SCHEME & SYLLABUS

OF

III & IV SEMESTERS

B.E. CIVIL ENGINEERING

2024-25

Vision of the Department of Civil Engineering

To become a premier Civil Engineering Department offering excellent engineering education in design methods and advanced technologies to the students, to pursue research in thrust areas and to offer professional services to the society.

Mission of the Department of Civil Engineering

The Department is committed to develop competent professionals by offering need based curriculum in Civil Engineering areas, promoting research and innovation to prepare the students for higher study, life-long learning and societal responsibility. The department is also committed to provide good learning environment to develop professional ethics and skills in our students and to provide engineering services to the society.

Programme Educational Objectives of Civil Engineering

PEO#1	Graduates of the program will practice Engineering profession as competent professionals applying fundamentals, state-of-the-art knowledge and technical skills. ***[Theme: Practice Engineering profession as competent professionals]***
PEO#2	Graduates of the program will excel in higher education with life-long learning. ***[Theme: Higher education and life-long learning]***
PEO#3	Graduates of the program will exhibit leadership qualities, communication skills and team spirit. ***[Theme: Communication and team work]***
PEO#4	Graduates of the program will contribute to societal needs with ethical attitude. ***[Theme: Initiated to Society and ethical practice]***

Programme Outcomes of Civil Engineering

The following list of program outcomes describes what graduates are expected to know and be able to do at the time of graduation. Graduates will have:

PSO#1	An ability to conduct standardized field testing on civil engineering materials, interpret experimental data and provide conclusions. Demonstrate the construction of masonry, reinforcement fabrication for beams columns, slabs, etc., electrical wiring, assembling of water supply and sanitary layouts, application of painting and welding of joints. *[Short title: CE Field experiments and demonstration].*
PSO#2	An ability to estimate material quantities, cost estimates, prepare specifications, produce engineering drawings by conducting appropriate survey works and 3D modeling of systems/components using modern tools for technical projects *[Short title: CE technical reports and 3D modeling].*
PSO#3	Able to perform analysis and design in at least three to four of the technical areas appropriate to Civil Engineering. *[Short title: CE Technical areas].*

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
3. **Design/development of solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
4. **Conduct investigations of complex problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8)
5. **Engineering tool usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
6. **The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
7. **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
8. **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
9. **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
10. **Project management and finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
11. **Life-long learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

SIDDAGANGA INSTITUTE OF TECHNOLOGY, TUMAKURU

(An autonomous institution affiliated to VTU, Belagavi, Approved by AICTE, New Delhi, Accredited by NAAC with 'A' grade & ISO 9001:2015 Certified)

B.E. in Civil Engineering

SCHEME OF TEACHING AND EXAMINATION (2022 Scheme) (for 2023-27 Batch)- 160 Credit Scheme

III Semester (2024-25)

Sl. No.	Course and Course Code		Course Title	Teaching / Paper setting Dept.	Teaching hrs./week				Examination				Credits
					Lecture	Tutorial	Practical/ Drawing	Self-Study Component	Duration in hrs.	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1.	BSC	S3MAT1	Statistics and Probability	Civil	42	-	-	48	3	50	50	100	3
2.	IPCC	S3CVI01	Strength of Material (Integrated)	Civil	42	-	28	50	3	50	50	100	4
3.	IPCC	S3CVI02	Geomatics (Integrated)	Civil	42	-	28	50	3	50	50	100	4
4.	PCC	S3CV01	Fluid Mechanics and Hydraulics	Civil	42	-	-	48	3	50	50	100	3
5.	PCCL	S3CVL01	Building planning & Drawing using modern tools	Civil	-	-	28	2	3	50	50	100	1
6.	ESC	S3CVExx	ESC/ETC/PLC	Dept.	42	-	-	48	3	50	50	100	3
7.	UHV	SHS01	Social Connect and Responsibility **(Board: ME)**	Dept.	-	-	28		-	100	-	100	1
8.	AEC/SEC	S3CVAxx	Ability Enhancement Course/ Skill Enhancement Course – III	Dept.	If offered as Theory Course				1½	50	50	100	1
					14	-	-	16					
					If offered as Integrated Course				1½				
					-	-	28	2					
9.	NCMC	SMC01	National Service Scheme (NSS)	NSS CO	-	-	28			100	-	100	0
		SMC02	Physical Education (PE)(Sports and Athletics)	PED									
		SMC03	Yoga	PED									
			Total							**550**	**350**	**900**	**20**
		AAP	AICTE Activity Points (Applicable for both Regular and Lateral Entry students)	40 hours community service to be documented and produced for the examination									

Note: **PCC**: Professional Core Course, **IPCC**: Integrated Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **NCMC**: Non Credit Mandatory Course, **AEC**: Ability Enhancement Course, **SEC**: Skill Enhancement Course, **ESC**: Engineering Science Course, **ETC**: Emerging Technology Course, **PLC**: Programming Language Course
L: Lecture, **T**: Tutorial, **P**: Practical **S= SDA**: Skill Development Activity, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation.

Ability Enhancement Course – III (Offered by the Department)		Engineering Science Course (ESC/ETC/PLC) (Offered by the Department)	
S3CVA01	Basic Construction Practice (Lab)	S3CV02	Indian architecture and culture
S3CVA02	Microsoft office tools (Lab)	S3CV03	Rural Urban Planning & Architecture
S3CVA03	Problem Solving with Python (Lab)	S3CV04	Engineering Geology
S3CVA05	Interior Designing	S3CV05	Fire Safety in Buildings

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B.E. in Civil Engineering

SCHEME OF TEACHING AND EXAMINATION (2022 Scheme) (w.e.f. 2023-24)- 160 Credit Scheme

IV Semester (2024-25)

Sl. No.	Course Code		Course Title	Teaching / Paper setting Dept.	Teaching hrs./week				Examination				Credits
					Lecture	Tutorial	Practical/ Drawing	Self-Study Component	Duration in hrs.	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1.	PCC	S4CV01	Analysis of determinate structures	Civil	42	0	0	48	3	50	50	100	3
2.	IPCC	S4CVI02	Building Materials & Concrete Tech. (Integrated)	Civil	42	0	28	50	3	50	50	100	4
3.	IPCC	S4CVI03	Water supply & Sanitary engg. (integrated)	Civil	42	0	28	50	3	50	50	100	4
4.	PCCL	S4CVL01	Hydraulics and Hydraulic machines Lab	Civil	0	0	28	2	3	50	50	100	1
5.	ESC	S4CVEEXX	ESC/ETC/PLC	Civil	42	0	0	48	3	50	50	100	3
6.	BSC	S4CCA01	Biology for Engineers(Board: BT)	BT, CH, Phy, Che	42	0	0	48	3	50	50	100	3
7.	UHV	SHS02	Universal Human Values Course(Board: IEM)	Dept.	14	0	0	16	1½	50	50	100	1
8.	AEC	S4CVAxx	Ability Enhancement Course/ Skill Enhancement Course – IV	Civil	If offered as Theory Course				1½	50	50	100	1
					14	0	0	16					
					If offered as Integrated Course				1½				
					0	0	28	2					
9.	NCMC	SMC06	National Service Scheme (NSS)	NSS CO	0	0	28			100	-	100	0
		SMC07	Physical Education (PE)(Sports and Athletics)	PED									
		SMC08	Yoga	PED									
			Total							500	400	900	20
		AAP	AICTE Activity Points (Applicable for both Regular and Lateral Entry students)	40 hours community service to be documented and produced for the examination									

Note: PCC: Professional Core Course, IPCC: Integrated Professional Core Course, PCCL: Professional Core Course laboratory, UHV: Universal Human Value Course, NCMC: Non Credit Mandatory Course, AEC: Ability Enhancement Course, SEC: Skill Enhancement Course, ESC: Engineering Science Course, ETC: Emerging Technology Course, PLC: Programming Language Course
L: Lecture, T: Tutorial, P: Practical S= SDA: Skill Development Activity, CIE: Continuous Internal Evaluation, SEE: Semester End Evaluation.

Engineering Science Course (ESC/ETC/PLC) (Offered by the Department)		Ability Enhancement Course – IV (Offered by the Department)	
S4CV02	Construction equipment, plants,& machinery	S4CVA01	Drone surveying
S4CV03	Sustainable Design Concepts for bldg services	S4CVA02	Allied Construction Practice (Lab)
S4CV05	Remote Sensing & GIS	S4CVA03	Data Analytics with Excel or ATT Lab
S4CV06	Hydrology	S4CVA04	3D Visualization & Animation (Lab)

Statistics and Probability

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S3MAT1	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES: This course will enable students to:	
1	Develop and conduct appropriate experimentation, analyse and interpret data and use engineering judgment to draw conclusion
2	Understand the basic concepts and applications of probability in engineering
3	Learn the random variable, random process and how to model the random processes in engineering
4	Understand the multiple random variables and stochastic process
5	Investigate the variability in sample statistics from sample to sample, measure of central tendency & dispersion of sample statistics and pattern of variability of sample

NOTES:

UNIT I

8 Hours

Statistics: • Introduction, Curve Fitting: Straight line, reducible to Linear and Quadratic form-parabola. Definition of Correlation and regression lines, formula for correlation coefficient, regression lines with proof and angle between the regression lines, Rank correlation. •

UNIT II

10 Hours

Probability: • Basic terminology, Definition of probability, Probability and set notations, Types of events, Addition law of probability, conditional probability, multiplication law of probability, Baye's theorem •

UNIT III

8 Hours

Random Variable: • Definition of Random Variable, Discrete Probability distribution, expectation, Variance, Binomial distribution, Poisson distribution • Continuous Probability distribution- expectation, Variance, Normal distribution and Exponential distributions. •

UNIT IV

8 Hours

Joint probability: • Joint probability distribution, Discrete and independent random variables, Expectation, Covariance, Correlation coefficient. Probability vectors, stochastic matrices, fixed point matrices, Regular stochastic matrices, Markov chains, Higher transition-probabilities, stationary distribution of regular Markov chains and absorbing states •

UNIT V

8 Hours

Sampling Distribution: • Introduction, Objectives, sampling distribution, testing of hypothesis, level of significance, confidence limits, simple sampling of attributes, test of significance of large samples, comparison of large samples, sampling of variables, central limit theorem, confidence limits for unknown mean, test of significance for means of two large samples, Sampling of variables – small samples, Student's t-distribution •

TEXT BOOKS:

	Grewal, B.S.	"Higher Engineering Mathematics", Khanna Publications, 43rd edition, 2015. ISBN:978-81-7409-195-5
2	Ramana .B.V.	"Higher Engineering Mathematics", Tata-McGraw Hill, latest edition, 2016. ISBN;0-07-053516-7

REFERENCES:		
1	Erwin Kreyszig.	"Advanced Engineering Mathematics" , Wiley Publications, 10th edition,2015. ISBN;978-81-7409-195-5
2	C. Ray Wylie and Louis C.Barrett	"Advanced Engineering Mathematics", Tata-McGraw Hill, 6th Edition,2005
3	Louis A. Pipes and Lawrence R. Harvill	"Applied Mathematics for Engineers and Physicists", McGraw Hill, 3rdEdition, 2014

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Apply the least square method to fit a curve for the given data and evaluate the correlation coefficient and regression lines for the data (L3)
CO2	Analyze the nature of the events and hence determine the appropriate probabilities of the events (L3).
CO3	Classify the random variables to determine the appropriate probability distributions and hence compute the associated probability. (L2).
CO4	Computes the joint probability and its parameters. Predicts the long run behavior of a Markov chain using transition matrix (L3).
CO5	Estimate the parameters of a population and sample in testing of hypothesis (L2)

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3													
CO2	3													
CO3	3													
CO4	3	1												
CO5	3	1												

Strength of Material (Integrated)

Contact Hours/ week: (L-T-P-S)	3-0-2-3	**Credits:**	4
Total Lecture Hours:	120 = 42 (L)+0(T)+28(P)+50(S)	**CIE Marks:**	50
Sub. Code:	S3CVI01	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	Compute the stresses, strains and elastic constants in loaded components
2	Compute the principal stresses and principal planes in two-dimensional stress system using both analytical and graphical methods. To study the internal stresses in thin and thick cylinders.
3	Compute magnitudes of bending moment and shear force over the span of various kinds of beams subjected to different kinds of loads.
4	Compute bending stress and shear stress at critical sections of the beam and to sketch the distribution diagrams. To determine the torsional shear, rigidity and magnitudes of power transferred through shafts subjected to twisting moment / torque.
5	Compute the buckling load for a column subjected to different end conditions.

NOTES:

UNIT I

8 Hours

Simple stresses and strains: Introduction, stress, strain, Hooke's law, stress strain diagram for Structural steel and nonferrous materials. Elongation of prismatic and non-prismatic bars, volumetric strain, elastic constants, and relationships. Composite section and Temperature stresses. •

UNIT II

10 Hours

Compound Stresses: Introduction, state of stress at a point, two-dimensional stress system, Principal stresses and principal planes. Mohr's circle of stresses. • Thin and Thick Cylinders: Introduction, Thin cylinders subjected to internal pressure; Hoop stresses, Longitudinal stress and change in volume. Thick cylinders are subjected to both internal and external pressure, Lame's equation, radial and hoop stress distribution. •

UNIT III

8 Hours

Bending moment and shear force in beams: Introduction, Relationship between intensity of loading and shear force, shear force and bending moment. Determination of shear force and bending moment for simply supported cantilever and overhanging beams subjected to different loads. Sketching the variation of bending moment and shear force. •

UNIT IV

8 Hours

Stresses in beams: Theory of simple bending, assumption, derivation of bending equation, determination of bending stress at critical points for different cross sections (I, T, and L sections). Derivation of equation for shear stress, determination of shear stress distribution at critical points for different cross sections. •

UNIT V

8 Hours

Torsion of circular shaft: Derivation of equation of torsion, problems involving solid and hollow shafts, power transmitted by a shaft. • Columns and Struts: Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory. Rankine-Gordon's formula for columns. •

LAB COMPONENT

28 Hours

Lab 1 - Determination of hardness of materials. • Lab 2 - Single shear and double shear strength test on structural steel. • Lab 3 - Determining Energy absorption (Impact test) using Charpy test and Izod test. • Lab 4 - Tension test on Mild Steel and Cast Iron. • Lab 5 - Compression test on Mild steel and Cast Iron. • Lab 6 - Bending Strength Test on Wood. • Lab 7 - Torsion test on Mild steel. •

TEXT BOOKS:

1	Ferdinand P Beer, Russel Johnston, John T D Wolf, David F. Mazurek	"Mechanics of Materials", , MG _Graw Publishing, 7th edition, ISBN: 9780073398235, 2014.
2	James. M. Gere, David E Goetsch	"Strength of Materials", Cengage Learning, India Edition, ISBN: 978-8131509272, 9th edition, 2019.

