3rd SENESTER

Course Title	Applied Mathematics- III	Semester	III
Course Code	MM201	CIE	50
Total No. of Contact Hours	50	SEE	50
No. of Contact Hours/week	3:2:0	Total	100
Credits	4	Exam. Duration	3 Hours
Teaching Dept.	Mathematics		

Course objective is to:

- Use Fourier series to represent periodical physical phenomena in engineering analysis and to enable the student to express non periodic functions to periodic function using Fourier series.
- Analyze signals in terms of Fourier transforms.
- Find the association between attributes and the correlation between two variables.
- Acquaint the students with differential equations and their applications in engineering.
- Analyze engineering problems by applying Partial Differential Equations.

Module-1	RBT Levels L1, L2, L3	10 Hours
----------	--------------------------	----------

Fourier Series:

Introduction to infinite series, convergence and divergence. Periodic functions, Dirichlet's condition. Fourier series of periodic functions with period 2π and arbitrary period. Half range Fourier series. Practical harmonic analysis.

Module-2	RBT Levels L1, L2, L3	10 Hours
----------	--------------------------	----------

Fourier Transform:

Introduction to Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms, Inverse Fourier cosine and sine transforms. Discrete Fourier transform (DFT), Fast Fourier transform (FFT).

Modulo 3	RBT Levels	10 Hours
Module-3	L1, L2, L3	10 110015

Statistical Methods:

Correlation and Regression-Karl Pearson's coefficient of correlation and rank correlation. Regression analysis- lines of regression. Curve Fitting: Curve fitting by the method of least squares- fitting the curves of the form- y = ax + b, $y = ax^{b} y = ax^{2} + bx + c$.

Numerical Solution of Second-Order ODEs:

Second-order differential equations - Runge-Kutta method and Milne's predictor and corrector method Calculus of Variations: Variation of function and functional, variational problems, Euler's equation, Geodesics, Hanging chain problem.

Module-5 RBT Le L1, L2,	vels L3	10 Hours
----------------------------	------------	----------

Numerical Solution of Partial Differential Equations:

Classifications of second-order partial differential equations, finite difference approximations to derivatives, Solution of Laplace's equation using standard five-point formula. Solution of heat equation by Schmidt explicit formula and Crank- Nicholson method, Solution of the Wave equation.

Sugge	sted Learning Resources:
Textbo	poks:
1	B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 44th edition, 2021.
2	R.E. Walpole, R. H. Myers, R. S. L. Myers and K. Ye – Probability and Statistics for Engineers and Scientists – Pearson Education – Delhi – 9th edition – 2012.
2	Erwin Kreyszig – Advanced Engineering Mathematics, Wiley publication, 10th
3	edition, 2015.
Referen	ice Books:
1	Glyn James & Phil Dyke – Advanced Modern Engineering Mathematics, Pearson
-	Education,5th edition, 2018.
2	Srimanta Pal & Subobh C Bhunia - Engineering Mathematics, Oxford University Press, 3rd
•	Reprint, 2016
3	Murray R Spiegel, John Schiller & R. Alu Srinivasan – Probability and Statistics –
v	Schaum's outlines -4th edition-2012.
Web lin	ks and Video Lectures (e-Resources):
M1: <u>htt</u>	ps://youtu.be/HoGNkZclxDU?si=29Bz9yAg2NUjbNaT
M2: <u>htt</u>	ps://youtu.be/n9XP6pljtw8?si=FF7QqRniWdipzIgU
M3: <u>htt</u>	os://youtu.be/Qy1YAKZDA7k?si=I952IsojPQkeIEPb
M4: <u>htt</u>	os://youtu.be/loZXC_29nIY?si=_Bn8eEvaDir34f3i
M5: <u>htt</u>	os://youtu.be/TMTMCZ3rXQQ?list=PLovLEjwi_wfB_Yp8fGnDfogSuBGb-PHlu

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

Quiz, Group Discussions, In class assignments

Course	Course outcomes: At the end of the course the students will be able to				
CO1	Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.				
CO2	Use Fourier transforms to analyze problems involving continuous-time signals				
CO3	Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data.				
CO4	Understand that physical systems described by differential equations.				
CO5	Demonstrate partial differential equations and their solutions for physical interpretations.				

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		2								2
CO2	2	2		2								2
CO3	2	2		2								2
CO4	2	2		2								2
CO5	2	2		2								2

Course Title	Strength of Materials	Semester	III
Course Code	CV202	CIE	50
Total No. of Contact Hours	50	SEE	50
No. of Contact Hours/week	3:2:0	Total	100
Credits	04	Exam. Duration	3 Hours
Teaching Dept.	Civil Engineering		

Course objective is to:

- To understand the basic concepts of the stresses and strains for different materials and strength of structural elements.
- To know the development of internal forces and resistance mechanism for one dimensional and two-dimensional structural elements.
- To analyze and understand different internal forces and stresses induced due to representative loads on structural elements.
- To evaluate the behavior of torsion members, columns and struts.
- To analyze the stresses developed in case of thick and thin cylinders.

Module-1	L1, L2, L3	10 Hours

Simple Stresses and Strains: Introduction, Properties of Materials, Stress, Strain, Hook's law, Poisson's Ratio, Stress – Strain Diagram for structural steel, Total elongation of tapering bars of circular and rectangular cross sections. Elastic constants, relationship among elastic constants. Temperature stresses, Numerical on above.

Compound stresses: Introduction, Stress components on inclined planes, General twodimensional stress system, Principal planes and stresses, Compound stress using Mohr's circle method.

Module-2	L1, L2, L3	10 Hours

Bending moment and shear force diagrams in beams: Definition of shear force and bending moment, Sign convention, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, development of Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) with salient values for cantilever, simply supported and overhanging beams for point loads, UDL (Uniformly Distributed Load), UVL (Uniformly Varying Load) and Couple.

Violule-5 II, L2, L5 IO Hours	Module-3 L1, L	L2, L3 10 Ho	urs
-------------------------------	----------------	--------------	-----

Bending stress in beams: Introduction – Bending stress in beam, Pure bending, Assumptions in simple bending theory, derivation of Simple bending equation (Bernoulli's equation), modulus of rupture, section modulus, Flexural rigidity, Problems

Shear stress in beams: Derivation of Shear stress intensity equations, Derivation of Expressions of the shear stress intensity for rectangular, triangular and circular cross sections of the beams. Problems on above.

Module-4

L1, L2, L3 10 Hours

Torsion: Twisting moment in shafts, simple torque theory, derivation of torsion equation, tensional rigidity, polar modulus, shear stress variation across solid circular and hollow circular sections, Problems

Elastic stability of columns: Introduction – Short and long columns, Euler's theory on columns, Effective length, slenderness ratio, radii of gyration, buckling load, Assumptions, derivations of Euler's Buckling load for different boundary conditions, Limitations of Euler's theory, Rankine's formula and related problems.

Module-5		

L1, L2, L3 10 Hours

Thin cylinders: Introduction: Longitudinal, circumferential (hoop) stress in thin cylinders. Expressions for longitudinal and circumferential stresses. Efficiency of longitudinal and circumferential joints. Problems on estimation of change in length, diameter and volume when the thin cylinder subjected to internal fluid pressure.

Thick cylinders: Concept of Thick cylinders Lame's equations applicable to thick cylinders with usual notations, calculation of longitudinal, circumferential and radial stresses – simple numerical examples.

Suggested Learning Resources:

Textb	ooks:
1	Timoshenko and Young, "Elements of Strength of Materials", East West Press, 5th edition
	2003
2	R. Subramanyam, "Strength of Materials", Oxford University Press, 3rd Edition -2016
3	B.C Punmia, Ashok Jain, Arun Jain, "Strength of Materials", Laxmi - 2018-22
	Publications,10th Edition-2018
Refere	nce Books:
1	R K Bansal "Strength of Materials", 6 th edition, Laxmi publications
2	D K Singh, "Strength of Materials", 4 th edition, Springer Cham
3	S.S. Rattan "Strength of Materials" McGraw Hill Education (India) Pvt. Ltd., 2nd Edition (Sixth reprint 2013).
4	S S Bhavikatti, "Strength of Materials" Vikas Publishing (5th Edition)
5	B.S. Basavarajaiah, P. Mahadevappa "Strength of Materials" in SI Units, University Press (India) Pvt. Ltd., 3rd Edition, 2010
Web li	nks and Video Lectures (e-Resources):

1. Strength of Materials web course by IIT Roorkee https://nptel.ac.in/courses/112107146/

2. Strength of Materials video course by IIT Kharagpur https://nptel.ac.in/courses/105105108/

- 3. Strength of Materials video course by IIT Roorkee <u>https://nptel.ac.in/courses/112107147/18</u>
- 4. All contents organized http://www.nptelvideos.in/2012/11/strengthof-materials-prof.html

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

Seminars/Quiz (To assist in GATE Preparations)

- Demonstrations in Lab
- Self-Study on simple topics
- Simple problems solving using Excel
- Virtual Lab Experiments

Course	Course outcomes:				
	Evaluate the behavior when a solid material is subjected to various types of forces (namely				
CO1	Compressive, Tensile, Thermal, Shear, flexure, Torque, internal fluid pressure) and estimate				
	Stresses and corresponding strain developed.				
CO^{2}	Estimate the forces developed and draw schematic diagram for stresses, forces, moments for				
02	Simple beams with different types of support and are subjected to various types of loads.				
CO3	Analyze bending and shearing stresses induced due to representative loads on the beams.				
	Evaluate the behavior when a solid material is subjected to Torque and internal fluid				
CO4	Pressure and estimate stresses and corresponding strain developed, Distinguish the				
	Behavior of short and long column.				
CO5	Examine the longitudinal and Circumferential stresses developed in thin and thick cylinders.				

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1									3	3	
CO2	3	3	2									2	3	
CO3	3	3	2									2	3	
CO4	3	3	2									1	3	
CO5	3	3	2									1	3	

Building Material Testing Laboratory						
Course Code	CV203	CIE Marks	50			
L:T:P	0:0:2	SEE Marks	50			
Hrs. / Week	02	Total Marks	100			
Credits	01	Exam Hours	03			

Course objectives: At the end of the course, the student will be able to:					
1	1 Utilize the basic concepts of the stresses and strains for different Materials and				
	Strength of structural elements.				
2	Know the development of internal forces and resistance mechanism for one				
	Dimensional and two-dimensional structural elements.				
3	Analyze and understand different internal forces and stresses induced due to				
Representative loads on structural elements.					
4	Evaluate the behavior of torsional members, columns and struts				

Pgm. No.	List of Experiments / Programs	Hours	Cos				
Prerequisite Experiments / Programs / Demo							
Fundamental concepts of Engineering Mechanics and strength of materials courses.							
	PART-A						
1Tension test on Mild steel and HYSD bars2CO1 / CO3							
2	Compression test of Mild Steel, Cast iron and Wood	2	CO1 / CO3				
3	Torsion test on Mild Steel circular sections	2	CO1 / CO3				
4	Bending Test on Wood Under two-point loading	2	CO2 /CO3				
5	Shear Test on Mild steel.	2	CO1 / CO3				
6	Impact test on Mild Steel (Charpy & Izod)	2	CO1 / CO3				
	PART-B						
7	Hardness tests on ferrous and non-ferrous metals – Brinell"s, Rockwell and Vicker"s	2	CO1 / CO3				
8	Demonstration of Strain gauges and Strain indicators	2	CO3				
PART-C Beyond Syllabus Virtual Lab Content							
1. Principal stresses experiment							
2. Fatigue test experiment							

Sugge Textb	ested Learning Resources: ooks/ Reference Books:
1	Testing of Engineering Materials, Davis, Troxell and Hawk, International Student Edition – McGraw Hill Book Co. New Delhi.
2	Mechanical Testing of Materials", Fenner, George Newnes Ltd. London
3	"Experimental Strength of Materials", Holes K A, English Universities Press Ltd. London.
Web li	nks and Video Lectures (e-Resources):
\triangleright	https://sm-nitk.vlabs.ac.in/
\succ	https://sm-nitk.vlabs.ac.in/List%20of%20experiments.html
\succ	https://www.youtube.com/watch?v=GHpZgeGFYuA
Activit	y-Based Learning (Suggested Activities in Class)/ Practical Based learning
\succ	Site / Industrial visits
Cours	e outcomes:
CO1	Reproduce the basic knowledge of mathematics and engineering in finding the strength in
COI	tension, compression, shear and torsion.
CO^2	Identify, formulate and solve engineering problems of structural elements subjected to
002	flexure.
CO3	Evaluate the impact of engineering solutions on the society and also will be aware
005	of contemporary issues regarding failure of structures due to unsuitable materials.

High-3, Medium-2, Low-1

PO2 PO3

3

2

2

PO4

1

1

1

PO5

PO6

PO7

PO8

2

2

2

PO9

3

3

3

PO10

PO11 PO12

1

1

2

PSO1

3

3

3

PSO2

CO-PO Mapping

PO1

3

2

2

CO/PO

CO1

CO2

CO3

Course Title	Fluid Mechanics & Hydraulics	Semester	III
Course Code	CV204	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3:0:0	Total	100
Credits	03	Exam. Duration	3 Hours
Teaching Dept.	Civil Engineering		

Course objective is to:

- The Fundamental properties of fluids and its applications.
- Hydrostatic laws and application to solve practical problem.
- Basic design of pipes and pipe networks considering flow, pressure and its losses.
- Design the open channels of various cross sections including design of economical sections.
- The working principles of the hydraulic machines for the given data and analyzing the Performance of Turbines for various design data.

Module-1	L1, L2, L3	08 Hours

Fluids & Their Properties: Concept of fluid, Systems of units. Properties of fluid; Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Newton's law of viscosity, Cohesion, Adhesion, Surface tension,

Fluid Pressure and Its Measurements: Definition of pressure, Pressure at a point, Pascal's law, Types of pressure. Measurement of pressure using simple, differential & inclined manometers (theory & problems).

Fluid Dynamics: Introduction. Forces acting on fluid in motion. Euler's equation of motion along a streamline and Bernoulli's equation. Assumptions and limitations of Bernoulli's equation. Problems on applications of Bernoulli's equation (with and without losses).

Module-2	2
----------	---

L1, L2, L3 08 Hours

Concepts and expressions for Venturi meter, Orifice meter, Pitot tube with Numerical Problems

Orifice and Mouth piece: Introduction, classification, flow through orifice, hydraulic coefficients and Numerical problems. Mouthpiece, classification (No problems).

Notches and Weirs: Introduction. Classification, discharge over rectangular, triangular, trapezoidal notches, Cipolletti notch, broad crested weirs. Numerical problems.

L1, L2, L3 08 Hours

Flow through Pipes: Introduction. Major and minor losses in pipe flow. Darcy- Weis bach equation for head loss due to friction in a pipe. Minor losses in pipe flow, equation for head loss due to sudden expansion. Numerical problems.

Open Channel Flow Hydraulics: Uniform Flow: Introduction, Classification of flow through channels, Chezy's and Manning's equation for flow through open channel, Most economical channel sections, Uniform flow through Open channels, Numerical Problems.

Impact of jet on Curved vanes: Introduction, Impulse-Momentum equation. Direct impact of a jet on stationary and moving curved vanes, Introduction to concept of velocity triangles, impact of jet on a series of curved vanes- Problems.

Turbines – Impulse Turbines: Introduction to turbines, General lay out of a hydro- electric plant, Heads and Efficiencies, classification of turbines. Pelton wheel- components, working principle and velocity triangles. Maximum power, efficiency, working proportions – Numerical problems.

Module-5

L1, L2, L3 08 Hours

Reaction Turbines and Pumps: Radial flow reaction turbines: (i) Francis turbine-Descriptions, working proportions and design, Numerical problems. (ii) Kaplan turbine-Descriptions, working proportions and design, Numerical problems. Draft tube theory and unit quantities. (No problems)

Centrifugal pumps: Components and Working of centrifugal pumps, Types of centrifugal pumps, Work done by the impeller, Heads and Efficiencies, Minimum starting speed of centrifugal pump, Numerical problems.

