತವಮಾನ ಕಾಲ್ ವಾಕಯ ರಚನೆ - Formation of Past, Future and Present Tense Sentences with Verb Forms	1	0	0
3.3	Kannada Vocabulary List :ಸಂಭಾಷಣೆಯಲ್ಲಿ ಔನ್ತ್ಯೋಪ್ಯಕ್ಕಾರಿ ಕನಾ ಡ ಪ್ದಗಳು - Kannada Words in Conversation	1	0	0
	Total No. of Lecture Hours	**15**		
	Total No. of Tutorial Hours		**0**	**-**
	Total No. of Self learning Hours			**0**

Textbooks:

ಬಳಕೆ ಕನಾ ಡ

ಲೇಖಕರ್: ಡಾ. ಎಲ್. ತಮ್ಮ ಶೆಟ್

ಪ್ರ ಸ್ವರ್ತ್ಯೊಂಗ, ವಿಶ್ವಾ ಶಾ ರಯಯ ತ್ಯೊಂತು ಕ ವಿಶಾ ವಿದ್ಯಯ ಲ್ಯ, ಬೆಳಗಾವಿ.

Code: 21KA3H01 / 21KA4H01

Course: Samskrutika Kannada /ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

Non Credit Mandatory Course

Credits:	**0**	**L:T:P:S 1:0:0**
SEE:	**-**	**CIE: 100%**
SEE Hours:	**-**	**Max. Marks: 50**

ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು	1. ವೃತ್ತಿ ಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾRುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು 2. ಜನ್ನ ಸಾಹಿತ್ಯದ ಪರ ಧಾನ್ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾರ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾR ಪರಿಚಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತೆ ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿ ಯನ್ನು ಮೂಡಿಸುವುದು. 3. ತಿಂಥಿಣಿ ಕರ್ನಾಟಕ ಗಳ ಪರಿಚಯರ್ನ್ನು ಹಾಗು ಅರಸರುಗಳು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು. 4. ಕನ್ನಡ ಶಬ್ದ ಸಂಪತ್ತಿನ್ ಪರಿಚಯ ಮತ್ತು ಕನ್ನಡ ಭಾಷೆಯ ಬಳಕೆ ಹಾಗೂ ಕನ್ನಡದಲ್ಲಿಷ್ ಕರ್ನಾಟಕ ರತ್ನಹಾರರ್ನ್ನು ತಿಳಿಸಿಕೊಡುವುದು.

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ	ಪರಿಚಯ
CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯ ದ ಆಧುನಿಕ ಪೂರ್ವ ಹಾಗೂ ಆಧುನಿಕ ಕಾರ್ಯ ಗಳ ಪರಿಚಯ ಮತ್ತು ಆಸಕ್ತಿ ಮೂಡುತ್ತದೆ.	ಗರಿಹಿಕೆ
CO3	ತಿಂಥಿಣಿ ಕರ್ನಾಟಕ ಪರಿಚಯ ಮತ್ತೆ ಕಥಾ ಸಾಹಿತ್ಯ ಪರಿಚಯ	ವಿಶ್ಲೇಷಣೆ

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	1	-	2	-	1
CO2	-	-	-	-	-	-	-	1	-	2	-	1
CO3	-	-	-	-	-	-	-	3	-	2	-	1

PSO1	PSO2	PSO3	PSO4
To be identified for each branch by Course Instructor			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

	ಘಟಕ - 1 ಲೇಖನಗಳು: ಕನ್ನ ಡ ಇತಿಹಾಸ್ ಮತ್ತು ಸಂಸ್ಕ ೃತಿ ಪರಿಚಯ	**No. of Lecture Hours**	**No. of Tutorial Hours**	**Practical Hours**
1.1	ಕರ್ನಾಟಕ ಸಂಸ್ಕ ೃತ್ತ - ಹಂಪ ರ್ನಗರಾಜಯಾ	1	0	0
1.2	ಕರ್ನಾಟಕದ ಏಕೀಕರಣ: ಒಂದು ಅಪೂರ್ಣ ಚಿರಕ್ಷ - ಜಿ ವಿಂಕರಸಂಬಬ ಯಂ	1	0	0
1.3	ಆಡಳಿತ್ ಭಾಷೆಯಂR ಕನ್ನ ಡ - ಡಂ. ಎಲ್. ತಮ್ಮ ೇಶ ಮತ್ತೆ ವಿ. ಕೇಶರ್ಮಂೂರ್ತಿ	1	0	0
ಘಟಕ - 2 ಪದ್ಯ : ಆಧುನಿಕ ಪೂರ್ವದ್ ಕಾರ್ಯ ಮತ್ತು ಆಧುನಿಕ ಕಾರ್ಯ				
2.1	ರ್ಚನೆಗಳು: ಬಸ್ರಣಣ , ಅಕ್ಕ ಮಹಾದೇವಿ, ಅಲ್ಲಿ ಮಪ್ರ ಭಂ, ಆಯಡ ಕ್ಕ ಮಂರಯಂ, ಜೇಡರದ್ಯಸಿಮಮ ಯಂ , ಆಯದ ಕ್ಕ ಲ್ಕ ಮಮ	2	0	0
2.2	ಕೀರ್ತನೆಗಳಂ: ಅದರಿಂದರೇನ್ನ ಫಲ ಇದರಿಂದರೇನ್ನ ಫಲ - ಪುರಂದರದ್ಯಸ್ರು ತ್ತ್ವ ಪದಗಳಂ: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟಂ - ಶಿಶುರ್ನಳ ಶರೀಫ	2	0	0
2.3	ಡಿವಿಜಿ ಅರ್ಥ ಮಂಕುತ್ತಮಮ ನ್ ಕಗೆ ದಿಂದ ಆಯದ ಕೆಲ್ವು ಭಾಗಗಳು	1	0	0
2.4	ಕುರುಡು ಕಾಂಚಾಣ : ದ. ರಾ. ಬಿಂದೆರ	1	0	0
2.5	ಹೊಸ್ಮಾಳಿನ್ Rೀತ್ರ - ಕುವಿಂಂಪು	1	0	0
ಘಟಕ - 4 ಗದ್ಯ : ತಾಂತ್ರಿ ಕ ರ್ಯ ಕ್ಷು ಪರಿಚಯ, ಕಥೆ ಮತ್ತು ಪ್ರ ವಂಸ್ ಕಥನ್				
3.1	ಡಂ. ಸ್ರ್. ಎಂಂ. ವಿಶ್ವ : ಮತ್ತಿ ಐತಹ - ಎ ಎನ್ ಮಂೂರ್ತಿರಾವ್ ೇಶ ಯಾ ರ್ಂ ಕ್ಂ ಕ್ಷಿ	2	0	0
3.2	ಕರಕಂಶಲ್ ಕಲೆಗಳು ಮತ್ತೆ ಪರಂಪರೆಯ ವಿಜ್ಞಂ ನ್ : ಕರೀಗೌಡ ಬೇಚನಹಳ್ಳಿ	1	0	0
3.3	ಯುಗಂದ: ರ್ಸ್ಧಂದು ಮಾನೆ ಎಂಂಬ Rರಜನ್ ಪರ್ತಿತ್ : ಹಂ. ಚಂ. ಬೇರಲ್ಲಿಂಗಯಂ	2	0	0
	Total No. of Lecture Hours	**15**		
	Total No. of Tutorial Hours		**0**	**-**
	Total No. of Self learning Hours			**0**

Textbooks:

ಸಾಂಸ್ಕ ೃತ್ತಿಕ ಕನ್ನ ಡ

ಲೇಖಕರು: ಹಂ. ಚಂ. ಬೇರಲ್ಲಿಂಗಯಂ ಮತ್ತೆ ಡಂ. ಎಲ್. ತಮ್ಮ ೇಶ

ಪ್ರ ಸಾರಾಂಗ, ವಿಶ್ವ ೇಶ ರಯಂ ತಿಂಕ್ಷ ಕ ವಿಶ್ವ ವಿದ್ಯಂ ಲ್ಯ, ಬೆಳಗಾವಿ.