REFERENCES:

1	B.C. Punmia	"Strength of Materials", Lakhmi Publications, 10th edition, New Delhi, 2015.
2	D.H. Young, S.P. Timoshenko	" Elements of Strength of Materials", East West Press Pvt. Ltd, 5th Edition (Reprint 2014)
3	Bhavikatti S.S	"Strength of Materials, Vikas Publishing House (P) Ltd, 4th Edition, ISBN 13-9789325971578

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Use relations between stress, strain and elastic moduli to determine the deformations in composite bars under both mechanical and temperature loading conditions.
CO2	Determine the principal stresses and principal planes for two-dimensional stress systems, and for thin & thick cylinders, using both analytical and graphical methods.
CO3	Analyse a given determinate beam to draw bending moment and shear force diagrams.
CO4	Analyse the bending and shear stress distribution across the cross-sections of different shapes.
CO5	Analyse the deformation of shafts and stability of axially loaded columns of various end conditions.
CO6	Perform laboratory tests on various materials to evaluate their mechanical properties under axial, shear, torsional, bending and impact loading conditions.

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1												
CO2	2	1												
CO3	2	1												
CO4	2	1												
CO5	2	1												
CO6					2							3		

Geomatics (Integrated)

Contact Hours/ week: (L-T-P-S)	3-0-2-3	**Credits:**	4
Total Lecture Hours:	120 = 42 (L)+0(T)+28(P)+50(S)	**CIE Marks:**	50
Sub. Code:	S3CVI02	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1. In this course, the students will be taught to use the various surveying techniques/methods to measure directions/ angles, distances of lines, elevations, co-ordinates, direction of lines, land areas by conducting different surveys using Total Station and Levelling. Further, to evaluate data to set out geometrical figures, curves, coordinates of points, etc.

NOTES:

UNIT I

8 Hours

Introduction to Surveying : Objectives, primary division, classification, principles of surveying, India and adjacent countries (I&AC) maps and their numbering systems, principle of chain surveying, basic accessories, ranging out of survey lines, measurement of sloping distances by direct and indirect methods, offsets, types of errors, error due to incorrect length of chain, correction for sag, pull and temperature-problems, obstacles in chaining, cross staff survey for an irregular area-problems. •

UNIT II

10 Hours

Levelling: Dumpy level and auto level: Parts, temporary adjustments; Types of levelling: Simple levelling, differential levelling, profile levelling – plotting of longitudinal and cross sectioning; Booking and reducing of levels by H.I. method and rise & fall methods - numerical problems; Levelling across obstacles, errors in levelling, effect of curvature and refraction. Contouring – Contour interval, horizontal equivalent, characteristics of contours, uses of contour maps, methods of contouring - Direct and indirect method of squares. Calculation of area and volume of contours. •

UNIT III

8 Hours

Introduction to Total station survey: Independent coordinates, dependent coordinates, WGS 84 coordinate system, standard traverse format, closing error, balancing of a traverse by Bowditch's method, calculation of lat and longitude. Total station - Components, capabilities, advantages, different applications of total station (REM, stake out, area, missing line measurement, Z co-ordinates, measurement of coordinates of points, temporary adjustments at a station point, orientation to North and subsequent stations, resection, traversing around a building and its plotting (manually), column marking for a building. •

UNIT IV

8 Hours

Curve Surveying: Elements of a simple curve, setting out simple curve by Rankine's method of deflection angles, problems on curve setting. Transition Curves - General requirements, advantages, ideal transition curve, types of transition curves, length of transition curve. •

UNIT V
8 Hours

Advanced survey techniques and Modern survey equipment : LiDAR: Geo-referencing and GCP's accuracy indices, role of DGPS in establishing precise GCP, Physics of Laser, characteristics, range measurement, Air borne Altimetric LiDAR, Topographic and Bathymetric LiDAR, data processing, classifications from LiDAR data. Drone: Introduction to unmanned aerial vehicles, selection of hardware, different UAV models, limitations and applications, construction Laser and its applications, Concept of DEM (Digital Elevation Modelling) and its applications. •

LAB COMPONENT
28 Hours
1. Chain Surveying: i. Ranging out a survey line & measuring its horizontal length, setting out perpendicular by 3-4-5 method & cross staff. • 2. Leveling: i. Measurement of elevation of points by simple leveling, establishing bench marks • ii. Profile leveling –longitudinal & cross sectioning and plotting. • 3. Total station: i. Study of total station, its parts & adjustments, steps to set up the instrument over a station • ii. Orientation with reference to north, measurement of horizontal distances, sloping distances, horizontal angles in angular measuring mode. • iii. Standard Traverse Format-Establishing traverse stations. • iv. Setting of Simple curves. • v. Traversing of a building including orientation to north at 1st station and subsequent orientation to previous stations and plotting the work manually (use GPS for global coordinates), Resection application. • vi. Conducting block levelling for given area & measure NEZ coordinates of ground points. • vii. Locating column positions for a given building plan in the field. • viii. Determining the remote elevation of an object and Area of parcel of land. •

TEXT BOOKS:		
1	B. C. Punmia	Surveying, Laxmi Publications Pvt. Ltd., New Delhi, Edition 17th, Vol. I & II,2016.
2	K. R. Arora	Surveying, Standard Book House, New Delhi, Edition 11th, Vol. I & II, 2013.

REFERENCES:		
1	T.P. Kanetkar and S.P. Kulkarni	Surveying, Tata McGraw Hill Publishing Co. Ltd., New Delhi, Edition 6th, Vol I, 2009.
2	C. Venkataramaiah	Surveying, Universities Press (India) Pvt. Ltd., Hyderabad, Edition 2nd, 2011.
3		www.pix4d.com, www.satvig.com, www.sensefly.com, www.heliceo.com, www.sciencedirect.com

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Identify and solve the engineering problems involving the determination of distances and areas by applying suitable corrections using basic principles of surveying; read international map series and numbering system.
CO2	Identify the given field data and record in an appropriate format; to determine the reduced levels of points for further engineering applications; to describe the generation of contour maps and their characteristics.
CO3	Describe the field procedure to set out building columns, traversing of building and other miscellaneous operations (MLM, REM, areas, etc.) using Total station.
CO4	Compute the necessary deflection angles by Rankine's method to set out simple and transition curves for roads/ railway routes using total station.
CO5	Using the principles of survey apply the advanced survey technologies and equipment's (such as LiDAR) for accurate survey works

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2										1		
CO2	3	2										2		
CO3	2	3										2		
CO4	2	3										3		
CO5	3											3		

Fluid Mechanics and Hydraulics

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	0
Sub. Code:	S3CV01	**SEE Marks:**	0

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:	
This course will enable students to:	
1	The objectives of the course are to enable the students: Introduce fundamental aspects of fluid statics, dynamics, and kinematics.
2	Introduce the students to the basic principles, laws and phenomena in the area of fluid mechanics and enable them to apply these principles to fluid flow problems associated with pipe flows, open channel flows.
3	Enable the students to solve practical fluid flow problems.
4	Analyze methods and devices for measurement of pressure and velocity of a fluid in motion.
5	Design and analysis of hydraulic machinery (turbines)
NOTES:	

UNIT I

8 Hours

Properties of fluids and fluid statics: • Basic Properties of Fluids - Concepts and Definitions –Density, Specific weight, Specific Volume, Specific gravity, Newton's law of viscosity and Kinematic viscosity – Problems. Surface tension, Capillarity–problems. • Fluid statics: Pascal's law, hydrostatic pressure variation, Absolute, Gauge, Atmospheric and Vacuum pressures, simple and differential manometers - problems. Total pressure and centre of pressure, Hydrostatic forces on vertical and inclined plane surfaces – Problems. •

UNIT II

8 Hours

Kinematics of Fluid Flow: • Kinematics of Fluid Flow - Types of fluid flow (Steady/Unsteady, Uniform/Non-uniform, Laminar/Turbulent, Rotational/Irrotational, one/two/three dimensional flows). General form of Continuity equation (three dimensional) – Problems. Flow patterns – Streamlines, streak line, path line, stream tube, stream function, velocity potential function, relational between stream and velocity potential functions - Problems. •

UNIT III

8 Hours

Dynamics of Fluid Flow: • Dynamics of Fluid Flow – Equations of motion, Bernoulli's equation from Euler's equation, Bernoulli's equation for real fluid flows – Application of Bernoulli's equation for measurement of velocity (pitot-tube) and discharge (Venturimeter)-Problems. Orifices and Mouthpieces-Classifications, discharge measurement through circular orifices and mouthpieces – Determination of hydraulic co-efficients of orifice and mouthpiece. (No submerged conditions.) – Problems. •

UNIT IV
10 Hours
Flow in Pipes and Open Channels: • Flow in Pipes and Open Channels – Expression for loss of head due to friction in pipes, Major and minor losses for flow in pipes - Pipes with parallel connections and pipes in series. Open channel flows – Classifications – Specific energy and specific energy curve, critical depth, critical velocity, minimum specific energy in terms of critical depth. Uniform flows – Manning's and Chezy's equations, most economical sections of Rectangular, Trapezoidal and Triangular channels – Problems, Flow measurements in weirs, Notches (rectangular, triangular)-problems. •

TEXT BOOKS:		
1	Bansal R.K.	"Fluid Mechanics and Hydraulics", Lakshmi Publications, New Delhi, 2013. ISBN:978-81-318-0815-3.
2	Modi P.N & Seth S.M.	"Hydraulics & Fluid Mechanics", Standard Book House, 18th Ed. New Delhi, 2011. ISBN:81-900893-7-4.
3	Subramanya K	"Fluid Mechanics and Hydraulic Machines", (Problems and Solution), McGraw Hill Education, 2nd Edition, Chennai 2019. ISBN: 978-93-5316-342-6.

REFERENCES:		
1	White F.M.	"Fluid Mechanics", TMH Book Company,7th Edition, New York 2011. ISBN:978-0-07-352934-9.
2	Ojha C.S.P , Berndtsson R and Chadramouli P.N.	" Fluid Mechanics and Machinery", Oxford University Press, 2010. ISBN:9780195699630.

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Apply Newton's law of viscosity and Pascal's law for fluid statics.
CO2	Characterize fluid flow using continuity equations.
CO3	Apply Bernoulli's energy equation and momentum principles to evaluate fluid dynamics in orifice, mouthpiece and pipe flow.
CO4	Design of hydraulically efficient open channels and flow measurements through weirs and notches of various types.
CO5	Design basic aspects of turbines and its accessories.

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2										1		3
CO2	3	2										1		3
CO3	3	2										1		3
CO4	3	3	2									1		3
CO5	3	2	2									1		3

Building planning & Drawing using modern tools

Contact Hours/ week: (L-T-P-S)	0-0-2-0	**Credits:**	1
Total Lecture Hours:	30 = 0 (L)+0(T)+28(P)+2(S)	**CIE Marks:**	50
Sub. Code:	S3CVL01	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	Enable students to gain drafting knowledge, visualize the various components of a building and design a building.
2	This will enable students to design and draw the various types of buildings based on the given functional requirements and electrical water supply and sanitary services make graphical representation using CAD

UNIT I

4 Hours

INTRODUCTION • Scales, definition of various terms used in building drawings. Concepts of Light, ventilation, specifications for residential, office and public buildings. Building bye-laws of BDA and BBMP. The setback distances, calculation of carpet area, plinth area and floor area ratio. •

UNIT II

4 Hours

BUILDING COMPONENTS • To prepare geometrical drawing of various component of buildings such as i) Stepped wall footings, ii) Isolated and combined RCC column footings, iii) RCC doglegged and open well staircases, iv) Doors & windows (Fully panelled doors & glazed windows) •

UNIT III

6 Hours

USING AUTO-CAD SOFTWARE • Development of Plan, Elevation, section, North Line and Schedule of Openings for following building. (With or without line diagram) 1. Single bedroom single story buildings 2. Two bedrooms single story buildings and 3. Two storied buildings. •

UNIT IV

6 Hours

FUNCTIONAL DESIGN OF BUILDING • Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following buildings. 1. Primary health center 2. School building 3. College canteen 4. Office building. 5. Library •

UNIT V

8 Hours

USING AUTO-CAD SOFTWARE • DRAW simple residential building (plan being given). 1. Plumbing, sanitary layouts 2. electrical layouts •

TEXT BOOKS:

1	Shah M.H., Kale C.M, and Patki S.Y.	Building Drawing, , Tata Mcgraw Hill, 5th Ed., New Delhi, 2002
2	Sikka V. B, Kataria S. K & Sons.	A Course in Civil Engineering Drawing, 11th Edition, 2015

REFERENCES:

1	Sushil Kumar	Building Construction, Standard Publishers Distributors, New Delhi, 2010

2	Code	IS:962-Code of practice for architecture and building drawing National Building code, BIS, New Delhi
3	Bhavikatti S. S	Building Planning and Drawing, I K International Publishing House Pvt. Ltd, 2014

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Explain Building bye-laws, floor area, plinth area, carpet area. Floor area ratio
CO2	Prepare drawings of various components of buildings
CO3	Design and develop residential building drawings from given line diagram
CO4	Develop line diagram drawings showing the interconnectivity of functional components of public buildings
CO5	Develop drawings showing the interconnectivity of functional components of buildings along with service layouts, including electrical, water supply and sanitary details

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1													3	
CO2					3								3	
CO3					3								3	
CO4					2								3	
CO5					3								3	

Indian architecture and culture

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S3CV02	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:
This course will enable students to:

1	Sensitize students towards social, political and cultural influences on evolution of architecture and settlements
2	Appraise the textual interpretations of architecture in vedic period
3	Understand the characteristics of rock hewn buildings of Buddhist era and ideas of settlement in Himalayan region
4	Discuss various design and structural innovations during the medieval period
5	Discuss the architectural essence of colonial and post- Independence era

NOTES:

UNIT I

8 Hours

Ancient River valley Civilizations: Introduction to the domain of Architecture. Introduction to river valley cultures- example of Indus valley civilization - settlement planning pattern, typology of Shelters and civic buildings, Citadel-Granary-Great baths, civic utility systems. • Introduction to ancient texts on building technology and Architecture in India. Town planning principles prescribed in Manasara •

UNIT II

10 Hours

Vedic Culture and Architecture: Introduction to Indian Temple Architecture and the philosophical background of evolution of temple form. Typologies of Indian temple Architecture – Dravida, Nagara & Vesara, their similarities and differences. Examples – Brihadeeshwara Temple, Thanjavur, Chennakeshava temple, Belur, Lingaraja Temple, Odisha •

UNIT III

8 Hours

Rock-Hewn and Himalayan Architecture: Rise and development of Buddhist phase - study of the early Hinayana and Mahayana phases. Types of structures and elements developed Eg: Stupas, Viharas, Chaityas, Rock cut examples. Himalayan Cities-Settlement Patterns, Public Places and Architecture •

UNIT IV

8 Hours

Medieval Indian Architecture: Elements of Indo- Islamic Architecture. Study of typical Indian mosque. Example – Quwwat Ul Islam mosque, New Delhi. Evolution of Tomb Architecture – Example – Taj Mahal. Ideas of Rauza/ Mausoleum, example – Ibrahim Rauza, Bijapur. Baolis –example – Rani ki Wav, Ahmedabad. Introduction to components and planning of Mughal forts- Red fort, New Delhi •

UNIT V

8 Hours

Colonial & Post independence Architecture: Colonial architecture of British. British forts in Madras & Kolkata. Buildings – Victoria Terminus, Mumbai, Bombay Town Hall. Planning and buildings of New Delhi by Lutyens. Buildings - Rashtrapati Bhavan, Parliament building. Modern Architecture– Planning of Chandigarh city and buildings of capitol complex. Innovations of Mahendra Raj – Pragati Maidan, DMC building •

TEXT BOOKS:		
1	Francis D. K. Ching	Architecture - Form, Space and Order, JOHN WILEY NP, 4th Edition, 2015
2	Ernest Burden	Elements of Architectural Design – A Visual Resource, Van Nostrand Reinhold, 2nd Edition, 2000.
3	V.S. Pramar	Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., 1990th edition, 1997
4	David, G. and Saile	Architecture in Cultural Change: Essays in Built Form and Culture Research, University of Kansas, First Edition, 1986

REFERENCES:		
1	Banister Fletcher	History of Architecture, CBS Publisher, 20th Edition, 1999
2	Percy Brown	Indian Architecture (Buddhist and Hindu period), Read Books, 2nd Edition, 2010
3	Percy Brown	Indian Architecture (Islamic Period), Life Span Publishers & Distributors, 2022

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Elaborate on Ancient civilizations and their settlement patterns nature of buildings and civic utility systems.
CO2	Demonstrate and explain the settlement patterns, vast shastra and other topology details related to temples
CO3	Present the development of Buddhist architecture and landscape patterns
CO4	Explain Islamic architecture with special reference of domes and fort
CO5	Explain the modern architecture patterns and planning of cities

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1						2								
CO2						2								
CO3						2								
CO4						2								
CO5						2								

Rural Urban Planning & Architecture

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S3CV03	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:	
This course will enable students to:	
1	Understand the concepts of rural development and various strategies practiced in India
2	Enable the student to gain an understanding of the evolution of urban and rural development in India
3	Enable the student to gain insights into the urban and rural relationship
4	Develop and understand the basic theories of urban and regional planning.