Sugg	Suggested Learning Resources:							
Text	books:							
P.N.Modi and S.M.Seth-Hydraulics and Fluid Mechanics, including Hydraulic ma								
1	standard Book House, New Delhi							
2	K Subramanya- Fluid Mechanics and Hydraulic Machines, Tata McGraw-Hill, New Delhi							
3	R.K. Bansal- A text book of Fluid Mechanics and Hydraulic Machines- Laxmi							
	Publications, New Delhi.							
Refer	ence Books:							
1	Victor L. Streeter, Benjamin Wyile E and Keith W. Bedford- Fluid Mechanics, Tata							
1	McGraw Hill publishing Ltd, New Delhi							
2	J.F.Douglas, J.M. Gasoreik, John Warfield , Lynne Jack – Fluid Mechanics , Pearson , Fifth							
2	Edition.							
2	K.Subramanya- Fluid Mechanics and Hydraulic Machines, Problems and Solutions, Tata							
3	McGraw-Hill, New Delhi							
1	S.K SOM and Biswas – "introduction to Fluid Mechanics and Fluid Machines, Tata							
4	Mcg raw Hill, New							
Web l	inks and Video Lectures (e-Resources):							

- <u>https://searchworks.stanford.edu/view/10496310</u>
- <u>https://searchworks.stanford.edu/view/13576277</u>
- <u>https://searchworks.stanford.edu/view/11842972</u>

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Seminars /Quiz (to assist in GATE preparations)
- Demonstrations in lab
- Self-Study on simple topics
- Simple problems solving by C+
- Virtual lab experiments

Cours	Course outcomes: At the end of the course the student will be able to :								
CO1	Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical Applications.								
CO2	Compute the discharge through pipes using venturi meter and orifice meter, over Notches and weirs.								
CO3	Understand Classification of flow, Major and minor losses concept practically.								
CO4	Compute and solve numerical on Impact of jet on types of vanes and working principle of Turbines.								
CO5	Compute and solve problems on hydrostatics, pumps, turbines including practical Applications.								

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1									3		2
CO2	3	3	2									3		2
CO3	3	2	2									3		2
CO4	3	3	2									3		2
CO5	3	3	3									3		2

Fluid Mechanics and Hydraulics Laboratory								
Course Code	CV205	CIE Marks	50					
L:T:P	0:0:2	SEE Marks	50					
Hrs. / Week	02	Total Marks	100					
Credits	01	Exam Hours	03					

Course objectives: At the end of the course, the student will be able to:								
1	1 Calibrate flow measuring devices							
2	Determine the force exerted by jet of water on vanes							
3	Measure discharge and head losses in pipes							
4	Understand the fluid flow pattern							

Pgm. No.	List of Experiments / Programs	Hours	COs						
Prerequisite Experiments / Programs / Demo									
	Fundamental concept of Fluid Mechanics, Hydraulics and Hydraulic machines courses.								
	PART-A								
1	Determination of Cd for Venturimeter and Orifice meter.	2	CO1						
2	Determination of C_d for Rectangular and Triangular notch.	2	CO1						
3	Determination of force exerted by a jet on flat and curved vanes.	2	CO1						
4	Determination of Minor losses in pipe due to sudden Enlargement, sudden contraction and bend.	2	CO1						
5	Determination of Major Loss in Pipes	2	CO1						
	PART-B								
6	Determination of efficiency of centrifugal pump	2	CO2						
7	Determination of efficiency of Pelton wheel turbine	2	CO2						
8	Determination of efficiency of Francis turbine	2	CO2						
19	Determination of efficiency of Kaplan turbine	2	CO2						
	PART-C								

Beyond Syllabus Virtual Lab Content

- Verification of Bernoulli's Equation
- Vermitation of Bernoull's Equation
 Determination of C_d for Ogee and Broad crested weir
 Determination of C_d for Venturi flume
- > Determination of hydraulic co-efficient of small vertical orifice.

Suggested Learning Resources:

Textl	Textbooks/ Reference Books:							
1	Sarbjit Singh, Experiments in Fluid Mechanics - PHI Pvt. Ltd New Delhi							
2	Mohd. Kaleem Khan, "Fluid Mechanics and Machinery", Oxford University Press							
3	Hydraulics and Fluid Mechanics' – Dr. P.N. Modi& D r S.M. Seth, Standard Book House- New Delhi. 2009 Edition.							

Web links and Video Lectures (e-Resources):

- 1. https://eerc03-iiith.vlabs.ac.in/
- 2. <u>https://fmc-nitk.vlabs.ac.in/</u>
- 3. https://www.vlab.co.in/broad-area-civil-engineering

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- > Model making
- > Industrial visit / Dam visits Report preparation.

Course outcomes: During the course of study students will develop understanding of									
CO1	CO1 Properties of fluids and the use of various instruments for fluid flow measurement.								
CO2	Working of hydraulic machines under various conditions of working and their characteristics.								

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				1	2	1	2			2		2
CO2	3	2				1	2	1	2			2		2

Course Title	Geodetic Engineering	Semester	III
Course Code	CV206	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	2:0:2	Total	100
Credits	03	Exam. Duration	3 Hours
Teaching Dept.	Civil Engineering		

Course objective is to: : This course will enable students to

- Ability to understand principles of both traditional and modern surveying applying knowledge of mathematics.
- Ability to handle surveying equipment's and software tools to carry out field surveying, plottopographical Drawings and construction drawing
- Ability to use Total station for data capture, data storage, data transfer.
- Ability to prepare construction drawing and setting out. Module-1

L1,L2 08 Hours

Engineering surveying – Definition & importance of surveying for Civil Engineers. Surveying types-Control survey, Topographical surveying, Construction Survey, Cadastral survey, Hydrographic survey and Underground Survey. Surveying through the ages- Chain surveying, Compass surveying and Plane Table Surveying (concepts and limitations only).

Measurement of Distance- Various types of tapes, Laser distance meter, Distance measuring wheel, Electronic Distance measurement, GPS.

Module-2	L1,L2,L3	08 Hours				
Measurement of Directions and Angles: Compass survey: Basic definitions; meridians, bearings,						
magnetic and True bearings. Prismatic and surveyor's compasses, temporary adjustments, declination.						
Quadrantal bearings, whole circle bearings, local attraction and related pro-	oblems.					
Module-3	L1,L2,L3	08 Hours				
Leveling: Basic terms and definitions, Methods of leveling, Dumpy level	l, auto level, digi	ital and laser				
levels. Booking and reduction of levels. Differential leveling, profile	leveling, fly lev	eling, check				
leveling, reciprocal leveling.						
Module-4	L1,L2	08 Hours				
Plane Table Surveying: Plane table and accessories, Advantages and lim	itations of plane	table survey,				
Orientation and methods of orientation, Methods of plotting – Radiation,	Intersection, Tra	versing,				
Resection method, Two point and three point problems, Solution to two point	oint problem by	graphical				
method, Solution to three point problem Bessel's graphical method, Errors	s in plane table s	urvey.				
Modulo 5	111212	09 Hound				
Module-5	L1,L2,L3	Vð Hours				
Areas and Volumes: Measurement of area by dividing the area into geometrical figures, area from						
offsets, mid ordinate rule, trapezoidal and Simpson's one third rule, area from co-ordinates,						
introduction to planimeter, digital planimeter. Measurement of volumes- trapezoidal and prismoidal						
formula.						

Contouring: Contours, Methods of contouring, Interpolation of contours, contour gradient, characteristics of contours and uses.

Practice Experiments:

- 1. Measurements of distances using tape along with horizontal planes and slopes, direct ranging.
- 2. Setting out perpendiculars. Use of cross staff, optical square.
- 3. Measurements of bearings / directions using prismatic compass, setting of geometrical figures using prismatic compass.
- 4. Determination of distance between two inaccessible points using compass
- 5. Determination of reduced levels of points using dumpy level/auto level (simple leveling)
- 6. To determine the difference in elevation between two points using Reciprocal leveling and to determine the collimation error.
- 7. To conduct profile leveling, cross sectioning and block leveling. Plotting profile and cross sectioning in excel. Block contour on graph paper to scale.
- 8. To locate the points using Radiation and Intersection method of Plane table surveying.
- 9. To solve three point problem in plane table using Bessel's graphical solution.
- 10. Demonstration of Minor instruments like Clinometer, CeylonGhattracer, Box sextant, Hand level,Planimeter, nautical extant and Penta graph.

Open ended experiments leading to guided projects:

Hands on training related to advanced equipment's like Total station in modern surveying.

~						
Sugg	ested Learning Resources:					
1 I EXU	Punmia BC & Iain Ashok Kumar (2016) Surveying (17th ed. Vol. 1) Laymi Publications					
1	$\frac{1}{10000000000000000000000000000000000$					
2	Kanetkar I P and S V Kulkarni, Surveying and Leveling Part I, Pune					
	Vidyarthi Griha Prakashan, 1988.					
3	Dr. K.R. Arora. (2019). Surveying (17th ed., Vol. 1). Standard Book House.					
Refere	ence Books:					
1	S.K. Duggal, "Surveying Vol.1", Tata McGraw Hill Publishing Co. Ltd. New Delhi.2009.					
2	K.R. Arora, "Surveying Vol. 1" Standard Book House, New Delhi. –2010					
2	R Subramanian, Surveying and Leveling, Second edition, Oxford University Press,					
5	New Delhi					
4	A. Bannister, S. Raymond, R. Baker, "Surveying", Pearson, 7th ed., New Delhi					
Web li	b links and Video Lectures (e-Resources):					
•	https://enterprise.dji.com/surveying/land-surveying					
•	https://www.gps.gov/applications/survey/					
•	https://www.constructionplacements.com/total-station-in-surveying-types-uses-and- applications/					
•	https://www.youtube.com/watch?v=bbs5AEPstl4					
•	https://www.youtube.com/watch?v=KHI4TEeexuM&list=PLLy_2iUCG87DwNVc3Mz1yYlRA					
	42jSQ1t B&index=28					
•	https://www.youtube.com/watch?v=Iu9vrE48_I4&list=PLLy_2iUCG87DwNVc3Mz1yYlRA4					
	2jSQ1tB &index=30					
•	https://www.youtube.com/watch?v=RXUi2cX4CkU					
•	https://www.youtube.com/watch?v=SVa66vO08So					

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Hand on use of various surveying instruments.
- Surveying Civil engineering block and plotting with instruments of student's choice.
- Setting out a single bedroom house plan in field.

Course o	Course outcomes: At the end of the course, the student will be able to:					
CO1	Summarize various types of surveying and carry out distance measurement using various					
	Equipment's.					
Measurement of vertical and horizontal plane, linear and angular dimensions to arrive a						
02	solutions tobasic surveying problems.					
CO3	Illustrate the use and applications of leveling.					
CO4	Analyze the obtained spatial data and compute areas and volumes.					
CO5	Plot contours, longitudinal and cross sections for construction projects.					

CO-PO	Mapp	ing												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3							1					1
CO2	2	3							1					1
CO3	2	3							1					1
CO4	2	3							1					1
CO5	2	3							1					1

Course Title	Building Materials and Construction Technology	Semester	III
Course Code	CV221	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3:0:0	Total	100
Credits	3	Exam. Duration	3 Hours
Teaching Dept.	Civil Engineering	•	

Course objective is to:

- To recognize good construction materials based on properties.
- To investigate soil properties and design suitable foundation.
- To understand the types and properties of masonry materials and supervise masonry construction.
- To gain knowledge of structural components like lintels, arches, staircase and roofs.
- To understand the finishes in construction like flooring, plastering, paining.

	Module-1 RBT Level L1,L2	08 Hours
--	----------------------------	----------

Building Materials: Stone as building material; Requirement of good building stones, Dressing of stones, Deterioration and Preservation of stone work. Bricks; Classification, Manufacturing of clay bricks, Requirement of good bricks. Field and laboratory tests on bricks; compressive strength, water absorption, efflorescence, dimension and warpage.

Cement Concrete blocks, Autoclaved Aerated Concrete Blocks, Sizes, requirement of good blocks. Timber as construction material.

Fine aggregate: Natural and manufactured: Sieve analysis, zoning, specify gravity, bulking, moisture content, deleterious materials.

Coarse aggregate: Natural and manufactured: Importance of size, shape and texture. Grading of aggregates, Sieve analysis, specific gravity, Flakiness and elongation index, crushing, impactand abrasion tests.

Module-2

RBT Level L1,L2 08 Hours

Foundation: Preliminary investigation of soil, safe bearing capacity of soil, Function and requirements of good foundation, types of foundation, introduction to spread, combined, strap, mat and pile foundation

Masonry: Definition and terms used in masonry. Brick masonry, characteristics and requirements of good brick masonry, Bonds in brick work, Header, Stretcher, English, Flemish bond, Stone masonry, Requirements of good stone masonry, Classification, characteristics of different stone masonry, Joints in stone masonry. Types of walls; load bearing, partition walls, cavity walls.

Module-3

RBT Level L1,L2 08 Hours

Lintels and Arches: Definition, function and classification of lintels, Balconies, chejja and canopy. Arches; Elements and Stability of an Arch.

Floors and roofs: Floors; Requirement of good floor, Components of ground floor, Selection of flooring material Procedure for laying of Concrete (VDF), Mosaic, Kota, Slate, Marble, Granite, Tile flooring, Cladding of tiles.

Roof: Requirement of good roof, Types of roof, Elements of a pitched roof, Trussed roof, King post Truss, Queen Post Truss, Steel Truss, Different roofing materials, R.C.C. Roof.

Doors, Windows and Ventilators : Location of doors and windows, technical terms, Materials for doors and windows: PVC, CPVC and Aluminum. Types of Doors and Windows: Paneled,
Flush, Collapsible, Rolling shutter, Paneled and glazed Window, Bay Window, French window. Steel windows Ventilators Sizes as per IS recommendations
Formwork: Introduction to form work, scaffolding, shoring, under pinning.
Module-5RBT Level L1,L208 Hours
 Plastering and Pointing: Mortar and its types. Purpose, materials and methods of plastering and pointing: Sand faced plastering, Stucco plastering, lathe plastering, and defects in plastering. Water proofing with various thicknesses. Damp proofing- causes, effects and methods. Paints- Purpose, types, technical terms, ingredients and defects, Preparation and applications of
paints to new and old plastered surfaces, wooden and steel surfaces.
 Practice Experiments: Tests on Fine aggregates – Moisture content, Specific gravity, Bulk density, Sieve analysis and Bulking Tests on Coarse aggregates – Absorption, Moisture content, specific gravity, Bulk density and Sieve analysis
 Open ended experiments leading to guided projects: Test on Bricks and Tiles
Suggested Learning Resources: Textbooks:
1Sushil Kumar "Building Materials and construction", 20th edition, reprint 2015, Standard Publishers
2 Dr. B. C. Punmia, Ashok kumar Jain, Arun Kumar Jain, "Building Construction, Laxmi Publications (P) ltd., New Delhi.
3 Rangawala S. C. "Engineering Materials", Charter Publishing House, Anand, India.
Reference Books:
1 (P) Limited, 2016 National Building Code(NBC) of India
2 P C Vergese, "Building Materials", PHI Learning Pvt.Ltd
3 Building Materials and Components, CBRI, 1990,India
4 Jagadish. K.S, "Alternative Building Materials Technology", New Age International, 2007.
Web links and Video Lectures (e-Resources):
 <u>https://youtube.com/playlist?list=PLyqSpQzTE6M_RfjEQMK7_L-</u> <u>UvxAMhplUT&feature=shared</u>
https://youtube.com/playlist?list=PL8BA090E69BF01BC2&feature=shared
Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning
Visit to construction site
Industrial visit
• Demonstrations

Module-4

RBT Level L1,L2 08 Hours

Course	Course outcomes:				
CO1	Select suitable materials for buildings and adopt suitable construction techniques.				
CO2	Decide suitable type of foundation based on soil parameter				
CO3	Supervise the construction of different building elements based on suitability				
CO4	Exhibit the knowledge of building finishes and form work requirements				

СО-РО	Mapp	ing												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3			1	3	3	3				3		3
CO2	2	3			1	3	3	3				3		3
CO3	2	3			1	3	3	3				3		3
CO4	2	3			1	3	3	3				3		3

Course Title	Rural, Urban Planning and Architecture	Semester	III
Course Code	CV222	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/Week	3:0:0	Total	100
Credits	3	Exam. Duration	3 Hours
Teaching Dept.	Civil Engineering		

Course objective is to enable students:

- To make the student understand about the past and present architecture of different parts of the world
- Rural and urban planning and growth and circulation of patterns and effect of increase in urbanization
- The basic planning required for urban and rural centers with respect to physical and social aspects
- Student s to visit the different place of architecture monuments to understand the concept
- To understand different types of architecture and planning

Module-1	RBT Level L1, L2	08 Hours		
Introduction: Aim and importance of Architecture, Architect	ture as a fine art. Role of an	architect		
and anengineer.				
Essential principles and qualities of architecture with examples				
Factors of architecture: Mass, Form, Colour, Solids, and Vo	ids, Uniformity, Balance and	l Symmetry,		
Painting with examples.				
Module-2	RBT Level L1, L2	08 Hours		
Architectural influence of the following: Association, Tradi	tion, Climate, Materials, To	pography,		
Religion social customs and aspiration of time.				
Architectural characteristics of the following architecture with	n examples. 1. Egyptian, 2. C	Freek, 3.		
Roman, 4. Buddhist, 5. Hindu, 6. Jain, 7. Chalukyan, 8. Mode	ern architecture			
Factors that have influence present day Modern Architecture	e, Aesthetic difference betwe	een the past		
and present Architecture.				
Students are advised for a technical tour related Architect additional knowledge in this subject	ure and town planning to	gain		
Module-3	RBT Level L1, L2	08 Hours		
Human settlements, Rural and urban pattern of growth, Factor	ors that promote growth and	l		
development of Rural and urban areas				
Ancient Town Planning in India: Principles of town plannin	g and circulation pattern with	thexamples		
Module-4	RBT Level L1, L2	08 Hours		
Industrialization: Impact on town planning, Urbanization car	uses, its effect on town and	cities,		
remedial measures both in urban and rural planning				
Circulation pattern in cities: Urban roads and streets, their functional classification, traffic survey				
data				
and its use in town planning				
Module-5	RBT Level L1, L2	08 Hours		
Contemporary objectives and methods of planning of	town: Development plans	for cities,		
objectives and stages involved in their preparation and implei	mentation, space standards for	or planning.		