Code: 21CI3H01/ 4H01 **Course: Constitution of India and Professional Ethics**

Non Credit Mandatory Course

Credits: 0 **L:T:P 1:0:0**

SEE: - **CIE: 50 Marks**

SEE Hours: - **Max. Marks: 50**

Prerequisites if any	-
Learning objectives	1. Orient students on the salient features of the Indian Constitution with special emphasis on fundamental rights and duties. 2. Provide an overview of the Union and State legislature, executive and judiciary, importance of electoral process. 3. Make the students understand duties and basic responsibilities of engineers towards society and their employer.

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand the importance of provisions made in the Constitution, the scope of fundamental rights subject to limitations in the light of leading court cases.	Apply
CO2	Understand the doctrine of Separation of Power, working of Indian Parliament, Legislatures, Executive and Judiciary.	Apply
CO3	Understand Engineering ethics and responsibilities of Engineers towards society and the country	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	1	-	-	-	1
CO2	-	-	-	-	-	3	-	1	-	-	-	1
CO3	-	-	-	-	-	3	1	3	-	-	-	1

PSO1	PSO2	PSO3	PSO4
To be identified for each branch by Course Instructor			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

	Module – 1	No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
1.1	Introduction - Preamble to the Constitution of India	2	0	0
1.2	Fundamental rights under Part III - Limitations and Important Leading cases	2	0	0
1.3	Relevance of Directive Principles of State Policy under Part-IV, Fundamental duties under Part - IV A	3	0	0
2.1	Union Executive - President, Vice-President, Prime Minister, Union Legislature - Parliament and Union Judiciary – Supreme Court of India	2	0	0
2.2	State Executive - Governors, Chief Minister, State Legislatures and High Courts Emergency Provisions	2	0	0
2.3	Electoral process	1	0	0
3.1	Scope and aims of Engineering Ethics	1	0	0
3.2	Responsibility of Engineers, Impediments to responsibility	1	0	0
3.3	Honesty, Integrity and reliability, risks, safety and liability in Engineering	1	0	0
	Total No. of Lecture Hours	**15**		
	Total No. of Tutorial Hours		**0**	**0**

Textbooks:

1. Durga Das Basu : "Introduction to the Constitution of India" (student edition) Prentice - Hall EEE, 19th /20th Edition, 2001.
2. "Engineering Ethics" by M.Govindarajan, S.Natarajan, V.S.Senthikumar, Prentice - Hall of India Pvt. Ltd., New Delhi, 2004

Course Code: 21CV3A01 **Course: Drawing of building components**

Credits: 1 **L: T: P: S - 0:0:2:0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours: 3 **Max. Marks: 50**

Prerequisites if any	None
Learning objectives	1. To determine various concepts involved in preparing the working plans of the residential, commercial, and public buildings. 2. Utilize the available drawing tools to prepare different views of building and their components.

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO1	1. Determine the concepts involved in functional planning of buildings to prepare interconnectivity diagram for building.	L3
CO2	2. Understand the perception of views in a building drawing to conceptualize plans, section, elevation of buildings and its components.	L3

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	-	-	-	-	-	-	-	-	-	-		3	2	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-		3	2		-	-

Course Structure

	Module – 1	No. of Lecture Hours	No. of Tutorial Hours	Self-Learning Hours
1.1	**Basic Concepts of Building Planning:** Orientation and positioning of various units of buildings, Traditional concepts in building planning,	2	0	0
1.2	Building standards, Building Bye- Laws, Set back and Functions of local authority.	1	0	0
1.3	**Components of Building:** Geometric drawing of RCC dog-legged & Open wall stairs.	2	0	0
1.4	**Interconnectivity Diagram:** Functional design of buildings using interconnectivity diagrams (Bubble diagrams).	2	0	0
1.5	Development of line plans for simple residential and public buildings.	2	0	0
	Module – 2			

2.1	**Development of Plan, Section and Elevation for given requirements:** Residential buildings (i.e. for various plot sizes)	2	0	0
2.2	Commercial and Public buildings (i.e. commercial center/complex, hotel & bank.),	2	0	0
2.3	Preparation of water supply, sanitary & electrical layout for a given line diagram.	2	0	0
	Total No. of Lecture Hours	15		
	Total No. of Tutorial Hours			
	Total No. of Self learning Hours			

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module-1 1.1	LO1	Week 1	-	-	LMS - Moodle	IM - PPT	Presentations	50
1.1	LO1	Week 2	-	-				50
1.2	LO1	Week 3	-	-				50
1.3	LO1	Week 4	-	-				50
1.3	LO1	Week 5	-	-				50
1.4	LO1	Week 6	-	-				50
1.4	LO1	Week 7	-	-				50
1.5	LO2	Week 8	-	-				50
1.5	LO2	Week 9	-	-				50
Module-2 2.1	LO2	Week 10	-	-		IM - PPT	Presentations	50
2.1	LO2	Week 11	-	-				50
2.2	LO2	Week 12	-	-				50
2.2	LO2	Week 13	-	-				50
2.3	LO2	Week 14	-	-				50
2.3	LO2	Week 15	-	-				50

Assessment Pattern:

Bloom's level	Continuous Internal Examination			Semester End Examination
	Test 1	Class Work	Assignment	
Remember	✔	✔	✔	✔
Understand	✔	✔	✔	✔
Apply	✔	✔	✔	✔
Analyze	-	-	-	-
Evaluate	-	-	-	-
Create	✔	✔	✔	✔

Text Books:

1. B.P. Verma, "Civil Engineering Drawing and House planning"- Khanna Publishers, 11th Edition, 1992.

Reference Books:

1. Shah M.H. and Kale CM, "Building Drawing"- Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. Gurucharan Singh and Jagadish Singh, "Building Planning Designing and Scheduling", Standard publishers distributors, 5th Edition, 2002
3. National Building Code (NBC 2016), BIS, New Delhi, 2016.
4. SP 41 (S&T): 1987 - Handbook on functional requirements of buildings (other than industrial buildings), BIS, New Delhi.
5. M. Chakraborti, "Civil Engineering Drawing" - Published by author, 6th Edition, 2004.

III SEMESTER (2021-25 Batch)

Course Code: 21XX3U01

Credits: 0
CIE: 50 Marks
SEE: -

Course Name: Social Connect & Responsibilities
Non Credit Mandatory Course
L:T:P - 1:0:0
Max. Marks: 50

Prerequisites if any	Nil
Learning objectives	• To make students understand and appreciate the important societal/ environmental issues like conservation/ sustainability/ waste management and the like and inculcate ethical responsibility towards the same. • Provide a formal platform for students to communicate and connect to their surroundings and enable them to have a responsible connection with society.

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

COs		**Bloom's level**
CO1	Understand social responsibility	Understand
CO2	Practice sustainability and creativity	Apply
CO3	Demonstrate planning and organizational skills	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	1	3	1	1	-	2		To be identified for each branch by Course Instructor		
CO2	-	-	-	-	-	2	1	3	2	2	-	2				
CO3	-	-	-	-	-	2	1	3	3	3	-	1				

S – Strong (3) M – Medium (2) L – Low (1)

Course Structure

Module – I:		**No. of Lecture Hours**	**No. of Tutorial Hours**	**No. of Practical Hours**
1.1	Plantation and adoption of a tree: Plantation of a tree that will be adopted for four years by a group of B.E. students. They will also make an excerpt either as a documentary or a photoblog describing the plant's origin, its usage in daily life, and its appearance in folklore and literature	01	0	04
OR				
1.1	Heritage walk and crafts corner: Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsmen, photo blog and documentary on evolution and practice of various craft forms.	01	0	04
Module – II				
2.1	Organic farming and waste management: usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus.	01	0	04
OR				

2.2	Food Walk; City's culinary practices, food lore, and indigenous materials of the region used in cooking.	01	0	04
Module – III				
3.1	Water Conservation: knowing the present practices in the surrounding villages and implementation in the campus, documentary or photo blog presenting the current practices	01	0	04
	Total No. of Hours	**15**		

Activities:

Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others.
Share the experience of Social Connect: Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.

Pedagogy:

The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion and a course project.
Applying and synthesizing information from these sources to define the social problem to address and try to arrive at the solution through the course project, of your group.
Social immersion with NGOs/social sections will be a key part of the course.