UNIT I

8 Hours

Trends in Urban and Rural Development: Introduction, terms such as urban and rural as used in India - Rural Development: Concept, Objectives and Indicators Concept and Objectives of Rural Development; Rural-Urban Differences; Indicators of Rural Development; Rural Dynamics Population growth; Migration; Growth of urban and rural settlements- numbers, area, population; Consumption pattern changes; Changes in asset ownership, Agriculture and land utilisation. Policies and Programmes: National Five Year Plans (1950 to 2012), National Housing Policies- 1994, 1998 and 2007, Programmes such as the JNNURM, Rural Employment Schemes, Command Area Programme, PURA etc. •

UNIT II

10 Hours

Rural Development Strategies: Types of Rural Development Strategies; Rural Development: Major Initiatives. Roads & Transport: All weather rural roads; Challenges of Power and Electricity Facilities; Safe Drinking Water & Sanitation for All; Status of Rural Housing: Challenges in Building Permanent Housing •

UNIT III

8 Hours

Issues in Urban and Rural Development: Poverty, Migration, Pollution, Safety/Security, Livelihoods, Energy, Infrastructure, Mobility, Land Conversion, Housing, Politics. National and International concepts such as Carbon Zero Cities, Smart Cities, Special Economic Zones (SEZ), Special Investment Region (SIR), Transit Oriented Development (TOD), etc. •

UNIT IV

8 Hours

Theories in Urban planning: Garden city concept by Ebenezer Howard, Theories of urbanization including Concentric Zone Theory; Sector Theory; Multiple Nuclei Theory. Land Use and Land Value. City as an organism: a physical entity, social entity and political entity. •

UNIT V

8 Hours

Tools and techniques of data collection for planning: Arial and Satellite, GIS , Spatial data and attributes Aerial photography as a tool for collection of data and preparation of maps, its application in planning and preparation for a project, orientation concept and methodology transformation and adjustment techniques. Basic principal and methods of photo interpretation and techniques of data collection through satellite data, Classification techniques using satellite data, Digital image processing, enhancement techniques in urban information extraction Base map preparation and elementary data analysis using satellite data GIS techniques and their application in planning field. •

TEXT BOOKS:		
1	Misra,R.P	Regional Planning – Concepts, Techniques, Policies and Case Studies, New Delhi.
2	IDFC	IDFC Rural Development Network, India Rural Development Report, 2012-13, Delhi: OrientBlack Swan, 2013.

REFERENCES:		
1	Margaret, Robert.	An Introduction to Town Planning Technique

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Recognize the parameters influencing rural and urban development
CO2	Select appropriate strategy for rural development with awareness of its components & challenges
CO3	Identify the issues concerning urban and rural development
CO4	Evaluate the merits and demerits of various theories of urban planning
CO5	Select suitable tools and techniques for collecting data required for rural/ urban planning

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1						2								
CO2						2								
CO3						2								
CO4						2								
CO5					3									

Engineering Geology

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S3CV04	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	This course appraises the students about the basic principles of mineralogy, petrology, structural geology and applied geology, GIS, GPS and applications of remote sensing and introduce to the applications of these areas to the problems of site selection and ground water exploration

UNIT I

8 Hours

Introduction to Mineralogy: Introduction: Origin and development Geologic Mapping and Remote Sensing: Topographic maps, geologic maps, preparation of geologic sections, aerial photographs, LIDAR, SAR, GIS Mineralogy: Chemical analysis of rocks and minerals, rock and soil minerals, physical properties of minerals, susceptibility of minerals to alteration, basics of optical mineralogy, SEM, XRD •

UNIT II

10 Hours

Classification of Soil and Rock: • Classification of Soil and Rock (2 lectures) : Types of rock and origin: Igneous (extrusive and intrusive), sedimentary and metamorphic, ternary diagrams, definitions (structure, texture) • Igneous Rock (1 lecture): Agents, structure, texture, IUGG classification of intrusive and extrusive rocks • Metamorphic Rock (1 lecture): Causes of metamorphism (stress, temperature, tectonism, pore fluid), recrystallization, phase change, structure and texture Sedimentary Rock (1 lecture): Sedimentation environments, structure, textural classification of siliclastic and carbonate rock • Soil Formation (2 lectures): Weathering processes, transportation and sedimentation processes, structure, texture and classification, surficial deposits and landforms •

UNIT III

8 Hours

Subsurface exploration and mechanical properties of rocks: • Subsurface exploration (3 lectures) : Intrusive and non intrusive sub-surface investigation, drilling and sampling, geophysical methods, geologic investigations for site selection of dams, reservoirs, tunnels, bridges and highways Engineering Properties of Soil and Rock : Engineering properties (density, unit weight, porosity), strength, index measurements for soil and rock (SPT blow count, RQD, RMR, Point Load Index), relationships of index measurements with strength of soil and rock. • Strength Behavior of Soil and Rock (5 lectures) : Stress and strain in rock, Mohr's Circle, concept of effective stress, failure of soil and rock, fracturing of rock, folds, faults and joints in rock, shear failure of soil and rock, consequences of failure (landslides, earthquakes, subsidence) •

UNIT IV

8 Hours

Subsurface water and seismo-tectonics: • Subsurface water : Sources, aquifer, aquiclude, water table, Artesian groundwater in soil and rock, springs, hydraulic conductivity and its measurement, Darcy's law, well hydraulics, well yield, water capacity of rock, lowering of water table and subsidence, salt water intrusion in coastal areas • Geologic and seismotectonic setting of India: Geologic provinces of India and their surficial and subsurface geology, seismotectonics of the Indian plate, seismic zones of India •

UNIT V	
	8 Hours
Geological Hazards : Major geological hazards Geological considerations in design of constructed facilities and infrastructure, causes and classification of landslides, stability assessment for soil and rock slopes, mitigation of landslide hazard, effect of earthquakes on constructed facilities and infrastructure, geotechnical and structural considerations in mitigation of earthquake hazard. • Case study of 4 prominent Geological hazards of which 3 are relevant to Indian sub-continent •	

TEXT BOOKS:

1	Mukharjee,P.K.	A text book of Geology, The World Press Pvt. Ltd, 2013
2	Kesavulu, C.	Textbook of Engineering Geology, Laxmi Publications Pvt Ltd, 3rd Edition, 2018.
3	Bangar, K.M.	Principles of Engineering Geology, Standard Publishers Distributors, First Edition,2021.

REFERENCES:

1	Billings, M.P.	Structural Geology, Prentice Hall India Learning Private Limited, 3rd Edition, 1972
2	Blyth, F.G.H and de Freitas	Geology for Engineers, M.H. ELBS, London, First edition, 1974

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Identify minerals, rocks and their class based on their physical and chemical properties
CO2	Evaluate suitability of rocks for civil engineering applications based on properties & occurrence
CO3	Interpretation of geological structures based on field measurements of dip, strike and slip
CO4	Selection of feasible sites for construction of buildings, dams, tunnels, bridges and highways from geological consideration.
CO5	Apply remote sensing, GIS and GPS in Civil Engg. for drainage analysis, catchment area calculationand DEM analysis

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2													
CO2	2													
CO3	2													
CO4	2													
CO5	3													

Fire safety in buildings

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S3CV05	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	Explain the importance fire safety
2	Sensitise about the various techniques involved in fire safety
3	Design of fire-resistant buildings using proper materials and methods

UNIT I

9 Hours

Fire: Introduction, Basic concepts of fire protection, Fire as a process of combustion, planning for fire protection, fire resistance Ventilation and fuel controlled fire, process of combustion: flashover condition, effect of fire on construction material, design of fire resistance steel structure, concrete structure •

UNIT II

9 Hours

Fire safety: urban planning, escape and refuge, internal planning, detection and suppression Introduction to lift design, design of lift system, expected stop and floor of reversal, different cases, simulation, arrangements and escalators •

UNIT III

8 Hours

Introduction to flow system: water supply, constant demand, variable demand and diversity factor, control systems Flow in pipe networks and fixture units, design of water supply distribution system, flow in waste water pipes •

UNIT IV

8 Hours

Introduction to HVAC: governing equations to HVAC process, numerical problem on HVAC system, psychometric chart, equation based approach Electrical systems: design of electrical systems, intelligent building, life cycle cost and basics of building maintenance, stages of maintenance management, planning for building maintenance, periodicity of maintenance management, estimation of repair cycle, cost profile of maintenance, lamp replacement, building inspection, planned and Ad-hoc maintenance •

UNIT V

8 Hours

Condition survey and health evaluation of buildings, diagnosis of building by visual survey, case studies of visual survey, effect of corrosion and alkali aggregate reaction, sampling and choice of test location Non-destructive testing, core strength test, carbonation and chloride measurement, electrical method of progress measurement Repair, rehabilitation, retrofit, periodicity and economics of condition survey, interpretation of test results •

TEXT BOOKS:

1	Purkiss, J. A.	Fire Safety Engineering: Design of Structures, Taylor & Francis, First Edition,2009
2	Jain, V. K.	Fire Safety in Buildings, New Age International Private Limited, Third edition,2020

3	NPTEL	Fire protection, services and maintenance management of building, NPTEL videolecture, IIT, Delhi
4	Bureau of Indian Standards	Handbook of functional requirements of buildings, (SP-41 & SP- 32), BIS 1987and 1989
5	BIS	SP-35 (1987): Handbook of Water supply & drainage-BIS, 1987

REFERENCES:

1	Thomas A. M., Edwin N. M.	Buildings, climate, and energy, Pitman Publishing Limited, 1980.
2	Croome,J.D .& Roberts,B.M.	Air conditioning and ventilation of buildings- Vol1, Pergamon press, 2ndEdition, 1981.
3	Mever, T. W.	Building Services Design, RIBA Publications, First Edition, 1971
4	Merrit, F.S. & Ambrose,J.	Building Engineering & System Design, Springer-Verlag New York Inc., 2ndEdition, 2012

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Explain the types of fire, combustion process and fire resistance
CO2	Plan for fire safety and design of lifts
CO3	Design flow network in buildings
CO4	Design of electrical systems and maintenance
CO5	Perform health evaluation of buildings and suggest remedies

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1					2								
CO2	1					2								
CO3	1		1			2								
CO4	1		1			2								
CO5	1					2								

Social Connect and Responsibilities

Contact Hours/ week: (L-T-P-S)	0-0-2-0	**Credits:**	1
Total Lecture Hours:	30 = 0 (L)+0(T)+28(P)+2(S)	**CIE Marks:**	50
Sub. Code:	SHS01	**SEE Marks:**	0

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES: This course will enable students to:	
1	Do a deep drive into societal challenges being addressed by NGO(s), social enterprises & The government and build solutions to alleviate these complex social problems through immersion, design & technology
2	Have a formal platform to communicate and connect with their surroundings
3	Create of a responsible connection with society

NOTES:	
Contents:	The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large. The course will engage students in interactive sessions, reading groups and semester-long activities conducted by faculty mentors. In the following a set of activities planned for the course have been listed:
Activities	1. Plantation and adoption of a tree: Select suitable species in consultation with horticulture, forest or agriculture department. Interact with NGO/Industry and community to plant Tag the plant for continuous monitoring 2. Heritage walk and crafts corner: Survey in the form of questioner by connecting to the people and asking. Questions during survey can be asked in local language but report language is English. 3. Organic farming: Collect data on organic farming in the vicinity. Like types of crop, methodology etc., 4. Water Conservation: Report on traditional water conservation practices (to minimize wastage) 5. Food Walk: Survey local food centres and identify its specialty, Identify and study the food ingredients, Report on the regional foods, Report on Medicinals values of the local food grains, and plants.
Pedagogy	The pedagogy will include interactive lectures, inspiring talks by various departments, field visits, social immersion. Applying and synthesizing information from these sources to define the social problem with your group. Social immersion with NGOs/social sections will be a key part of the course
COURSE TOPICS:	The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversional will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem.
	A total of 26 hrs engagement per semester for this course in 3rd semester of the B.E. program. The students will be divided into 1 group of 60 each. Each group will be handled by one faculty mentor.

