D Y Patil College of Engineering, Akurdi, Pune

Department of Civil Engineering

S Y B. Tech Autonomy Curriculum

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D Y Patil College of Engineering, Akurdi, Pune

An Autonomous Institute from AY 2024-25, Affiliated to Savitribai Phule Pune University, Pune

D Y Patil College of Engineering, Akurdi, Pune														
SY B Tech Civil Engineering Semester III														
Course Code	Course	Teaching Scheme				Evaluation Scheme								
							Theory % Marks			Practical % Marks				
		L	T	P	Cr	Exam	Max	Min for Pass		Max	Min For Pass			
CV124PC301	Applied Mathametics	2	0	0	2	CCE	50	20	40					
						ESE	50	20						
CV124PC302	Mechanics of Structures	3	0	0	3	CCE	50	20	40					
						ESE	50	20						
CV124PC303	Mechanics of Structures Lab	0	0	2	1	CCE				50	20	40		
						ESE				50	20			
CV124PC304	Surveying	3	0	0	3	CCE	50	20	40					
						ESE	50	20						
CV124PC305	Surveying Lab	0	0	2	1	CCE				50	20	40		
						ESE				50	20			
CV124MD306	Environment and Sustainability	2	0	0	2	CCE	50	20	40					
						ESE	50	20						
CV124OE307	Maintenance Management	3	1	0	4	CCE	50	20	40					
						ESE	50	20						
CV124EE308	Project Management	2	0	0	2	CCE	50	20	40					
						ESE	50	20						
CV124VC309	Sustainable Development-I	2	0	0	2	CCE	50	20						
CV124FP310	Field Engineering Project	0	0	4	2	CCE	100	40						
NC1	Design Thinking	0	0	2	0	CCE	50	20						
NC2	Aptitude & Technical Mastery for Placements-I	0	0	2	0	CCE	50	20						
	Total	**17**	**1**	**12**	**22**									
				Hrs										
L	Lecture	**Theory**		**18**										
T	Tutorial	**Pract/Lab**		**12**										
P	Practical	**Total**		**30**										
Cr	Credits													
NC	Non Credit Course (Pass/Fail)													
CCE	Continuous ComprehensiveEvaluation													
ESE	End Semester Examination													

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D Y Patil College of Engineering, Akurdi, Pune													
SY B Tech Civil Engineering Semester IV													
Course Code	Course	Teaching Scheme				Evaluation Scheme							
							Theory Marks			Practical Marks			
		L	T	P	Cr	Exam	Max	Min for Pass		Max	Min for pass		
CV124PC401	Concrete Technology	2	0	0	2	CCE	50	20	40				
						ESE	50	20					
CV124PC402	Concrete Technology Lab	0	0	2	1	CCE				50	20	40	
						ESE				50	20		
CV124PC403	Building Technology and Architectural Planning	3	0	0	3	CCE	50	20	40				
						ESE	50	20					
CV124PC405	Building Technology and Architectural Planning lab	0	0	2	1	CCE				50	20	40	
						ESE				50	20		
CV124PC406	Structural analysis	3	0	0	3	CCE	50	20	40				
						ESE	50	20					
CV124MD407	Air Pollution and Solid Waste Management	2	0	0	2	CCE	50	20	40				
						ESE	50	20					
CV124OE408	Investment Management	2	0	0	2	CCE	50	20	40				
						ESE	50	20					
CV124VS409	Computer Aided Design	1	0	2	2	CCE	100	40					
CV124AE410	Workplace and Life Readiness Category	1	0	2	2	CCE	100	40					
CV124EE411	Entrepreneurship, Economics and Financial Management	2	0	0	2	CCE	50	20	40				
						ESE	50	20					
CV124VE412	Sustainable Development-II	2	0	0	2	CCE	50	20					
NC3	Engineering Geology & Rock Mechanics	2	0	0	0	CCE	50	20					
NC4	Aptitude & Technical Mastery for Placements-II	0	0	2	0	CCE	50	20					
	Total	**20**	**0**	**10**	**22**								
				Hrs									
L	Lecture	**Theory**		**20**									
T	Tutorial	**Pract/Lab**		**10**									
P	Practical	**Total**		**30**									
Cr	Credits												
NC	Non Credit Course (Pass/Fail)												
CCE	Continuous Comprehensive Evaluation												
ESE	End Semester Examination												

Course Category		PCC			Course Code		CV124PC301
Course Title		Applied Mathematics					
		Teaching Scheme			Evaluation Scheme		
L	T	P	Cr	Exam	Theory % Marks		
					Max	Min for Pass	
2	0	0	2	CCE	50	20	40
26	0	0		ESE	50	20	
		Total Hours: 26		Total	100	40	

Prerequisites:
Differential & Integral calculus, Differential equations of first order & first degree, Fourier series, Collection, classification and representation of data and Vector algebra.

Course Objective

1. To make the students familiarize with concepts and techniques in Ordinary differential equations, Laplace-Transform, Statistical methods
2. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines

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

CO1	**SOLVE** higher order linear & nonlinear differential equations using appropriate techniques for modelling, analysing electrical circuits and control systems.	BT-3
CO2	**APPLY** Integral transform techniques such as Laplace transform to solve differential equations involved in vibration theory, heat transfer and related civil engineering applications.	BT-3
CO3	**APPLY** Statistical methods like correlation, regression in analysing and interpreting experimental data applicable to reliability engineering	BT-3
CO4	PERFORM Vector differentiation & **ANALYZE** the vector fields	BT-4
CO5	PERFORM Vector integration, **APPLY** to fluid flow problems	BT-3

Syllabus

Unit I	**Higher order linear and nonlinear Differential Equation & its Applications**	**7 hrs**
LDE of nth order with constant coefficients, Complementary Function, Particular Integral, Short methods, Method of variation of parameters. Modelling of Mass-spring systems, Free &Forced damped and undamped systems		
Unit II	**Integral Transforms & its Applications**	**5 hrs**
Laplace Transform **(LT):** LT of standard functions, properties and theorems, Inverse LT, Application of LT to solve LDE.		
Unit III	**Descriptive statistics**	**5 hrs**
Measures of central tendency, Measures of dispersion, Coefficient of variation, Moments, Skewness and Kurtosis, Correlation and Regression, Reliability of Regression Estimates		
Unit VI	**Vector Differential Calculus**	**5 hrs**
Vector differentiation, Gradient, Divergence and Curl, Directional derivative, Solenoidal & Irrotational fields		
Unit V	**Vector integral Calculus**	**4 hrs**
Line, Surface and Volume integrals, Green's Lemma, Gauss's Divergence theorem and Stoke's theorem.		
Reference Books		
1. Higher Engineering Mathematics by B. V. Ramana (Tata McGraw Hill)		

2. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi
3. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)
4. Advanced Engineering Mathematics by M. D. Greenberg (Pearson Education)
5. Advanced Engineering Mathematics by Peter V. O'Neil (Thomson Learning)
6. Thomas' Calculus by George B. Thomas, (Addison-Wesley, Pearson)
7. Applied Mathematics (Vol. I and II) by P.N. Wartikar and J.N.Wartikar Vidyarthi Griha Prakashan, Pune.
8. Differential Equations by S. L. Ross (John Wiley and Sons)

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination

CO-PO Mapping

3: High, 2: Moderate, 1: Low, 0: No Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	0	0	0	0	0	1	0	0	1
CO2	3	3	0	0	0	0	0	1	0	0	1
CO3	3	3	0	0	0	0	0	1	0	0	1
CO4	3	3	0	0	0	0	0	1	0	0	1
CO5	3	3	0	0	0	0	0	1	0	0	1

Course Category	PCC	Course Code	CV124PC302
Course Title	Mechanics of Structures		

Teaching Scheme				Evaluation Scheme					
					Theory Marks			Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass		Max	Min for Pass
3	0	0	3	CCE	50	20	40	-	-
Total Hours				ESE	50	20			
39	0	0	Total hrs: 39		100	40			

Prerequisites:

Engineering Mathematics, Engineering/Applied Mechanics.

Course Objectives: (Min 3)

1. To impart knowledge of stresses and strains in structural members
2. To build concepts of shear force and bending moment diagrams of structures
3. To provide fundamental knowledge of slope and deflections in structural members.

Course Outcomes: After successful completion of the course the student will be able to		**BT Level**
CO1	Analysis and Evaluate different types of stresses, strains in determinate and indeterminate structures	3
CO2	Develop shear force and bending moment diagrams for determinate beams	4
CO3	Evaluate stresses due to shear, bending	3
CO4	Analysis and Evaluate the torsional stresses, principle stresses and strain in structural members	3
CO5	Solve axially and eccentrically loaded Columns	2

Syllabus

Unit I	**Stresses and Strains**	**7 hrs**
	a) Overview of construction materials and their properties. Introduction to Hooke's Law and the stress-strain diagrams for elastic, plastic, and brittle materials, including an idealized stress-strain curve. Explanation of axial stresses (compression and tension) and various types of strains (linear, lateral, shear, and volumetric). Discussion on elastic constants and their interrelationships. Analysis of stresses and strains resulting from temperature variations. b) Study of stresses, strains, and deformations in determinate and indeterminate structures for homogeneous and composite materials, considering the effects of temperature changes.	
Unit II	**Shear force, Bending Moment Diagrams**	**8 hrs**
	Understanding the concept of shear force and bending moment, along with their relationship to the intensity of loading. Construction of shear force and bending moment diagrams for determinate beams subjected to concentrated loads, uniformly distributed loads, uniformly varying loads, and moments/couples. Deriving bending moment and loading diagrams from a given shear force diagram.	
Unit III	**Stresses in beams due to Shear and Bending**	**8 hrs**
	a) Shear Stresses in Beams: Introduction to the concept of shear and complementary shear. Derivation of the shear stress formula and analysis of	

	shear stress distribution across various cross-sections. Calculation of maximum and average shear stress for circular and rectangular sections. b) Bending Stresses in Beams: Theory of simple or pure bending, including underlying assumptions and the derivation of the flexure formula. Examination of bending stress distribution diagrams and determination of the moment of resistance for different cross-sections.	
Unit IV	**Torsion of Circular Shafts and Principal Stresses and Strains**	**8 hrs**
	a) Torsion of Circular Shafts: Torsion theory, including assumptions and derivation of the torsion formula. Analysis of stresses, strains, and deformations in determinate and indeterminate shafts with solid, hollow, and homogeneous cross-sections under applied twisting moments. Calculation of power transmitted by shafts. b) Principal Stresses and Strains: Introduction to the concept of principal planes and principal stresses. Analysis of normal and shear stresses on an oblique plane, along with the determination of the magnitude and orientation of principal stresses and maximum shear stress.	
Unit V	**Axially and Eccentrically Loaded Columns**	**8 hrs**
	a) Axially loaded columns: concept of critical load and buckling, Euler's formula for buckling load with hinged ends, concept of equivalent length for various end conditions, Rankine's formula, safe load on column and limitations of Euler's formula. b) Direct and bending stresses for eccentrically loaded short column and other structural components such as retaining walls, dams, chimneys, etc. Effect of lateral force and self-weight. Resultant stress diagrams due to axial loads, uni-axial, and bi-axial bending. Concept of core of section for solid and hollow rectangular and circular sections.	

References

Text Books:

S. B. Junnarkar and Dr. H. J. Shah, *Mechanics of Structures* Vol. I &II by, Twenty second edition, Charotar Publishing House Pvt Ltd.

Dr. V.L. Shah, Dr. S.R. Karve, R.A. Ogale, Strength Of Materials, 3rd Edition, Structures Publications.

References Books:

1. Timoshenko and Young, Elements of Strength of Materials by, East-West Press Ltd.
2. F.L. Singer and Andrew Pytel \, Strength of Materials by, Harper and Row Publication.
3. Beer and Johnston, Mechanics of Materials by, McGraw Hill Publication.
4. E.P. Popov Introduction to Mechanics of Solids by, Prantice Hall Publication.
5. Gere & Timoshenko Mechanics of Materials by, CBC publisher.
6. R. C. Hibbler Intermediate Structural Analysis by, Pearson Education Publishers.
7. Strength of Materials by Ramamrutham- Dhanpat Rai & Publications

You Tube: https://www.youtube.com/watch?v=La4UEa7hA7Q&list=PLJoALJA_KMOARYNi50T6b488kPUBbOIsX

Website: https://archive.nptel.ac.in/courses/105/105/105105108/

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination,

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	0	0	0	0	0	0	0	3	3	0
CO2	3	3	3	3	0	0	0	0	0	0	0	3	3	0
CO3	3	3	3	3	0	0	0	0	0	0	0	3	3	0
CO4	3	3	3	3	0	0	0	0	0	0	0	3	3	0
CO5	3	3	3	3	0	0	0	0	0	0	0	3	3	0

3: High, 2: Moderate, 1: Low, 0: No Mapping

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Course Category				PCC			Course Code	CV124PC303
Course Title				Mechanics of Structures (Lab)				
Teaching Scheme				Evaluation Scheme				
L	T	P	Cr	Exam	Theory Marks		Practical Marks	
					Max	Min Marks for Pass	Max	Min marks for Pass
0	0	2	1	PE	-	-	50	20
				EE	-	-	50	20
0	0	2	Total hrs: 26			Total	100	40