Guideline for Assessment Process: Continuous Internal Evaluation (CIE)

After completion of the social connect, 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 social connect period. The report should be signed by the mentor.
The course shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed / based on the rubrics approved by the DC.

Components	Marks
Marks allotted for the diary	10
Planning and scheduling the social connect	05
Information/Data collected during the social connect-	10
Analysis of the information/data and report writing	15
Final presentation	10
Total	**50**

COURSE CODE: 21MA3N01

ADDITIONAL MATHEMATICS-I

Credits: 0 **Total: 20hrs + 20hrs** **L:T:P (2:2:0)**
CIE: 50 Marks **Max. Marks:50**

Prerequisites if any	Basic concepts of Differentiation and Integration.
Learning objectives	**I.** To facilitate the students with a strong foundation of differential and integral calculus. **II.** To emphasize the need and importance of numerical methods to solve engineering problems

Course Outcomes:

On the successful completion of the course, the student will be able to

COs		**Bloom's level**	**Expected attainment level %**
CO1	Expand any differentiable function into power series & compute partial derivatives.	Apply	60
CO2	Compute integrals using appropriate methods and evaluate multiple integrals.	Apply	60
CO3	Estimate a real root of the given equation and apply appropriate interpolation formulae for equal and unequal arguments.	Apply	60

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-
CO2	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-
CO3	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-

S – Strong (3) M – Medium(2) L – Low (1)

Course Structure

	Module – 1: Differential Caluculus	No. of Lecture Hours	No. of Tutorial Hours	Self Learning Hours
1.1	Successive differentiation, Maclaurin's series expansion	2	2	Nil
1.2	Taylor's series expansion	1	1	Nil
1.3	Partial differentiation,Total derivative	2	2	Nil
1.4	Derivative of composite function	2	2	Nil
1.5	Maxima,minima for function of two variable	2	2	Nil
	Module – 2: Integral Calculus			
2.1	Evaluation of definite integrals by the method of substitution	2	2	Nil
2.2	Integration by parts, Bernoulli's rule of integration	2	2	Nil
2.3	Multiple integrals-Evaluation of double integrals.	1	1	Nil
	Module – 3: Numerical Methods			
3.1	Numerical solutions of algebraic and transcendental equations- Newton-Raphson method	2	2	Nil
3.2	Finite differences- Forward differences, Backward differences	2	2	Nil
3.3	Newton's Forward and Backward Interpolation Formula.	1	1	Nil
3.4	Interpolation for unequal intervals-Newton's Divided difference formula	1	1	Nil
	Total No. of Lecture Hours	20		
	Total No. of Tutorial Hours		20	Nil
	Total No. of Self learning Hours			Nil

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform / LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module -1 1.1	I	Week 1	Title: Engineering Mathematics-I Delivered by: Prof. Jitendra Kumar, IIT Kharagpur **URL:** https://youtube.com/playlist?list=PLLy_2iUCG87DEfQ7Wp0B9OmAnYKBZUvfn https://youtube.com/playlist?list=PLLy_2iUCG87DEfQ7Wp0B9OmAnYKBZUvfn	Video lectures on prerequisites and the summary of each module by internal faculty	Video lectures will be prepared using i-scribe and will be shared through Moodle/ google classroom		**CHALK & TALK**	240
1.2	I	Week 2						120
1.3	I	Week2, Week 3						240
1.4	I	Week3, Week 4						240
1.5	I	Week 4 Week 5						240
Module -2 2.1	I	Week 5 Week 6						240
2.2	I	Week 7 Week 8						240
2.3	I	Week 8 Week9						120
Module-3 3.1	II	Week 10						240
3.2	II	Week 11						240
3.3	II	Week 12, Week 13						120
3.4	II	Week 13 Week 14						120

Assessment Pattern:

Bloom's level	Continuous Internal Examination (CIE)		
	T1(20 marks)	T2(20 marks)	Assignment (10 marks)
Remember	√	√	
Understand	√	√	√
Apply	√	√	√

Textbook:

1. Higher Engineering Mathematics – B.S. Grewal, 42nd edition, Khanna Publications, 2017.

Reference 1. Advanced Engineering Mathematics – H. K. Dass, Chand Publications, 2019.

2. Higher Engineering Mathematics – B. V. Ramana, Tata McGraw-Hill Publications, 2017.

IV

COURSE CODE: 21MA4C01

STATISTICS AND PROBABILITY

(CIV/MECH/IP/CS/IS)

Credits: 3 **Total: 40 Hrs** **L:T:P (3:0:0)**
SEE: 100 Marks **CIE: 50 Marks**
SEE Hours: 3 hrs **Max. Marks:100**

Prerequisites if any	Basic knowledge of set theory, counting techniques and calculus
Learning objectives	**I** To understand the concepts of random variables, probability distributions, Markov chains and queuing systems **II** To extract maximum information about the population by examining the samples of the population

Course Outcomes:

On the successful completion of the course, the student will be able to

COs		**Bloom's level**	**Expected attainment level %**
CO1	To solve problems associated with discrete and continuous probability distributions of one or more variables	Apply	60
CO2	To solve problems associated with Markov chains and queuing systems	Apply	60
CO3	To study skewness and kurtosis for a given data and use the method of least squares to fit curves for a given data and solve problems on correlation and regression	Apply	60
CO4	To test the hypothesis for sampling distributions	Apply	60

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-
CO2	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-
CO3	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-
CO4	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-

S – Strong (3) M – Medium(2) L – Low (1)

Course Structure

	Module – 1:Basic Probability and Discrete Probability Distribution	No. of Lecture Hours	No. of Tutorial Hours	Self Learning Hours
1.1	Probabilistic models, conditional probability, Mutually exclusive, independence events	1	Nil	Nil
1.2	Total probability, Baye's theorem, Counting	1	Nil	Nil
1.3	Random variables-probability mass functions	1	Nil	Nil
1.4	Mathematical expectations, moment generating functions	2	Nil	Nil
1.5	Discrete distributions: Binomial	2	Nil	Nil
1.6	Poisson distributions	1	Nil	Nil
	Module-2: Continuous and Joint Probability Distribution			
2.1	Continuous random variables & PDF's, Cumulative distribution functions	3	Nil	Nil
2.2	Normal distributions, Central limit theorem	2	Nil	Nil
2.3	Two dimensional Random variables: Joint probability distributions	3	Nil	Nil
	Module-3: Markov Chains and Queuing Theory			
3.1	Markov chains – probability vector	2	Nil	Nil
3.2	Stochastic matrix, transition probability matrix	3	Nil	Nil
3.3	Concept of queuing – M/M/1 queuing system	2	Nil	Nil
	Module-4: Statistics			
4.1	Moments, skewness from third moment	1	Nil	Nil
4.2	Measure of skewness by Karl Pearson's, Kurtosis	2	Nil	Nil
4.3	Curve fitting- Straight line and Exponential curves-y=ab^x	2	Nil	Nil
4.4	Correlation, Regression	2	Nil	Nil
4.5	Multiple Correlation and Regression.	2	Nil	Nil
	Module-5: Sampling Theory			
5.1	Population and Sampling, Sampling distributions, Statistical estimation	2	Nil	Nil
5.2	Statistical Decisions: Type I and Type II errors	2	Nil	Nil
5.3	Level of Significance, One-tailed tests, ***t***-distribution	1	Nil	Nil
5.4	Chi-Square distribution.	3	Nil	Nil
	Total No. of Lecture Hours	40		
	Total No. of Tutorial Hours		Nil	Nil
	Total No. of Self learning Hours			Nil

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module-1 1.1	I	Week1	https://www.youtube.com/watch?v=KbB0FjPg0mw&list=PL2SOU6wwxB0uwwH80KTQ6ht66KWxbzTIo	Video summary of each module	Video lecture will be prepared using iScribe and will be share through moodle/google classroom		C	60
1.2	I	Week1					H	60
1.3	I	Week1						60
1.4	I	Week2						120
1.5	I	Week2 Week3					A	120
1.6	I	Week3						60
Module-2 2.1	I	Week3 week4					L	180
2.2	I	Week4 Week5					K	120
2.3	I	Week5 Week6						180
Module-3 3.1	I	Week6					&	120
3.2	I	Week7					T	180
3.3	I	Week8						120
Module-4 4.1	II	Week8					A	60
4.2	II	Week9						120
4.3	II	Week9 Week10					L	120
4.4	II	Week10						120
4.5	II	Week11						120
Module-5 5.1	II	Week 11 Week12					K	120
5.2	II	Week12 Week13						120
5.3	II	Week13						60
5.4	II	Week14						180

Assessment Pattern:

Bloom's level	Continuous Internal Examination			End Semester Examination
	T1 (20 marks)	T2 (20 marks)	Assignment (10 marks)	
Remember				
Understand	√	√	√	√
Apply	√	√	√	√

Textbooks:

1. Higher Engineering Mathematics – B.S. Grewal, 42nd edition, Khanna Publications, 2017.

2. Introductory probability and statistical applications, Paul L Meyer, Oxford and IBH publishing co.pvt. Ltd, New Delhi, 1965.