Guideline for Assessment Process:- CIE	• Student shall keep a separate dairy and prepare report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period. • Report shall be handwritten or blog with paintings, sketches, poster, video and/or photograph with Geo tag. • The report should be signed by the mentor. • The report shall be evaluated on the basis of the following criteria (see Table below) and/or other relevant criteria pertaining to the activity completed. • Each module is evaluated for 35 Marks and final presentation will be for 15 marks. Sl. No. Particulars (for each module) Maximum Marks 1 Planning & scheduling the socialconnect 10 2 Data collected during the social connect10 3 Report writing 15 4 Final Presentation from the group 15 Total 50

UNIT I

6 Hours

Plantation and adoption of a tree: Plantation of a tree by Miyawaki Method that will be adopted by entire semester by a group of 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. •

UNIT II

6 Hours

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 craftsman, photoblog and documentary on evolution and practice of various craft forms •

UNIT III

4 Hours

Organic farming: Definition of organic farming, Organically grown crops in India, Differentiate between conventional farming and organic farming, Necessity of organic farming, Key characteristics of organic farming, Four principles of organic farming(principle of Health, principle of ecology, principle of fairness and principle of care),Types of organic farming: 1) Pure organic farming, 2) Integrated farming (Integrated nutrient management and Integrated pest management), objectives of organic farming, benefits of organic farming, Basic steps in organic farming and limitations of organic farming. •

UNIT IV

6 Hours

Water Conservation: Global Water Scarcity - Global water crisis and its implications; Rainwater Harvesting - Concept and benefits of rainwater harvesting; Water Audit – An approach to water conservation; Efficient Water Use - Optimizing water consumption in daily life . •

UNIT V

4 Hours

Food Walk City's culinary practices, food lore, and indigenous materials of the region used in cooking. •

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Understand social responsibility
CO2	Practice sustainability and creativity
CO3	Showcase planning and organizational skills

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1														
CO2														
CO3														
CO4														

Basic Construction Practice (Lab)

Contact Hours/ week: (L-T-P-S)	0-0-2-0	**Credits:**	1
Total Lecture Hours:	30 = 0 (L)+0(T)+28(P)+2(S)	**CIE Marks:**	50
Sub. Code:	S3CVA01	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:
This course will enable students to:

1	The course aims to impart hands-on-training in the basic construction practices like site marking, preparing mortar, constructing masonry forms, preparing concrete, preparing basic formwork and bar bending

NOTES:

UNIT I

6 Hours

Building Components: Demonstration of main components of building and sketching lab layout • Reading typical building plan and calculation of central line • Center line marking of a typical building in the site •

UNIT II

8 Hours

Brick Masonry: Preparation of cement mortar and construction of one brick wall thick and partition wall by English bond. • Plastering: Plastering in cement mortar for brick masonry. • Concrete mix: Preparation of nominal concrete mixes by weight and volume method. Casting of concrete specimens for Compression test. •

UNIT III

8 Hours

Fabrication of reinforcement: Bar Bending and fabrication of reinforcement for footing, column, beam and one way slab •

UNIT IV

6 Hours

Marking of water supply lines and plumbing fixtures for a typical toilet • Fixing of water supply lines and plumbing fixtures for a toilet •

TEXT BOOKS:

1	Sandeep Mantri, Satya Prakashan,	"The A To Z of Practical Building Construction and its Management", New Delhi, ISBN-10 : 8176842052,July 31, 2020, ISBN-13 : 978-8176842051.
2	Chitawadagi M.V. and Bhavikatti S.S.	"Building Planning and Drawing", Dreamtech Press, Jan 1, 2019, ISBN-13978-9389307085.

REFERENCES:

1	Punmia B.C. , Jain A.K., & Ashok Jain	"Building Construction", Lakshmi Publication, New Delhi. ISBN: 8170080533, 9788170080534, 2014.
2	Sandeep Mantri, Smt. Sumitra Handa,	"The A to Z of Practical Building Construction and its Management", Prop-Satya Prakashan, Fifth Edition, ISBN:81-7684-205-2 ,2005.

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Execute centre line marking for buildings
CO2	Construct brick masonry by English bond and applying plastering as per specifications.

CO3	Fabrication of reinforcement for various RCC works
CO4	Installation of pipe, pipe joints and plumbing fixtures for a typical toilet

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2	3											3		
CO3	3											3		
CO4	3											3		

Microsoft office tools (Lab)

Contact Hours/ week: (L-T-P-S)	0-0-2-0	**Credits:**	1
Total Lecture Hours:	30 = 0 (L)+0(T)+28(P)+2(S)	**CIE Marks:**	50
Sub. Code:	S3CVA02	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:	
This course will enable students to:	
1	Prepare professional reports with dynamic features
2	Make impressive presentations for technical and non-technical audience
3	Apply the programming features of spreadsheets to do professional data analysis
NOTES:	

LAB COMPONENT
28 Hours
MS Word: Page Layout, section creation, Customizing styles, linking multilevel listing to styles, Auto numbering subheadings • MS Word: Auto-numbering figures, tables and equations • MS Word: Inserting table of contents, table of figures, cross-references and bibliography • MS power point: Slide layout, creating schematic diagrams in 2D and 3D, using summary zoom, section zoom and slide zoom • MS power point: Animations for subtle effects, Recording voice over slides, Creating videos • MS Excel: Using formulas, inserting graphs & formatting graphs • MS Excel: Sorting, filtering, data analysis using pivot tables • MS Excel: Lookup functions, data validation, creating interactive tables, dynamic referencing using INDIRECT( ) function • MS Excel: Mail merging •

TEXT BOOKS:		
1	Acklen, L.	Absolute Beginner's Guide to Microsoft Office Word, Que Publishing, 2004.
2	Lambert, J., & Frye, C.	Microsoft Office 2019 Step by Step, Microsoft Press, 2018.

REFERENCES:		
1	Weblinks:	https://www.oakland.edu/Assets/Oakland/grad/files-and-documents/Thesis-Dissertations/Microsoft-Office-Tutorials/Microsoft%20Office%20Tutorials.pdf

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Create professional and elegant documents
CO2	Create professional presentations for engineering concepts
CO3	Create dynamic spread sheets for interactive calculation, data analysis and visualization

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1									3				2	
CO2									3				2	
CO3									3				2	
CO4														

Problem Solving with Python (Lab)

Contact Hours/ week: (L-T-P-S)	0-0-2-0	**Credits:**	1
Total Lecture Hours:	30 = 0 (L)+0(T)+28(P)+2(S)	**CIE Marks:**	50
Sub. Code:	S3CVA03	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	Understand why Python is a useful scripting language for developers
2	Read and write simple Python programs
3	Learn how to identify Python object types.
4	Learn how to write functions and pass arguments in Python.

NOTES:

UNIT I

6 Hours

Introduction to Python: Installing Python and Python packages, Managing virtual environments with venv module Introduction to NumPy arrays:Array creation, indexing, data types, broadcasting, copies and views, universal functions, I/O with NumPy •

UNIT II

6 Hours

Introduction to NumPy and SciPy:NumPy subpackages– linalg, fft, random, polynomials, SciPy subpackages– linalg, fftpack, integrate, interpolate, optimize Introduction to Matplotlib: Plotting 2D graphs with Matplotlib, annotations, legend, saving plots to file, bar and pie charts, line plots. •

UNIT III

5 Hours

Linear algebra using NumPy and SciPy:Solving linear simultaneous equations using NumPy and SciPy using numpy.linalg and scipy.linalg – solve, inverse, determinant, least square solution, Linear algebra using NumPy and SciPy (continued): Decomposition using lu and cholesky. Solving eigenvalue problems using NumPy and SciPy:Using numpy.linalg and scipy.linalg – eig, eigvals. •

UNIT IV

5 Hours

Solving initial value problems for ODE systems using scipy.integrate subpackage – solve_ivp, RK45, LSODA. Numerical integration of functions using SciPy:Using scipy.integratesubpackage– Definite integral using Gaussian quadrature – quad and quadrature Numerical integration of fixed samples using scipy.integratesubpackage– Trapezoidal rule trapezoid, Simpson's 1/3 rule using Simpson, Romberg integration romb. •

UNIT V

6 Hours

Determining roots of equations using SciPyusing scipy.optimizesubpackage– Bisection method bisect, Brent's method brentq, Newton-Raphson method newton. Symbolic computing using SymPy and solving civil engineering problems using SymPy: Introduction, defining symbols, derivatives, integrals, limits, expression evaluation, expression simplification, solving equations, solving differential equations. •

TEXT BOOKS:

1	R. Nageswara Rao	Core Python Programming, Dreamtech, 2nd Edition, 2018

2	Kurama, V.	Python Programming: A Modern Approach, LeotechPress/Pearson, First Edition, 2017
3	Theraja, R.	Python Programming , Oxford University Press, First Edition, 2017

REFERENCES:		
1	Weblinks	https://numpy.org/doc/
2	Weblinks	https://docs.scipy.org/doc/scipy/
3	Weblinks	https://matplotlib.org/stable/users/index
4	Weblinks	https://docs.sympy.org/latest/index.html.

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Understand Python syntax and semantics and be fluent in the use of Python flow control and functions.
CO2	Demonstrate proficiency in handling Strings and File Systems
CO3	Represent compound data using Python lists, tuples, Strings, dictionaries
CO4	Read and write data from/to files in Python Programs

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1					3							3		
CO2					3									
CO3					3									
CO4					3									

Interior Design

Contact Hours/ week: (L-T-P-S)	1-0-0-1	**Credits:**	1
Total Lecture Hours:	30 = 14 (L)+0(T)+0(P)+16(S)	**CIE Marks:**	50
Sub. Code:	S3CVA05	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	Get introduced to various concepts and aspects of interior design
2	Design interiors of a residential or commercial unit
3	Explore various interior surface materials and finishes

NOTES:

UNIT I

6 Hours

• Introduction to interior design and its history of evolution.Basics of interior design - concepts of interior space making/furniture layout, elements of interior design, lighting design, and selection of materials, finishes & colors •

UNIT II

5 Hours

• Components of Interior Design - Understanding the proportions to enhance the quality of interior space and its psychological effects of space such as ceiling, flooring, walls, furniture, lighting, etc. •

UNIT III

5 Hours

• Services related to interior design to be integrated such as plumbing, air-conditioning, acoustics, electrical & lighting etc •

UNIT IV

5 Hours

• Ergonomics of furniture, materials used, its style, characteristics and functional applications. Furniture positioning considering day lighting and artificial lighting factors in the interiors •

UNIT V

5 Hours

Studio Project shall include two interior design projects (one major and one minor) to be handled with complete design, detailing, furniture layout, specification for the materials, and their application. The projects shall relate to residential, commercial, educational or interiors of other public spaces •

TEXT BOOKS:

1	Francis D.K Ching	Interior design Illustrated, Wiley & Sons, 4th Edition, 2018
2	Julius Panero, Zelnik Martin & Joseph De Chiara.	Time Saver's Standards for Interior Design, McGraw-Hill, 2nd edition, 2017, ISBN-10: 1259004090, ISBN-13: 978-1259004094
3	Julius Panero & Zelnik Martin	Human Dimension and Interior Space, Watson-Guptill, 1979, ISBN-10: 0823072711, ISBN-13: 978-0823072712

REFERENCES:

1	Maureen Mitton	Interior Design Visual Presentation: A Guide to Graphics, Models and Presentation Techniques, John Wiley & Sons, 4th edition, 2012, ISBN-10: 0470619023, ISBN-13: 978-0470619025

2	John F Pile	Interior Design, Pearson, 4th edition, 2007, ISBN-10: 0132408902, ISBN-13: 978-0132408905

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Design the interior space using various concepts and elements of interior design. (PO1, PO5)
CO2	Develop schemes for interiors along with various parameters like services, furniture, space requirements, etc. (PO2, PO3)
CO3	Analyse the judicious use of materials considering the sensitivity of the design. (PO3, PO10)

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2				2									
CO2		2	2											
CO3			2			2								
CO4														

Analysis of determinate structures

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S4CV01	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	Perform analysis of determinate structures by different methods to find Axial force, SF, BM, and deflection at various locations.
2	Gain knowledge about the principles of analysis of rolling roads on determinate structures.
3	Carryout on analysis of arches and cables with different loading and boundary conditions

NOTES:

UNIT I

9 Hours

INTRODUCTION AND ANALYSIS OF PLANE TRUSSES • Introduction to structures: Forms of structures, one-two-three dimensional structural systems, conditions of equilibrium, Determinate and indeterminate structures, degrees of freedom, linear and nonlinear structures, simple and compound systems. • Analysis of plane trusses: Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints and method of sections. •

UNIT II

9 Hours

SLOPE AND DEFLECTION IN BEAMS • Derivation of differential equation of flexure, Slope and deflection in prismatic beams subjected to different loads by Double integration method, Moment Area method, Conjugate beam method. •

UNIT III

8 Hours

ENERGY PRINCIPLES AND ENERGY THEOREMS • Strain energy and complimentary strain energy, strain energy due to axial load, bending and shear. Theorem of minimum potential energy, law of conservation of energy, Castigliano's theorems. Slope and deflection by unit load method for cantilever, simply supported, overhanging beams, portal frames, determinate trusses. •

UNIT IV

8 Hours

INFLUENCE LINES AND MOVING LOADS • Introduction to moving loads, influence line diagrams, determination of maximum SF and BM at a section for point load, two-point load, several point loads, UDL and absolute maximum BM values for determinate beams. •

UNIT V

8 Hours

ARCHES AND CABLE STRUCTURES • Arches: Types of arches, three hinged parabolic with supports at same level and different levels, determination of normal thrust, radial shear, and bending moment. • Cable structures: Analysis of cable structure under concentrated loads and UDL, length of cables for supports at same level and at different levels. •

TEXT BOOKS:

1	DevadasMenon	Structural Analysis, Narosa (2010)

2	B.C.Punmia, Ashok Jain	Strength of materials and Theory of Structures, Edition 15th, 2015, Laxmi Publications, New Delhi.

REFERENCES:

1	R.C. Hibbeler	Structural Analysis, edition 7th, Pearson, Prentice Hall, 2014
2	Chukia Wang	Intermediate Structures, Edition 1, 2010, Tata McGraw Hill, New Delhi.
3	R.L.Jindal	Indeterminate Structures, Edition4, 1994, S. Chand and Company, New Delhi
4	S.Ramamrurtham	Strength of Materials, Edition 18, 2014, Dhanpat Rai & Publication, New Delhi.
5	C.S.Reddy	Basic Structural Analysis, Edition 3rd, 2010, Tata McGraw Hill, New Delhi.

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Analyse trusses for determinacy & member forces by method of joints & sections.
CO2	Determine the slopes and deflections of beams using differential equation of bending
CO3	Determine the deflection in beams, rigid frames and trusses using energy methods
CO4	Evaluate the SF and BM variations in beams for rolling loads using influence lines
CO5	Analyse determinate arches and flexible cable structures under in-plane loading for internal forces and external reactions.