Suggested I Textbooks:	Learning Resources:		
1	History of Architecture – Fletcher		
2	Urban pattern – Galliaon		
3	Indian architecture – Vol. I & II – Perey Brown		
Reference B	ooks:		
1	Principle of town and country planning – Lewis Keeble		
2	Urbanization and Urban Systems in India, Ramachandran R, Oxford University Press, New Delhi.		
3 Town planning – Rangwala, Charothar Publication			
Web links ar	nd Video Lectures (e-Resources):		

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Course	Course outcomes:						
At the completion of the course. The student shall be able to							
CO1	Understand importance of architecture in rural and urban planning						
CO2	Understand Influence of architecture						
CO3	Design infrastructure for rural and urban region						
CO4	Plan and design rural and urban roads						

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3			1	3	3	3				3		3
CO2	2	3			1	3	3	3				3		3
CO3	2	3			1	3	3	3				3		3
CO4	2	3			1	3	3	3				3		3

Course Title	Geospatial Techniques in Practice	Semester	III
Course Code	CV223	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/Week	3:0:0	Total	100
Credits	3	Exam. Duration	3 Hours
Teaching Dept.	Civil Engineering		

Course objective is to enable students:

- Introduce the concept of various geospatial technologies used in the industry
- Help to acquire basic idea about the processing and mapping with modern surveying equipment.
- Elaborate proven concepts, business practices and applications of geospatial technology.
- Explain learners understand how geospatial concepts are leveraged in handling real world business challenges of engineering and construction industry.

Module-1RBT Level L1, L208 HoursNeed of Geospatial technology in Industry: Geospatial in Day to Day Life, Spatial thinking,
Evolution of location technology and importance of geography and maps. Need for spatial
information, Terminologies, logic, language and formats of spatial technology. Location
perspective of construction industry, Overview of Geospatial technology in tenders, Designand
execution and Construction lifecycle management. Fundamentals and components of Geospatial
Engineering, Surveying and Conventional survey equipment Vs Modern surveying
Equipment Components. Digital Land Surveying Needs

Equipment Components. Digital Land Surveying Needs.

Module-2RBT Level L1, L208 HoursTotal Station and Global Navigation Satellite System (GNSS): Basics of Surveying, Introduction
to Survey and Mapping, Geospatial Surveying Equipment, Demo of Total Station Equipment, Setting
out and mapping, Advanced geospatial solutions, GNSS Overview of components, working and signal
structure of Global navigation System.08 Hours

Module-3

RBT Level L1, L2 08 Hours

Geospatial Engineering and technology: Remote Sensing Technologies, Types of remote sensing, Sensors and its types, Application of sensors & platforms, Image Acquisition, Applications of Remote Sensing. 3D scanning, Principles and the science behind

Photogrammetry, LiDAR, RADAR and SONAR. Introduction to Platforms and working.

Module-4

RBT Level L1, L2 08 Hours

Geographical Information System: Basics of GIS, Vector & Raster data models, Types and components of a Map. Hardware for GIS, DEM and TIN Data products, Attribute Data Types. Basic GIS data conversions, conversions from non-spatial formats to spatial formats. Demo of Conversion of Excel to GIS, Demo of Conversion of CAD TO GIS, Demo of Downloading and Geo-referencing Topo sheets and Raster files.

Module-5	RBT Level L1, L2	08 Hours				
Applications and Future trends of Geospatial Technologie	s: Application of GIS	- Spatial				
Analysis, Catchment Area delineation, Overlay Analysis, Clust	er Analysis, Hotspot A	nalysisand				
View shed Analysis. Future Trends of Geospatial Technologies. Case Study 1 -Benefit Realization -						
Case Study 2 Advancements in Modern Survey & Mapping Tech	nologies, Advancements	s in Spatial				
Analytics – Geo Intelligence, Future Trends, Geospatial Technology -						
Way Forward.						

Suggested	Learning Resources:					
Textbooks	;					
1	T. P. Kanetkar and S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune VidyarthiGriha Prakashan, Pune, 2010, 24th edition					
2	James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, SeventhEdition, McGraw Hill 2001					
3	Satheesh Gopi, R. Sathikumar, N. Madhu, — Advanced Surveying, Total Station GPS and Remote Sensing — Pearson education, 2nd Edition, 2017					
Reference Books:						
1	George Joseph and C. Jeganathan, Fundamentals of Remote Sensing, Third Edition Universities Press (India) Private limited, Hyderabad, 2018					
2	M. Anij Reddy. Textbook of Remote Sensing and Geographical Information systems. BSPublications, 2012.					
Web links a	nd Video Lectures (e-Resources):					
E-learn	ing content on L&T EduTech Platform.					
Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning						

- ArcGIS Online Open source
- QGIS Open source
- GPS co-ordinates app Open source
- Total Station Demo
- GNSS Demo

Course	Course outcomes:								
At the	At the completion of the course. The student shall be able to								
CO1	Comprehend different geospatial techniques in the Construction Industry								
CO2	Understand the application of geospatial equipment like Total Station, GNSS, LIDAR,								
	UAV (Drones), etc.,								
CO3	Evaluate the various spatial analysis operations by using GIS Environment								
CO4	Create a map layout with all essential cartographic elements in GIS Environment.								
CO5	Illustrate the various geospatial emerging trends of GIS in Industry								

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3			1	3	3	3				3		3
CO2	2	3			1	3	3	3				3		3
CO3	2	3			1	3	3	3				3		3
CO4	2	3			1	3	3	3				3		3
CO5	2	3			1	3	3	3				3		3

Course Title	Technical Writing Skills	Semester	Ш				
Course Code	CV224	CIE	50				
Total No. of Contact Hours	40	SEE	50				
No. of Contact Hours/Week	3:0:0	Total	100				
Credits	3	Exam. Duration	3 Hours				
Teaching Dept.	Civil Engineering						
Course objective is to enable s Achieve better Technica Develop adequate knowl Write business proposals Write conference papers Develop efficiency in dra Module-1	tudents: I writing and Presentation skills ledge of paragraph writing and pass and reports. and prepare gist of published pa afting social media posts and blo	for employment. recise writing technique pers. gs. BT Level L1, L2	es 08 Hours				
Technical Report Writing: In process Introduction to various	ntroduction to Technical writing	ng process, Understand	ling of writing				
Module-2	BT Level L1, L2	08 Hours					
Module-3 Business Report Writing: In Significance and types of report	ragraph writing, Features and its R ntroduction, Definition and Sa prt writing. (Formal and Inform	BT Level L1, L2 alient features of Bushal). Resume building	08 Hours siness reports. and Types of				
Module-4	R	RT Level L1 L2	08 Hours				
Technical Articles and Proposals: Nature and significance, Types of technical Articles Journal Articles and conference papers. Elements of technical articles .Introduction to technical proposal writing, Purpose, importance, structure and types of technical proposals.Module-5RBT Level L1, L208 HoursSocial media posts and Blog Writing: Ethics and practices of social media posts, Principles and fundamentals, Guiding principles for composition of articles, some common pitfalls. Maintaining Common etiquette Blogs and Blog writings strategies							
Suggested Learning Resour Textbooks:	rces:						
1 Sanjay Kumar and Pushpalata, 'Communication Skills', Oxford University Press. 2018.							
2 M. Ashraf Rizvi, 'Er	ffective Technical Communication	on', McGraw Hill, 2018					
Keterence Books:1Gajendra Singh Cha	uhan and et.al. 'Technical Comn	nunication', Cengage Pu	ublication,				
2018. 2 Meenakshi Raman and Sangeeta Sharma, Technical Communication Principles and Practice,Oxford University Press, 2018.							
Web links and Video Lecture	s (e-Resources):						
 https://developers.goog 	gle.com/tech-writing/announcem	ents					

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Demonstrations of Videos
- Group Discussion
- Practice sessions
- Presentation on any social issues
- Quizzes

Course outcomes: At the completion of the course. The student shall be able to						
CO1	Effectively communicate in technical matters.					
CO2	Practice preparation of gist, abstract and notes from a technical article.					
CO3	Prepare a business proposals and reports.					
CO4	Write and respond in social media and write blogs.					

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3			1	3	3	3				3		3
CO2	2	3			1	3	3	3				3		3
CO3	2	3			1	3	3	3				3		3
CO4	2	3			1	3	3	3				3		3

Course Title	Universal Human Values	Semester	III
Course Code	HV207	CIE	50
Total No. of Contact Hours	30	SEE	50
No. of Contact Hours/Week	2:0:0	Total	100
Credits	2	Exam. Duration	3 Hours
Teaching Dept	Any Department		

Course objective is to:

This course is intended to:

• To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

• To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.

• To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

• This course is intended to provide a much-needed orientation input in value education to the young enquiring minds.

Module – 1	RBT Level/s :L1, L2	06 Hours					
Introduction to Value Education :Introduction to Value Education	tion :Right U	nderstanding,					
Relationship and Physical Facility (Holistic Development and the Role	of Education) U	nderstanding					
Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and							
Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to							
Fulfil the Basic Human Aspirations							

Module – 2 RBT Level/s :L1, L2	06 Hours
-----------------------------------	----------

Harmony in the Human Being : Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.

Module-3	RBT Level/s :L1, L2	06 Hours
Harmony in the Family and Society : Harmony in the Family - the Basi	ic Unit of Huma	n Interaction,
'Trust' – the Foundational Value in Relationship, 'Respect' – as the Righ	t Evaluation, Ot	ther Feelings,

Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

Module-4	RBT Level/s :L1, L2	06 Hours
Harmony in the Nature/Existence · Understanding Harmony in the Nat	ure Interconnec	tedness self-

Harmony in the Nature/Existence : Understanding Harmony in the Nature, Interconnectedness, selfregulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Coexistence at All Levels, The Holistic Perception of Harmony in Existence

Modul	e-5	RBT Level/s :L1, L2	06 Hours
Implic	ations of the Holistic Understanding – a Look at Professional I	Ethics :Natural A	Acceptance of
Human	Values, Definitiveness of (Ethical) Human Conduct, A Basis	s for Humanist	ic Education,
Human	istic Constitution and Universal Human Order, Competence in	Professional E	thics Holistic
Techno	ologies, Production Systems and Management Models-Typical	Case Studies,	Strategies for
Transit	ion towards Value-based Life and Profession		-
Sugge	ested Learning Resources:		
Textb	oooks:		
	The Textbook A Foundation Course in Human Values and Prot	fessional Ethics,	R R Gaur, R
1	Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New	/ Delhi, 2019. IS	SBN 978- 93-
	87034-47-1		
2	The Teacher's Manual for A Foundation Course in Human Valu	ues and Profession	onal Ethics, R
2	R Gaur, R Asthana, G		
Refere	nce Books:		
1	Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakasha	n, Amar kantak,	1999.
2	Human Values, A.N. Tripathi, New Age Intl. Publishers, New D	elhi, 2004.	
3	The Story of Stuff (Book).	, , , , , , , , , , , , , , , , , , , ,	
4	The Story of My Experiments with Truth - by Mohandas Karam	chand Gandhi	
5	Small is Beautiful - E. F. Schumacher		
6	Slow is Beautiful - Cecile Andrews		
Weh li	nks and Video Lectures (e-Resources):		
Value I	Education websites		
• https://	//www.uby.org.in/uby-ii		
• <u>http:/</u>	///www.unv.org.m/unv-n,		
• <u>Intp./</u>	<u>/ullv.ac.in</u> ,		
• <u>mup./</u>			
• Story			
• <u>http:/</u>	/www.storyofstuff.com		
• Al Go	bre, An Inconvenient Truth, Paramount Classics, USA		
• Charl	ie Chaplin, Modern Times, United Artists, USA		
• IIT D	elhi, Modern Technology – the Untold Story		
 Gand 	hi A., Right Here Right Now, Cycle Wala Productions		
• <u>https</u> :	//www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw	, _	
• <u>https:</u>	//fdp-si.aicte-india.org/8dayUHV_download.php		
• https:	//www.youtube.com/watch?v=8ovkLRYXIjE		
• https:	//www.youtube.com/watch?v=OgdNx0X923I		
• https:	//www.youtube.com/watch?v=nGRcbRpyGoU		
• https://	//www.youtube.com/watch ⁹ v=sDxGXOgYEKM		
10000			
Activit	v-Based Learning (Suggested Activities in Class)/ Practical Bas	sed learning	
Teachi	ng-Learning Process (General Instructions) These are sample Strat	egies, which tea	chers can use
to acce	lerate the attainment of the various course outcomes.		
1	The methodology of this course is explorational and thus univer	sally adaptable	It involves a
1.	systematic and rational study of the human being vis-à-vis the rest	of existence	10 m 01 00 u
2	In addition to the traditional lecture method different types of	innovative teac	hing methods
2.	may be adopted so that the activities will develop students' theoret	tical and applied	skills
3	State the need for UHV activities and its present relevance in the	society and Pr	ovide real-life
5.	examples	society and Th	
1	Support and guide the students for self study estivities 5. Ver	will also have	an an aible far

4. Support and guide the students for self-study activities. 5. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.

- 5. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution.
- 6. Encourage the students for group work to improve their creative and analytical skills.

Course outcomes:

Course outcome (Course Skill Set) At the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature);

Expected to positively impact common graduate attributes like:

- 1. Ethical human conduct
- 2. Socially responsible behavior
- 3. Holistic vision of life
- 4. Environmentally responsible work
- 5. Having Competence and Capabilities for Maintaining Health and Hygiene
- 6. Appreciation and aspiration for excellence (merit) and gratitude for all

CO1	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
CO2	They would have better critical ability
CO3	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
CO4	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1			1	1					1
CO2			1			1	1					1
CO3			1			1	1					1
CO4			1			1	1					1

Γ	1	1	1
Course Title	NSS – Phase 1	Semester	III
Course Code	NS208	CIE	50
Total No. of Contact Hours	25	SEE	0
No. of Contact Hours/week	0:2:0	Total	50
Credits		Exam. Duration	
Teaching Dept	Any Department		

Course objective is to: National Service Scheme (NSS) will enable the students to:

1.Understand the community in which they work

2. Identify the needs and problems of the community and involve them in problem-solving

3.Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems

4.Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

5.Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony

Youth population in India and its characteristics:

Introduction to India: Physical, Socio-Economic and Demographic Background, Study on Indian Population Composition (Age composition), Youth composition, Youth policy, Importance of Youth Policy, Youth population in India, NSS as a Youth Organization.

Module:2 RBT Level/s :L1, L2	3 Hours
---------------------------------	---------

Fundamentals of NSS:

Introduction to NSS, Origin of NSS, Aims and Objectives of NSS, NSS Motto, NSS Emblem, NSS Badge, NSS Day.