References:

1. Probability and Stochastic processes, Roy D Yates, David J Goodman, Wiley publication, 3rd edition, 2022.

2. Advanced engineering mathematics, Erwin Kreyszig, 8th edition, Wiley publication, 2017.

IV

Course Code:21CV4C02 **Course: Applied Hydraulic Engineering**

Credits: 3 **L:T:P:S 3:0:0:0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours:3 Max. Marks: 100

Prerequisites if any	Mechanics of Fluids
Learning objectives	1. Analyze the field problems connected with flow of water through pipes and channels. 2. Understand the working knowledge of Turbines and Pumps related to field application. 3. Understand the application of Dimensional Analysis in hydraulic experimentation. 4. Understand the various concepts of hydraulic machinery.

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO1	Utilize the concept of Conservation of Energy and Momentum principles to arrive at solutions to field problems	Understand, apply, analyze
CO2	Apply Impulse Momentum Principle concept to solve field related problems.	Understand, apply, analyze
CO3	Utilize Dimensional Analysis to formulate equations in flow phenomenon and in model studies.	Understand, apply, analyze

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	1	-	-	-	-	-	-	-	-		3	2	2	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	-		3	2	2	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-		3	2	2	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	Self Learning Hours
	Module – 1 **Flow through pipes.**	**9**		
1.1	Types of Flow.	1	0	0
1.2	Reynolds' Experiment. Froude's Experiments.	1	0	0
1.3	Loss of head in pipes: Major and Minor losses.	1	0	0

1.4	Darcy-Weisbach Equation. Moody Diagram.	1	0	0
1.5	Friction factor: Colebrook-White Equation and Swamee-Jain Equation.	1	0	0
1.6	Energy & hydraulic gradient lines.	1	0	0
1.7	Equivalent pipes: pipes in series and parallel. Power transmission through pipes.	1	0	0
1.8	Flow though siphon pipes.	1	0	0
1.9	Water Hammer: Gradual and instantaneous closure of valve; Pressure Wave Propagation Without Friction.	1	0	0
	Module – 2 **Open Channel flow.**	**9**		
2.1	Types of flow in channels. Uniform flow: main features of uniform flow. Chezy's formula and Manning's formula.	1	0	0
2.2	Most economical or most efficient section of channel.	1	0	0
2.3	Computation of uniform flow.	1	0	0
2.4	Specific energy: specific energy curve, critical depth, alternate depth, critical velocity, critical flow.	1	0	0
2.5	Condition for minimum specific energy in channels. Critical Flow in rectangular channels.	1		0
2.6	Application of specific energy concept to channel transitions: transition through width constriction and transition through provision of humps	2	0	0
2.7	Hydraulic jump. Momentum in open channel flow: specific force. Analysis of hydraulic jump using specific force loss: initial and sequent depth calculation, height and length of jump and energy loss.	1	0	0
2.8	Metering flumes- venturi flume and Parshall flume.	1	0	
	Module – 3 **Impact of Jet on Stationary and Moving vanes. Impulse Turbines.**	**8**		0
3.1	Force exerted by the Jet on a stationary vertical vane. Force exerted by a jet on stationary inclined flat vane. Force exerted by a jet on stationary curved vane. Force exerted by a Jet on a hinged Plate.	2	0	0
3.2	Force exerted by a jet on moving vanes. Force on flat vertical vane moving in the direction of jet. Force on the inclined vane moving in the direction of the jet. Force on the curved plate when the plate is moving in the direction of jet. Force exerted by a jet of water on an unsymmetrical moving curved plate when jet strikes tangentially at one of the tips.	2	0	0
3.3	Force exerted by a jet of water on a series of vanes. Force exerted on a series of radial curved vanes.	2	0	0
3.4	Elements of Hydroelectric Power Plants and head and efficiencies of Hydraulic Turbines. Classification of Turbines. Pelton wheel: Velocity triangles. Work done and efficiencies, working proportions, design of pelton turbine runner.	2	0	0
	Module – 4 **Reaction Turbines and Centrifugal Pumps.**	**8**		
4.1	Reaction turbines. Francis turbine: construction and working. Work done and efficiencies of Francis turbine. Working proportions of Francis turbine. Design of Francis turbine runner. Draft tube theory.	2	0	0
4.2	Component Parts of a Centrifugal. Working of Centrifugal Pump. Work done by the Impeller. Head of Pump.	2	0	0
4.3	Specific Speed. Pump in Series and Parallel. Operating characteristic curves. Limitation of Suction.	2	0	0

4.4	Net Positive Suction Head.Cavitation in Centrifugal Pumps. Operating point and selection of pumps.	2	0	0
	Module – 5 **Dimensional Analysis and Similitude and Miscellaneous Hydraulic Machines.**	**8**		
5.1	Dimensions and units in FM. Dimensional homogeneity.	1	0	0
5.2	Methods of dimensional analysis: Buckingham π-Method.	2	0	0
5.3	Model Investigation. Similitude: types of Similarities.	1	0	0
5.4	Force Ratios: Dimensionless Numbers. Similarity Laws or Model Laws	2	0	0
5.5	Hydraulic Press, Hydraulic Accumulator, Hydraulic Intensifier, Hydraulic Ram, The Hydraulic Lift, Hydraulic Crane, Hydraulic Coupling, Hydraulic Torque Converter, Air Lift Pump, Gear-Wheel Pump.	2	0	0
	Total No. of Lecture Hours	42		
	Total No. of Tutorial Hours		0	
	Total No. of Self learning Hours			0

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module-1 1.1	L1	Week 1	-	-	**Moodle LMS**	IM (PPT)	**Blackboard**	60
1.2	L1	Week 1	-	-		-		60
1.3	L1	Week 1	-	-		-		60
1.4	L1	Week 2	-	-		-		60
1.5	L1	Week 2	-	-		-		60
1.6	L1	Week 2	-	-		-		60
1.7	L1	Week 3	-	-		-		60
1.8	L1	Week 3	-	-		-		60
1.9	L1	Week 3	-	-		-		60
Module-2 2.1	L1	Week 4	-	-		IM (PPT)		60
2.2	L1	Week 4	-	-		-		60
2.3	L1	Week 4	-	-		-		60
2.4	L1	Week 5	-	-		-		60
2.5	L1	Week 5	-	-		-		60
2.6	L1	Week 6	-	-		-		120
2.7	L1	Week 6	-	-		-		60
2.8		Week 6	-	-		-		60
Module-3 3.1	L2	Week 7	-	-		IM (PPT)		120
3.2	L2	Week 8	-	-		-		120
3.3	L2	Week 8	-	-		-		120
3.4	L2	Week 9	-	-		-		120
Module-4 4.1	L2	Week 10	-	-		IM (PPT)		120
4.2	L2	Week 10	-	-		-		120
4.3	L2	Week 11	-	-		-		120
4.4	L2	Week 12	-	-		-		120
Module-5 5.1	L3	Week 12	-	-		IM (PPT)		60
5.2	L3	Week 13	-	-		-		120
5.3	L3	Week 13	-	-		-		60
5.4	L3	Week 14	-	-		-		120
5.5	L4	Week 14	-	-		-		120

Assessment Pattern:

Bloom's level	Continuous Internal Examination			SemesterEnd Examination
	Test 1	Test 2	Assignment	
Remember	Y	Y	Y	Y
Understand	Y	Y	Y	Y
Apply	Y	Y	Y	Y

Text Books:

1. P. N. Modi and S. M. Seth, "**Hydraulics and Fluid Mechanics Including Hydraulics Machines"** Standard Book House.
2. P. N. Chandramouli**, "Applied Hydraulic Engineering"** Yee Dee Publishing, Chennai-600058.