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2												
CO2	3	2												
CO3	2	3												
CO4	2	3	1											
CO5	2	3												

Building Materials & Construction(Integrated)

Contact Hours/ week: (L-T-P-S)	3-0-2-3	**Credits:**	4
Total Lecture Hours:	120 = 42 (L)+0(T)+28(P)+50(S)	**CIE Marks:**	50
Sub. Code:	S4CVI02	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:	
This course will enable students to:	
1	The basic knowledge of different types of building materials, innovative building materials, the selection, and applications
2	The construction of different parts of the structure such as excavation and foundation, masonry, structural elements such as roofs and roof coverings, plastering, flooring.
3	Imparts the knowledge of services in building which includes plumbing, sanitation and Electrical works
NOTES:	

UNIT I

9 Hours

Building Materials: properties and uses and advantages of disadvantages of following materials: bricks, Stones, Cement, mortar, properties and uses of mild steel, high carbon steel and high-tension steel. •

UNIT II

9 Hours

Innovative Building materials- Properties, and uses of following innovative building materials: concrete hollow & solid, stabilized soil blocks, Marble Slurry Bricks, Solid, Cellular, Ferrocement Wall panels, Tiles, Porcelain, earthenweare, glazing, rubber, artificial and natural fibers, alluminium and its applications in construction •

UNIT III

8 Hours

Foundations and Plinth work: Functions of foundations, essential requirements of a good foundation. Types of Foundations-Shallow foundations-spread, combined, strap footings and mat foundation. Tools and machineries, preparation for P.C.C. works, work procedure for P.C.C. in foundation. Plinth work: casting and checking of columns up to plinth, check list for plinth/tie beams, refilling of plinth and foundation pits, D.P.C. over plinth walls, procedure to protect plinth. •

UNIT IV

8 Hours

Masonry in super structure- Classification of stone masonry-rubble masonry, ashlar masonry, brick masonry-Bonds in brickwork, English bond, Flemish bond, Lintel and Chajja, Stairs (Straight, Dog-legged, Open-Newel) Roofs- Types of roofs-flat roofs, pitched roofs-lean to roof, king and queen post roof truss. Plastering -Objects and requirements of good plaster, Types of mortars for plastering, defects in plastering. Flooring-Essential requirements for selection of type of floor, different types of floors-brick, cement concrete, tiled, granolithic, terrazzo, marble, timber flooring. •

UNIT V
8 Hours
Ingredients of Concrete: Cement - initial and final setting, Fine Aggregates- Gradation, bulking of sand, Coarse Aggregates - Flakiness and elongation index, Fresh concrete: Process of manufacture of concrete: Batching, Mixing, Transporting, Placing, Compaction, Curing. Workability- Factors affecting workability, Measurement of workability – slump, Properties of affecting Hardened concrete, Testing of Hardened concrete – Compressive strength, split tensile strength and flexural strength •
UNIT VI
28 Hours
Laboratory Component: • 1 . Determination of compressive strength of solid blocks and bricks • 2. Determination of bulking of sand and grain size distribution • 3. Determination of tensile strength of HYSD/TMT bars • 4. Determination of flexural strength and compressive strength of floor tiles • 5. Determination of workability by Slump test • 6. Determination of compressive, split tensile and flexural strength of concrete specimens • 7. Determination of flakiness index and elongation index • 8. Determination of fineness and normal consistency of cement • 9. Determination of initial and final setting time •

TEXT BOOKS:

1	Punmia B.C , Jain A.K, & Ashok Jain,	"Building Construction", Lakshmi Publication, New Delhi, 2014. ISBN: 8170080533, 9788170080534
2	Sandeep Mantri, Smt. Sumitra Handa	"The A to Z of Practical Building Construction and its Management", Prop-Satya Prakashan, Fifth Edition, 2005. ISBN:81-7684-205-2.

REFERENCES:

1	Sushil Kumar,Sadhu Singh	"Building Construction", STANDARD PUBLISHER DIST, 20th Edition,2010. ISBN-13: 978-8180141683.
2	Duggal S.K	"Building materials", New Age International publishers , second edition.4835/24, Ansari Road, Daryaganj, New Delhi-110 002 , 2003. ISBN 81-224-1435-4.
3	Surendra Singh	"Engineering Materials" , Konark Publishers Pvt.Limited, Revised 5th Edition,New Delhi.ISBN-10 : 8122000525, 1990. ISBN-13 : 978-8122000528,
4	Shetty M.S	"Concrete Technology", S. Chand & Company Ltd., 2006.

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Explain suitability of building materials and their uses
CO2	Explain suitability of innovative building materials with their applications.
CO3	Describe various types of foundations for different constructions.
CO4	Explain components of buildings and finishing work with their purposes.
CO5	Describe concrete and its constituents materials and its properties

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2											2		
CO2	2											2		
CO3	2											2		
CO4	2											2		
CO5	2											2		
CO6	2											2		

Water Supply and Sanitary Engineering (Integrated)

Contact Hours/ week: (L-T-P-S)	3-0-2-3	**Credits:**	4
Total Lecture Hours:	120 = 42 (L)+0(T)+28(P)+50(S)	**CIE Marks:**	50
Sub. Code:	S4CVI03	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	The course introduces the students to the need for protected water supply, methods of estimation of water demand, collection, and conveyance system of water, testing and analysis of water.
2	The course gives students an introduction to the basic theories and application of a selected set of methods for design and analysis of the unit operations and processes of water and wastewater treatment to conform to relevant standards.

UNIT I

9 Hours

Introduction: Importance of water. Need for protected water supply. Objective of public water supply, Components of public water supply scheme Water Demand: Types of water demands - domestic demand, institutional and commercial, public uses. Fire demand - Estimation by Kuichling's formula, National Board of Fire Underwriter's formula. Per capita demand of water – factors affecting per capita demand, estimation of water demand. Variations in demand of water - Peak factors, design periods and factors governing the design periods. Population forecasting - Arithmetic increase, Geometric increase, Incremental increase method - Numerical problems. Collection and conveyance of water: Intake structures – Factors to be considered for selection and location of intakes. Types of intakes: River, Reservoir, Lake, and Canal intakes. Economical diameter of pumping main - Numerical problems on rising main. •

UNIT II

9 Hours

Quality of water: Objectives of water quality management, Potable, polluted, contaminated and wholesome water, Types of impurities in water - physical, chemical and biological analysis. Water borne diseases. Water treatment: Objectives of treatment & Treatment flow-chart. Screening, Aeration: Objectives of aeration, types of aerators. Sedimentation: Theory of sedimentation, Types of sedimentation tanks, Design of sedimentation tanks - Numerical problems. Flocculation, Coagulant - Types of coagulants – Alum, polyelectrolytes. Jar test for determination of optimum dosage of coagulant. •

UNIT III

8 Hours

Filtration: Mechanism of filtration. Construction and operation of slow sand filters, Rapid sand filters and Pressure filters. Operational problems in filters. Numerical examples (excluding under drainage & back washing) Disinfection: Theory of disinfection, types of disinfection, Chlorination, chlorine demand, Residual chlorine, Break point chlorination, Use of bleaching powder as disinfectant - Numerical examples. Softening: Ion Exchange and regeneration of resins. Distribution systems: System of supply, distribution systems. Water distribution by gravity and pressure systems. •

UNIT IV

8 Hours

Sewerage systems: Necessity for sanitation, definitions of some terms used in sanitary engineering. Types of sewerage system and their suitability. Dry weather flow, factors affecting dry weather flow, estimation of flows Sewer materials, laying, joints & testing. Sewer appurtenances in brief Wastewater characterization: Physical, chemical & biological characteristics - Numerical problems Sewage disposal: disposal into streams, self-purification phenomenon oxygen sag curve (theory only), disposal on land, sewage farming & sewage sickness, disposal into sea. •

UNIT V
8 Hours
Treatment of wastewater: Flow diagram of municipal wastewater treatment plant. Screening, grit chambers, skimming tanks. Design of sedimentation tanks. Secondary treatment: Suspended growth and fixed film bioprocess; Trickling filter theory - construction and operation, loading, efficiency, Design examples on conventional filters, Activated sludge process - Principle and flow diagram, Aeration units, Numerical problems on ASP. Low-cost wastewater treatment methods •
UNIT VI
28 Hours
Laboratory Component: • Determination of Alkalinity and Acidity • Determination of pH and Chlorides • Determination of Total hardness • Determination of Dissolved Oxygen • Determination of Iron • Fluoride by data logging spectrophotometer • Determination of Sulphates and Nitrates by data logging spectrophotometer • Jar test for determination of optimum dosage of Alum • Determination of Total Solids, Settleable Solids and Fixed Solids in sewage • Determination of BOD, Determination of COD •

TEXT BOOKS:

1	Garg, S. K.	Water Supply Engineering, (2010), India: Khanna Publishers. ISBN:9788174091208
2	Punmia, B. C., Jain A. K.	Wastewater Engineering. (1998). India: Laxmi Publications Pvt Limited. ISBN:9788131805961

REFERENCES:

1	Peavy, H. S., Rowe D. R.,Tchobanoglous, G.	. Environmental Engineering (2013), India: McGraw-Hill Education. ISBN: 9789351340263
2	Metcalf, E. and Eddy, E.	Wastewater Engineering: Treatment and Reuse(2003). India: Tata McGraw Hill Education. ISBN: 9780070495395
3	Bureau of Indian Standards(BIS), 2012	Drinking Water-Specification, IS 10500:2012, Second Revision, Government of India, New Delhi.
4		https://cpcb.nic.in/general-standards/

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Explain the need for protected water supply and sanitation, water quality requirements and wastewater characteristics, theory behind various unit operations and unit processes in water and wastewater treatment.
CO2	Calculate the water demand using a suitable population forecasting method, economical diameter of pumping main.
CO3	Analyze the quality of water and wastewater with reference to drinking water and general discharge standards.
CO4	Design suitable conveyance systems, unit operations and processes of water and wastewatertreatment.
CO5	Experiment with water and wastewater samples following standard laboratory protocols to determine their quality.

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2					1								
CO2	2					1								
CO3	2					1								
CO4	2					2								
CO5	2					2								

Hydraulics and Hydraulic machines Lab

Contact Hours/ week: (L-T-P-S)	0-0-2-0	**Credits:**	1
Total Lecture Hours:	30 = 0 (L)+0(T)+28(P)+2(S)	**CIE Marks:**	0
Sub. Code:	S4CVL01	**SEE Marks:**	0

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:
This course will enable students to:

1	The student is equipped to conduct various tests on notches, flumes, weirs, venturi meter, and carry out their calibration, determine friction factors, losses, and hydraulic coefficients of various hydraulics appurtenances.
2	Evaluate the performance of different types of hydraulic machinery such as orifices, turbines, etc.

NOTES:

UNIT I

28 Hours

Calibration of V-notch. • Calibration of rectangular or Trapezoidal notch. • Calibration of Broad crested weir. • Calibration of ogee weir. • Calibration of Venturi flume. • Calibration of Venturi meter. • Determination of Darcy's friction factor for a straight pipe. • Determination of minor loss constants (Bend, Sudden contraction, Sudden expansion). • Impact of Jet on Vanes. • Determination of hydraulic coefficient of a vertical orifice. • Determination of efficiency of centrifugal pump • Performance tests on Pelton wheel turbine. • Performance tests on Francis turbine. •

TEXT BOOKS:

1	R.K. Bansal	"Fluid Mechanics and Hydraulics", Lakshmi Publications, New Delhi, 2013. ISBN:978-81-318-0815-3.

REFERENCES:

1	Modi P.N & Seth S.M.	"Hydraulics & Fluid Mechanics", Standard Book House, 18th Ed. New Delhi, 2011. ISBN:81-900893-7-4.

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Apply the basic principles of fluid mechanics and hydraulics to determine the coefficient of discharge in open channels, pipes and orifices. Analyze, interpret and comment on the test results.
CO2	Using the knowledge of flow through pipes determine the head losses in pipes, and pipe fittings. Analyze the variation in coefficients with respect to Reynold's number, interpret the results and comment on the validity.
CO3	Apply the mechanics of hydraulic machines to determine the characteristics of turbines. Analyze and interpret the results with respect to their efficiency and performance.
CO4	Participate fully as a team member in conducting experiments.

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2	3											3		
CO3	3											3		
CO4	3											3		
CO5	3											3		

Construction equipment, plants, and machinery

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S4CV02	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:	
This course will enable students to:	
1	Classify different types of concrete ingredients and identify their important characteristics and evaluate conformity of any set of given ingredients to relevant standards.
2	Explain the factors affecting workability of concrete and procedures for evaluation of workability and the role of admixtures.
3	Explain the factors affecting the strength of concrete and decide the types of destructive/ non-destructive tests to be conducted for assessing the strength of structures in service.
4	Compute concrete performance parameters, given the basic properties, and analyze and check the conformity of properties of a given concrete to relevant standards.
5	Design concrete mix for the required strength with available concrete materials considering exposure conditions for various engineering materials.
6	Explain the applications of different types of special concrete as per structural and functional requirements.
NOTES:	

UNIT I
9 Hours
Concrete Ingredients: • Cement: Introduction, Types of cement, Grades of cement, Chemical composition, Hydration of cement, Tests on cement, Fineness, Normal consistency, setting time, soundness, Specific gravity, Compression strength of cement, Field and Laboratory tests on cement. • Fine Aggregates: Natural and Msand, Tests on Fine Aggregates - Specific gravity, bulking, moisture content, grading of fine aggregates, silt content. • Coarse Aggregates: Grading of aggregates, specific gravity, Flakiness and elongation index, crushing, impact and abrasion tests. • Deleterious materials, water analysis. Cement certification and rejection. •

UNIT II
9 Hours
Fresh Concrete- properties and admixtures: • Fresh concrete: Process of manufacture of concrete: Batching, Mixing, Transporting, Placing, Compaction, Curing. • Workability- Factors affecting workability, Measurement of workability - slump, flow tests, Compaction factor and Vee-bee consistometer tests, Segregation and Bleeding. • Admixtures: Chemical admixtures- plasticizers, accelerators, retarders and air entraining agents. Mineral admixtures - Fly ash, Silica fumes and rice husk ash. •

UNIT III
8 Hours
Hardened concrete: Strength Parameters and testing: • Factors affecting strength, w/c ratio, gel/space ratio, maturity concept, Effect of aggregate properties, relation between compressive strength and tensile strength, bond strength, modulus of rupture, gain of strength with age, accelerated curing, aggregate-cement bond strength. • Testing of hardened concrete - compressive strength, Tensile strength, Flexural strength. Non-Destructive testing of in-situ fresh concrete. Inspection - Testing of fresh concrete. Acceptance testing of hardened concrete. •

UNIT IV
8 Hours
Hardened Concrete: Mechanical behaviour • Elasticity-Relation between modulus of elasticity and strength, factors affecting modulus of elasticity, Poisson ratio Shrinkage-Plastic shrinkage and drying shrinkage, factors affecting shrinkage. • Creep - Factors affecting creep. • Durability - Definition, significance, permeability, sulphate attack. Chloride attack, carbonation, freezing and thawing. •

UNIT V
8 Hours
Concrete Mix Design & Special concretes: • Concept of Mix design, variables in proportioning exposure conditions, Procedure of mix design as per IS 10262-2019. Numerical examples of Mix design. • Importance of Special Concrete, Types–Lightweight concrete, High Density Concrete, High Strength Concrete, High Performance Concrete, (Constituents and properties only). •

TEXT BOOKS:

1	Shetty M.S	Concrete Technology, S. Chand & Company Ltd., 2006.
2	Neville A.M.	Concrete Technology, J.J. Brooks, John Wiley & Sons, Inc., 2nd Ed., 2010.

REFERENCES:

1	Kumar Mehta P and Paulo J.M. Monterio.	Concrete: Microstructure, Properties, and Materials. McGraw Hill Education; 4 edition (2017)
2	Santhakumar A. R.	Concrete Technology, Oxford University Press, 2018, ISBN:9780199458523, 0199458529

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Assess the desirable parameters of ingredients of concrete by conducting suitable tests.
CO2	Explain the manufacturing process of fresh concrete and evaluate its workability by conducting suitable tests
CO3	Explain the factors affecting strength of hardened concrete and evaluate its strength under different loading conditions by conducting suitable tests.
CO4	Explain the factors affecting the short term and long-term mechanical properties of hardened concrete with respect to stress, strain and elastic moduli.
CO5	Design concrete mix for the given strength requirements.