Module:3	RBT Level/s	3 Hours
	:L1, L2	

NSS Songs:

NSS Anthem (Hindi & Kannada), National Integration song, Rastriya sevayojane Madiharu. Uteh samajkeliye Uteh Uteh. Navellaru Ondagi Balona Banni. Hum Sab Mil ka rDeshka Apani.

Module:4	RBT Level/s	15 Hours
	:L1, L2	

Activity Based Programmes:

A. Campus Activities:

Shramadhan – Plantation, Cleaning, Watering, Weeding, Any other activities.

Awareness Programmes – Seminar, Workshops, celebration of National and International days, Personality Development Programmes, Group Activities, etc.

B : Off Campus Activities:

Rally, Jatha, Visit to Adopted villages, Swatchatha Programme, Visit and Conserving Ancient monuments and heritage site, Socio Economic Survey of village/slum, Nature Camp, Environmental Education

Course of At the co	outcomes: completion of the course. The student shall be able to
CO1	Describe the concept of Youth and compare the international definitions of the term Youth.
CO2	Students will be able to appreciate our demographic advantage and its role in nation building.
CO3	Know the growth and evolution of NSS and its role in Nation building through community service
CO4	Visualize the signs, symbols, logo of NSS and understand their broader meaning.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1	1					1
CO2						1	1					1
CO3						1	1					1
CO4						1	1					1

Course Title	Physical Education (PE) (Sports and Athletics) – Phase 1	Semester	III
Course Code	PE208	CIE	50
Total No. of Contact Hours	25	SEE	0
No. of Contact Hours/Week	0:2:0	Total	50
Credits		Exam. Duration	
Teaching Dept	Sports		

Course objective:

Physical education aims to develop all aspects of the human personality through physical and sports activities. Being a subject of science, it has its own value in society and human life. Physical Education is a form of one of the most effective means of education imparted through exercises, fun activities and sports. It is an integral part of the education system. It caters to the need for development of the students on physical, mental and social aspects.

Orientation:

Introduction of Physical Education and sports, Importance of Physical fitness and healthy life style

- A. Lifestyle
- B. Fitness
- C. Food & Nutrition
- D. Health & Wellness
- E. Pre-Fitness test

Module	2-2	RBT Level/s :L1, L2	15 Hours
Genera	l Fitness & Components of Fitness:		
А.	Warming up (Free Hand exercises)		
B.	Strength – Push-up / Pull-ups		
С.	Speed – 30 Mtr Dash		
D.	Agility – Shuttle Run		
E.	Flexibility – Sit and Reach		
F.	Cardiovascular Endurance – Harvard step Test.		
Modul	a - 3	RBT Level/s	10 Hours
Mouun		:L1, L2	10 110015
Recrea	tional Activities:		
A.	Postural deformities.		
B.	Stress management.		
С.	Aerobics.		
D.	Traditional Games.		

Course outcomes: At the completion of the course. The student shall be able to							
CO1	CO1 Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness						
CO2	Familiarization of health-related Exercises, Sports for overall growth and development						
CO3	Create a foundation for the professionals in Physical Education and Sports						

CO4	Participate in the competition at regional/state / national / internationallevels							
CO5	Create consciousness among the students on Health, Fitness and Wellness indeveloping and maintaining a healthy lifestyle.							

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1			1	1					1
CO2			1			1	1					1
CO3			1			1	1					1
CO4			1			1	1					1
CO5			1			1	1					1

Course Title	Yoga for a Better Life Phase 1	Semester	III
Course Code	YG208	CIE	50
Total No. of Contact Hours	25	SEE	0
No. of Contact Hours/week	0:2:0	Total	50
Credits		Exam. Duration	
Teaching Dept			

Course objectives:

1) To enable the student to have good health.

- 2) To practice mental hygiene.
- 3) To possess emotional stability.
- 4) To integrate moral values.
- 5) To attain higher level of consciousness.

Semester III RBT Level/s :L1, L2 25	25 Hours
--	----------

Yoga, its origin, history and development. Yoga, its meaning, definitions. Different schools of yoga, Aim and Objectives of yoga, importance of prayer Yogic practices for common man to promote positive health Rules to be followed during yogic practices by practitioner Yoga its misconceptions, Difference between yogic and non-yogic practices.

Suryanamaskar prayer and its meaning, Need, importance and benefits of Suryanamaskar12 count, 2 rounds.

Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana Different types of Asanas

a. Sitting

- 1. Padmasana
- 2. Vajrasana

b. Standing

- 1. Vrikshana
- 2. Trikonasana

c. Prone line

- 1. Bhujangasana
- 2. Shalabhasana

d. Supine line

- 1. Utthitadvipadasana
- 2. Ardhahalasana

Suggested Learning Resources:

Textbooks:

- 1. Yogapravesha in Kannada by Ajitkumar
- 2. Light on Yoga by BKS Iyengar
- 3. Teaching Methods for Yogic practices by Dr. M L Gharote & Dr. S K Ganguly
- 4. Yoga Instructor Course hand book published by SVYASA University, Bengaluru
- 5. Yoga for Children -step by step by Yamini Muthanna

Web links and Video Lectures (e-Resources):

Refer links

- <u>https://youtu.be/KB-TYlgd1wE</u>
- <u>https://youtu.be/aa-TG0Wg1Ls</u>

The Health Benefits of Yoga

The benefits of various yoga techniques have been supposed to improve

- body flexibility,
- performance,
- stress reduction,
- attainment of inner peace, and
- Self-realization.

The system has been advocated as a complementary treatment to aid the healing of several ailments such as;

- coronary heart disease,
- depression,
- anxiety disorders,
- asthma, and
- Extensive rehabilitation for disorders including musculoskeletal problems and traumatic brain injury.

The system has also been suggested as behavioral therapy for smoking cessation and substance abuse (including alcohol abuse). If you practice yoga, you may receive these physical, mental, and spiritual benefits:

• Physical

- 1. Improved body flexibility and balance
- 2. Improved cardiovascular endurance (stronger heart)
- 3. Improved digestion
- 4. Improved abdominal strength
- 5. Enhanced overall muscular strength
- 6. Relaxation of muscular strains
- 7. Weight control
- 8. Increased energy levels
- 9. Enhanced immune system

• Mental

- 1. Relief of stress resulting from the control of emotions
- 2. Prevention and relief from stress-related disorders
- 3. Intellectual enhancement, leading to improved decision-making skills
- Spiritual
 - 1. Life with meaning, purpose, and direction
 - 2. Inner peace and tranquility
 - 3. Contentment

Course	Course outcomes:								
At the completion of the course. The student shall be able to									
CO1	Understand the meaning, aim and objectives of Yoga.								
CO2	Perform Suryanamaskar and able to Teach its benefits.								
CO3	Understand and teach different types of Pranayama, Asanas by name, its importance, methods and benefits.								
CO4	Instruct Kapalabhati and its need and importance.								
CO5	Coach different types of Kriyas, method to follow and usefulness.								

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1			1	1					1
CO2			1			1	1					1
CO3			1			1	1					1
CO4			1			1	1					1
CO5			1			1	1					1

Course Title	Additional Mathematics (Common for all branches)	Semester	III
Course Code	DM209	CIE	50
Total No. of Contact Hours	30	SEE	50
No. of Contact Hours/week	2:0:0	Total	100
Credits	0	Exam. Duration	3 Hours
Teaching Dept	MATHEMATICS	•	

Course objective is to:

- Develop the knowledge of numerical methods and apply them to solve transcendental and differential equations.
- Study the fundamental concepts of vector calculus viz. Gradient, curl and divergence
- Familiarize the importance of Integral calculus and Linear Algebra.

Module-1	Numerical Analysis	RBT Levels L1, L2,L3	6 Hours

Solution of algebraic and transcendental equations –Newton-Raphson methods. Finite differences, Interpolation and extrapolation using Newton's forward and backward difference formulae, Newton's divided difference Numerical integration: Trapezoidal rule, Simpson's (1/3)rd and (3/8)th rules, Weddle's rule.

Numerical Solution of Ordinary Differential Equations: Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order

Module-2	Ordinary Differential	Equations	RBT Levels L1, L2,L3	6 Hours				
Introduction to first-order ordinary differential equations pertaining to the applications for Computer								
Science & Engineering. Linear and Bernoulli's differential equations. Exact and reducible to exact								
differential equations - Integrating factors on $\frac{1}{N} \left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} \right) \frac{1}{M} \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \right)$.								
Higher -order linear ordinary differential equations with constant coefficients - Inverse differential operator.								
	Internel Colorator							
Module-3	Integral Calculus	Integral Calculus						
Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration								
		RBT Levels	6 Hours					
Module-4	Vector Calculus	L1, L2,L3						
Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrational vector fields.								
Madada 5	Timore Alexhau	RBT Levels	6 Hours					
Niodule-5	Linear Aigebra	L1, L2,L3						

Row reduction and echelon forms- Consistency of System of Equations. Solution sets of linear equations by Gauss Seidel, Gauss Jordan, Eigenvalues and eigenvectors Rayleigh's power method.

Sugge	ested Learning Resources:					
Textbooks:						
1	B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 44 th					
1.	Edition, 2017.					
2	Erwin Kreyszig - Advanced Engineering Mathematics, Wiley publication,					
2.	10th edition, 2015					
3	David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018					
Reference Books:						
1	Srimanta Pal & Subodh C Bhunia - Engineering Mathematics, Oxford					
1.	University Press, 3rd Reprint, 2016.					
2.	James Stewart: "Calculus" Cengage Publications, 7thEd., 2019.					
3.	Gilbert Strang, Linear Algebra and its Applications, 5th Edition (2016).					
	N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi					
4.	Publications, 10th Ed., 2022. 4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering					
	Mathematics"					
Web li	nks and Video Lectures (e-Resources):					
https://	youtu.be/Y7VWyyZ6B0g?si=rhxgG4vvrs3VS7mw					
https://	youtu.be/zT83sJ5IrEE?si=Crb9_cIWw4tTJxmj					
https://	youtu.be/9_m36W3cK74?si=h-bd19yVCgLF3VvW					
https://	youtu.be/2DX8Vp1Q2-0?si=rQ76vQyXPATricZz					
https://youtu.be/AuUi_bUeTS4						

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning: Course Seminars, Quiz, In class assignments.

Course outcomes: At the end of the course students will be able to							
CO1	Apply numerical methods to find the solution of algebraic and transcendental equations.						
CO2	Apply numerical methods to find the solution of ordinary differential equations.						
CO3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume.						
CO4	Use fundamentals of vectors to find gradient, curl and divergence.						
CO5	Test the consistency and solve the system of liner equations .						

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		2								2
CO2	3	2		2								2
CO3	3	2		2								2
CO4	3	2		2								2
CO5	3	2		2								2
4th SENESTER

Course Title	Applied Mathematics- IV	Semester	IV
Course Code	MM251	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	2:2:0	Total	100
Credits	3	Exam. Duration	3 Hours
Teaching Dept	Mathematics		
Course objective is to:			
• To illustrate the conception evaluation of complex in	pts of complex variables, comp tegrals in solving complex enginee	lex functions, different d	entiation and
 To illustrate the concept evaluation of complex in To enable students to bec Understand the concept a 	pts of complex variables, comp tegrals in solving complex enginee come familiar with probability dist and well conversant with testing th	ering problems. ribution. PRT L evolution	entiation and pling.
 To illustrate the conception evaluation of complex intervaluation. To enable students to becomplex to understand the concept at Module-1 	pts of complex variables, comp tegrals in solving complex enginee come familiar with probability dist and well conversant with testing th	elex functions, different ering problems. ribution. he hypothesis and sam RBT Levels L1,L2,L3	entiation and pling. 8 Hours
 To illustrate the conception evaluation of complex integration of complex integration. To enable students to becomplex and the conception of analysis: Complex Analysis: Complex Variables: Review of Analytic Functions-Cauchy-Rie construction of analytic function 	pts of complex variables, comp tegrals in solving complex engined come familiar with probability dist and well conversant with testing th a function of a complex variable, emann equations in Cartesian	ering problems. ribution. the hypothesis and sam RBT Levels L1,L2,L3 limits, continuity, difference and polar forms. Pr	entiation and pling. 8 Hours ferentiability operties and
 To illustrate the conception evaluation of complex integration of complex integration. To enable students to becurve to be the concept and the conce	pts of complex variables, comp tegrals in solving complex enginee come familiar with probability dist and well conversant with testing th a function of a complex variable, emann equations in Cartesian a s.	ering problems. ribution. ribution. RBT Levels L1,L2,L3 limits, continuity, diff and polar forms. Pr RBT Levels L1,L2,L3	entiation and pling. 8 Hours ferentiability operties and 8 Hours
 To illustrate the conception evaluation of complex integrals To enable students to becter a Understand the concept a Understand the concept a Module-1 Complex Analysis: Complex Variables: Review of Analytic Functions-Cauchy-Rie construction of analytic function Module-2 Complex Integrals: Complex line Integrals - Cauch Cauchy's Residue theorem. transformations: w=z², w=e^z, w 	pts of complex variables, complex engineer tegrals in solving complex engineer come familiar with probability distand well conversant with testing the a function of a complex variable, emann equations in Cartesian s. y's theorem and Cauchy's inter Transformations: Conformal $r = z + \left(\frac{1}{z}\right)$ ($z \neq 0$). Bilinear transformations	ering problems. ribution. he hypothesis and sam RBT Levels L1,L2,L3 limits, continuity, diff and polar forms. Pr RBT Levels L1,L2,L3 egral formula, Residue transformations-Dis formations.	entiation and pling. 8 Hours ferentiability operties and 8 Hours , poles, scussion o

Random variables: Discrete and continuous, probability mass/density functions. Binomial distribution, Poisson distribution. Exponential and Normal distributions.

Module-4	RBT Levels	8 Hours
	L1,L2,L3	0 110015

Joint Probability Distribution:

Joint Probability distribution for two discrete random variables, expectation, covariance, correlation coefficient.

Stochastic process: Probability vector, stochastic matrices, fixed points, regular stochastic matrices, Markov chains, higher transition probability.

Module-5	RBT Levels L1,L2,L3	8 Hours
----------	------------------------	---------

Transportation and Assignment Problems:

Formulation of transportation problems, Methods of finding initial basic feasible solutions by North-West corner method, least cost method, Vogel approximation method. Optimal Solutions-Problems. Formulation of assignment problems, Hungarian Method-Problems

Suggested Learning Resources: Textbooks:

Te	xtbooks:
1.	B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 44th edition, 2021.
2	R.E. Walpole, R. H. Myers, R. S. L. Myers and K. Ye - Probability and Statistics for
2.	Engineers and Scientists – Pearson Education – Delhi – 9th edition – 2012.
3	Kanti Swarup, P.K. Gupta and Man Mohan -Operations Research-Sultan Chand & Sons
5.	Publishers–2014.
Refe	erence Books:
1	Murray R Spiegel, John Schiller & R. Alu Srinivasan – Probability and Statistics – Schaum's
1.	outlines-4nd edition-2012.
2	Kishore S. Trivedi – Probability & Statistics with Reliability, Queuing and Computer Science
2.	Applications – John Wiley & Sons – 2^{nd} edition – 2008.
3.	Erwin Kreyszig – Advanced Engineering Mathematics, Wiley publication, 10 th edition, 2015.
Web	o links and Video Lectures (e-Resources):
M1:	https://youtu.be/jm0JLx9cT5c?list=PLVCBPCYGv7bBYULot9GNR0AW8ukryUplx
M2:	https://youtu.be/Q7ynQ9qgENo?list=PL2C56LrxJmW4Yo-8MDh8yijh5cFHMWAup
M3:	https://youtu.be/V8F8Wenuo?list=PLhSp9OSVmeyLB62fT9VNbjRkDEzJzzp
M4:	https://youtu.be/frAu2PIxKjI
M5:	https://youtu.be/qNqrHO3woyE

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

Quiz, Group Discussions, In class assignments.

Course	Course outcomes: At the end of the course students will be able to										
CO1	Use the basics of complex numbers and functions in finding the solutions of engineering										
COI	problems.										
CO2	Solve complex integration problems arising in engineering problems.										
CO3	Understand and apply a wide range of probability distributions to solve problems.										
CO4	Understand and apply Stochastic process as mathematical models of systems and										
0.04	phenomena that appear to vary in a random mannerto solve problems.										
CO5	Design and implement appropriate sampling methods based on sample data.										