Reference Books:

1. R.K. Rajput, **"A Textbook of Fluid Mechanicsand Hydraulic Machines"** S Chand and company limited, 1998.
2. R. K. Bansal, **"A Textbook of Fluid Mechanics and Hydraulic Machines"** Laxmi Publications Pvt. Ltd.
3. Y. A. Cengal and J. M. Cimbala, **"Fluid mechanics"** Tata McGraw-Hill Publishing Company limited, 2006.
4. M. Hanif Chaudhry, **"Open-Channel Flow"** 2nd edition, Springer publication, 2008.
5. S. K. Som, and G. Bishwas **"Introduction to Fluid Mechanics and Fluid Machines",** McGraw-Hill Publishing Company limited, 2002.

Online Resources:

1. NPTEL YouTube video: NOC Jan 2020: Hydraulic Engineering- Prof Md. Saud Afzal - YouTube

Course Code: 21CV4C02 **Course: Concrete Technology**

Credits: 3 **L: T: P: S – 3: 0: 0: 0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours: 3 **Max. Marks: 100**

Learning objectives (LO)	1. Utilize the properties of concrete ingredients in preparation of concrete mix design as per IS 10262:2019. 2. Understand the factors influencing the properties of concrete

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO1	Understand the importance as well as methods involved in determining the properties of cement and concrete ingredients.	Understand
CO2	Apply physical characteristics of concrete ingredients to prepare mix design as per IS10262:2019.	Understand and Apply
CO3	Illustrate the properties of concrete in fresh and hardened state that affect the performance of structures.	Understand

Mapping with POs and PSOs:

COs	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3
CO1	3	-	-	-	-	-	2	-	-	-	-	-		3	1	-
CO2	3	1	3	-	-	-	-	-	-	-	-	2		2	3	-
CO3	3	-	-	-	-	-	2	-	-	-	-	-		1	2	-

Course Structure

	Module – 1	No. of Lecture Hours	No. of Tutorial Hours	Self-Learning Hours
1.1	**Cement and Supplementary Cementitious Materials:** Manufacture of OPC by dry process (with flow chart), Chemical composition	2	0	0
1.2	Hydration of cement, Types of cement	2	0	0
1.3	Supplementary cementitious materials - Fly ash, Silica fumes and rice husk ash & GGBS	3	0	0
1.4	Testing of cement – Field testing, Fineness, Normal consistency, Setting time, Soundness, Compressive strength of cement and Grades of cement.	2	0	0
	Module – 2		0	0
2.1	**Aggregates, Water and Admixtures:** Fine aggregate: Grading, sieve analysis, specific gravity, bulking, types.	3	0	0
2.2	Coarse aggregate – Importance of size, shape and texture.	1	0	0

2.3	Grading of aggregates – Sieve analysis, specific gravity, Flakiness and elongation index, crushing, impact and abrasion tests.	2	0	0
2.4	Quality of mixing water, Chemical admixtures – plasticizers, accelerators, retarders.	3	0	0
	Module – 3		0	0
3.1	**Fresh Concrete Properties:** Workability, factors affecting workability	1	0	0
3.2	Measurement of workability – slump, flow tests, Compaction factor and Vee-Bee consistometer tests	2	0	0
3.3	Process of manufactures of concrete; Batching, Mixing, Transporting, Placing, Compaction, Curing	3	0	0
3.4	Segregation and bleeding	1	0	0
3.5	Ready Mix Concrete (RMC).	1	0	0
	Module – 4		0	0
4.1	**Concrete Mix Design:** Concept of Mix design, Procedure of mix design as per IS 10262-2019	2	0	0
4.2	Numerical examples of Mix Design	4	0	0
	Module – 5		0	0
5.1	**Hardened Concrete:** Strength development, Factors affecting strength, w/c ratio, gel/space ratio, maturity concept	2	0	0
5.2	Relation between compressive strength and tensile strength, bond strength, modulus of rupture.	1	0	0
5.3	Accelerated curing, aggregate–cement bond strength	1	0	0
5.4	Elasticity – Relation between modulus of elasticity and strength, Factors affecting modulus of elasticity, Poisson's ratio	1	0	0
5.5	Shrinkage- plastic shrinkage and drying shrinkage, factors affecting shrinkage	2	0	0
5.6	Durability-Factors effecting durability	1	0	0
	Total No. of Lecture Hours	40		
	Total No. of Tutorial Hours		0	
	Total No. of Self learning Hours			0

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module-1 1.1	LO1	Week 1	-	-	Moodle LMS	IM - PPT	Chalk and Talk / Presentations	50
1.2	LO1	Week 1	-	-		OER		50
1.2	LO1	Week 2	-	-		OER		50
1.3	LO1	Week 2	-	-		IM – PPT		50
1.3	LO1	Week 3	-	-		IM – PPT		50
1.4	LO1	Week 3	-	-		IM - OER		50
1.4		Week 4				IM - OER		50
Module-2 2.1	LO1	Week 4	-	-		IM – PPT		50
2.1	LO1	Week 5	-	-		IM – PPT		50
2.2	LO1	Week 5	-	-		IM – PPT		50
2.3	LO1	Week 5	-	-		IM – PPT		50
2.4	LO1	Week 6	-	-		IM – PPT		50

Module-3 3.1	LO1	Week 7	-	-		IM – PPT – OER		50
3.2	LO1	Week 8	-	-		IM – PPT – OER		50
3.3	LO1	Week 8	-	-		IM – PPT		50
3.4	LO1	Week 9	-	-		IM – PPT		50
3.5	LO1	Week 9	-	-		IM – PPT		50
Module-4 4.1	LO2	Week 9	-	-		IM – PPT		50
4.1	LO2	Week 10	-	-		IM – PPT		50
4.2	LO2	Week 10	-	-		IM – PPT		50
4.2	LO2	Week 11	-	-		IM – PPT		50
Module-5 5.1	LO2	Week 11	-	-		IM – PPT – OER		50
5.2	LO2	Week 12	-	-		IM – PPT		50
5.2	LO2	Week 12	-	-		IM – PPT		50
5.3	LO2	Week 12	-	-		IM – PPT		50
5.4	LO2	Week 13	-	-		IM – PPT		50
5.5	LO2	Week 13	-	-		IM – PPT		50
5.6	LO2	Week 14				IM – PPT		50

Assessment Pattern:

Bloom's level	**Continuous Internal Examination**			**Semester End Examination**
	Test 1	**Test 2**	**Assignment**	
Remember	✔	✔	✔	✔
Understand	✔	✔	✔	✔
Apply	-	✔	-	✔

Text Books:

1. M.S. Shetty, "Concrete Technology" - Theory and Practice, S.Chand and Company, New Delhi, 2002.

Reference Books:

1. P. K. Mehta and J.M. Monteiro "Concrete Microstructure, Properties and Materials", Third Edition, McGraw-Hill
2. Neville, A.M., "Properties of Concrete", ELBS, London Gambhir, "Concrete Manual" - DhanpatRai& Sons, New Delhi.
3. N.KrishnaRaju, "Concrete Mix Design" - Sehgal – publishers.
4. "Recommended guidelines for concrete mix design" - IS: 10262-2019, BIS publication.
5. Relevant IS Codes

Online Resources:

1. Fresh and Hardened concrete properties – YouTube Page - Anime_Edu - Civil Engineering https://www.youtube.com/c/AnimeEdu.
2. Tests on fresh and Hardened concrete – YouTube Page – NCTEL (Civil Playlist) - https://youtu.be/bwJz6fPRhQo