Prerequisites: Engineering Mathematics, Engineering/Applied Mechanics.	
Course Objectives: (Min 3)	
1. To perform experiments which are related to Mechanics of Structures subject to 2. understand the practical related to theories of the subject. 3. To determine strength properties of different solid materials. 4. Understanding of professional and ethical responsibility in the areas of material testing.	
Course Outcomes: After successful completion of the course the student will be able to	**BT Level**
CO1 Conduct experiments to Evaluate various properties of solid materials	3
CO2 Compute and analyze engineering values (e.g. stress or strain) from laboratory measurements	3
CO3 Write a technical test report	3

Syllabus

1	To determine the ultimate tensile strength of Mild steel and HYSD bars.	2hrs
2	To determine the ultimate buckling strength of materials like mild steel, cast iron and copper, aluminium, and compare their strength	2hrs
3	Determination of compression test on Timber – along and parallel to the grains	2hrs
4	Determination of compression test on Brick, AAC Bricks	2hrs
5	Determination of shear strength of Mild steel- single and double shear	2hrs
6	To determine Rockwell Hardness No. and Brinell Hardness No. of a sample	2hrs
7	To estimate the Shock Resistance of different qualities of materials by Izod‟s test and Charpy test	2hrs
8	Bending tests on simply supported beam on steel, Aluminium, Plywood, block board, timber and glass	2hrs
9	Measurement of deflections in statically determinate beam	2hrs
10	Demonstration of Strain gauges and Strain indicators	2hrs

References

Text Books:

1. Punmia B. C., A. K. Jain and A. K. Jain, Mechanics of Materials - Laxmi Publications (P) Ltd, New Delhi, 2001.
2. Bhavikatti S.S., Structural Analysis -Vikas Publications House, New Delhi.

References Books:

1. S. B. Junnarkar and Dr. H. J. Shah, "Mechanics of Structures Vol. I andII" - Charotar Publishing House Pvt Ltd. - Twenty second edition
2. R.K.Bansal, "Strength of Materials" - Laxmi Publications.
3. Timoshenko and Young, „Elements of Strength of Materials" -Affiliated East West Press,New Delhi.
4. F.L. Singer and Andrew Pytel , "Strength of Materials" - Harper and Row Publication.
5. Hibbeler, R. C., „Mechanics of Materials" -Pearson Prentice Hall.

You Tube: https://www.youtube.com/watch?v=DSr4G3l8e78
https://www.youtube.com/watch?v=tpGhqQvftAo
https://www.youtube.com/watch?v=dIUhX0NOqnQ

Website: https://archive.nptel.ac.in/courses/105/106/105106172/

Scheme of Practical Evaluation:

Component	Level	Parameters	Marks	Total	Pass
CCE	Progressive Evaluation (PE)	Viva Voce for assessment of Understanding	20	50	20
		Involvement, Participation, and Engagement	10		
		Quality of Submission of Report	10		
		Attendance	10		
	End Evaluation (EE)	Performance	25	50	20
		Oral Examination	25		

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	2	2	0	0	0	0	0	0	0	1	1	1
CO2	2	2	2	2	0	0	0	0	0	0	0	1	1	1
CO3	2	2	2	2	0	0	0	0	0	0	0	1	1	1

3: High, 2: Moderate, 1: Low, 0: No Mapping

D Y Patil College of Engineering, Akurdi, Pune

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Course Category	PCC	Course Code	CV124PC304
Course Title	Surveying		

Teaching Scheme				Evaluation Scheme					
					Theory Marks			Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass		Max	Min for Pass
3	0	0	3	CCE	50	20	40	-	-
Total Hours				ESE	50	20		-	-
39	0	0	Total hrs: 39		100	40			

Prerequisites: Basic Introduction to Civil Engineering field, Engineering Mathematics

Course Objectives: (Min 3)

1. To develop a comprehensive understanding of surveying principles, techniques, and technologies.
2. To apply surveying methods to solve real-world problems, including mapping, contouring, and volume computations.
3. Identify and calculate the errors in measurements and to develop corrected values for differential level circuits, horizontal distances and angles for open or closed-loop traverses.
4. Effectively communicate with team members during field activities; identify appropriate safety procedures for personal protection; properly handle and use measurement instruments.
   To acquire knowledge of modern surveying systems and technologies,

Course Outcomes: After successful completion of the course the student will be able to		**BT Level**
CO1	Apply basics of plane surveying and differentiate the instruments used for it.	3
CO2	Express proficiency in handling surveying equipment and analyses the surveying data from these equipment.	2
CO3	Use different methods of surveying and find relative positions of points on the surface of earth	3
CO4	Apply different instruments, tools, applications, and techniques to determine area, positions, distances, and angles between two points on the earth's surface.	3
CO5	Explain the concepts of modern surveying techniques and instrumentation.	3

Syllabus

Unit I	**Surveying and Levelling.**	**7 hrs**
	a) Definition and Importance of Surveying; Principles of Surveying, b) Definition, objective and fundamental classification of surveying (Plane and Geodetic), Offsetting and Traversing. Construction and use of prismatic compass, Concept of bearing &, types of bearings such as Whole Circle Bearing, Quadrental Bearing, meridian and their types, local attraction and correction for local attraction, dip, declination and calculation of true bearings, including numerical of all types. Methods of plane table Survey Radiation, intersection, traversing and resection c)Introduction to leveling, Types of leveling, Types of benchmarks, Study and use of dumpy level, auto level, digital level and principal axes of dumpy level, testing and permanent adjustments reciprocal leveling, curvature and refraction corrections, distance to the visible horizon. Collimation Plane Method, Rise & Fall Method.	
Unit II	**Theodolite Surveying**	**8 hrs**