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		2								2
CO2	2	2		2								2
CO3	2	2		2								2
CO4	2	2		2								2
CO5	2	2		2								2

		1	
Course Title	Advance Surveying	Semester	IV
Course Code	CV252	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3:0:0	Total	100
Credits	03	Exam. Duration	3 Hours
Teaching Dept	Civil Engineering		

Course objective is to: This course will enable students to

- Apply geometric principles to arrive at solutions to surveying problems.
- Analyse spatial data using appropriate computational and analytical techniques.
- Design proper types of curves for deviating type of alignments. •
- Use the concepts of advanced data capturing methods necessary for engineering practice.

Module-1 L1, L2, L3 **08 Hours Theodolite Survey and Instrument Adjustment:** Theodolite and types, Fundamental axes and parts of Transit theodolite, uses of theodolite, Temporary adjustments of transit theodolite, measurement of horizontal and vertical angles, step by step procedure for obtaining permanent adjustment of Transit theodolite.

Trigonometric Levelling: Trigonometric leveling (heights and distances-single plane and double plane methods).

Module-2	L2, L3	08 Hours

Tacheometry: Basic principle, types of tacheometry, distance equation for horizontal and inclined line of sightin fixed hair method, problems.

Geodetic Surveying: Principle and Classification of triangulation system, Selection of base line and stations, Orders of triangulation, Triangulation figures, Selection and marking of stations.

Module-3	L1, L2, L3	08 Hours
Curve Surveying: Curves - Necessity - Types, Simple curves, Eleme	ents, Designatio	n of curves,
Setting out simple curves by linear method (numerical problems on offset	ets from long ch	ord), Setting
out curves by Rankin's deflection angle method (Numerical problems).	Compound curve	es, Elements,
Design of compound curves, Setting out of compound curves (numerical j	problems).	
Types of Reverse curve and Transition curves Characteristics.		

Уŀ

Module-4	L1, L2	08 Hours
Total Station Surveying - Features, parts, accessories and advantages o	f Total Station.	Surveying
with total station - Measurement of Horizontal angle, vertical angle,	distance, slop	e, vertical
distance, multiple angles with Total station.		

Construction Surveying - Setting out works using Total Station, Setting out buildings by Centre line method.

Coordinate survey with Total station - Measurement of coordinates using total station. Creating Job files, importance of back sight data, coordinate data recording. Data transferring, data refinement and plotting in

CAD.

Module-5L1, L208 Hours

GPS Surveying – Introduction. Overview of GPS system- space, control and user segments. Reference co- ordinate systems. Absolute and Differential positioning with GPS. Gagan system in India. Types of GPS Receivers. Application and uses of Remote sensing and GIS in engineering surveying.

Surveying with Drone – Introduction, applications and advantages. Features of photogrammetric mapping method. Drone surveying requirements- Drone platform, Flight planning software, Sensor DGPS equipment and Image processing software. Types of drones and sensors. Process of drone surveying – flight planning.

DGPS markers, capturing images, post processing of images using photogrammetry software and output maps.

Sugg	sested Learning Resources:
Text	books:
1	B.C. Punmia, "Surveying Vol. 2", Laxmi Publications Pvt Ltd., New Delhi.
2	Kanetkar T P and S V Kulkarni, Surveying and Leveling Part 2, Pune Vidyarthi Griha Prakashan,
3	K.R. Arora, "Surveying Vol. 1" Standard Book House, New Delhi.
Refer	ence Books:
1	S.K. Duggal, "Surveying Vol. I & II", Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2	R Subramanian, Surveying and Leveling, Second edition, Oxford University Press, New Delhi.
3	David Clerk, Plane and Geodetic Surveying Vol1 and Vol2, CBSpublishers
4	B Bhatia, Remote Sensing and GIS, Oxford University Press, New Delhi.
Web l	inks and Video Lectures (e-Resources):
•	NPTEL courses
•	https://enterprise.dji.com/surveying/land-surveying
•	https://www.gps.gov/applications/survey/
•	https://www.constructionplacements.com/total-station-in-surveying-types-uses-and-
	applications/
•	https://www.youtube.com/watch?v=bbs5AEPstl4
•	https://www.youtube.com/watch?v=KHI4TEeexuM&list=PLLy_2iUCG87DwNVc3Mz1
	<u>yYlRA42j SQ1t B&index=28</u>
•	https://www.youtube.com/watch?v=Iu9vrE48_I4&list=PLLy_2iUCG87DwNVc3Mz1y
	<u>YIRA42jS Q1tB & index=30</u>
•	https://www.youtube.com/watch?v=RXUi2cX4CkU
•	https://www.youtube.com/watch?v=SVa66vO08So.
Ac	tivity-Based Learning (Suggested Activities in Class)/ Practical Based learning
•	Field visits
•	Hand on use of various surveying instruments
•	Surveying Civil engineering block and plotting with instruments of student's choice
•	Setting out a single bedroom house plan in field
Cours	se outcomes: After a successful completion of the course, the student will be able to:
CO1	Apply the knowledge of geometric principles to arrive at surveying problems.
COD	Use modern instruments to obtain geo-spatial data and analyze the same to appropriate
02	Engineering problems.
CO2	Capture geodetic data to process and perform analysis for survey problems with the use of
COS	Electronic instruments.
CO4	Design and implement the different types of curves for deviating type of alignments.
005	
005	Demonstrate the necessary skills to carry out GPS and DRONE Surveying Assessment.

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO3
CO1	2	1		1	1				1	1				1
CO2	2	3	2	1					3	1				1
CO3	2	2	2	2	2				2	1				1
CO4	2	2	3	2	3				3					1
CO5	2	2	3	2	2				3	1				1

Surveying Practice lab-II							
Course Code	CV253	CIE Marks	50				
L:T:P	0:0:2	SEE Marks	50				
Hrs. / Week	2	Total Marks	100				
Credits	1	Exam Hours	03				

Course objectives : At the end of the course, the student will be able to:					
1	Ability to understand principles of both traditional and modern surveying applying				
	knowledgeof mathematics.				
2	Ability to handle surveying equipment's and software tools to carry out field				
	surveying, plottopographical Drawings and construction drawing.				
3	Ability to use Total station for data capture, data storage, data transfer.				
4	Ability to prepare construction drawing and setting out.				

Pgm. No.	List of Experiments / Programs	Hours	COs				
Prerequisite Experiments / Programs / Demo							
	Chain, Tape, Ranging rod, arrow, cross staff						
	PART-A	II					
1	Measurement of horizontal angle by repetition and reiteration methods.	02	CO1				
2	Measurement of vertical angles using theodolite	02	CO1				
3	Trigonometrical levelling: Single plane method and Double planemethod	02	C01				
4	To determine distance and elevation using tachometric surveying with horizontal and inclined line of sight.	02	CO2				
5	Setting out simple curve using long chord method using Theodolite	02	C01				
6	Setting out simple curve using Rankine's method using Theodolite	02	CO3				
	PART-B						
7	Setting up of Total station. Features and components of Total station	02	CO2				
8	Longitudinal sectioning and cross sectioning using Total station	02	CO2				
9	Measurement of Distance, slope, vertical distance, horizontal andvertical angles using Total station	02	CO3				
10	Visit to railway station/ large construction site to understand the importance of datum and benchmark.	02	CO4				
	PART-C						

Beyond Syllabus Virtual Lab Content Workshops/ Seminars/Guest Lectures/ hands on training. Various workshops, seminars, Expert talks by academicians/industrialists on different technologies are organized to gain the knowledge and the attainment of POs and PSOs.

Suggested Learning Resources:						
Textbooks/ Reference Books:						
Punmia BC, & Jain Ashok Kumar. (2016). Surveying (17th ed., Vol. 1). Laxmi						
1 Publications						
Dr. K. D. Arora (2010) Surveying (17th ed. Vol. 1) Standard Book House						
2 DI. K.K. Afola. (2019). Surveying (1/m ed., vol. 1). Standard book house.						
Web links and Video Lectures (e-Resources):						
https://enterprise.dji.com/surveying/land-surveying						
https://www.gps.gov/applications/survey/						
https://www.constructionplacements.com/total-station-in-surveying-types-uses-and- applications/						
https://www.youtube.com/watch?v=bbs5AEPstl4						
https://www.youtube.com/watch?v=KHI4TEeexuM&list=PLLy_2iUCG87DwNVc3Mz1yYlRA42jSQ1t						
B&index=28						
https://www.youtube.com/watch?v=Iu9vrE48_I4&list=PLLy_2iUCG87DwNVc3Mz1yYlRA42jSQ1tB						
&index=30						
https://www.youtube.com/watch?y=RXUi2cX4CkU						
https://www.youtube.com/watch?v=SVa66yO08So						
Activity Deced Learning (Suggested Activities in Cleas)/Dupotical Deced learning						
Acuvity-Dased Learning (Suggested Acuvities in Class)/ Practical Based learning						

- Hand on use of various surveying instruments.
- Surveying Civil engineering block and plotting with instruments of student's choice.
- Setting out a single bedroom house plan in field.

Course outcomes: At the end of the course, the student will be able to:						
CO1	Illustrate the use and applications of levelling using theodolite and total station.					
CO2	Plot longitudinal and cross sections for construction projects from total station.					
CO3	Comprehend effectively field procedures required for a professional surveyor.					
CO4	Use techniques, skills and conventional surveying instruments necessary for engineering practice.					

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PS O3
CO1	2	1		1	2				1	1				1
CO2	1	3	2	1	0				2	1				1
CO3	1	3	2	1	2				2	1				1
CO4	2	2	3	2	3				3	1				1

Course Title	Analysis of Determinate Structures	Semester	IV
Course Code	CV254	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3:0:0	Total	100
Credits	03	Exam. Duration	3 Hours
Teaching Dept	Civil Engineering		

Course objective is to:

- Apply knowledge of mathematics and engineering in calculating slope and deflections.
- Identify, formulate, and solve engineering problems.
- Analyze structural systems and interpret data.
- Engage in lifelong learning with the advances in Structural Engineering.

Module-1				RBT Level L1,L2, L3, L4	08 Hours
T (1 (1	 0 DI	T	a 1 a	a 11.1	

Introduction and Analysis of Plane Trusses: Structural forms, Conditions of equilibrium, Compatibility conditions, Degree of freedom, Linear and non-linear analysis, Static and kinematic indeterminacies of structural systems. Method of joints and Method of sections with problems.

Module-2 KBT Level 08 Hour L2, L3, L4 08 Hour

Deflection of Beams: Moment area method: Derivation, Mohr's theorems, Sign conventions, Application of moment area method for determinate prismatic beams, Beams of varying section, Use of moment diagram by parts.

Modulo 3	RBT Level	08 Hours
Woulde-5	L2, L3, L4	00 11001 5

Deflection of Beams contd: Conjugate beam method: Real beam and conjugate beam, conjugate beamtheorems, Application of conjugate beam method of determinate beams of variable cross sections.

Madula 4	RBT Level	00 Hound
Module-4	L2, L3, L4	Uð Hours

Energy Principles and Energy Theorems: Principle of virtual displacements, Principle of virtual forces, Strain energy and complimentary energy, Strain energy due to axial force, bending, shear and torsion, Deflection of determinate beams and trusses using total strain energy, Castigliano's theorems and its application to estimate the deflections of beams, Dummy unit load method.

Module-5 RBT Level L2, L3, L4	08 Hours
---	----------

Arches and Cable Structures: Three hinged parabolic and circular arches with supports at the same and different levels. Determination of normal thrust, radial shear and bending moment. Analysis of cables under point loads and UDL. Length of cables for supports at same and at different levels.

Suggested Learning Resources:

Textbooks:

1.	Reddy C S, Basic Structural Analysis, Tata McGraw Hill, New Delhi
2.	Muthu K U et.al, Basic Structural Analysis, 2nd edition, I K International Pvt. Ltd., New Delhi,2015
3.	Bhavikatti, Structual Analysis, Vikas Publishing House Pvt. Ltd, New Delhi, 2002.
Referen	ce Books:
1.	Devadas Menon, Structural Analysis, Narosa Publishing House, New Delhi, 2008.
2.	Prakash Rao D S, Structural Analysis, University Press Pvt. Ltd, 2007.
3.	Hibbeler, R.C., Structural Analysis, 9 th Edition., Pearson publications., New Delhi, 2012.
4.	S Ramamrutham and R Narayanan, Theory of structures, Dhanpat Rai Publishing Company

Web links and Video Lectures (e-Resources):

https://nptel.ac.in/courses/105105166 https://archive.nptel.ac.in/courses/105/101/105101085/

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Seminars /Quiz (to assist in GATE preparations)
- Demonstrations in using Software's
- Self-Study on simple topics
- Simple problems solving by Etabs/Staad pro.

Course	e outcomes:
CO1	Evaluate the forces in determinate trusses by method of joints and sections.
CO2	Evaluate the deflection of cantilever, simply supported and overhanging beams by different Method
CO3	Understand the energy principles and energy theorems and its applications to determine the Deflections of trusses and bent frames.
CO4	Determine the stress resultants in arches and cables.

CO-PO Mapping

oo i o mupping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2			2			2	1		3	3	
CO2	3	3	3	2	3	2			2	2		3	3	
CO3	3	3	3	2	3	3			2	2		3	3	
CO4	3	3	3	2	3	3			2	2		3	3	

Computer Aided Building Planning and Drawing

Course Code	CV255	CIE Marks	50
L:T:P	0:0:2	SEE Marks	50
Hrs. / Week	2	Total Marks	100
Credits	1	Exam Hours	03

Course Objectives : At the end of the course, the student will be able to:							
1.	Achieve skill sets to prepare, read and interpret computer aided engineering drawings						
2.	Understand the details of construction of different building elements.						
3.	Visualize the completed form of the building and the intricacies of construction based						
	on the engineering drawings.						

Pgm. No.	List of Experiments / Programs	Hours	COs
	Prerequisite Experiments / Programs / Demo		
	Drawing Basics: Selection of scales for various drawings, thickness of lines, dimensioning, abbreviations and conventional representations as per IS: 962.	2	C01
	PART-A		
1	Drawing Tools: Lines Circle, Arc, Poly line, Multiline, Polygon, Rectangle, Spline, Ellipse, modify tools: Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet,	2	CO1
2	Using Text: Single line text, Multiline text, Spelling, Edit text	2	CO1
3	Special Features: View tools, Layers concept, Dimension tools, Hatching, Customizing Toolbars, Working with multiple drawings.	2	CO1
4	 Drawings Related to Different Building Elements: Following drawings are to be prepared for the data given using CAD Software a) Cross section of size-stone masonry, brick masonry wall foundation. b) Different types of bonds in brick masonry. c) Different types of staircases – Dog legged, open well. 	2	CO2
5	Cross section of a pavement.	2	CO2
6	Layout plan of Rainwater recharging and harvesting system.	2	CO2
7	Cross sectional details of a road for a Residential area with provision for all services.	2	CO2
PART-B			
1	Drawing of Plan, elevation and sectional elevation including electrical, plumbing and sanitary services using CAD software for Single and double story residential building.	2	CO3
2	Drawing of Plan, elevation and sectional elevation including electrical, plumbing and sanitary services using CAD software for Hostel building.	2	CO3
3	Drawing of Plan, elevation and sectional elevation including Electrical, plumbing and sanitary services using CAD software forHospital building.	2	CO3

4	Drawing of Plan, elevation and sectional elevation including	2	CO3
	Electrical, plumbing and sanitary services using CAD software		
	forSchool building.		

PART-C

Beyond Syllabus	Virtual	Lab	Content
Deyonu Synabus	v II tuai	Lav	Content

Suggeste	d Learning Resources:					
Textbook	xs/ Reference Books:					
1	MG Shah, CM Kale, SY Patki, "Building drawing with an integrated approach to					
1.	Built					
	Environment Drawing", Tata Mc Graw Hill Publishing co. Ltd., New Delhi					
2.	Gurucharan Singh, "Building Construction", Standard Publishers, & distributors, New					
	Delhi.					
3	Malik R S and Meo G S, "Civil Engineering Drawing", Asian					
5.	Publishers/Computech					
	Publications Pvt Ltd.					
Web links	and Video Lectures (e-Resources):					
• <u>htt</u>	• <u>https://www.coursera.org/search?query=building%20information%20modeling</u>					
• <u>htt</u>	ps://www.nibs.org/					
• http	ps://www.youtube.com/user/TheDetchko					

• <u>https://www.linkedin.com/learning/topics/cad</u>

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Provide constraints and requirements for the design, such as building codes, space utilization goals, and aesthetic preferences.
- Encourage students to use CAD software like AutoCAD or Sketch Up to develop theirdesigns, incorporating principles of space planning, structural integrity, and building functionality.
- Assign design challenges that require students to create plans for specific scenarios, such as designing a residential house, office building, or public space.