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2											2		
CO2	2											2		
CO3	2											2		
CO4	2											2		
CO5	2											2		

Sustainable Design Concepts for building services

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S4CV03	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	Learn about the principles, indicators and general concept of sustainability.
2	Apprehend the local, regional and global impacts of unsustainable designs, products and processes.

NOTES:

UNIT I

9 Hours

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

UNIT II

9 Hours

Global Environmental Issue: Resource degradation, Climate change, Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon footprint Carbon sequestration – Carbon capture and storage (CCS). Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking •

UNIT III

8 Hours

Sustainable Design: Basic concepts of sustainable habitat, Green buildings, green materials for building construction, material selection for sustainable design, green building certification- GRIHA & IGBC Certification for buildings, Energy efficient building design- Passive solar design technique, Thermal storage, Cooling strategies, high performance insulation. Sustainable cities, Sustainable transport •

UNIT IV

8 Hours

Clean Technology and Energy: Energy sources: Basic Concepts-Conventional and non-conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, biofuels, Energy derived from oceans, Geothermal energy. Rainwater harvesting. •

UNIT V

8 Hours

Green Engineering: Green Engineering concepts, Sustainable Urbanization, industrialization, and poverty-reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis •

TEXT BOOKS:		
1	Allen, D.T. and S honnard, D. R.	Sustainability Engineering: Concepts, Design and Case Studies, , Prentice-Hall, Pearson, First Edition, 2015
2	Bradley. A.S; Adebayo, A. O., Maria, P.	Engineering applications in sustainable design and development, Cengage learning, International Edition, 2015.
3	GRIHA Council	GRIHA Version 2019: The Sustainable Habitat Handbook (6 Volume Set), TERI Publications, 2019

REFERENCES:		
1	Mackenthun, K. M.	Basic Concepts in Environmental Management, CRC Press, First Edition, 2019
2	Bureau of Energy Efficiency	ECBC Code 2007, Bureau of Energy Efficiency, First Edition, 2007.

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Learn the sustainability concepts; understand the role and responsibility of engineers in sustainable development
CO2	Quantify sustainability, and resource availability, Rationalize the sustainability based on scientific merits
CO3	Apply sustainability concepts in construction practices, designs, product developments and processes across various engineering disciplines
CO4	Decide in applying green engineering concepts and become a lifelong advocate of sustainability in society.

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1						2								
CO2						3								
CO3						3								
CO4						3					2			

Remote Sensing & GIS

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S4CV05	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1 This course introduces the basic concepts of remote sensing systems and data acquisition. This course covers energy interaction and make proper choice of sensors and platforms, basic concepts of visual image interpretation and analysis, basic concepts of GIS and spatial data management, skills in image processing techniques and also covers the application of RS, GIS & GPS in various engineering fields.

NOTES:

UNIT I

9 Hours

Basic principles of remote sensing: Concepts of remote sensing; Characteristics of electro- magnetic radiation; electromagnetic spectrum; Interaction between matter and electro- magnetic radiation; Wave length regions of electro- magnetic radiation; types of remote sensing with respect to wave length regions; Definition of radiometry; Black body radiation; Reflectance; Spectral reflectance of land covers; Spectral characteristics of solar radiation. •

UNIT II

9 Hours

Platforms and Sensors: Types of platforms; Atmospheric condition and altitude; Atmospheric windows; Atmospheric scattering; Types of satellite such as Indian Remote Sensing (IRS) satellites, Landsat, Spot, ERS, Radarsat, Ikonos, Quickbird and Ocean Colour Monitoring (OCM) etc.; Geostationary satellite , Polar orbit satellites, Meteorological satellite. Types of sensors: active and passive sensors, Thermal sensors, Microwaves sensors, Atmospheric sensors, Sonar sensors, Cameras for remote sensing. Sensors resolutions: Spectral, Spatial, Radiometric and Temporal resolutions. •

UNIT III

8 Hours

Visual Image interpretation (VIP) and analysis: Fundamentals of satellite image interpretation; elements of interpretation . Types of imaging: Panchromatic, Multispectral, Hyper- spectral and Stereo images. Techniques of visual interpretation; Generation of thematic maps such as Soil map, Litho- logical map, Drainage map, Land use and Land Cover map. Application of remote sensing in water resources, Urban planning, environmental assessment etc. •

UNIT IV

8 Hours

Geographical Information Systems (GIS)/Geospatial Technology: Introduction; GIS definitions and terminology; GIS categories; Components of GIS; Fundamental operations of GIS; Data collection; input and output; GIS data types: Raster and Vector data; Spatial and non spatial data: layered based GIS; Feature based GIS mapping; Map coordinate system; Map projection; Map elements ; Map features; Georeferncing; Digitization; GIS software; GIS applications. Working principles of GPS and its applications. •

UNIT V

8 Hours

Digital Image Processing (DIP): Digital data manipulation and analysis, preprocessing stages of image: rectification, radiometric correction, atmospheric correction, geometric correction. Image enhancement; spatial feature manipulation; Image classification techniques: Supervised classification and unsupervised classification. False Colored Composite (FCC) ; Image subset; Image mosaics; Overview of Erdas Imagine software. •

TEXT BOOKS:		
1	Lillesand and Kiefer	"Principles of Remote sensing and Image Interpretation, John Wiley andSons
2	Peter A and Burrough ReachealA	"Principles of GIS", McDonnel, Oxford.

REFERENCES:		
1	John R Jenson	"Introductory Digital Image Processing", Verlag (NY)
2	Floyd F Sabins, W. H.	"Remote sensing - Principles & Interpretation", Freeman and Company (NY), II Edition.

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Explain the concept of remote sensing and techniques of data acquisition
CO2	Visually interpret the remote sensing data and analyze the digital data by image processing method
CO3	Compute data for planning and conducting land coverage analysis like vegetation, water and soil etc.
CO4	Apply Remote sensing, GIS & GPS applications in various engineering projects

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1		2												
CO2			2											
CO3				2										
CO4						3								

Hydrology

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S4CV06	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	Understand the basic principles of hydrology and water resources
2	Analyze the components of the hydrologic cycle and their interactions
3	Estimate discharge in a given stream and flood discharge for a given catchment area

NOTES:

UNIT I

9 Hours

Introduction: Introduction, practical applications of Hydrology, water resources, Hydrological cycle (Horton's Quantitative representation), concept of catchment, water budget equation. Precipitation: Definition and forms of precipitation, types of precipitation, measurement of precipitation, non-recording and recording type rain gauges, computation of average depth of precipitation over an area, Arithmetic-mean method, Thiessen polygon and Isohyetal methods, estimation of missing rainfall data, mass curve and consistency of data, rain gauges network, optimum number of rain gauges, problems. •

UNIT II

9 Hours

Water Losses: Infiltration- Definition, factors affecting infiltration, measurement of infiltration (Double ring infiltrometer), Horton's infiltration curves, infiltration indices, problems. Evaporation-Factors affecting evaporation, measurement using IS Class A Pan, estimation using empirical formulae, measurement of evapotranspiration, Blaney-Criddle method, problems. Runoff: Components, factors affecting runoff, basin yield, rainfall–runoff correlation using simple regression analysis, problems, computation of runoff by empirical equations-Binnie's percentage, Strange's table and curves, Inglis and Desouza formula, Khosla's formula. •

UNIT III

8 Hours

Hydrograph Theory: Components of a hydrograph, separation of base flow, unit hydrograph theory, derivation and application of unit hydrograph, computation of unit hydrograph, unit hydrograph of different duration, S-curve and it use, problems. •

UNIT IV

8 Hours

Streamflow measurements • Introduction, Measurements of stage, measurement of velocity, Area veclocity method, dilution technique, electromagnetic method, ultrasonic method, indirect methods, stage-discharge relationships, extrapolation of rating curve, hydrometry stations •

UNIT V	
	8 Hours
loods • Introduction, Rational method, Empirical formulae, Unit hydrograph method, Flood frequency studies, Gumbel's method, Log-Pearson Type III distribution, Partial duration series, Regional flood frequency Analysis, Limitation of frequency studies, Design flood, Design storm, Risk, reliability and safety factor •	

TEXT BOOKS:

1	RaghunathH.M.	Hydrology: Principles, Analysis and Design, New Age international publishers, NewDelhi, Ed. 2, 2006.
2	Subramanya,K.	Engineering Hydrology, Tata McGraw-Hill Publishing COmpany Ltd, Fourth Edition,2013.

REFERENCES:

1	Ven Te Chow, David R. Maidment, and Larry W. Mays	Applied Hydrology, McGraw-Hill Education, 1st Edition, 1988

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Estimate the quantity of precipitation available for a given catchment and a River basin.
CO2	Determine water losses from precipitation, the rain gauge network and compute the average depth of rain fall over a basin.
CO3	Predict the surface runoff based on hydrograph theory.
CO4	Estimate the streamflow using field measurements and calculations
CO5	Estimation of flood discharge for a given catchment area

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2												3
CO2	3	1												3
CO3	3													3
CO4	3													3
CO5	3													3

Biology for Engineers

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S4CCA01	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:	
This course will enable students to:	
1	Familiarize the students with the basic biological concepts and their engineering applications
2	Enable the students with an understanding of biodesign principles to create novel devices and structures
3	Provide the students an appreciation of how biological systems can be re-designed as substitute productsfor natural systems
4	Motivate the students to develop interdisciplinary vision of biological engineering

NOTES:	
Teaching- Learning Process (General Instructions)	These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. • Explanation via real life problem, situation modelling, and deliberation of solutions, hands-on sessions, reflective and questioning /inquiry-based teaching. • Instructions with interactions in classroom lectures (physical/hybrid). • Use of ICT tools, including YouTube videos, related MOOCs, AR/VR/MR tools. • Flipped classroom sessions (~10% of the classes). • Industrial visits, Guests talks and competitions for learning beyond the syllabus. • Students' participation through audio-video based content creation for the syllabus (asassignments). • Use of gamification tools (in both physical/hybrid classes) for creative learning outcomes. • Students' seminars (in solo or group) /oral presentations.
Assessment Details (bothCIE and SEE)	The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.
ContinuousInternal Evaluation:	• For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks. • The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered • Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. • For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment. • Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester- End Examination:	Theory SEE will be conducted by University as per the scheduled timetable, with commonquestion papers for the course (duration 03 hours). 1. The question paper will have ten questions. Each question is set for 20 marks. 2. There will be 2 questions from each module. Each of the two questions under a module(with a maximum of 3 sub-questions), should have a mix of topics under that module. 3. The students have to answer 5 full questions, selecting one full question from eachmodule. 4. Marks scored shall be proportionally reduced to 50 marks
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning	• Group Discussion of Case studies. • Model Making and seminar/poster presentations. • Design of novel device/equipment like Cellulose-based water filters, Filtration system.

UNIT I
9 Hours
INTRODUCTION TO BIOLOGY: The cell: the basic unit of life, Structure and functions of a cell. The Plant Cell and animal cell, Prokaryotic and Eukaryotic cell, Stem cells and their application. Biomolecules: Properties and functions of Carbohydrates, Nucleic acids, proteins, lipids. Importance of special biomolecules; Enzymes (Classification (with one example each), Properties and functions), vitamins and hormones. •
UNIT II
9 Hours
BIOMOLECULES AND THEIR APPLICATIONS (QUALITATIVE): Carbohydrates (cellulose-based water filters, PHA and PLA as bioplastics), Nucleic acids (DNA Vaccine for Rabies and RNA vaccines for Covid19, Forensics – DNA fingerprinting), Proteins (Proteins as food – whey protein and meat analogs, Plant based proteins), lipids (biodiesel, cleaning agents/ detergents), Enzymes (glucose-oxidase in biosensors, lignolytic enzyme in bio-bleaching). •
UNIT III
8 Hours
HUMAN ORGAN SYSTEMS AND BIO DESIGNS (QUALITATIVE): Brain as a CPU system (architecture, CNS and Peripheral Nervous System, signal transmission, EEG, Robotic arms for prosthetics. Engineering solutions for Parkinson's disease). Eye as a Camera system (architecture of rod and cone cells, optical corrections, cataract, lens materials, bionic eye). Heart as a pump system (architecture, electrical signalling - ECG monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators). Lungs as purification system (architecture, gas exchange mechanisms, spirometry, abnormal lung physiology - COPD, Ventilators, Heart-lung machine). Kidney as a filtration system (architecture, mechanism of filtration, CKD, dialysis systems). •
UNIT IV
8 Hours
NATURE-BIOINSPIRED MATERIALS AND MECHANISMS (QUALITATIVE): Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf). Bird flying (GPS and aircrafts), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Human Blood substitutes-hemoglobin-based oxygen carriers (HBOCs) and perflourocarbons (PFCs). •

UNIT V

8 Hours

TRENDS IN BIOENGINEERING (QUALITATIVE): Muscular and Skeletal Systems as scaffolds (architecture, mechanisms, bioengineering solutions for muscular dystrophy and osteoporosis), scaffolds and tissue engineering, Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D printed foods. Electrical tongue and electrical nose in food science, DNA origami and Biocomputing, Bioimaging and Artificial Intelligence for disease diagnosis. Self- healing Bioconcrete (based on bacillus spores, calcium lactate nutrients and biomineralization processes) and Bioremediation and Biomining via microbial surface adsorption (removal of heavy metals like Lead, Cadmium, Mercury, Arsenic). •

TEXT BOOKS:

1	Rajendra Singh C and Rathnakar Rao N	Biology for Engineers, Rajendra Singh C and Rathnakar RaoN Publishing, Bengaluru, 2023.
2	Stuart Fox, Krista Rompolski	Human Physiology, McGraw-Hill eBook. 16th Edition, 2022
3	Thyagarajan S., Selvamurugan N.,Rajesh M.P., Nazeer R.A.	Biology for Engineers, Tata McGraw-Hill, New Delhi, 2012.
4	Arthur T. Johnson,	Biology for Engineers, CRC Press, Taylor and Francis, 2011
5	Leslie Cromwell,	Biomedical Instrumentation, Prentice Hall 2011.
6	Sohini Singh and Tanu Allen	Biology for Engineers, Vayu Education of India, New Delhi,2014.
7	Yoseph Bar-Cohen	Biomimetics: Nature-Based Innovation, 1st edition, 2012,CRC Press.
8	Floreano D and Mattiussi C	Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies, MIT Press, 2008.
9	Sunilkumar C R , Geetha N , Udayashankar A C	Bioremediation of heavy metals: bacterial participation,Lambert Academic Publishing, 2019.
10	Ibrahim Ozbolat	3D Bioprinting: Fundamentals, Principles and Applications,Academic Press, 2016.
11	Maria Rodriguez Mende	Electronic Noses and Tongues in Food Science, AcademicPress, 2016

REFERENCES:

1	Web links and Video Lectures(e-Resources):	https://nptel.ac.in/courses/121106008 • https://freevideolectures.com/course/4877/nptel-biology-engineers- other-non-biologists • https://ocw.mit.edu/courses/20-020-introduction-to-biological- engineering-design-spring-20 • https://ocw.mit.edu/courses/20-010j-introduction-to-bioengineering- be-010j-spring-2006 • https://www.coursera.org/courses?query=biology • https://onlinecourses.nptel.ac.in/noc19_ge31/preview • https://www.classcentral.com/subject/biology • https://www.futurelearn.com/courses/biology-basic-concepts

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Elucidate the basic biological concepts via relevant industrial applications and case studies
CO2	Evaluate the principles of design and development, for exploring novel bioengineering projects
CO3	Corroborate the concepts of biomimetics for specific requirements.
CO4	Think critically towards exploring innovative biobased solutions for socially relevant problems.