	a) Study of vernier transit 20" theodolite, uses of theodolite for measurement of horizontal angles by repetition and reiteration, vertical angles, measurement of deflection angles using transit theodolite and magnetic bearing, prolonging a line, lining in and setting out an angle with a theodolite. Fundamental axes of theodolite: testing and permanent adjustments of a transit theodolite. b) Theodolite traversing – computation of consecutive and independent co-ordinates, adjustment of closed traverse by transit rule and Bowditch's rule, Gales traverse table. Checks, omitted measurements, area calculation by independent co-ordinates.	
Unit III	**Tachometry and Contouring.**	**8 hrs**
	a) Tachometry – applications and limitations, principle of stadia tachometry, fixed hair method with vertical staff to determine horizontal distances and elevations of points, finding tachometric constants. Tachometric contouring. Numerical b) Contouring – Definition of Contours, Characteristics of Contours, Contour Patterns for various natural features, direct and indirect methods of contouring, uses of contour maps, study and use of topo-sheets, profile leveling and cross-sectioning and their applications	
Unit IV	**Curves and Measurement of Area and Volume**	**8 hrs**
	a. Curves: Elements of simple, reverse, transition, and compound curves, method of setting out. elements and setting out by linear methods such as radial and perpendicular offsets, offsets from long chord, successive bisection of chord and offsets from chords produced. Angular methods: Rankine's method of deflection angles (one and two theodolite methods). (Numerical on simple circular curves and compound curves to be asked), Transition curves: necessity b. Area and volume: Computation of area by sub-divisions into triangles, double meridian distances, co-ordinates, and volume by Prismoidal and trapezoidal method.	
Unit V	**Modern Field Survey and Geographic Information System**	**8 hrs**
	a. Modern Field Survey Systems: Electronic distance measurement (EDM), distomat and total station (types, accessories, advantages, applications, field procedure and errors). b. Geographic Information system (GIS), Digital elevation model, image classification, surveying with global positioning systems (GPS)-segments, positioning methods, application, and errors. c. Introduction to drone survey and DGPS d. Introduction to Lidar survey	

References

Text Books:

Surveying and Levelling by Basak N. N. Tata McGrawHill. Second edition (2017).
Geomatics Engineering by Manoj, K. Arora and Badjatia, Nem Chand & Bros, first edition (2011).
Surveying and Levelling (Volume I and II) by Bhavikatti, S.S., I.K. International, first edition (2013).

References Books:

Surveying and Levelling (Volume I and II) by Kanetkar T. P. and Kulkarni S. V. Pune Vidyarthi Griha Prakashan, First edition (2008).
Construction Engineering and Management of Projects by S.C. Sharma, Khanna Publications, 3rd edition (2008).
Surveying (Volume I, II, and III) by Arora, K.R., Standard Book House, twelfth edition (2015).

Journal Papers:

Kam W. Wong, Anthony G. Wiley, and Michael Lew, GPS-Guided Vision Systems for Real-Time Surveying, Journal of Surveying Engineering, Volume 115, Issue 2 https://doi.org/10.1061/(ASCE)0733-9453(1989)115:2(243)

You Tube: https://www.youtube.com/watch?v=j8poe2vvD2Q; https://www.youtube.com/watch?v=rN3IMV78EEc; https://www.youtube.com/watch?v=Mb2jbdqMJHA
Website: https://archive.nptel.ac.in/courses/105/107/105107122/

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination,

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	1	3	0	0	0	2	2	1	2	2	2
CO2	2	2	1	2	0	0	2	2	0	2	3	3	3	2
CO3	2	2	2	2	2	0	2	2	1	3	2	2	3	3
CO4	2	3	2	1	3	2	0	2	3	2	3	2	2	2
CO5	2	2	2	3	2	1	0	0	3	2	3	2	2	2

3: High, 2: Moderate, 1: Low, 0: No Mapping

D Y Patil College of Engineering, Akurdi, Pune

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Course Category	PCC	Course Code	CV124PC305
Course Title	Surveying Lab		

Teaching Scheme				Evaluation Scheme				
L	T	P	Cr	Exam	Theory Marks		Practical Marks	
					Max	Min Marks for Pass	Max	Min marks for Pass
0	0	2	1	PE	-	-	50	20
				EE	-	-	50	20
0	0	2	Total hrs: 26			Total	100	40

Prerequisites: Basic Introduction to Civil Engineering field, Engineering Mathematics

Course Objectives: (Min 3)

1. Describe the functions of surveying in civil engineering field.
2. Apply the traditional methods of surveying such as chain compass survey, simple and differential leveling, theodolite traversing, tachometry and contouring
3. Apply the modern techniques of surveying such as use of Total station.
4. Understand and apply different methods of plane survey, geodetic survey, hydrographic survey.
5. Calculate design and establish curves, understand, interpret and prepare plan, profile and cross-sectional drawing.
6. Work as team member on surveying party to achieve common goal of accurate and timely project completion

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Demonstrate basics of plane surveying and different instrument used for it.	3
CO2	Express proficiency in handling surveying equipment's and analyse surveying data obtained from these equipment's	2
CO3	Use modern instruments like Total station in civil engineering projects	4

Syllabus

1	Measurement of magnetic bearing by Prismatic Compass	**2hrs**
2	Plane table survey, method of radiation	**2hrs**
3	Simple and differential levelling with at least two change points by using Auto level	**2hrs**
4	Measurement of horizontal angle by Direct method using vernier transit theodolite	**2hrs**
5	Measurement of horizontal angle by Repetition method	**2hrs**
6	Setting out simple circular curve by offset from long chord	**2hrs**
7	Setting out simple circular curve by Rankines method of Deflection Angles	**2hrs**
8	Practical based on various special functions available in total station such as remote elevation measurements, remote distance measurements and co-ordinate stake out.	**2hrs**
9	Setting out a building by given foundation plan (minimum six coordinates) using total station	**2hrs**
10	Use of GPS for property measurement	**2hrs**

Projects:

1. Block contouring using Auto Level.
2. Road project using Auto level for minimum length of 1000 m. (Including fixing of alignment, profile levelling, cross-section, plotting of longitudinal section and cross-section).
3. Total Station Traversing.

References

Text Books:

N.N. Basak, Surveying and Levelling, Tata McGraw Hill.
Dr. B. C. Punmia, Ashok K. Jain, Arun K.Jain, Surveying, Vol. I and II,
Laxmi Publications

References Books:

1. T. P. Kanetkar and S.V. Kulkarni „Surveying and Leveling" Vol. I and Vol. II - Pune Vidyarthi Griha Prakashan.
2. S. K. Duggal „Surveying, Vol. I and II" - Tata Mc-Graw Hill.
3. Dr. K. R. Arora, „Surveying Vol. I and II"- Standard Book House.
4. Subramanian, „Surveying and Levelling" - Oxford University Press.
5. James M. Anderson, Edward M. Mikhail, „Surveying: Theory and Practice"-
6. Tata Mc-Graw Hill.
7. C. Venkatramaiah, „Textbook of Surveying" - University Press.
8. John Uren and Bill Price, „Surveying for Engineers" Palgrave Macmillan

You Tube: https://www.youtube.com/watch?v=j8poe2vvD2Q;
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https://www.youtube.com/watch?v=Mb2jbdqMJHA

Website: https://archive.nptel.ac.in/courses/105/107/105107122/

Scheme for Practical Evaluation:

Component	Level	Parameters	Marks	Total	Pass
CCE	Progressive Evaluation (PE)	Viva Voce for assessment of Understanding	20	50	20
		Involvement, Participation, and Engagement	10		
		Quality of Submission of Report	10		
		Attendance	10		
	End Evaluation (EE)	Performance	25	50	20
		Oral Examination	25		

CCE: Continuous Comprehensive Evaluation

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	0	0	0	1	1	0	0	1	1	0	1	0	0
CO2	2	0	0	0	1	1	0	0	1	1	0	1	0	0
CO3	2	0	0	0	1	1	0	0	1	1	0	1	0	0

3: High, 2: Moderate, 1: Low, 0: No Mapping

D Y Patil College of Engineering, Akurdi, Pune

An Autonomous Institute from AY 2024-25, Affiliated to Savitribai Phule Pune University, Pune

Course Category	MDM-I (Environmental Management and Urban Sustainability)	Course Code	CV124MD306
Course Title	Environment and Sustainability		

Teaching Scheme				Evaluation Scheme					
L	T	P	Cr	Exam	Theory Marks			Practical Marks	
					Max	Min Marks for Pass		Max	Min for Pass
2	0	0	2	CCE	50	20	40	-	-
Total Hours				ESE	50	20			
26	0	0	Total hrs: 26		100	40			

Prerequisites: • Environmental Science, Environmental Chemistry, Earth Systems Science

Course Objectives: (Min 3)

1. To impart knowledge of Ecology and Biodiversity.
2. To procure the knowledge about the challenges related to Climate Change and Sustainable Development
3. To acquire knowledge of science and technology for sustainable development

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Apply knowledge of science and engineering to solve environmental issue	3
CO2	Apply new technology to address climate change issue	3
CO3	Evaluate impact of climate change	4
CO4	Apply principles of sustainability to engineering and technology	3
CO5	Estimate environmental impact	4

Syllabus

Unit I	**Natural Resources and Ecosystem** Renewable and Non-renewable resources, Forest resources, water resources, Mineral resources, food Resources, Energy resources, alternative energy resources Land resources, Structure and Functions of ecosystem, biotic rind abiotic components, food chains, food web Biodiversity, types of' biodiversity, conservation of biodiversity.	**6 hrs**
Unit II	**Introduction to Climate Change** Definition and basic concepts, Historical context and scientific foundations, Overview of key terms and terminology, Causes of Climate Change, climate change induced hazards, Urban Heat island effect, Human activities driving climate change, Natural factors influencing climate variability, application of space technology in addressing climate change.	**5 hrs**
Unit III	**Impacts of Climate Change** Rising global temperatures and heatwaves Melting glaciers, ice sheets, and sea-level rise Ocean acidification and coral bleaching ,Changes in precipitation patterns and droughts , effects on biodiversity and ecosystems, Shifts in species distribution and extinction risks, Impact on agriculture and food security Climate-induced migration and displacement, Economic consequences of extreme weather events, Vulnerability of communities in developing nations	**5 hrs**

Unit IV	**Sustainability**: Introduction, concept, the evolution of the concept; Social, environmental, and economic sustainability concepts; Sustainable development, Nexus between Technology and Sustainable development; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), Clean Development Mechanism (CDM).	**5 hrs**
Unit V	**Role of Various Stakeholders in achieving SDG** Estimation of environmental impacts (carbon footprint ,water footprint, ecological footprint etc.),circular economy and regenerative practices, Case studies on sustainability..	**5 hrs**

References

Text Books:

Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
Bradley. A.S; Adebayo,A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning
Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis

References Books:

ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System, TERI Publications - GRIHA Rating System
Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw-Hill Professional.
Twidell, J. W. and Weir, A. D., Renewable Energy Resources, English Language Book Society (ELBS).
Purohit, S. S., Green Technology - An approach for sustainable environment, Agrobios Publication.

You Tube:

Website: https://onlinecourses.nptel.ac.in/noc20_mg38/preview

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	2	3	0	0	0	0	1	1	1
CO2	2	2	0	0	0	2	3	0	0	0	0	1	1	1
CO3	2	2	0	0	0	2	3	0	0	0	0	1	1	1
CO4	2	2	0	0	0	2	3	0	0	0	0	1	1	1
CO5	2	2	0	0	0	2	3	0	0	0	0	1	1	1

3: High, 2: Moderate, 1: Low, 0: No Mapping

D Y Patil College of Engineering, Akurdi, Pune

An Autonomous Institute from AY 2024-25, Affiliated to Savitribai Phule Pune University, Pune

Course Category	OE	Course Code	CV124OE307
Course Title	Maintenance Management		

Teaching Scheme				Evaluation Scheme					
					Theory Marks			Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass		Max	Min for Pass
3	1	0	4	CCE	50	20	40	-	-
Total Hours				ESE	50	20			
39	13	0	Total hrs: 52		100	40			

Prerequisites: Fundamentals of Various Engineering discipline

Course Objectives: (Min 3)

1. To develop concepts of maintenance management
2. To diagnose faults in various parts of a product
3. To study advanced maintenance techniques

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Understand the Functions and Objectives of Maintenance	3
CO2	Explore Maintenance Strategies and Scheduling	4
CO3	Understand Spare Parts Management and Maintenance Policies	4
CO4	Examine Condition-Based Maintenance and Fault Diagnosis Methods	4
CO5	Understand Advanced Maintenance Techniques: TPM, Benchmarking, and JIT Maintenance	4

Syllabus

1	Maintenance Concepts, deals with functions and objectives of maintenance, maintenance strategies,	**7 hrs**
2	Maintenance scheduling and organization and spare parts management, various methods and policies of maintenance engineering.	**7 hrs**
3	Condition Based Maintenance, describes the methods of fault diagnosis, condition checking and inspection and trend monitoring methods	**7 hrs**
4	Machine fault identification and its diagnosis, maintenance division models, reliability oriented maintenance systems	**9 hrs**
5	Total Productive Maintenance (TPM) and Benchmarking, procedures of JIT maintenance, zero defect maintenance and zero breakdown maintenance systems.	**9 hrs**

References

References Books:

1. Condition Monitoring and Maintenance Engineering-BME-025- IGNOU Course Materials
2. Plant Maintenance and Reliability Engineering- Prof. N.V.S.Raju, Sengage Learning India Publications

You Tube: https://www.youtube.com/watch?v=BvpqyKkFJIo
https://www.youtube.com/watch?v=aQeu5fynOLE

Website: https://onlinecourses.swayam2.ac.in/nou25_me05/preview

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination,

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	0	0	0	0	0	0	0	0	1	2	0	0	1
CO2	1	0	0	0	0	0	0	0	0	1	2	0	0	1
CO3	1	0	0	0	0	0	0	0	0	1	2	0	0	1
CO4	1	0	0	0	0	0	0	0	0	1	2	0	0	1
CO5	1	0	0	0	0	0	0	0	0	1	2	0	0	1

3: High, 2: Moderate, 1: Low, 0: No Mapping

D Y Patil College of Engineering, Akurdi, Pune

An Autonomous Institute from AY 2024-25, Affiliated to Savitribai Phule Pune University, Pune

Course Category	EEM	Course Code	CV124EE308
Course Title	Project Management		

Teaching Scheme				Evaluation Scheme					
L	T	P	Cr	Exam	Theory Marks			Practical Marks	
					Max	Min Marks for Pass		Max	Min for Pass
2	0	0	2	CCE	50	20	40	-	-
Total Hours				ESE	50	20			
26	0	0	Total hrs: 26		100				

Prerequisites: Fundamentals of Civil Engineering, Indian Construction Industry, Economics.