3. Structure of cement - https://archive.nptel.ac.in/courses/105/102/105102012/

4. Cement properties and Hydration https://archive.nptel.ac.in/courses/105/104/105104030/

Course Code: 21CV4C03 **Course: Structural Analysis**

Credits: 04 **L:T:P:S-3:2:0:0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours: 03 **Max. Marks: 100**

Prerequisites if any	1. Engineering Mechanics 2. Mechanics of Deformable Bodies
Learning objectives	1. Facilitate the students with a basic knowledge of analysis of structures 2. Impart knowledge of various methods in solving the determinate and indeterminate structures

Course Outcomes

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO1	Analyse columns and struts using Euler's and Rankine's theory	Analyse
CO2	Analyse statically determinate structures using Geometric and Energy methods	Analyse
CO3	Analyse statically Indeterminate structures using Force and Displacement Methods	Analyse

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											3		
CO2	3	3											3		
CO3	3	3											3		

Course Structure

Sl. No.	Module No's	No. of Lecture Hours	No. of Tutorial Hours	Self Learning Hours
	Module – 1			
1.1	Introduction: Classification of structures, Forms of structures, Loads, Compatibility, Equilibrium, Static indeterminacy and Kinematic indeterminacy	1	0	0
1.2	Columns and Struts, Short and long columns	1	0	0

1.3	Euler's theory for long columns	2	2	0
1.4	Rankine's theory for columns	2	2	0
Module – 2				
2.1	Introduction to Geometrical Methods for computing Slope and deflection	1	0	0
2.2	Computing slopes and deflections in statically determinate beams by moment area method	4	2	0
2.3	Computing slopes and deflections in statically determinate beams by conjugate beam method	4	4	0
Module – 3				
3.1	Introduction to concept of Strain energy	1	0	0
3.2	Castigliano's theorem for computing deformations in statically determinate trusses	3	4	0
3.3	Unit load method for computing deformations in beams and frames	5	4	0
Module – 4				
4.1	Analysis of Statically Indeterminate Structures by Force Method- Introduction and general procedure for analysis	1	0	0
4.2	Analysis of Propped Cantilever Beams by consistent deformation method	3	2	0
4.3	Analysis of Continuous beams and frames having maximum degrees of Indeterminacy not exceeding two, by consistent deformation method	5	4	0
Module – 5				
5.1	Analysis of Statically Indeterminate Structures by Displacement Method- Introduction and general procedure for analysis	1	0	0
5.2	Analysis of beams having maximum degrees of Indeterminacy not exceeding two, using slope deflection method	4	2	0
5.3	Analysis of frames without sway having maximum degrees of Indeterminacy not exceeding two, using slope deflection method	4	2	0
	Total No. of Lecture Hours	42		
	Total No. of Tutorial Hours		28	
	Total No. of Self learning Hours			0

Detailed Plan

Sl No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	

Module-1 1.1	I	Week-1			Google Forms/ Moodle Gurukul	IM-Blackboard teaching/ PowerPoint presentations (if needed)/OER	QUIZ	50
1.2	I	Week-1						50
1.3	I	Week-1 & 2						100
1.4	I	Week-2						100
Module-2 2.1	II	Week-3			Google Forms/ Moodle Gurukul	IM-Blackboard teaching/ PowerPoint presentations (if needed)/OER	QUIZ	50
2.2	II	Week-3 & 4						200
2.3	II	Week-4 & 5						200
Module-3 3.1	II	Week-6			Google Forms/ Moodle Gurukul	IM-Blackboard teaching/ PowerPoint presentations (if needed)/OER	QUIZ	50
3.2	II	Week-6 & 7						150
3.3	II	Week-7 & 8						250
Module-4 4.1	II	Week-9			Google Forms/ Moodle Gurukul	IM-Blackboard teaching/ PowerPoint presentations (if needed)/OER	QUIZ	50
4.2	II	Week-9 & 10						150
4.3	II	Week - 10 & 11						250
Module-5 5.1	II	Week - 12			Google Forms/ Moodle Gurukul	IM-Blackboard teaching/ PowerPoint presentations (if needed)/OER	QUIZ	50
5.2	II	Week - 12 & 13						200
5.3	II	Week - 13 & 14						200

Assessment Pattern:

Bloom's level	Continuous Internal Examination			Semester End Examination
	Test 1	Test 2	Assignment	
Remember				
Understand				
Apply	✓	✓	✓	✓
Analyze	✓	✓	✓	✓

Text Book(s):

1. Pandith Gupta and Gupta, "Theory of Structures Vol 1 and Vol 2", Tata McGraw Hill Co. 2000, New Delhi

Reference Books:

1. P N. Chandramouli, "Structural Analysis 1" Yesdee publications, 2015
2. S.S.Bhavikatti, "Structural Analysis" Volume 1&2, Vikas Publications, 1999
3. Ramamrutham S., "Theory of Structures", Dhanpat Rai & Sons, New Delhi, 2018.
4. Reddy S. C., "Basic Structural Analysis", Tata McGraw Hill Education, New Delhi, 2017.
5. Vazirani V. N. and M. M. Ratwani, "Analysis of Structures", Khanna Publications, New Delhi, 2015.
6. Thandava Moorthy T. S., "Structural Analysis", Oxford University Press, 2011.
7. Vaidyanathan R. and Perumal P., "Structural Analysis", Volume I & II, Laxmi Publications (P) Ltd., 2017.
8. Punmia B.C, Ashok Kumar Jain, Arun Kumar Jain, "Strength of materials and Theory of Structures", Volume I & Volume II, Laxmi Publications (P) Ltd., 2019.
9. R.C.Hibler ,"Structural Analysis", Pearson Education Inc, 5th Edition, 2002
10. Chu-Kia Wang, "Intermediate Structural Analysis" McGraw Hill Education, 1st edition, 2017
11. Aslam Kassimali, "Structural Analysis", Nelson Engineering, 5th edition, 2014
12. Norris and Wilbur, "Elementary Structural Analysis", Tata McGraw Hill, 3rd Edition, 1977

Online Resources

1. OER, https://www.youtube.com/c/TheEfficientEngineer
2. OER, https://swayam.gov.in/nd1_noc20_ce35/preview
3. OER, https://nptel.ac.in/courses/105/101/105101085/
4. OER, https://nptel.ac.in/courses/105/105/105105166/
5. OER, https://nptel.ac.in/courses/105/101/105101086/
6. OER, https://nptel.ac.in/courses/105/105/105105109/

Course Code: 21CV4C04 **Course: Water Supply and Treatment**

Credits: 4 **L:T:P:S : 3:0:2:0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours: 3 Hrs **Max. Marks: 100**

Prerequisites if any	None
Learning objectives	1. Familiarize the concept of various water demand, population forecasting, quality and quantity aspects of water resources pertinent water supply scheme 2. Learn the design of conventional water treatment units and the concept of water distribution 3. Learn the analysis of water and wastewater analytes and get introduced to deriving inferences from the analysis results

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO1	Estimate water demand for various purposes; evaluate the quality and quantity of water from different sources to decide the suitability of water to satisfy different water demand	Understand, Apply
CO2	Design conventional water treatment units	Apply, Analyse
CO3	Understand conventional water supply distribution system	Understand
CO4	Analyse the major physical and chemical parameters in the water using instrumental, titrimetric and gravimetric method of analysis	Analyse

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3
CO1	2	2	-	-	-	-	-	-	-	-	-	-		3	1	-
CO2	-	-	3	-	-	-	1	-	-	-	-	-			3	-
CO3	2	-	1	-	-	-	-	-	-	-	-	-		2	1	-
CO4	2	2	-	-	-	-	-	-	-	-	-	1		2	-	1

Course Structure

	Module – 1	No. of Lecture Hours	No. of Tutorial Hours	Self Learning Hours
1.1	***Demand of water*:** Types of water demands - domestic demand, industrial, institutional and commercial, public uses, compensation for losses, fire demand, Per capita demand – factors affecting per capita demand	02	0	0