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2				3								
CO2	2	2	3			3								
CO3	2	2	3			3								
CO4	2	2				3								

Universal Human Values

Contact Hours/ week: (L-T-P-S)	1-0-0-1	**Credits:**	1
Total Lecture Hours:	30 = 14 (L)+0(T)+0(P)+16(S)	**CIE Marks:**	50
Sub. Code:	SHS02	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:	
This course will enable students to:	
1	Understanding of self-exploration about themselves (human beings), family, society and nature/existence
2	Appreciating the harmony in the human being, family, society and nature/existence
3	Strengthening holistic perception of co-existence and mutual fulfilment among the four orders of nature.

NOTES:

Evaluation Pattern:	Two Tests of 25 marks each and 45 minutes duration SEE for 50 marks and examination duration is 90 minutes
	Description Schedule Duration (min) Conducted for Reduced toTest-1 7th Week 45 25 marks 25 marks Test-2 14th Week 45 25 marks 25 marks CIE 50 marks 50 marks SEE 90 50 marks 50 marks Total 100 marks 100 marks
Question Paper Pattern	CIE: CIE pattern may be hybrid type with MCQs and descriptive questions. • 10 Marks MCQs • 3 descriptive questions of 5 marks each • All the questions are compulsory SEE: SEE pattern may also be hybrid type with MCQs and descriptive questions. • 20 Marks MCQs • 1 descriptive question of 10 marks from each of the units (total 3 questions)or 2 questions of 5 marks from each of the units (total 6 questions) • All the questions are compulsory

UNIT I

3 Hours

Understanding Harmony in the Human Being - Harmony in self Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’; Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility; Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer); Understanding the characteristics and activities of ‘I’ and harmony in ‘I’. •

UNIT II

2 Hours

Understanding Harmony in self and body Understanding the harmony of 'I' with the Body: Sanyam and Health, correct appraisal of Physical needs, meaning of Prosperity in detail, Include discussions to differentiate between i) Prosperity and accumulation. ii) Ensuring health vs dealing with disease. •

UNIT III

3 Hours

Understanding Harmony in the Family - Harmony in Human-Human Relationship Understanding values in human - human relationship, meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness, Trust and Respect as the foundational values of relationship; Understanding the meaning of Trust, Difference between intention and competence; Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. •

UNIT IV
2 Hours
Understanding Harmony in Society and Nature Understanding the harmony in the society (society being an extension of family)- Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Understanding the harmony in the Nature; Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature. •

UNIT V
3 Hours
Understanding Harmony in all levels of Existence Understanding Existence as Co-existence of mutually interacting units in all-pervasive space; Holistic perception of harmony at all levels of existence. Include discussions on-human being as cause of imbalance in nature (film “Home” can be used), pollution, depletion of resources and role of technology etc. •

TEXT BOOKS:		
1	Gaur, R.R. & Sangal R	'Foundation Course in Human Values and Professional Ethics; Presenting a universal approach to value education through self-exploration', Excel Books, Bangalore, 2016, ISBN: 978-8-174-46781-2

REFERENCES:		
1	Tripathi A.N.	‘Human Values', New Age International Publisher, 2003, ISBN: 81-224-1426-5
2		Web Resource: 1. Story of Stuff, http://www.storyofstuff.com 2. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw 3. https://fdp-si.aicte-india.org/8dayUHV_download.php 4. https://www.youtube.com/watch?v=8ovkLRYXIjE 5. https://www.youtube.com/watch?v=OgdNx0X923I

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Become more aware of themselves, and their surroundings (family, society, nature)
CO2	Become more responsible in life, and value human relationships and human society
CO3	Have better critical ability in handling problems and in finding sustainable solutions

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1					1		3							
CO2					1		3							
CO3					1		3							
CO4					1		3							

Drone surveying

Contact Hours/ week: (L-T-P-S)	3-0-0-3	**Credits:**	3
Total Lecture Hours:	90 = 42 (L)+0(T)+0(P)+48(S)	**CIE Marks:**	50
Sub. Code:	S4CVA01	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:

This course will enable students to:

1	This course introduces the basic concepts of drone surveying. This course covers image processing and photogrammetry of drone data. It also covers the mapping, modelling and application of drone surveying in various fields of Civil Engineering.

UNIT I

9 Hours

Introduction to Drones, History of Drone/UAS/UAVs, payload, battery life, Specs for good results, Regulations of DGCA and Drone license, Pre and Post Flight planning- Flight execution and photography, data collection- Image Format, GSD, Scale and Resolution. •

UNIT II

9 Hours

SURVEYING WITH DRONE: Consideration for hardware selections, comparison on surveying drone and its accuracy, Techniques of controlling errors, Consideration of GCP in vertical and horizontal accuracies, Planning and estimation of drone surveying jobs, Autonomous flight vs. manual and hybrid flight profiles •

UNIT III

8 Hours

IMAGE PROCESSING AND PHOTOGRAMMETRY: Aerial Triangulation, post processing softwares, Analyzing Data, Contouring, DEM, DSM, Cut, Fill, and Volumetric Measurement Calculation and orthophoto generation. •

UNIT IV

8 Hours

MAPPING AND MODELING: Introduction to mapping and modeling concepts, Understanding RTK, PPK and GCP’s, Overview of popular data processing software platforms and functions. •

UNIT V

8 Hours

DRONE APPLICATIONS: Application of drone for Surveying & Mapping-Construction, Irrigation and Agricultural, Engineering Land Survey and Transportation •

TEXT BOOKS:

1	Lillesand andKiefer	“Remote Sensing and Image Interpretation”, 5th Edition, John Wiley and Sons, 2008
2	John E. Jackson	"One Nation Under Drones: Legality, Morality, and Utility of Unmanned CombatSystems",

REFERENCES:

1	A.M. Chandra, S.K. Ghosh	“Remote Sensing and Geographical Information System”, Narosa Publishing house, 1st Edition, 2007
2	David P Paine	“Aerial Photography and Image Interpretation”, Wiley Higher Education, 2nd Edition, 2006
3	James Igoe Walsh	"Drones and Support for the Use of Force".

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Explain the fundamentals of Drone surveying
CO2	Describe the Methods of Surveying with Drone
CO3	Explain the concepts of Image processing and Photogrammetry
CO4	Explain modelling with Drones
CO5	Discuss the Drone applications

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1					3								2	
CO2					3								2	
CO3					3								2	
CO4					3								2	
CO5					3								2	

Allied Construction Practice (Lab)

Contact Hours/ week: (L-T-P-S)	0-0-2-0	**Credits:**	1
Total Lecture Hours:	30 = 0 (L)+0(T)+28(P)+2(S)	**CIE Marks:**	50
Sub. Code:	S4CVA02	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:
This course will enable students to:

1	The course aims to impart hands-on-training in the allied construction practices like concrete mix design, bar bending, welding, carpentry and sanitation

UNIT I

8 Hours

Concrete mix design for a specified concrete strength as per IS code 10262-2019 • NDT test- Ultrasonic pulse test and Rebound concrete test/specimen • Laying of sanitary sewer line using stone ware pipes between manholes •

UNIT II

6 Hours

Form work for columns, beams and shear walls •

UNIT III

8 Hours

Ferro cement: Construction of circular wall using steel reinforcement and weld mesh/chicken mesh bar • Finishing work: Painting over wall/plywood surface with brush and spray, Wall glazing with ceramic tiles • Flooring: Laying of ceramic/vitrified tiles over CC bed with cement mortar •

UNIT IV

6 Hours

Carpentry: Fabricating wardrobe/shelf using plywood and accessories and applying veneers/farmica sheet • Welding: Arc welding for lapping structural steel elements •

TEXT BOOKS:

1	Sandeep Mantri, Satya Prakashan,	"The A To Z of Practical Building Construction and its Management", New Delhi, ISBN-10 : 8176842052,ISBN-13 : 978-8176842051
2	Ranjeet Sahani	"Complete Bar Bending Schedule: Total Field knowledge for civil Engineers (BarBending Series Book 1)"

REFERENCES:

1	IS: 2502-1963	CODE OF PRACTICE FOR BENDING AND FIXING OF BARS FOR CONCRETE REINFORCEMENT,BUREAU OF INDIAN STANDARDS, MANAK BHA-VAN, 9BAHADUR SHAH ZAFAR MARG, NEW DELHI-110002
2	RameshSingh	Arc Welding Processes Handbook (2021), ISBN:9781119819059

COURSE OUTCOMES: Upon completion of this course the student will be able to:

CO1	Design of concrete mix of specified strength and measuring its comprehensive strength by NDT test, Laying of sewer lines to a given gradient.
CO2	Fabrication of form works for various structural elements
CO3	construction of Ferrocement units and building surface finishing works
CO4	Fabrication of building interior elements and welding of steel members

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2	3											3		
CO3	3											3		
CO4	3											3		

Data Analysis using Excel (Lab)

Contact Hours/ week: (L-T-P-S)	0-0-2-0	**Credits:**	1
Total Lecture Hours:	30 = 0 (L)+0(T)+28(P)+2(S)	**CIE Marks:**	50
Sub. Code:	S4CVA03	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES: This course will enable students to:	
1	Understand the use of Spreadsheet for data collection and analysis
2	Evaluate the equations using Excel functions
3	Learn the data quality and consistency of data

LAB COMPONENT

28 Hours

Introduction to Data Analysis Using Spreadsheets: Fundamentals of spreadsheet applications, Excel interface, and learn how to navigate around a worksheet and workbook. • Using Excel Spreadsheets: Perform basic spreadsheet tasks, such as viewing, entering and editing data, and moving, copying and filling data. Learn about the fundamentals of formulas, and learn about the most common functions used by a data analyst. Finally, you will learn how to reference data in formulas. • Cleaning & Wrangling Data Using Spreadsheets: Importance of data quality, how to import file data in to Excel, fundamentals of data privacy, remove duplicate and inaccurate data, and how to remove empty rows in your data. • How to deal with inconsistencies in your data and how to use the Flash Fill and Text to Columns features to help you manipulate and standardize your data • Analyzing Data Using Spreadsheets: Fundamentals of analyzing data using a spreadsheet, and learn how to filter and sort data. Learn how to use some of the most useful functions for a data analyst • How to use the VLOOKUP and HLOOKUP reference functions. In addition, learn how to create pivot tables in Excel, and use several pivot table features • Final Project: In this final module, you will be introduced to a hands-on lab where you will complete a graded assignment for cleaning and preparing data, and then analyzing data using an Excel spreadsheet. • Submission of report for final assessment •

TEXT BOOKS:

1	Michel R. Berthold, Christian Borgelt, Frank Hoopner	Guide to Intelligent Data Analysis, Springer- Verlag Publications, First Edition, 2010. ISBN 978-1-84882-259-7, DOI 10.1007/978-1-84882-260-3.
2	Charles M. Zudd, Garry H. Mcchelland, Carry S. Ryan	Data Analysis: A Model Comparison Approach, Routledge Publication, First Edition, 2009.
3	Allan Agresty	An Introduction to Categorical Data Analysis, Wiley Publication, 2nd Edition, 2007

REFERENCES:

1	Weblinks	https://www.coursera.org/learn/excel-basics-data-analysis-ibm
2	Weblinks	Any online platform with the above course content like YouTube videos and NPTEL courses

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Prepare the data sets and perform the analysis.
CO2	Analyse and perform repetitive calculations using several functions
CO3	Design and apply solutions to verify the data sets

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1				2								1	
CO2	1				2								1	
CO3	1				2								1	
CO4														

3D Visualization & Animation (Lab)

Contact Hours/ week: (L-T-P-S)	0-0-2-0	**Credits:**	1
Total Lecture Hours:	30 = 0 (L)+0(T)+28(P)+2(S)	**CIE Marks:**	50
Sub. Code:	S4CVA04	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES: This course will enable students to:	
1	Enhance the Employability and Career Skills of students
2	Impart animation and visualization skills using free open-source software like blender

LAB COMPONENT

28 Hours

1. Fundamentals of Graphics Designing and its application areas, GIMP Software Installation, Introduction to Toolbox, Advanced Tools and options, Assignment • 2. Image editing and enhancement, Overview of Filters, Advanced Filters, Assignment • 3. Black and White to Color Image Conversion, Layers and Layer Properties, Layer Effects, Text Effects, Assignment • 4. Paths and Channels, Publishing for the web, image composition, button creation, Assignment • 5. Overview of Animation techniques, Blender Software Installation, Overview of IDE (Integrated Development Environment), Architectural Modeling • 6. Architectural Modeling and CharacterModeling, Modeling assignment • 7 . Rigging, Rendering and Publishing, Assignment • 8. Google SketchUp Installation, Overview of working environment, 3D Modeling, Assignment •

TEXT BOOKS:

1	Kent, B.R.	3D scientific visualization with blender, iopscience.iop.org, 2015.
2	Flavell,L.	Beginning Blender: open source 3d modelling, animation, and game design, Apress, FirstEdition, 2011

REFERENCES:

1	Guevarra, E. T.M.	Modelling and animation using Blender: blender 2.80: the rise of Eevee, Apress, FirstEdition, 2019
2	Weblink	http://cs.wellesley.edu/~cs110/lectures/M01-color/graphics.pdf
3	weblink	https://www.docdroid.net/UKocmTz/arcsynthesis.pdf.html#page=194
4	weblink	http://dl.finebook.ir/book/9e/11032.pdf
5	weblink	https://www.cs.auckland.ac.nz/~jli023/opengl/blender3dtutorial.htm
6	weblink	http://web.engr.oregonstate.edu/~mjb/blender/blender.1pp.pdf
7	weblink	http://web.engr.oregonstate.edu/~mjb/sketchup/sketchup.1pp.pdf
8	Weblink	https://docs.gimp.org/en/

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Enhance images using filters, text layers, colour editing, etc using GIMP
CO2	Create professional and elegant animations and visualizations using Blender
CO3	Model 3D structures and objects using sketch-up
CO4	Download and install open-source animation and visualization software

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1					3				2					
CO2					3				2					
CO3					3				2					
CO4					3				2				2	

National Service Scheme (NSS)

Contact Hours/ week: (L-T-P-S)	0-0-3--3	**Credits:**	0
Total Lecture Hours:	0 = 0 (L)+0(T)+42(P)+-42(S)	**CIE Marks:**	50
Sub. Code:	SMC01	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:	
This course will enable students to:	
1	Understand the community in which they work.
2	Understand themselves in relation to their community
3	Identify the needs and problems of the community and involve them in problem solving process
4	Develop among themselves a sense of social and civic responsibility
5	Utilize their knowledge in finding practical solution to individual and community problems
6	Gain skills in mobilizing community participation
7	Acquire leadership qualities and democratic attitude;
8	Develop capacity to meet emergencies and natural disasters and
9	Practice national integration and social harmony

UNIT I

8 Hours

Basic concepts of NSS: Introduction and Basic Concepts of NSS, Emblem, flag, motto, song, badge, etc., Organizational structure, roles and responsibilities of various NSS functionaries, Concept of regular activities, special camping, Day Camps, Basis of adoption of village/slums, Methodology of conducting Survey, Maintenance of the Diary, Issues, challenges and opportunities for youth. •

UNIT II

8 Hours

Introduction to Volunteering: Volunteer, Volunteerism, Benefits of volunteerism, Volunteer Opportunities, Rights as a Volunteer, Indian Tradition of volunteerism, Needs & importance of volunteerism, Motivation and Constraints of Volunteerism, Shramdan as a part of volunteerism. •

UNIT III

7 Hours

General Awareness programs: Water conservation awareness, Road safety awareness, National Integration Programme, Education Awareness, Swachh Bharat Abhiyan, Awareness campaign for traffic rules, Environmental protection awareness, Covid-19 Protocol Awareness, Mission Shakti (Women's empowerment awareness). •

UNIT IV

8 Hours

Health and Education: Concept of community and society, Human values, Gender justice, Food and Nutrition, National health programme, Healthy Lifestyles, HIV AIDS, Drugs and Substance abuse, First Aid, Concept of yoga, Yoga as a tool for healthy lifestyle. •

UNIT V

9 Hours

Society Awareness and programs: Plantation Awareness, Fit India movement, Health awareness, Waste management awareness, Production of bio-fertilizer from biological waste, Blood donation awareness, Awareness for self-Employment in adapted village. •

TEXT BOOKS:		
1	Amit K Jain & Brijesh K Rathi Panwar	National Service Scheme: A Youth Volunteers Programme for Under Graduate Students as Per UGC Guidelines.