Course Objectives: (Min 3)

1. Describe the various concepts involved in Project Management.
2. Explain scientific methods of planning and management
3. Demonstrates methods of manpower planning and Use various project monitoring methods.
4. Differentiate the methods of resource management and site planning.

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Describe project life cycle and the domains of Project Management.	2
CO2	Explain networking methods and their applications in planning and management	3
CO3	Compare advanced pscheduling methods with conventional	4
CO4	Demonstrate project monioring techniques and their applications in project control	4
CO5	Design site layout as per the progress of site and apply safety norms to various types of activities	4

Syllabus

Unit I	**Introduction to Project Management**: Importance, Objectives & Functions of Management, Principles of Management, Categories of Project, Project Failure, Project--- Life Cycle Concept and Cost Components, Project Management Book of Knowledge {PMBOK} – Different Domain Areas, Importance of Organizational Structure in Management- Authority / Responsibility Relation, Role of Project Management Consultants in Pre-Tender and Post-Tender	**5 hrs**
Unit II	**Project Planning and Scheduling**: WBS – Work Breakdown Structure, Gantt / Bar chart & its Limitations, Network Planning, Network analysis, Critical Path Method - Activity on Arrow (A.O.A.), Critical Path and Types of Floats, Precedence Network Analysis (A.O.N.), Types of Precedence Relationship, P. E. R.T. Analysis	**5 hrs**
Unit III	**Advanced Techniques in Scheduling:** Beelime method, DSM	**5 hrs**
Unit IV	**Project Monitoring and Control:** Resource Allocation – Resource Smoothening and Leveling, Network Crashing – Time- Cost – Resource Optimization, Project Monitoring - Methods, Updating and Earned Value Analysis	**6 hrs**

Unit V	**Project Resources and Site Planning** Objectives of Materials Management – Primary and Secondary Material Procurement Procedures -Material Requirement - Raising of Indents, Receipts, Inspection, Storage, Delivery, Record, Inventory Control - ABC Analysis, EOQ, Site Layout and Planning Safety Norms – Measures and Precautions on Site, Implementation of Safety Programs	**5 hrs**

References

Text Books:

1. Project planning and Control with PERT and CPM by DR. B.C. Punmia and K.K.Khadelwal Publisher: Firewall Media, Laxmi publication New Delhi.
2. Project management Principles and Techniques by B.B. Goel, Publisher: Deep and Deep publisher

References Books:

1. Project Management by Khatua, Oxford University Press
2. Construction Project Management-Planning, Scheduling and Controlling by K. K. Chitkara, Tata McGraw Hill Publishing Company, New Delhi.
3. Construction Management and Planning by B. Sengupta and H. Guha, Tata McGraw Hill Publishing Company, New Delhi.
4. The Essentials of Project Management by Dennis Lock, Gower Publishing Ltd. UK.
5. Essentials for Decision Makers by Asok Mukherjee, Scitech Publication, New Delhi.

Research paper: Novy, Martin and NovÃ¡kovÃ¡, Jana and Waldhans, MiloÅ¡ Project management in building industry management, 2012, pages 189-198, volume 60, Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, doi = 10.11118/actaun201260070189

You Tube: https://www.youtube.com/watch?v=E2gGF1rburw

Website:

1. https://www.pmi.org/search#q=pmbok&sort=relevancy
2. https://www.projectmanager.com/blog/precedence-diagramming-method
3. https://pmo.huit.harvard.edu/resource-planning-management%E2%80%8B
4. https://www.wrike.com/project-management-guide/faq/what-is-resource-allocation-in-project-management/

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Total	Pass
CCE	Faculty	5	5	5	5	25	10
	Department	5	5	5	5	25	10
ESE	Institute	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	0	0	0	0	0	0	1	0	0	2	1	2	2	2
CO2	0	1	0	1	0	0	0	1	1	2	1	2	2	2
CO3	0	1	2	0	0	0	0	0	0	2	1	2	2	2
CO4	0	0	2	1	0	0	0	1	1	2	1	2	2	2
CO5	0	0	2	1	0	0	0	1	1	2	1	2	2	2

D Y Patil College of Engineering, Akurdi, Pune

An Autonomous Institute from AY 2024-25, Affiliated to Savitribai Phule Pune University, Pune

Course Category	Value Education Course 1	Course Code	CV124VC309
Course Title	Sustainable Development - 1		

Teaching Scheme				Evaluation Scheme				
					Theory Marks		Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass	Max	Min for Pass
2	0	0	2	CCA	100	40	-	-
Total Hours								
26	0	0	Total hrs: 26					

Prerequisites:
None

Subjects Included:

Sustainable Development Goals (SDG - Basic) 2 units

Environment Studies 2 units

Intellectual Property Rights (IPR) 1 unit

Course Objectives: (Min 3)

Understand the Concept of SDGs – Introduce students to the importance of sustainable development and the role of SDGs in global and local contexts.

Explore SDG Interconnections – Analyze how various SDGs are linked and the challenges in achieving them collectively.

Understand Environmental Issues – Examine environmental challenges and their impact on sustainable development.

Study Environmental Policies – Analyze national and global policies related to environmental sustainability.

Learn Intellectual Property Rights (IPR) – Understand the basics of patents, copyrights, trademarks, and their role in innovation.

1.

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

CO1	**DEFINE** the key concepts of SDGs and LIST the 17 SDGs with their significance.
CO2	**EXPLAIN** interconnections between different SDGs and analyze their holistic impact.
CO3	**DESCRIBE** key environmental challenges and their implications for sustainable development.
CO4	**DISCUSS** major environmental policies and governance frameworks.

CO5	**UNDERSTAND** fundamental concepts of Intellectual Property Rights (IPR) and their applications.