1.2	Population forecasting - different methods with merits & demerits, Variations in demand of water, Peak factors, design periods & factors governing the design periods	03	0	0
1.3	**Sources of water** :Surface source – streams, lakes, rivers, ponds, storage reservoirs, Sub-surface sources – springs, infiltration galleries, infiltration wells, groundwater pumping/tube wells	02	0	0
1.4	Suitability with regard to quality and quantity.	01	0	0
	Module – 2			
2.1	**Quality of Water** Objectives of water quality management, Concept of safe water, wholesomeness & palatability, Water borne diseases, Sampling of water for examination	02	0	0
2.2	Examination of Water – Objectives, Physical, chemical and Microbiological Examinations (IS: 3025 and IS: 1622) using analytical and instrumental techniques,	02	0	0
2.3	**Collection of water and conveyance of raw water** Intake structures- types, Selection and location of intakes, Pumps – Types, Power of pumps	03	0	0
	Module – 3			
3.1	**Conventional Water treatment** Objectives – Flow diagram of conventional water treatment plants ***Aeration*** Principle, Types of Aerators. ***Sedimentation*** Theory- types of settling (discrete, flocculant, hindered and compression), Plain sedimentation.Types of plain sedimentation tanks.	03	0	0
3.2	Design – problems, Coagulant aided sedimentation, types of coagulants, Clari-flocculator, Jar test, chemical feeding, and flash mixing.	03	0	0
3.3	***Filtration*** Mechanism of filtration –Types - Slow sand and Rapid sand including construction, operation, cleaning, Designs for above, Operational problems in filters	04	0	0
3.4	***Disinfection*** Theory of disinfection, methods of disinfections, Chlorine as a disinfectant. Chlorine demand, residual chlorine, break point chlorination.	04	0	0
	Module – 4			
4.1	**Conveyance of treated water Distribution systems** Methods of distribution -Gravity system, Combined gravity and pumping system, Pumping system, Systems of supply – Intermittent, Continuous	02	0	0
4.2	Service reservoirs and their capacity determination, Types of layouts - Dead end system, Grid system, Radial system, Circular system,	02	0	0
4.3	Analysis of pressure in the distribution system - Equivalent pipe method, Hardy cross method	03	0	0
	Module – 5			
5.1	**Water supply for buildings** Water supply layouts for buildings, Service connection, Water meters, Valves for water supply in buildings.	02	0	0

5.2	Design of water supply network inside the building- up feed and down feed system of water supply. Pipe joints, Valves - Sluice valves, Air valves, reflux valves, relief valves, scour valves, Fire hydrants	02	0	0
5.3	***Miscellaneous treatment*** Removal of hardness, Temporary hardness - Boiling and use of lime, Permanent hardness - Lime soda process and Zeolite process	01	0	0
5.4	Removal of color, odor, taste - use of copper sulfate & adsorption technique	01	0	0
	Total No. of Lecture Hours	42		
	Total No. of Tutorial Hours		0	
	Total No. of Self learning Hours			0

List of experiments

Sl.No	Name of the Experiment
1	To determine the concentration of Chloride present in the given sample
2	To determine the concentration of Hardness present in the given sample
3	To determine the concentration of Alkalinity present in the given sample
4	To determine the concentration of Acidity present in the given sample
5	To determine the concentration of Chlorine present in Bleaching Powder
6	To determine the Dissolved Oxygen present in the given sample
7	To determine the Optimum Coagulant dosage
8	To determine the Residual Chlorine and Chlorine demand
9	Experiment on Sieve Analysis
10	To determine the concentration of Fluoride using SPANDS method
11	To determine the BOD in the given sample
12	To determine the COD in the given sample
13	Determination of concentration of Sulphate,Iron,Nitrate,Fluorides, Phosphate in the water using Spectrophotometer
14	To determine Solids in the water

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode	
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity
Module-1 1.1 -1.4	1	Week 1-3	NPTEL Course on water and waste by Dr.Bose Water Supply Engineering by Dr. Manoj Tiwari	-	Moodle Google Classroom	Course Instructor made PPT Videos Black Board teaching	Poster Presentation Model Making Field Visit
Module-2 2.1-2.3	1	Week 3-5		-			
Module-3 3.1-3.4	2	Week 6-10		-			
Module-4 4.1-4.3	2	Week 10-12		-			
Module-5 5.1-5.4	2	Week 13-14		-			
Practicals/Lab Experiments	3	Week 1-14		-		Black Board teaching + Demo for Conduction of Experiments	

Assessment Pattern:

Bloom's level	Continuous Internal Examination			Semester End Examination
	Test 1	Test 2	Assignment	
Remember	-	-	-	-
Understand	✔	✔	✔	✔
Apply	✔	✔	✔	✔
Analyze	✔	✔	✔	✔

Text Books:

1. S. K. Garg **"Water supply engineering"** –, Khanna Publishers – 2010.

Reference Books:

1. Hammer and Hammer**, "Water Technology"**, Butterworth Heinemann Publications 2009.
2. Howard S. Peavey, Donald R. Rowe, George Tchobanoglous, **"Environmental Engineering"**, McGraw Hill International Edition.
3. Gray, N. F., **"Water Technology"**, Elsevier Science & Technology Books.
4. Punmia, B. C., and Ashok Jain. **"Environmental Engineering-I"** Lakshmi Publications – 1995.
5. CPHEEO. **"Manual on Water supply and treatment"**, Ministry of Urban Development, New Delhi -22.
6. Drinking water standards IS:10500,2012
7. Sawyer and McCarty, "**Chemistry for Environmental Engineers**", McGraw Hill International Edition.
8. Indian Standard Code:IS: 3025
9. Standard Methods foe examinations of Water and Waste Water by APHA,AWWA and APCF

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc22_ce07/preview#:~:text=Water%20supply%20schemes%20are%20a,is%20progressively%20getting%20more%20pertinent.
2. NPTEL course by Dr P Bose, IIT Kanpur titled " Water and Waste water Engineering"

Course Code: 21CV4L01 **Course: Fluid Mechanics Laboratory**

Credits: 1 **L:T:P:S :- 0:0:2:0**

CIE: 50% Marks **SEE: 50% Marks**

SEE Hours: 2 **Max. Marks: 50**

Prerequisites if any	Mechanics of Fluids
Learning objectives	1. Estimate various hydraulic coefficients, losses in the pipes and determination of performance characteristics of various hydraulic machines

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO1	Understand and analyze the flow systems in terms of mass, momentum, and energy balance.	Understand Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3
CO1	3	2	-	3	-	-	-	-	-	-	-	-		3	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-

List of experiments

1. (a) To determine various hydraulic coefficients for Orifice (b)To determine hydraulic coefficients for month price
2. (a)To determine Co efficient of discharge for Venturimeter (b) To determine Co efficient of discharge for orifice meter
3. (a) To determine C_d for Venturiflume (b) To determine C_d for Board Crested Weir
4. To determine friction factors in pipes
5. To determine K-value in minor losses in pipes
6. (a) To determine C_d for rectangular notch (b) To determine $C_d$of triangular notch
7. To determine C_I in Various stationary vanes

8. To determine efficiency of Pelton wheel turbine
9. To determine efficiency of Francis turbine
10. To determine efficiency of Kaplan turbine
11. To determine efficiency of Single Stage Centrifugal pump
12. To determine efficiency of Multi Stage Centrifugal pump

Detailed Plan

Sr No. of Experiment	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Experiment-1	L1	Week 1	vlab.co.in and Videos on youtube	-	-	-	Lab Equipment's	120
Experiment-2	L1	Week 2		-	-	-		
Experiment-3	L1	Week 3		-	-	-		
Experiment-4	L1	Week 4		-	-	-		
Experiment-5	L1	Week 5		-	-	-		
Experiment-6	L1	Week 6		-	-	-		
Experiment-7	L1	Week 7		-	-	-		
Experiment-8	L1	Week 8		-	-	-		
Experiment-9	L1	Week 9		-	-	-		
Experiment-10	L1	Week 10		-	-	-		
Experiment-11	L1	Week 11		-	-	-		
Experiment-12	L1	Week 12		-	-	-		

Assessment Pattern:

Bloom's level	Continuous Internal Examination	SemesterEnd Examination
Remember	√	√
Understand	√	√
Apply	√	√
Analyze	-	-
Evaluate	-	-
Create	-	-

Text Books:

1. C.S.P. Ojha, R. Berndtsson, and P.N. Chandramouli, "Fluid Mechanics and Machinery"Oxford University Publication - 2010.