Course	Course outcomes:							
CO1	Prepare, read and interpret the drawings in a professional set up.							
CO2	Know the procedures of submission of drawings and Develop working and submission drawings for building.							
CO3	Plan of residential or public building as per the given requirements.							

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		1	1		1	3	2	1	3	3	
CO2	3	3	3		1	1		1	3	3	1	3	3	
CO3	3	3	3		1	1		1	3	3	1	3	3	

Course Title	Environmental Engineering - I	Semester	IV
Course Code	CV256	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3:0:0	Total	100
Credits	3	Exam. Duration	3 Hours
Teaching Dept	Civil Engineering	·	

Course objective is to: This course will enable students to

- 1. Analyze the variation of water demand and to estimate water requirement for a community.
- 2. Evaluate the sources and conveyance systems for raw and treated water.
- 3. Study drinking water quality standards and to illustrate qualitative analysis of water.
- 4. Design physical, chemical and biological treatment methods to ensure safe and potable water Supply.

Madala 1	RBT Level/s	Hours: 8
Module-1	L1, L2, L3	

Introduction: Need for protected water supply. Demand of Water: Types of water demands -domestic demand, industrial, institutional and commercial, public use, fire demand, Factors affecting per capita demand, Variations in demand of water, Peak factor, Design period and factors governing design period. Different methods of population forecasting -with merits and demerits. Numerical Problems.

Module-2	RBT Level/s L1, L2, L3	Hours: 8
	21, 22, 23	

Intake structures - types of intakes –Factors to be considered in selection of intake structures. Sources and Characteristics: surface and subsurface sources -suitability with regard to quality and quantity. Sampling - Objectives, methods, Preservation Techniques. Water quality characteristics: Physical, Chemical and Microbiological. Drinking water Quality standards. Water Treatment: Objectives, Treatment flow chart – significance of each unit.

Model making on Intake Structures

Madula 2	RBT Level/s	Hours: 10
Module-5	L1, L2, L3	

Sedimentation -theory, settling tanks, types, design.

Coagulation aided sedimentation-types of coagulants, chemical feeding, flash mixing, Clariflocculators.

Filtration: mechanism -theory of filtration, types of filters, slow sand, rapid sand and pressure filters including construction, operation, cleaning. Operational problems in filters. Design of slow and rapid sand filter without under drainage system.

Ultra and micro filtration: Overview of ultra and micro filtration elements and systems, Fouling in MF/UF systems, fouling control and pre-treatment.

Model making on treatment units.

Madula 4	RBT Level/s	Hours: 7
Module-4	L1, L2, L3	

Disinfection: Methods of disinfection with merits and demerits, Theory of disinfection, chlorination, break-point chlorination, numerical examples.

Miscellaneous treatment: Softening: Overview of Lime soda, Zeolite process, RO and Nano filtration: Overview of RO and nano filtration membranes and elements, Conventional pre -treatment techniques for RO and nano filtration.

Fluoridation and De-fluoridation.

Model making on filtration and defloridation units

Madula 5	RBT Level/s	Hours: 7
Module-5	L1, L2, L3	

Collection and Conveyance of water:

Pumps: Types of pumps with working principles. Numerical Problems.

Pipes: Design of theeconomical diameter for the rising main; Numerical Problems.

Distribution system: Methods- Gravity, Pumping, Combined gravity and pumping system, Service reservoirs and their capacity determination.

Visit to Intake structure, Water treatment plant and report working of each unit Design of water treatment plant units and distribution system with population forecasting for the given city.

Suggested Learning Resources: Textbooks:

	Environmental Engineering by Howard S Peavy Donald R Rowe McGraw Hill Indian						
1.	Edition 2000						
r	Environmental Engineering vol Lby P.C. Dunmie, Levris Dublications, 2 nd edition, 2016						
Ζ.	Environmental Engineering vol-1 by B C Punnia, Laxini Publications, 2 edition, 2010						
3	Environmental Engineering vol-I, Water supply by S.K.Garg, Khanna Publishers, – New Delhi,						
5	28 th edition and 2017						
Ref	ference Books:						
	CPHEEO Manual on water supply and treatment engineering, Ministry of Urban Development,						
1	Government of India, New Delhi, 1999						
2	Water & Waste Water Technology, Mark.J Hammer, John Wiley & Sons Inc., New York, 2008						
We	b links and Video s (e-Resources):						
01:	: Background and Course Introduction <u>https://youtu.be/yDnrv-oGSBc</u>						
02:	02: Water Sources and Availability <u>https://youtu.be/K4Vty0cmybI</u>						
03:	: Water Uses <u>https://youtu.be/9H7dPkWOsjA</u>						
04:	: Water Supply Key Issues and Concerns <u>https://youtu.be/JueYGPbsflw</u>						
05:	05: Urban water services and water supply systems https://youtu.be/bCKm9KkcQtw						
06:	: Urban water services and water supply systems <u>https://youtu.be/s0hy0ZlM1bA</u>						
07:	: Components of Water Demand <u>https://youtu.be/mVmErXpIp64</u>						
08:	: Fluctuations in Water Demand <u>https://youtu.be/qXUwy5OnX9Q</u>						
09:	: "Concept of Design Period and Design Population Need to Forecast Population Population						
For	Forecasting Methods https://youtu.be/QyLdA_qhUog						
10:	Demand Forecasting and Design Capacities <u>https://youtu.be/rKTwjvx7E8A</u>						
Ac	tivity-Based Learning (Suggested Activities in Class)/ Practical Based learning						
_							

- <u>https://swayam.gov.in</u>
- <u>https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham</u>

Course	Course outcomes:					
CO1	Relate the relations between the environment and ecology, estimating water requirement for Public water supply scheme.					
CO2	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system					
CO3	To understand the principals of water treatment and design treatment units.					
CO4	Understand the uses of pumps and their applications, to devise cost effective water collection and distribution systems.					

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2			2	2	1				2		3
CO2	3	2	2			2	2	1				2		3
CO3	3	3	3			2	2	1				2		3
CO4	3	2	3			2	2	1				2		3

Course Title	Watershed Management	Semester	IV
Course Code	CV261	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/Week	2:2:0	Total	100
Credits	3	Exam. Duration	3 Hours
Teaching Dept.	Civil Engineering		

Course objective is to enable students:

Module-1

- To understand Watershed Hydrology
- To estimate water demand and learn, water conservation methods
- To understand application of Remote Sensing and GIS in watershed management •
- Sustainable measures for watershed management

RBT Level L1. L2 08 Hours

Principles of Watershed Management: Basics concepts, hydrology and wateravailability, surface water, ground water, conjunctive use, human influences in the water resources system.

Module-2 RBT Level L1, L2 08 Hours

Water resources systems: Integrated water resources system, river basins- morphometric analysis of watersheds for watershed management, watershed management practices in arid and semi-arid regions, watershed management through wells, management of water supply, short term and longterm strategic planning.

Module-3 **RBT Level L1, L2**

Conservation of Water: Perspective on recycle and reuse, wastewater reclamation, social aspects of watershed management and community participation, private sector participation, institutional issues, socio-economy, integrated development, water legislation and implementations, case studies.

Water Harvesting: Rainwater management, conservation, storage and effective utilization of rainwater, structures for rainwater harvesting, roof catchments system, check dams, aquifer storage.

Module-4					RB	F Level	l L1, L2	2	08	Но	ars
	A 1	с , ·	1.1	• ,	. 1	. 1	1			. 1	

Sustainable Watershed Approach: Sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, soil erosion and conservation.

Module-5

RBT Level L1, L2 08 Hours

Applications of RS and GIS in Watershed management: Role of decision support systemin watershed management, watershed characteristics of coastal regions, coastal aquifer tor management, uniqueness of coastal water resources.

08 Hours

Sugge	ested Learning Resources:
Textb	books:
1	Singh Vir, Raj., "Watershed Planning and Management", Yash Publishing House,
1	Bikaner.3 rd Revised Edition, 2016.
n	Murthy, J. V. S., "Watershed Management in India", New Age Publishers, New Delhi.
Z	2 nd Edition, 2017.
Refere	nce Books:
1	"Decision Support System for Integrated Watershed Management", Colorad State
1	University. 2012.
Web li	nks and Video Lectures (e-Resources):
•	https://www.youtube.com/watch?v=wkPu4LwRKro
•	https://youtu.be/wkPu4LwRKro
•	https://youtu.be/wkPu4LwRKro
•	https://youtu.be/wkPu4LwRKro
Activit	y-Based Learning (Suggested Activities in Class)/ Practical Based learning
•	Seminars/Quiz (To assist in GATE Preparations)
•	Self-Study on simple topics
•	Discussion of case studies
•	Field visits to construction sites

Course	Course outcomes:						
At the	At the completion of the course. The student shall be able to						
CO1	Discuss surface and ground water resources system and, human influences.						
CO2	Integrate water resources system in arid and semi-arid regions and explain watershed aquiferfor management.						
CO3	Analyse water resources related issues for conservation and synthesize augmentation of waterresources.						
CO4	Design integrated watershed management system.						
CO5	Apply modern tools in watershed management.						

CO-PO	Mapp	ing												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1				1	1						1	2
CO2	2	1				1	1						1	2
CO3	2	1				1	1						1	2
CO4	2	1				1	1						1	2
CO5	2	1				1	1						1	2

Course Title	Construction Equipment, Plants and Machinery	Semester	IV
Course Code	CV262	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/Week	2:2:0	Total	100
Credits	3	Exam. Duration	3 Hours
Teaching Dept.	Civil Engineering		

Course objective is to enable students:

- To provide insight on the different functions and operations of different equipment andtechniques during construction
- To impart knowledge on the various maintenance and safety to be considered during construction
- To acquire knowledge on the life cycle of a construction equipment
- To adopt mechanization in the Construction industry

Module-1	RBT Level L1, L2	08 Hours

Basics and Hydraulics of Construction Equipment: Introduction to Construction Equipment-Functions, Operations of Construction Equipment Introduction to Four & Two Stroke Engine and their components- Introduction and Components to Automobiles. Introduction to Principles of Hydraulic- Calculation of Pressure, Force & Flow- Components of a Hydraulic System- Basic layout of Hydraulic System Applications of Hydraulics- Strand Jack Operation

Module-2

RBT Level L1, L2 08 Hours

Concreting, Earth Moving, Road Making and Quarry/Mining Equipment: Operations of a Batching Plant - Introduction and Components of Concrete Pump & Placer- Concrete Pipeline-Laying and Cleaning- Bulldozer- Classification and Components- Classification, Components and Attachments of Excavator- Backhoe Loader- Classification & components- Introduction and classification to Hot mix Plant Process of Asphalt Paver-PQC Paver- Classification & Components- Motor Grader Classification & Components- Horizontal Movement Vehicles- Quarry/Mining

Module-3							RBT Level I	08 Hours		
Equipment	Life	Cycle	Management:	Life	Cycle	of	an	Equipment-	Equipment	Performance

Parameters - Introduction to Maintenance- Types of Maintenance- Maintenance Practices

Module-4RBT Level L1, L208 HoursTunneling Equipment / Piling Equipment: Introduction to Tunnel Boring Machines- Details and
Operation of a Hard-Rock TBM Details of Earth Pressure Balance (EPB) TBM- Details and
operation of Slurry TBM & Components- Hydraulic Grabs- Piling RigDetails and
Module-5Module-5RBT Level L1, L208 HoursMechanization and Digitalization in Construction and Safety in Construction Equipment:
Importance of Digital Analytics- Digital Solution in Construction Projects- Importance of

Mechanization – Railway Track Construction – rebar processing Machine-Operation of Mechanized Equipment- Introduction to 3D Concrete Printer- Importance of Safety- Various PPE & Purpose- Safety of Men & Machines at Work- Safety During Construction Activities Safety with Tools & Tackles.

Textbooks: 1 S.C.Sharma, "Construction Equipment and management" E-Book .2019 2 Dr. Manoranjan Samal, "Advanced Construction Techniques and Equipment" S.K. Kataria& Sons Reference Books: 1 Velumani. P, "Construction Techniques and Practices", SIA Publishers & Distributer PvtLtd, 2020. Web links and Video Lectures (e-Resources): • E-learning content on L&T EduTech Platform. Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning	Suggest	ed Learning Resources:
1 S.C.Sharma, "Construction Equipment and management" E-Book .2019 2 Dr. Manoranjan Samal, "Advanced Construction Techniques and Equipment" S.K. Kataria& Sons Reference Books: 1 Velumani. P, "Construction Techniques and Practices", SIA Publishers & Distributer PvtLtd, 2020. Web links and Video Lectures (e-Resources): • E-learning content on L&T EduTech Platform. Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning	Textboo	ks:
2 Dr. Manoranjan Samal, "Advanced Construction Techniques and Equipment" S.K. Kataria& Sons Reference Books: 1 Velumani. P, "Construction Techniques and Practices", SIA Publishers & Distributer PvtLtd, 2020. Web links and Video Lectures (e-Resources): • E-learning content on L&T EduTech Platform. Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning	1	S.C.Sharma, "Construction Equipment and management" E-Book .2019
2 Kataria& Sons Reference Books: 1 Velumani. P, "Construction Techniques and Practices", SIA Publishers & Distributer 1 PvtLtd, 2020. Web links and Video Lectures (e-Resources): • E-learning content on L&T EduTech Platform. Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning	2	Dr. Manoranjan Samal, "Advanced Construction Techniques and Equipment" S.K.
Reference Books: 1 Velumani. P, "Construction Techniques and Practices", SIA Publishers & Distributer PvtLtd, 2020. Web links and Video Lectures (e-Resources): • E-learning content on L&T EduTech Platform. Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning	Z	Kataria& Sons
1 Velumani. P, "Construction Techniques and Practices", SIA Publishers & Distributer PvtLtd, 2020. Web links and Video Lectures (e-Resources): • E-learning content on L&T EduTech Platform. Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning	Reference	e Books:
Image: PvtLtd, 2020. Web links and Video Lectures (e-Resources): • E-learning content on L&T EduTech Platform. Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning	1	Velumani. P, "Construction Techniques and Practices", SIA Publishers & Distributers
Web links and Video Lectures (e-Resources): • E-learning content on L&T EduTech Platform. Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning	1	PvtLtd, 2020.
E-learning content on L&T EduTech Platform. Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning	Web link	s and Video Lectures (e-Resources):
Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning	• E-	learning content on L&T EduTech Platform.
There is a more more more more than the second in the second second in the second seco	Activity-l	Based Learning (Suggested Activities in Class)/ Practical Based learning
• Visit to construction site to understand construction equipment's	• Vi	sit to construction site to understand construction equipment's

Course	Course outcomes:					
At the	At the completion of the course. The student shall be able to					
CO1	Evaluate equipment and techniques required during construction					
CO2	Understand the operation of a batching plant.					
CO3	Analyse the equipment life cycle management.					
CO4	Comprehend mechanization and digitalization in construction					

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			1			1		2	1		1	1	
CO2	1						2		2				1	
CO3	1			1						1			1	
CO4	1	1	1	2					1	1			1	

Course Title	Concrete Techniques and Practices	Semester	IV
Course Code	CV263	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	2:2:0	Total	100
Credits	3	Exam. Duration	3 Hours
Teaching Dept	Civil Engineering		

Course objective is to:

- To present the basics of concrete and different materials used in it.
- To impart knowledge on materials used in concrete, relevant Indian standard codes, and practical aspects on concreting activities at projects.
- To explain the importance of making good quality concrete to build durable structures.
- To introduce the Design of concrete mixes from the Industrial experiences at Sites and optimization of higher grades of Concrete.
- To learn the best practices in concrete construction from industry's decades of experiences, thumb rules, mitigation of concreting issues at Sites

Madula 1	RBT Level	08 Hours
Module-1	L1,L2	vð hours

Introduction to concrete, overview of materials- cement, low carbon cement, coarse aggregate and fine aggregate, and mineral admixture:- fly ash, GGBS, micro silica / silica fume, metakaolin / rice husk ash, composite cement and ultrafine materials, lab test - fineness of fly ash, recycled aggregate

		00 0	
Module-2	RBT Level	08 Hours	
	L1, L2		
Fresh Concrete: Workability, Factors affecting workability, Measureme	nt of workability	by different	
tests, Setting times of concrete - Effect of time and temperature on worka	ability.		
Water and chemical admixture: Source, requirements, limits and test	ing Blending of	aggregate -:	
Blending of fine and coarse aggregate, gradation for optimization and pra	ctical aspects.		
M. J. J. 2	RBT Level	00 11	
Widdule-3	L1,L2,L3	vo nours	
Mix design - Volumetric mix design, mix design by absolute volume me	ethod, worked ou	it practical	
examples based on industries experience at project sites over several	decades, higher	grades of	
concrete, high performance concrete, test on concrete: workability	of concrete, fle	exural and	
compressive strength tests.			
	1		
Module-4	RBT Level	08 Hours	
Module-4	L1, L2	00 11001 5	

Production of concrete: batching plant, calibration, mixing and transportation of concrete handling of concrete at construction, ready-mix concrete, pumping, placing of concrete with boom placers, levelling, vibration and compaction, cold joints, finishing and curing and protection of concrete.