Syllabus

Unit I	**Introduction to SDGs & Sustainability**	**6 hrs**
	Evolution from MDGs to SDGs, significance in the UN 2030 Agenda, India's contributions, real-world applications.	
Unit II	**SDG Targets & Interconnections**	**6 hrs**
	Understanding SDG indicators, interlinkages, roles of stakeholders, case studies, impact assessment frameworks.	
Unit III	**Environmental Challenges & Sustainability**	**5 hrs**
	Key environmental issues like climate change, biodiversity loss, pollution; impact on health and society, mitigation strategies.	
Unit IV	**Environmental Policies & Governance**	**5 hrs**
	National and global environmental policies, role of regulatory bodies, sustainability standards, case studies of successful interventions.	
Unit V	**Introduction to Intellectual Property Rights (IPR)**	**4 hrs**
	Basics of patents, copyrights, trademarks, importance in innovation and sustainability, protection of intellectual property in academia and industry.	

Scheme for Examination

Component	**Parameters**	**Marks**	**Total**	**Pass**
CCE	Viva Voce for assessment of Understanding	20	50	20
	Involvement, Participation, and Engagement	10		
	Quality of Submission of Report	10		
	Attendance	10		
End Evaluation	Performance (Internal)	25	50	20
	Oral Examination (Internal)	25		

CCE: Continuous Comprehensive Evaluation

CO-PO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	0	0	0	0	0	0	0	0	3	3
CO2	3	3	3	3	0	0	0	0	0	0	0	0	3	3
CO3	3	3	3	3	0	0	0	0	0	0	0	0	3	3
CO4	3	3	3	3	0	0	0	0	0	0	0	0	3	3
CO5	3	3	3	3	0	0	0	0	0	0	0	0	3	3

3: High, 2: Moderate, 1: Low, 0: No Mapping

Course Category				FEP			Course Code	CV124FP310
Course Title				Field Engineering Project				
Teaching Scheme				Evaluation Scheme				
L	T	P	Cr	Exam	Theory Marks		Practical Marks	
					Max	Min Marks for Pass	Max	Min marks for Pass
0	0	4	2	PE	-	-	50	20
				EE	-	-	50	20
0	0	4	Total hrs: 52			Total	100	40

Prerequisites: Engineering Mathematics, Engineering Mechanics

Course Objectives: (Min 3)

1. To engage students in constructive learning environment and develop self-learning abilities.
2. To develop critical thinking and solving civil engineering problems by exploring and proposing sustainable solutions.
3. To integrate knowledge and skills from civil and other engineering areas.
4. To develop professional skills and project management.

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Identify the community/ practical/ societal needs and convert the idea into a product/ process/service.	3
CO2	Analyse and design the physical/ mathematical/ ICT model in order to solve identified problem/project.	3
CO3	Create, work in team and applying the solution in practical way to specific problem.	4

Syllabus

	1. Introduction to Field Engineering Projects 2. Principles of Problem Design Seven Steps of Problem Design 3. Applications and Research Trends 4. Case Studies in Civil Engineering	
	Group Structure: • There should be team/group of maximum four students. • The students identify, plan, manage and complete a task/ field project/ activity which address the stated problem related to Civil engineering. • A supervisor / mentor faculty teacher assigned to individual groups.	
	Selection of Field Project/Problem: 1. Selection of field project/problem related to any technical aspect of civil engineering is recommended 2. Give preference to select project/problem related to solving any field problem/ issue for which suitable model can be developed or software can be used. The field project/problem selected could have different alternative solutions which could be theoretical, practical, working model,	

	demonstration or software analysis. The project/problem selected may have multi-disciplinary approach to get the solution. 3. Filed Problem needs to refer back to a particular practical, scientific, or technical domain. 4. It is recommended to include hands-on activities, organizational and field visits, expert consultation to make students aware with current use of technologies. 5. Proper representation of project/field problem, course work and report on the results and conclusion is important for assessment of course.	

References

1. M. Savin-Baden and C. Howell Major, Foundations of Problem-based Learning. McGraw-Hill Education, 2004

2. T. J. Newby, D. A. Stepich, J. D. Lehman and J. D. Russell, Instructional technology for teaching and learning: Designing instruction, integrating computers, and using media. Englewood Cliffs, NJ: Merrill/Prentice-Hall, 1996\3. S. N. Alessi and S. R. Trollip, Multimedia for learning: methods and development. Needham Heights, MA: Allyn & Bacon, 2001

4. Guerra, Aida, Ulseth, Ronald, Kolmos, Anette, PBL in Engineering Education: International Perspectives on Curriculum Change, Springer, 2017

5. Mahnaz Moallem Woei Hung Nada Dabbagh- The Wiley Handbook of Problem-Based Learning, Wiley, 2019

6. Jane I. Krauss, Suzanne K. Boss, Thinking Through Project-Based Learning: Guiding DeeperInquiry.

7. John Larmer, David Ross, John R. Mergendollar, Project Based Learning (PBL) Starter Kit.

8. William N. Bender, Project-Based Learning: Differentiating Instruction for the 21st Century.

9. Bob Lenz, Justin Wells, Sally Kingston, Transforming Schools Using Project-Based Learning, Performance Assessment, and Common Core Standards.

10. Suzie Boss with John Larmer (ASCD/Buck Institute for Education), Implementing Project-Based Learning Solutions by Suzie Boss

Website for references:

1. www.pblwork.org
2. www.my.pblworks.org
3. www.swayam.gov.in/nd2_ntr20_ed12/preview
4. www.schoology.com

Scheme for Evaluation:

Component	Level	Parameters	Marks	Total	Pass
CCE	**Progressive Evaluation (PE)**	Presentation and Viva Voce for assessment of Understanding	20	50	20
		Involvement, Participation, and Engagement	10		
		Quality of Submission of Report	10		
		Attendance	10		
	End Evaluation (EE)	Presentation	25	50	20
		Oral Examination	25		

CCE: Continuous Comprehensive Evaluation

CO-PO Mapping

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

Course Category				NC			Course Code	
Course Title				Design Thinking				
Teaching Scheme				Evaluation Scheme				
L	T	P	Cr	Exam	Theory Marks		Practical Marks	
					Max	Min Marks for Pass	Max	Min marks for Pass
1	0	2		PE	-	-	50	20
				EE	-	-	50	20
13	0	26	Total hrs: 39			Total	100	40

Prerequisites: Basic Communication Skills, Basic knowledge of Engineering.

Course Objectives:

1. Understand the fundamental concepts of design thinking and its relevance in Civil engineering.
2. Apply design thinking methodologies to solve engineering problems creatively.
3. Analyze user needs and synthesize design solutions using structured ideation techniques.
4. Evaluate engineering design alternatives through prototyping and testing.
5. Create innovative and sustainable solutions using an iterative design approach.