Reference Books:

1. K.R. Arora, "Fluid mechanics, Hydraulics and Hydraulic machines", 5th edition,standard publisher distributors, - 2005.
2. Modi, Seth, "Fluid Mechanics. Hydraulic and Hydraulic Machines", Standard Book House, 2011.

3. Annapureddy Domodara Reddy, “Fluid Mechanics and Hydraulic Machines Lab manual”, LAMBERT Academic Publications.

Online Resources:

1. Virtual Labs: https://fm-nitk.vlabs.ac.in/

Course Code: 21CV4A01 **Course: Computer Aided Drawing**
Credits: 1 **L:T:P:S: 0:0:2:0**
CIE: 50% Marks **SET: 50% Marks**

SET Hours: 3 **Max. Marks: 50**

Prerequisites if any	Building planning and drawing.
Learning objectives	Use AUTOCAD proficiently to develop plan, section and elevation from line diagrams for all Civil Engineering entities.

Course Outcomes:

On successful completion of the course, the student will be able to:

COs	Course Outcomes	Bloom's level
CO1	Use fundamentals of AUTOCAD.	Apply
CO2	Prepare plan and elevation of various Civil Engineering entities using AUTOCAD.	Apply
CO3	Prepare structural drawings related to Civil Engineering projects.	Apply

Mapping with POs and PSOs:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3
CO1					2									2	-	-
CO2				2	2									2	-	-
CO3					2									2	-	-

List of experiments

Sl.no	Experiment
1.	Drawing components of building Footing for 200mm thick wall Foundation for 300mm thick wall Dwarf wall footing Partition for 100 thick wall Eccentric footing for 200mm thick wall
2.	Fully Panelled Door, Panelled Glazed Door, & Fully Glazed Door
3.	Fully Glazed Window Shutter & Fully Glazed Window
4.	King post truss & Queen post truss
5.	Open well staircase & Doglegged staircase
6.	Residential building – Single Storey (Plan, Front elevation, Sectional elevation), with schedule of openings (5 Exercises)
7.	Detailing of Column, Lintel and Chejja
8.	Detailing of singly reinforced beam
	Detailing of one way & two way slab reinforcement

Detailed Plan

Sr No. of Experiments/ exercises	Number of related learning Objectives	Classes	Online Mode		ICT Tool/ Platform/ LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
1.	1	3	-	-	Power Point Presentation and Hands on			120 minutes
2.	1	1	-	-				
3.	1	1	-	-				
4.	1	1	-	-				
5.	1,2	1	-	-				
6.	2	3	-	-				
7.	2,3	1	-	-				
8.	2,3	1	-	-				
9.	2,3	1	-	-				

Assessment Pattern:

Bloom's level	Continuous Internal Examination	Semester End Examination
Remember	√	√
Understand	-	-
Apply	√	√
Analyze	-	-
Evaluate	-	-
Create	√	√

Reference Books:

1. M. N. Shesha Prakash, G. S. Suresh, 2016, "Reference book on Computer Aided Design Laboratory", Lakshmi Publications.
2. Roberts J T , "Introduction to AUTOCAD 2006" - , BPB publications.
3. George Omura, "Mastering AUTOCAD 2006", BPB Publications.
4. Ramesh Bangia, "Learning AUTOCAD 2005", Khanna Book Publishing Co.
5. Sham Tickoo, "Understanding AUTOCAD 2004 "A beginners Guide", Wiley Dreamtech India Pvt Ltd.

COURSE CODE: 21MA4N01

ADDITIONAL MATHEMATICS-II

Credits: 0 **Total: 20hrs + 20hrs** **L:T:P (2:2:0)**
CIE: 50 Marks **Max. Marks:50**

Prerequisites if any	Basics of matrix theory and Ordinary Differential Equations.
Learning objectives	I. To develop a strong foundation of Linear Algebra in a comprehensive manner. II. To impart knowledge of various methods of solving first and higher order ordinary differential equations. III. To emphasize the need and importance of Numerical methods to solve engineering problems.

Course Outcomes:

On the successful completion of the course, the student will be able to

COs		**Bloom's level**	**Expected attainment level %**
CO1	Operate elementary transformations on matrices to solve system of linear equations, compute eigenvalues and eigenvectors.	Apply	50
CO2	Solve first and higher order linear differential equations.	Apply	50
CO3	Estimate the values of the derivatives and definite integrals using numerical techniques. Use numerical techniques to solve ordinary differential equation with initial conditions.	Apply	50

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-
CO2	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-
CO3	S	M	-	-	-	-	-	-	-	-	-	L		-	-	-	-	-

S – Strong (3) M – Medium(2) L – Low (1)

Course Structure

	Module – 1: Linear Algebra	**No. of Lecture Hours**	**No. of Tutorial Hours**	**Self Learning Hours**
1.1	Elementary transformations of a matrix. Rank of a matrix by elementary row transformations	2	2	Nil
1.2	Consistency of a system of linear algebraic equations, Solution of a system of non homogeneous equations	2	2	Nil
1.3	Eigen values and Eigen vectors of a square matrix	2	2	Nil
	Module – 2: Differntial Equations			
2.1	Solution of first order and first degree differential equations-Separation of Variables, linear, Exact.	3	3	Nil
2.2	Solution of higher order non-homogeneous differential equations- P.I. for e^{ax}, sinax/cosax, x^n.	3	3	Nil
	Module – 3: Numerical Methods			
3.1	Numerical Differentiation- equal intervals.	2	2	Nil
3.2	Numerical integration- Trapezoidal rule, Simpson's 1/3rd, Simpson's 3/8th & Weddle's rules	3	3	Nil
3.3	Numerical solutions of ODE: Taylor's series method ,Modified Euler's method	2	2	Nil
3.4	Runge-Kutta method.	1	1	Nil
	Total No. of Lecture Hours	20		
	Total No. of Tutorial Hours		20	Nil
	Total No. of Self learning Hours			Nil

Detailed Plan

Sr No. of Module	Number of related learning Objectives	Weeks/ Dates	Online Mode		ICT Tool/ Platform / LMS	Face-to-face Mode		Duration in Minutes
			Resource (OER/ URL/ IM/ CP)	Activity (Describe activity in detail)		Resource (OER/ URL/ IM/ CP)	Activity	
Module -1 1.1	I	Week 1 Week 2	Title: Engineering Mathematics-I Delivered by: Prof. Jitendra Kumar, IIT Kharagpur **URL:** https://youtube.com/playlist?list=PLLy_2iUCG87DEfQ7Wp0B9OmAnYKBZUvfn https://youtube.com/playlist?list=PLLy_2iUCG87DEfQ7Wp0B9OmAnYKBZUvfn	Video lectures on prerequisites and the summary of each module by internal faculty	Video lectures will be prepared using i-scribe and will be shared through Moodle/ google classroom		**CHALK & TALK**	240
1.2	I	Week 2,Week 3						240
1.3	I	Week 4 Week 5						240
Module -2 2.1	II	Week5 Week 6 Week 7						360
2.2	II	Week 7 Week 8 Week 9						360
Module-3 3.1	III	Week 9 Week10						120
3.2	III	Week11, Week 12						360
3.3	III	Week 13, Week 14						120
3.4	III	Week 14						60

Assessment Pattern:

Bloom's level	Continous Internal Examination (CIE)		
	T1(20 marks)	T2(20 marks)	Assignment (10 marks)
Remember	√	√	
Understand	√	√	√
Apply	√	√	√

Textbook:

1. Higher Engineering Mathematics – B.S. Grewal, 42nd edition, Khanna Publications, 2017.

References

1. Advanced Engineering Mathematics – H. K. Dass, Chand Publications, 2019.
2. Higher Engineering Mathematics – B. V. Ramana, Tata McGraw-Hill Publications, 2017.