3 Hours
31

Special types of concrete: self-compacting concrete, mass concrete, dry lean concrete, geopolymer concrete, pavement quality concrete, fiber reinforced concrete, composite concrete, lightweight concrete, ferrocement, shotcreteing, guniting, grouting, challenges faced at sites: plastic shrinkage cracks, plastic settlement, honey comb, bug holes, cover to concrete, do's and don'ts in concrete construction, site shoot, introduction on 3D printing.

Practice Experiments:

- 1. Testing of cement: Consistency, fineness, setting time, Specific Gravity, Soundness and strength.
- 2. Testing of fine aggregate: Specific Gravity, sieve analysis and zoning, bulking of fine aggregate, bulk density, silt content.
- 3. Testing of coarse aggregate: Specific Gravity, sieve analysis, bulk density, flakiness index, elongation index, water absorption & moisture content.

Open ended experiments leading to guided projects:

- 1. Concrete Mix design by ACI 211.1-91 method, IS code method as per 10262- 2019 & 456- 2000, DOE method
- 2. Tests on Concrete- Workability tests Slump cone test, compaction factor test, Vee-bee consistometer test, flow table test, strength tests- compressive strength, flexural strength, split tensile strength
- 3. Tests on Self-compacting concrete Slump cone test ,V-funnel, L-Box test

Suggested I	Learning Resources:				
Textbooks:					
1	Concrete Technology by M. S. Shetty, S Chand, New Delhi-110055.				
2	Concrete Technology by M. L. Gambhir, Tata McGraw-Hill.				
3	Concrete: Microstructure, Properties, and Materials, P. Kumar Mehta , Paulo J. M.				
5	Monteiro, McGraw-Hill Education				
Reference Bo	ooks:				
1	IS 456, IS 269, IS 516, IS 1786, IS 1893, IS 12269, IS 9103, IS 8112				
2	GambhirDhanpatRai&Sons, "Concrete Manual" -, New Delhi				
3	N.KrishnaRaju, "Concrete Mix Design" -, Sehgal – publishers				
1	IS:10262-2016, "Recommended guidelines for concrete mix design", Bureau of				
4	Indian Standards, New Delhi				
Web links ar	nd Video Lectures (e-Resources):				
• E-lear	ning content on L&T EduTech Platform				
• Com	nt https://www.sl.e.s.in/commons/105102012/1				

- Cement <u>https://nptel.ac.in/courses/105102012/1</u>
- Aggregates <u>https://nptel.ac.in/courses/105102012/6</u>
- Mineral admixtureshttps://nptel.ac.in/courses/105102012/11
- Chemical admixtures <u>https://nptel.ac.in/courses/105102012/9</u>
- https://nptel.ac.in/courses/105102012/10
- Concrete mix design <u>https://nptel.ac.in/courses/105102012/14</u>
- Concrete production & fresh concrete <u>https://nptel.ac.in/courses/105102012/19</u>
- Engineering properties of concrete https://nptel.ac.in/courses/105102012/23

- Dimensional stability & durability https://nptel.ac.in/courses/105102012/27
- Durability of concrete <u>https://nptel.ac.in/courses/105102012/31</u>
- Special concretes <u>https://nptel.ac.in/courses/105102012/36</u>

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Visit to construction site to understand concreting process
- Demonstrations
- Self-Study on simple topics
- Simple problems solving using Excel
- Virtual Lab Experiments

Cours	e outcomes:
CO1	Evaluate the properties of concrete by conducting test on cement, aggregate and concrete
	(with & without admixtures) for using the data for Mix design procedures
CO2	Understand the manufacturing process and asses the quality of green (L2)
CO3	Describe the properties of fresh and hardened concrete – Strength and Durability aspects
005	(L3)
CO4	Design the concrete mix for the given materials as per IS:10262-2019 provisions (L4)
CO5	Examine and Evaluate properties of Cement and Concrete

СО-РО	CO-PO Mapping													
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1		1	1	1			1				1	
CO2	3	1		1	1	1			1				1	
CO3	3	1		1	1	1			1				1	
CO4	3	1		1	1	1			1				1	
CO5	3	1		1	1	1			1				1	

	1	1						
Course Title	Finance for Professionals	Semester	IV					
Course Code	CV264	CIE	50					
Total No. of Contact Hours	40	SEE	50					
No. of Contact Hours/Week	2:2:0	Total	100					
Credits	3	Exam. Duration	3 Hours					
Teaching Dept.	Civil Engineering							
• To give learners an over Module-1	view of finance and develop their	RBT Level L1, L2	08 Hours					
Module-1 Economics: Introduction to ec	conomics, Economic policies, R	RBT Level L1, L2	08 Hours					
the economy								
Module-2		RBT Level L1, L2	08 Hours					
example, Accounting, finance & & uses of funds, Sources & u bookkeeping, Illustration of do profit & loss example, Profit profitability example 2	& auditing, Capital vs. revenue, C ses of funds example, Revenue uble entry book keeping, Unders and profitability, Profit and	Capital vs. revenue example 10 recognition principles, tanding profit & loss, U profitability example	nple, Sources Double entry Inderstanding					
Module-3		RBT Level L1, L2	08 Hours					
Financial Statement and Risk metrics & financial statement example, Funds flow analysis, cash flow analysis, Introductio Management of risk, understar management products example,	Analysis: Finance metrics & fin analysis example, understanding Example of funds flow analysis on to risk management, understanding risk management measurer Holistic look at risk management	ancial statement analys liquidity, understandir , Cash flow analysis, F nding risk managemen ment example, Understa	is, Finance ag liquidity Example of t example, anding risk					
Module-4 RBT Level L1, L2 08 Hours								
Time Value of Money: Time financial functions, Application example, Cost of capital, Co budgeting - example	value of money, understanding to ons of time value of money, G ost of capital example, Capital	ime value of money, un Capital structure, Capit budgeting, Understan	nderstanding al structure ding capital					
Modulo 5		DPT Lovel I 1 I 2	00 11.000					

Personal Finance: Financial Instrument, Approaches to investing, Ratios for investment, Portfolio management principles, Example of portfolio, forming a portfolio, Forming a portfolio example

Suggested Learning Resources:

Textbooks:

1 Financial Management: Theory & Practice | 11th Edition by Prasanna Chandra

Reference Books:

1 International Financial Reporting Standards (Bangalore Univ)

Web links and Video Lectures (e-Resources):

• E-learning content on L&T EduTech Platform.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

• Case study to understand the project finance concept

Course	Course outcomes:									
At the	completion of the course. The student shall be able to									
CO1	Understand how their work and effort contribute to organizational financial performance									
CO2	Comprehend financial acumen and tools to optimize outcomes									

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1				1	1						1	2
CO2	2	1				1	1						1	2

Course Title	Green Building	Semester	IV
Course Code	CV271	CIE	50
Total No. of Contact Hours	30	SEE	50
No. of Contact Hours/week	2:0:0	Total	100
Credits	02	Exam. Duration	3 Hours
Teaching Dept	Civil Engineering		

Course objective is to:

- Understand the Definition, Concept & Objectives of the terms cost effective construction and green building.
- Apply cost effective techniques in construction.
- Apply cost effective Technologies and Methods in Construction.
- Understand the Problems due to Global Warming.
- State the Concept of Green Building.
- Understand Green Buildings.

Module-1	RBT Level L1, L2	06 Hours
----------	---------------------	----------

Introduction to the concept of cost effective construction -Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- LimePoszolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building materials

Module-2	RBT Level L1, L2	06 Hours
Environment friendly and cost effective Building Technologies - I	Different substit	ute for wall
construction Flemish Bond - Rat Trap Bond - Arches - Panels - Cavit	y Wall – Ferro	Cement and

Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products – steel and plastic -Contributions of agencies - Cost ford - Nirmithi Kendra – Habitat

Modulo 3	RBT Level	06 Hours
Widdule-5	L1,L2	00 11001 5

Global Warming – Definition - Causes and Effects - Contribution of Buildings towards Global Warming -Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition – Features Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings – Heat island effect.

Module-	4	RBT Level L1,L2,L306 Hours									
Green B	uilding rating Systems- BREEAM – LEED - GREEN STAR	-GRIHA (Gree	en Rating for								
Integrated Habitat Assessment) for new buildings - Purpose - Key highlights - Point System with											
Differential weight age. Green Design - Definition - Principles of sustainable development											
Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials											
Integrated Lifecycle design of Materials and Structures (Concepts only)											
Module-	5	RBT Level L1,L2	06 Hours								
Utility of	f Solar Energy in Buildings										
Utility of	Solar energy in buildings concepts of Solar Passive Cooling and	d Heating of Bu	ildings. Low								
Energy C	cooling. Case studies of Solar Passive Cooled and Heated Building	igs, solar panelli	ng design.								
Concepts	s of Green Composites Water Utilization in Buildings Low F	Energy Approach	hes to Water								
Manager	nent. Management of Solid Wastes. Management of Sullage	Water and Sev	wage. Urban								
Environ	nent and Green Buildings. Green Cover and Built Environment.		e								
Sugges Textbo	ted Learning Resources: ooks:										
1	HarharaIyer G, Green Building Fundamentals, Notion Press										
2	Abe Kruger and Carl Seville, "Green building: principals and	practice in resi	dential								
2	construction", Cengage Learning										
Referen	ce Books:										
1	Dr. Adv. HarshulSavla, Green Building: Principles & Practices										
2	Handbook on Green Practices published by Indian Society of	Heating Refrig	eratingand								
2	Air conditioning Engineers, 2009.										
3	Standard for the design for High Performance Green Building	ngs by Kent Pe	terson, 2009								
4	Complete Guide to Green Buildings by Trish riley										
Web lin	ks and Video Lectures (e-Resources):										
• <u>1</u>	nttps://www.youtube.com/watch?v=THgQF8zHBW8										
• 1	https://www.youtube.com/watch?v=DRO_rIkywxQ										
Activity	-Based Learning (Suggested Activities in Class)/ Practical Ba	sed learning									
• \$	Students have to visit a building which is green rated and prepare	a report									
Course	outcomes:										
CO1	Select different building materials for construction										
CO^2	Apply effective environmental friendly building technology										
CO_2	Analyze global warming due to different materials in construction	n									
CO_4	Analyze global warming due to different materials in construction	<u>'11</u>									
CO4	Analyze buildings for green failing										
005	Use alternate source of energy and effective use water		CO5 Use alternate source of energy and effective use water								

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1				1	1							2
CO2	2	1				1	1							2
CO3	2	1				1	1							2
CO4	2	1				1	1							2
CO5	2	1				1	1							2

Course Title	Problem Solving with PYTHON	Semester	IV
Course Code	CV272	CIE	50
Total No. of Contact Hours	30	SEE	50
No. of Contact Hours/Week	2:0:0	Total	100
Credits	02	Exam. Duration	3 Hours
Teaching Dept.	Civil Engineering		

Course objective is to enable students:

- To understand why Python is a useful scripting language for developers.
- To read and write simple Python programs
- To learn how to identify Python object types.
- To learn how to write functions and pass arguments in Python.

Module-1RBT Level L1, L206 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

Module-2	RBT Level L1, L2	06 Hours
----------	------------------	----------

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

Module-3	RBT Level L1, L2	06 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.

Module-4	RBT Level L1, L2	06 Hours
Solving initial value problems for ODE systems using sci RK45, LSODA. Numerical integration of functions using So Definite integral using Gaussian quadrature – quad and qua- samples using scipy.integratesubpackage– Trapezoidal rul Simpson, Romberg integration romb.	py.integrate sub package – ciPy: Using scipy.integratesu drature Numerical integration e trapezoid, Simpson's 1/3	solve_ivp, lbpackage— on of fixed rule using

Module-5	RBT Level L1, L2	06 Hours

Determining roots of equations using SciPy using scipy optimize sub package– 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.

Suggested Learning Resources:

Textbooks:

1

- R. Nageswara Rao, "Core Python Programming", dreamtech
- 2 Python Programming: A Modern Approach, Vamsi Kurama, Pearson

Reference Books:

1 Python Programming , Reema theraja, OXFORD publication

Web links and Video Lectures (e-Resources):

- NumPy documentation at https://numpy.org/doc/
- SciPy documentation at https://docs.scipy.org/doc/scipy/
- Matplotlib documentation at <u>https://matplotlib.org/stable/users/index</u>
- SymPy documentation at https://docs.sympy.org/latest/index.html.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

• Real world problem solving: Demonstration of projects developed using python language

Course	Course outcomes:				
At the	completion of the course. The student shall be able to				
CO1	Understand Python syntax and semantics and be fluent in the use of Python flow control				
COI	andfunctions.				
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	Mapp	ing												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1				1	1							2
CO2	2	1				1	1							2
CO3	2	1				1	1							2
CO4	2	1				1	1							2

Course Title	Smart Urban Infrastructure	Semester	IV
Course Code	CV273	CIE	50
Total No. of Contact Hours	30	SEE	50
No. of Contact Hours/Week	2:0:0	Total	100
Credits	02	Exam. Duration	3 Hours
Teaching Dept.	Civil Engineering	L	1

Course objective is to enable students:

- Knowing about Urban Infrastructure Systems & their Management
- Knowing about Smart Cities Key Concepts
- Understand the Transport and Energy Smart Urban Infrastructure and Services
- Developing Feasibility Studies for Smart City Services
- Understand the Global Context of Smart Cities

Module-1	RBT Level L1, L2	06 Hours

Introduction to Smart Urban Infrastructures and Smart Cities: Introduction to smart city, Basic concept of developing smart city, Global standards to create smart city. Different conceptual approaches to Smart Cities and discussing the pros and cons of each approach. Smart urban Infrastructure: List of infrastructure facilities, advantages and disadvantages

Module-2	RBT Level L1, L2	06 Hours

Smart Urban Energy Systems: Introduction to Smart Energy Systems, Government policy and technology. Energy sector to explore some of the most important managerial considerations in the transition phase and operation of Smart Urban Energy Systems.

Module-3	RBT Level L1, L2	06 Hours

Smart Transportation Technologies: Introduction to smart transportation system, Mode of transport systems for smart city, data collection to arrive at best transport facility. Significant opportunities and threads for legacy urban transportation systems. Managerial considerations to facilitate the transition phase, and operation of Smart Urban Transportation Systems

Module-4RBT Level L1, L206 Hours

Towards Smart Cities: Important factors in the transition phase of legacy cities to Smart cities and their managerial implications.

Module-5

RBT Level L1, L2 06 Hours

oo mours

Towards Smart Cities: Management of Smart Cities calls for different approaches from conventional urban management approaches. The role of city government in the network of actors who play an important role in management of Smart Cities.