REFERENCES:		
1	Nirmalya Kumar Sinha and Dr.Surajit KumarMajumder	Text Book of National Service Scheme (Volume–I)

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Improve the quality of educated manpower by fostering social responsibility.
CO2	Raising society to a higher material and moral level by preparing students for final dedication in the service of nation.
CO3	Introduce urban students to rural life by living in contact with the community in whose midst their institution is located
CO4	Making campus relevant to the needs of the community
CO5	Develop constructive linkage between the campus and the community by supplementing technical education with social and economic reconstruction of the country.
CO6	Involvement in the tasks of national development
CO7	Better understanding and appreciation of the problems of the society
CO8	Encourage Community participation

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1														
CO2														
CO3														
CO4														

Physical Education (PE) (Sports and Athletics)

Contact Hours/ week: (L-T-P-S)	0-0-3--3	**Credits:**	0
Total Lecture Hours:	0 = 0 (L)+0(T)+42(P)+-42(S)	**CIE Marks:**	50
Sub. Code:	SMC02	**SEE Marks:**	50

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:	
This course will enable students to:	
1	To learn the rules, fundamental skills, and strategies of sport.
2	To learn basic offensive and defensive patterns of play.
3	To use different parts of the body in utilizing the above skills while playing a sport.
4	Students will understand the basic fundamentals of a game, how and when to move, where and why.
5	To develop a positive attitude towards game as a lifetime sport and to improve physical fitness through participation in Kho-Kho.

UNIT I

0 Hours

Kho-Kho - History of Kho-Kho. National tournaments, Records and outstanding players. • Cricket - History of Cricket. National and International level tournaments, Records and outstanding players. • Volleyball- History of Volleyball. Measurements and Specification of Equipment's. Sports Awards in Volleyball. • Basketball- History of Basketball. Measurements and Specification of Equipment's. Sports Awards in Basketball. • Athletics- Athletics: Introduction Track Events - Steeple Chase, Race Walking, Middle and Long distance races Race walking - Technique, Faults and Officiating. Middle and Long distance races – Technique and Training • Kabaddi-Introduction of rules and regulations of Kabaddi. National and International level tournaments, Records and outstanding players. • Football- History of Football. (a) Origin and Development of football (b) Formation, Structure & Functions of FIFA, AFC & AIFF • Badminton- History of Badminton. National and International level tournaments, Records and outstanding players. • Throwball - History of Throwball • Hockey- History of Hockey, • National and International tournaments, Awards and outstanding players. • Table Tennis- History of Table Tennis. Measurements and Specification of Equipment's. Sports Awards in Table Tennis. •

UNIT II

0 Hours

Kho-Kho- Fundamental skills- Drills & lead up activities • Cricket- Fundamental skills- Batting grip, back lift, forward batting, cover drive, late cut, leg glance, Pull shots, • Hook shot, straight drive and running between wickets. • Volleyball- Players Stance, Receiving and passing ,The Volley (Overhead pass), The Dig (Underhand pass). • Basketball- Grip; Player stance- Triple threat stance and Ball handling exercises, Passing (Two hand/one hand)- Chest pass, Bounce Pass, Overhead pass, Underhand pass, Hook Pass Behind the back pass, Baseball pass, Side arm pass and passing in running. Receiving-Two Hand receiving, One hand receiving, Receiving in stationary position, Receiving while jumping, Receiving while running. • Athletics- Jumping Events - High Jump and Triple Jump: Basic Skills and techniques, High Jump - Straddle Roll & Flop Technique, Approach, Take-off, Technique in the air, Clearance over the bar & Landing, Triple Jump – Hop, Step and Jump Technique, Approach, Take-off & Landing • Kabaddi- Fundamental skills- Drills & lead up activities. • Football- Laws of the game and their interpretations. (a) Interpretation and critical analysis of laws of the game. (b) Signals by the Referee and the Assistant Referee. (c) The laws of the game & Coach. (d) Relationship between tactics and Laws of the game. • Badminton- Fundamental skills- Drills & lead up activities. Grip-Back hand, fore hand. • Throwball- Fundamental skills- Drills & lead up activities • Hockey- Fundamental skills- Drills & lead up activities. Passing-short pass, long pass, push pass and Hit. Trapping. • Table Tennis- Players Stance, Footwork. Racquet Grip, four hand grip and back hand grip. •

UNIT III
0 Hours
Kho-Kho- Offensive skills- Sitting in the square, Giving Kho, proximal method, distal method, faking kho, late kho, Pole Turning, Pole Dive, Diagonal Attack, Tapping and Diving. • Cricket- Bowling grip, run up, delivery and follow through, length and line, pace bowling, in swing, out swing. Leg spin. Off spin and Goodly and leg cutter. • Volleyball- Service Reception - Under Arm Service, Jump Service, Side Arm Spin Service, Round Arm Service, High spin service, Asian serve / American serve (floating). Setting the ball- Set for attack, Back set, Jump set. • Basketball- Dribbling- How to start dribble, How to stop dribble, High / Low dribble with variations, Shooting- Layup shot and its variations, one hand set shot, One hand jump shot, Free throw, Hook shot, Tip-in shot. Stopping- Stride/Scoot, Pivoting and Faking /Feinting footwork. • Athletics- Throwing Events - Discus Throw and Hammer Throw: Basic Skills and techniques, Discus Throw - Standing and Rotatory techniques, Grip, Stance, Rotation Technique, Power stance, Release and Reverse (Follow through), Hammer Throw - Grip, Swings, Rotation foot work, Release and Follow through. • Kabaddi- Offensive skills- Hand touch, Foot touch, Toe touch, sudden leg thrust, the roll, side kick, front kick and back kick. • Football- Organization and management of competition (a) Competition system and qualifying system being followed in the game at (1) Olympics (2) FIFA World Cup (3) Major Tournaments/Championships in India. (b) Drawing of Fixtures (c) Conduct of tournaments • Badminton- Stance- Attacking Stance, Defensive Stance, Net stance. Footwork- Move only 2-3 steps backward, shuffle only 1 step sideward, Move only 2-3 steps front. Smash- fore hand, Back hand and Jumping smash. Drop shot. • Throwball- Offensive skills, Services a. Simple service. b. High service. c. Spin service. d. High spin service. Throw a. Spin throw. b. High throw. c. Jump & throw. • Hockey- Skills-Deception, Defence, Dribbling, First touch, Flat stick tackling, Jab, Passing, Position, leading and Running • Table Tennis- Service- Four hand, Back hand and Spin. Pushes- Four hand and Back hand. •

UNIT IV
0 Hours
Kho-Kho- Defensive skills- Zig-Zag run, 3-3-2 chain and 1-4-5-6 chain, short ring, medium ring and long ring. • Cricket- Fielding- Ground ball, catching, fly ball, slip fielding and fielding positions. Wicket Keeping. • Volleyball- Smash/Spike- Straight smash, Body turn smash, Wrist outward smash, Wrist inward smash. Block- Single block, Double block, Three-man block. Rolls- Overhead pass & back rolling, one hand underhand pass with side rolling, Forward dive. • Basketball- Rebounding- Defensive rebound, Offensive rebound, Box out, Rebound Organization. Individual Defensive- Guarding the man with the ball and without the ball. Offensive drills, Fast break drills, Team Defense/Offense, Team Tactics. • Athletics- Rules, Officiating and Marking - Ground / Sector Marking, Interpretation of Rules. • Kabaddi- Defensive skills- ankle hold, Thigh hold, Knee hold/ double knee hold, the waist/ trunk/back hold. The tackle and wrist hold. • Football- Development of football techniques (i) Techniques without ball (a) Running technique (b) Changing of direction (c) Jumping (d) Feinting. (ii) Techniques with ball. a) Different types of kicking. b) Different types of ball controlling/trapping c) Different types of heading Dribbling and feinting d) Different types of tackling e) Interception f) Throw-in g) Goalkeeping. • Badminton- Offensive skills-service-high service, short service, flicks service. Under arm fore hand clear and under arm back hand clear. • Throwball- Defensive skills- receive-four hands receive & back hand receive. • Hockey- Skills-penalty stroke practice.Penalty corner practice.Goal keeping, Ball clearance-kicking and deflecting. • Table Tennis- Spinning-Top spin, back spin, right side spin and back side spin. Loops and speed. •

UNIT V
0 Hours

Kho-Kho- Equipment's, Ground marking, Rules and regulations, Signals of officials and their interpretations. • Cricket- Equipment's-Ball, Bat, Wickets, Bails. Ground marking, Rules, Signals of officials and their interpretations. • Volleyball- Attack Combination, Defense Systems, Libero play. Court marking, Rules and their interpretations and Duties of officials. • Basketball- Court marking, official signals, Rules and their interpretations. • Kabaddi- Equipment's, Ground marking, Rules, Signals of officials and their interpretations • Football- Development of personal performance and demonstration ability in the following techniques. Throw-in- Standing and Sliding. a) Kicking b) Controlling the ball/ball reception c) Heading d) Feinting e) Tackling f) Throw in g) Passing and supporting play h) Shooting at goal i) Goal –keeping j) Dribbling. • Badminton- Equipment's, Ground marking, Rules, Signals of officials and their interpretations. • Throwball- Equipment's, court marking, Rules, Signals of officials and their interpretations. • Hockey- Game practice with applications of rules and regulations. Equipment's, Ground marking, Signals of officials and their interpretations. • Table Tennis- Measurement of board, specifications, Rules and their interpretations and Duties of officials. •

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Learn basic skills and knowledge associated with a sport
CO2	Demonstrate the knowledge of the rules of the game.
CO3	Improve foot work skills and drills in order to execute court coverage in sport with different drills.
CO4	Improve physical fitness and practice positive personal and lifestyle.
CO5	Gain an understanding of the value of sports in attaining wellness, maintaining good health and developing spirit of teamwork.

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1														
CO2														
CO3														
CO4														

Yoga

Contact Hours/ week: (L-T-P-S)	0-0-3--3	**Credits:**	0
Total Lecture Hours:	0 = 0 (L)+0(T)+42(P)+-42(S)	**CIE Marks:**	100
Sub. Code:	SMC03	**SEE Marks:**	0

CIE- Continuous Internal Evaluation, SEE-Semester End Examination

COURSE OBJECTIVES:	
This course will enable students to:	
1	To prepare the students for the integration of their physical, mental and spiritual faculties.
2	To enable the students to maintain good health.
3	Role of yoga in health promotion.
4	To practice mental hygiene and to attain higher level of consciousness
5	To process emotional stability, self-control and concentration; by practicing yoga.
6	To inculcate among students self-discipline, moral and ethical values.
7	Yoga for personality development

UNIT I

0 Hours

Yoga : Introduction Surya Namaskara:- 12 Counts – with prayer •

UNIT II

0 Hours

Introduction yogasana meaning principals and there health benefits. • Asanas: Standing- Tadasana, Vrukshasana, Aradhakatichakrasana, Ardha Chakrasana, Trikonasana, Parshwa Konasana, Parivrutta Parshwa Konasana, Veerabadrasana. (Prakar- 1-2-3) • Asanas Sitting- Dandasana, Paschimottasana, Janusirashasana, Upavistakonasana, Baddakonasana, (Butterfly) Vajrasana, Padmasana, Matsyasana, Shirasasanna •

UNIT III

0 Hours

• Asanas : Prone Position: Makarasana, Bhujangasana, Shalabhasana, Dhanurasan • Asanas: Supine Position: Uttitha Padasana, Merudandasana, Viparitha Karani, Sarvangasana, Halasana, (if Possible Sirashasana) •

UNIT IV

0 Hours

• Asana: Prone Position – Shalabhasana, Bhujagasana, Sarpasana, Dhanurasana. • Asanas: Supine Position – Parsvottanasana, Marjariasana, Janu Sirsana, Adho Mukha Savanasana. •

UNIT V

0 Hours

Introduction to Pranayama. Dhyana and there health benefits. • Pranayams: Sectional Breathing, 1) Abdominal Breathing (Udhara Swasa) (2) Thoracias Breathing (Ura Swasa) 3) clavicular Breathing (Greeva Swasa) 1) Anuloma- Viloma, Pranayama, 2) Nadi shodhana Pranayama, 3)Kaplabhathi Pranayama. 4) Basthrika Pranayama, 5) Sheetali – Seetakari Sadanta, 6) Bhramari Pranayama. • Dhyana & its types: Practices leading to meditation & Dhyana Sadana. •

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES: Upon completion of this course the student will be able to:	
CO1	Practice yoga for strength, flexibility, and relaxation.
CO2	Learn techniques for increasing concentration and decreasing anxiety
CO3	Become self-disciplined and self-controlled
CO4	Improve physical fitness and perform better in studies.
CO5	Gain self-confidence to face challenges in the society with commitment to serve the society.
CO6	Yoga meaning four Yogas - History of Yoga- Astanga Yoga

CO-PO Mapping: 1=> Low, 2=> Medium, 3 => Strong mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1														
CO2														
CO3														
CO4														