Suggested 1	Learning Resources:
Textbooks:	
1	Infrastructure for Smart Cities, Dr. R P Rathaliya, Shree Hari Publications, 2021
2	Building Smart Cities, ISBN-13 978-1032340128, by Carol L. Stimmel, 2022
Reference B	ooks:
	Smart Cities for Sustainable Development, Ram Kumar Mishra, Ch Lakshmi
1	Kumari, Sandeep Chachra, P.S. Janaki Krishna, Springer, ISBN-13 978-9811674099,
	2022
Web links a	nd Video Lectures (e-Resources):
https://www.	coursera.org/learn/smart-cities
Activity Do	and Learning (Suggested Activities in Class)/Dractical Dased learning
ACTIVITY Ba	sed Learning (Suggested Activities in Class)/ Practical Based learning

Course outcomes:

At the	At the completion of the course. The student shall be able to		
CO1	Understand the concept of smart city		
CO2	Play the role of a civil engineer in providing smart infrastructure		
CO3	Design efficient energy system for smart city		
CO4	Analyze and design efficient transport system		

CO-PO Mapping CO/PO PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PSO1 PSO2 CO1 **CO2** CO3 **CO4**

Course Title	Personality Development for Civil Engineers	Semester	IV	
Course Code	CV274	CIE	50	
Total No. of Contact Hours	30	SEE	50	
No. of Contact Hours/Week	2:0:0	Total	100	
Credits	02	Exam. Duration	3 Hours	
Teaching Dept.	Civil Engineering			
Course objective is to enable students:				

- To offer placement focused guidance across interview best practices, formal communication, and business etiquette
- To give learners a comprehensive understanding of job skills and knowledge that are essential for adapting to changes in workplace

Module-1	RBT Level L1, L2	6 Hours	
LSRW and Personality Development: Importance of LSR	RW Skills: Art of listening	- Listening	
comprehension – Art of Speaking – Art of Reading – Read	ling comprehension – Art o	of Writing –	
email writing Personality Development: Emotional Inter-	elligence – Self Awarene	ess – Self	
Management – Personal SWOT – Manners & Etiquette – H	Positive Attitude – Confider	ice building	
Interpersonal Skills: Active Listening - Motivation - Fle	exibility – Patience – Depe	endability –	
Adaptability - Interpersonal & Intrapersonal skills - Body La	inguage	-	
Module-2	RBT Level L1, L2	6 Hours	
NVC, Presentation and Teamwork: Non - Verbal Commu	inication: Body language -	Gestures -	
Postures - Eye contact - Hand Shake - First impression	on – Proxemics – Facial	Expressions	
Presentation Skills: 4P's of Presentation - Communicating w	vith Credibility – Audience a	analysis and	
Building Rapport – Usage of Figures, diagrams & Charts	- Presenting with Confider	nce – Body	
Language in Presentation Teamwork: What is a Team - Stage	es of a Team – Benefits of Te	eam work &	
Collaboration - Group vs Team - Types of Teams - Roles of	the Team		
Module-3	RBT Level L1, L2	6 Hours	
Etiquette and Management: Critical Thinking & Problem So	lving: Core Skills – Uses &	Importance	
of Critical Thinking - Principles of Critical Thinking - Fact	s about Problem Solving – S	Skills to use	
in Problem Solving - Problem Solving Process - Barriers t	o Problem Solving Time M	lanagement:	
Managing your time – Time wasters – Analyzing your Strengths and weakness – Goal Setting – Why			
Goal Setting is important - SMART Goals - Types of Goals	Business Etiquette: Types of	Etiquette –	
Importance of Etiquette – Meeting Etiquette – Office Etique	tte – Phone and email Etique	ette – Work	
Place Etiquette			
Module-4	RBT Level L1, L2	6 Hours	
Leadership: Leadership Skills: What makes an effective Leadership	der – Relationship Building	– Leader vs	
Boss – Decision Making Skills – Innovation & Motivation –	Dependability Business Wr	iting – How	
to improve your Business writing skills – Importance of Bus	siness writing – how to write	e effectively	
-5C's of Business writing -4 types of Business writin	g Conflict Management: S	trategies of	
Conflict Management – Best practices for Conflict Resolution	n-Stress Management – Lear	n to say No	
– Importance of Conflict Management at Work Place	C	5	
Module-5	RBT Level L1, L2,L3	6 Hours	
V GD Creativity and Psychometry: Group Discussion: Type	$r_{\rm CD} = 100000000000000000000000000000000000$	Proactive –	
Time management & how to stick to it – Importance of L	istening - Do's & Don'ts (Creativity &	
Innovation: What is Creativity – What is Innovation – Difference between Creativity & Innovation –			
Categories and misconception of Creativity Psychometric Analysis: What is Psychometric Analysis			
- Cognitive Skills - Importance of Personality Tests - Personality Profiling			

Suggested I	Suggested Learning Resources:				
Textbooks:					
1	1. Personality Development And Soft Skills, Barun K Mitra, 2nd edition, Oxford University Press, 2016 2. 3.				
2	Power of Positive thinking, Norman Vincent Peale, ISBN-13 978-0091906382, RHUK, 2016				
Reference Bo	ooks:				
1	Magic of thinking Big, David J Schwartz, ISBN-13 978-1785040474, Vermilion, 2016				
Web links an	nd Video Lectures (e-Resources):				
• E-lea	urning content on L&T EduTech Platform.				
Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning					
• Select a topic and write an essay					
Conduct group discussion					

Course outcomes: At the completion of the course. The student shall be able to				
CO1	Use English as a medium of communication in interviews and in any professional working environment proficiently.			
CO2	Develop necessary skills to Answer common interview questions, express confidence in body language and present with clarity			

CO-PO	Mapp	ing												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1				1	1							2
CO2	2	1				1	1							2
CO3	2	1				1	1							2

Course Title	Biology for Engineers	Semester	IV
Course Code	BG257	CIE	50
Total No. of Contact Hours	30	SEE	50
No. of Contact Hours/Week	2:0:0	Total	100
Credits	2	Exam. Duration	3 Hours
Teaching Dept.	Basic Sciences		

Course objective is to enable students:

- Acquire an understanding on basic modern biological concepts with an emphasis on how bioprocesses are analogous to engineering field, as a multidisciplinary field.
- Understand basic engineering principles imminently run physiological processes particularly about engineering designs and solutions that are arrived citing body functional examples.
- Explain aspects that many bio-solutions could be foundational to design, develop better processes, products and useful to achieve quality of life.

Module-1	RBT Level L1, L2	6 Hours

Biomimetic:

Biology for Engineers, Body Fluid: Blood – Mechanics of heart, Blood pressure, Life molecules: Water, Carbohydrates, Proteins, Lipids and Nucleic acids, Biomimetic: Bio-processes- engineering analogies.

Module-2	RBT Level L1, L2	6 Hours

Bioenergy:

Unit of life: Human and Plant cell, Metabolism: Enzymes as Bio-catalysts and physiological entities, Anabolism – Bioenergy from Sun-Photosynthesis, catabolism.

Module-3	RBT Level L1, L2	6 Hours
----------	------------------	---------

Biomechanics (Human body Movement Mechanics)

Normal Human Movement: Force-vector of body; Movement Angles; Muscle contraction-relaxation; Posture – Static & Dynamic; Ideal and abnormal posture, Practical: Stepping- Lifting- Sit-Stand.

Module-4	RBT Level L1, L2	6 Hours

Bioelectronics

Brain & Computer: Senso-neural networks, Biosensors and IoT as applied to biology, Bionic Eye: Mechanism of Vision, Electronic Nose: Bio-olfactory mechanisms (Science of smell), Impulses: Cardiac and Nerve, Biological Clock and Circadian rhythm/

Module-5	RBT Level L1, L2,L3	6 Hours

Biopharma:

Metabolic syndromes, Cancer and its diagnostics, Lab on a chip, Drug Discovery

Suggeste Textbook	d Learning Resources:
1	Campbell, N.A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S.A.; Minorsky, P.V.;
1	Jackson, R. B. Pearson. "Biology: A global approach", , Global Edition, 10/E, 2014
2	David Nelson, Michael Cox. "Lehniger Principles of Biochemistry". W H Freeman &
	Company, Seventh Edition, 2017.

Reference Books:

1Janine M Benvus. "Biomimicry: Innovation inspired by Nature". William Morrow
Paperbacks, 2002.

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Real world problem solving and puzzles using group discussion.
- Demonstration of solution to a problem though experiential learning.
- Demonstration using real objects taking students on educational tour.

Course outcomes:

At the completion of the course. The student shall be able to

CO1	Apply and utilize essential knowledge of the biological mechanisms of living organisms
	from the perspective of engineers and find solutions to solve bio-engineering problems with
	appropriate tools.
CO2	Distinguish and make use of optimal designs in engineering that are bio-mechanical in
	nature and build and use by observing and understanding bio-physiological processes
	involved in sensing, locomotion, and knowledge application of range of bio-chemicals.
CO3	Demonstrate that bio-chemical, bio-sensory, bioprocesses could be path-finders to optimize
	similarities for functional aspects of electronic, computer, mechanical, electrical machines.

CO-PO	CO-PO Mapping											
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					1
CO2	3	1	1				1					1
CO3	3	1	1				1					1

Γ			,
Course Title	NSS - Phase 2	Semester	IV
Course Code	NS258	CIE	50
Total No. of Contact Hours	25 Hours	SEE	0
No. of Contact Hours/week	0:2:0	Total	50
Credits		Exam. Duration	
Teaching Dept.	Any Department		

Course objective is to: National Service Scheme (NSS) will enable the students to:

- Understand the community in which they work.
- Identify the needs and problems of the community and involve them in problem-solving
- Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems
- Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes
- 5. Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony

Module:1	RBT Level/s :L1, L2	4 Hours
----------	------------------------	---------

Organic farming

Indian Agriculture (Past, Present and Future) Connectivity for marketing. Waste management– Public, Private and Govt organization, 5 R's.Plantation and adoption of plants. Know your plants. Awareness on Organic farming.

Module:2	RBT Level/s :L1, L2	3 Hours
----------	------------------------	---------

Developing Water conservation techniques

To develop sustainable water management system, – Role of different stakeholders– Implementation Developing Sustainable Water management system for rural areas and implementation approaches.

Module: 3	RBT Level/s :L1, L2	8 Hours
-----------	------------------------	---------

Activity Based Programmes:

A. Campus Activities: Celebration of national importance days

Awareness Programmes – Preparing an actionable business proposal for enhancing the village income and approach for implementation. Importance of health, hygiene, and sanitation Healthy life style, HIV /AIDS, drugs and substance

Module: 4RBT Level/s :L1, L210

Off Campus Activities:

Govt. school Rejuvenation and helping them to achieve good infrastructure and results, Women Empowerment Programme, Health Camps, Blood grouping awareness and Blood donation, Legal awareness Programme, Literacy Programme, Water Conservation Programme, One Day Special Camp in a village (preferably in adopted village.

Course outcomes: At the completion of the course. The student shall be able to							
CO1	Describe the concept of Youth and compare the international definitions of the term Youth.						
CO2	Students will be able to appreciate our demographic advantage and its role in nation building.						
CO3	Know the growth and evolution of NSS and its role in Nation building through community service						
CO4	Visualize the signs, symbols, logo of NSS and understand their broader meaning.						

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1	1					1
CO2						1	1					1
CO3						1	1					1
CO4						1	1					1
Course Title	Physical Education (PE) (Sports and Athletics) – Phase 2	Semester	IV									
----------------------------	--	----------------	----	--								
Course Code	PE258	CIE	50									
Total No. of Contact Hours	25 Hours	SEE	0									
No. of Contact Hours/Week	0:2:0	Total	50									
Credits		Exam. Duration										
Teaching Dept	Sports											

Course objective:

Physical education aims to develop all aspects of the human personality through physical and sports activities. Being a subject of science, it has its own value in society and human life. Physical Education is a form of one of the most effective means of education imparted through exercises, fun activities and sports. It is an integral part of the education system. It caters to the need for development of the students on physical, mental and social aspects.

Module – 1	RBT Level/s :L1, L2	5 Hours

Ethics and Moral Values:

- A. Ethics in Sports.
- B. Moral Values in Sports and Games

Module – 2 RBT Level :L1, L2	15 Hours
---------------------------------	----------

Specific Games (Any one to be selected by the student)

- A. Volleyball Attack, Block, Service, Upper Hand Pass and Lower hand Pass.
- B. Throw ball Service, Receive, Spin attack, Net Drop & Jump throw.
- C. Kabaddi Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus.
- D. Kho-Kho Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 up.
- E. Table Tennis Service (Fore Hand & Back Hand), Receive (Fore Hand & BackHand), Smash.
- F. Athletics (Track / Field Events) Any event as per availability of Ground.

	•		
Module - 3RBT Level/s :L1, L25 Hour	Module - 3	RBT Level/s :L1, L2	5 Hours

Role of Organization and administration

Course At the	e outcomes: end of the course, the student will be able to
CO1	Understand the ethics and moral values in sports and athletics.
CO2	Perform in the selected sports or athletics of student's choice
CO3	Understand the roles and responsibilities of organization and administration of sports and games

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1			1	1					1
CO2			1			1	1					1
CO3			1			1	1					1

High-3, Medium-2, Low-1

Course Title	Yoga for a Better Life - Phase 2	Semester	IV	
Course Code	YG258	CIE	50	
Total No. of Contact Hours	25	SEE	0	
No. of Contact Hours/week	0:2:0	Total	50	
Credits	0	Exam. Duration		
Teaching Dept				

Course objectives:

- To enable the student to have good health.
- To practice mental hygiene.
- To possess emotional stability.
- To integrate moral values.
- To attain higher level of consciousness.

SEMESTER IV	RBT Level/s :L1, L2	25 Hours
-------------	------------------------	----------

Patanjali's Ashtanga Yoga, its need and importance. Yama :Ahimsa, Satya, asteya, brahmacarya, aparigraha Niyama :shoucha, santosh, tapa, svaadhyaya, Eshvarapranidhan.

Suryanamaskar12 count- 4 rounds of practice

Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana Different types of Asanas

a. Sitting

- 1. Sukhasana
- 2. Paschimottanasana

b. Standing

- 1. Ardhakati Chakrasana
- 2. Parshva Chakrasana

c. Prone line

1. Dhanurasana

d. Supine line

- 1. Halasana
- 2. Karna Peedasana

Meaning, importance and benefits of Kapalabhati. 40 strokes/min 3 rounds Meaning, Need, importance of Pranayama.

Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama Pranayama –

1. Suryanuloma –Viloma 2. Chandranuloma-Viloma 3. Suryabhedana 4. Chandra Bhedana 5. Nadishodhana

Suggested Learning Resources: Textbooks:

- 1. Yogapravesha in Kannada by Ajitkumar
- 2. Light on Yoga by BKS Iyengar
- 3. Teaching Methods for Yogic practices by Dr. M L Gharote & Dr. S K Ganguly
- 4. Yoga Instructor Course hand book published by SVYASA University, Bengaluru
- 5. Yoga for Children step by step by Yamini Muthanna

Web links and Video Lectures (e-Resources): Refer links

- <u>https://youtu.be/KB-TYlgd1wE</u>
- <u>https://youtu.be/aa-TG0Wg1Ls</u>

The Health Benefits of Yoga

The benefits of various yoga techniques have been supposed to improve

- body flexibility,
- performance,
- stress reduction,
- attainment of inner peace, and
- Self-realization.

The system has been advocated as a complementary treatment to aid the healing of several ailments such as;

- coronary heart disease,
- depression,
- anxiety disorders,
- asthma, and

• Extensive rehabilitation for disorders including musculoskeletal problems and traumatic brain injury.

The system has also been suggested as behavioral therapy for smoking cessation and substance abuse (including alcohol abuse). If you practice yoga, you may receive these physical, mental, and spiritual benefits:

• Physical

- 1. Improved body flexibility and balance
- 2. Improved cardiovascular endurance (stronger heart)
- 3. Improved digestion
- 4. Improved abdominal strength
- 5. Enhanced overall muscular strength
- 6. Relaxation of muscular strains
- 7. Weight control
- 8. Increased energy levels
- 9. Enhanced immune system

• Mental

- 1. Relief of stress resulting from the control of emotions
- 2. Prevention and relief from stress-related disorders
- 3. Intellectual enhancement, leading to improved decision-making skills
- Spiritual
 - 1. Life with meaning, purpose, and direction
 - 2. Inner peace and tranquility
 - 3. Contentment

Course	Course outcomes:										
At the completion of the course. The student shall be able to											
CO1	Understand the meaning, aim and objectives of Yoga.										
CO2	Perform Suryanamaskar and able to Teach its benefits.										
CO3	Understand and teach different types of Pranayama, Asanas by name, its importance, methods and benefits.										
CO4	Instruct Kapalabhati and its need and importance.										
CO5	Coach different types of Kriyas, method to follow and usefulness.										

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1			1	1					1
CO2			1			1	1					1
CO3			1			1	1					1
CO4			1			1	1					1
CO5			1			1	1					1

High-3, Medium-2, Low-1