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Apply the principles of Design Thinking to understand problem-solving approaches in engineering.	3
CO2	Demonstrate the use of empathy and user research in engineering design.	3
CO3	Analyze different ideation techniques to generate innovative solutions for engineering problems.	4
CO4	Evaluate and refine engineering design concepts using prototyping and feedback loops.	4
CO5	Develop innovative and sustainable solutions for real-world civil engineering problems.	5

Syllabus

CO 1	**Concepts in Design Thinking**	**2 hrs**
Definition and Importance of Design Thinking, Design Thinking vs. Traditional Problem-Solving, Stages of Design Thinking (Empathize, Define, Ideate, Prototype, Test), Role of Design Thinking in Civil Engineering		
CO 2	**Empathy and Problem Definition**	**2 hrs**
Understanding User Needs and Pain Points, Techniques for Empathy Mapping and User Research, Problem Framing and Defining Engineering Challenges, Case Studies on Civil Engineering Design		
CO 3	**Ideation Techniques and Creative Problem-Solving**	**3 hrs**
Brainstorming and Mind Mapping, SCAMPER and TRIZ Techniques, Design Heuristics for Engineering Solutions, Group Ideation and Concept Sketching		
CO 4	**Prototyping and Testing in Engineering Design**	**3 hrs**
Types of Prototypes (Low-Fidelity vs. High-Fidelity), Rapid Prototyping Techniques (3D Printing, CAD, Physical Models), Testing and Feedback Loop in Design, Case Studies on Successful Prototyping		
CO 5	**Innovation, Sustainability, and Iterative Design**	**3 hrs**
Sustainability in Design Thinking, Iterative Design Process, Design Validation and Real-World Implementation, Industry-Based Case Studies.		

Reference Books

Textbooks

1. Brown, T. – Change by Design: How Design Thinking Creates New Alternatives for Business and Society (Harper Business, 2009)
2. Cross, N. – Engineering Design Methods: Strategies for Product Design (John Wiley & Sons, 5th Edition, 2011)
3. Dym, C. L., Little, P., & Orwin, E. – Engineering Design: A Project-Based Introduction (John Wiley & Sons, 4th Edition, 2013)
4. IDEO – Design Thinking Toolkit for Educators (IDEO, 2012)

Reference Books

1. Brown, T. – Design Thinking: A Quick Overview (Design Council, 2017)

2. Liedtka, J., & Ogilvie, T. – Designing for Growth: A Design Thinking Toolkit for Managers (Columbia University Press, 2011)
3. Pahl, G., & Beitz, W. – Engineering Design: A Systematic Approach (Springer, 3rd Edition, 2007)

NPTEL / SWAYAM Course

1) NPTEL – Design Thinking – A Primer (IIT Madras, Prof. B. Gurumoorthy)
   Link: https://nptel.ac.in/courses/110/106/110106124/
2) NPTEL – Innovation, Business Models, and Entrepreneurship (IIT Roorkee, Prof. Anil Gupta)
   Link: https://nptel.ac.in/courses/110/104/110104116/
3) SWAYAM – Design Thinking for Engineers and Managers (IIM Bangalore, Prof. Ashwin Mahalingam)
   Link: https://swayam.gov.in/nd2_imb20_mg14/preview
4) NPTEL – Product Design and Manufacturing (IIT Kanpur, Prof. Shantanu Bhattacharya)
   Link: https://nptel.ac.in/courses/112/104/112104262/
5) NPTEL Course(s) applicable for credit transfer as per Institute Policy

Research Papers

1) Mayer, S., & Schwemmle, M. (2025). The impact of design thinking and its underlying theoretical mechanisms: A review of the literature. *Creativity and Innovation Management*, *34*(1), 78-110.
2) Ferreira, I. C. M., Zanin, L. M., Prates, C. B., da Cunha, D. T., & Stedefeldt, E. (2025). Design thinking: An effective strategy to evolve food safety culture?. Food Control, 171, 111093.

Rubrics for Continuous Evaluation

Component	Parameters	Marks	Total	Pass
Continuous Comprehensive Evaluation (CCE)	Viva Voce for assessment of Understanding	20	50	20
	Involvement, Participation, and Engagement	10		
	Quality of Submission of Report of practical/s	10		
	Attendance	10		
End Semester Evaluation (ESE)	Prototype Demonstration & Testing	25	50	20
	Final Design Challenge Presentation	25		

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PS03
CO1	2	2	1	2	2	2	1	2	1	1	2	1	1	2
CO2	2	1	2	2	2	1	1	1	2	2	2	1	2	2
CO3	2	1	2	2	2	2	1	1	1	1	1	2	1	2
CO4	1	2	2	2	2	1	1	1	2	1	2	2	1	2
CO5	1	2	2	2	2	2	1	2	1	1	1	1	2	1

3: High, 2: Moderate, 1: Low, -: No Mapping

Course Category	NC	Course Code	NC
Course Title	Professional and Technical Communication Category		

Teaching Scheme				Evaluation Scheme					
L	T	P	Cr	Exam	Theory % Marks			Practical % Marks	
					Max	Min for Pass		Max	Min for Pass
0		2			--	--	--	50	20
Total Hours									
0		26	Total: 26		---	--			

Prerequisites: Basic English Grammar Skills

Course Objective: Purposes of Course are:

1. This course is designed to equip students with essential professional and technical communication skills necessary for success in the modern workplace.
2. Emphasizing both written and verbal communication
3. The course covers a wide range of topics, including effective written communication, active listening and public speaking.
4. Develop strong aptitude & problem solving to clear company selection tests

Course Outcomes: After Successful completion of course units, students will

CO1	Analyse and evaluate spoken information critically for understanding the context and credibility of the source.
CO2	Demonstrate effective interpersonal communication skills for harmonious and productive interactions.
CO3	Articulate strategies for clear and coherent writing skills for personal & professional communication needs.
CO4	Develop skills for effective and authentic non-verbal communication to ace the professional communication needs.
CO5	Solve complex aptitude problems efficiently, improving selection test performance.

Syllabus

Unit I	Development of Listening and Speaking Skills	04 Hrs.

Introduction to Listening skills, Barriers to Listening skills, active Listening techniques, Listening for main ideas and details, Note taking strategies. Introduction to Speaking skills, Building vocabulary and fluency, Conversational Skills, Public speaking fundamentals. Speed and Fluency, Removing MTI.

Unit II	Development of Writing and Reading Skills	03 Hrs.

Introduction to Effective Written Communication, fundamentals of grammar and punctuation, Paragraph Structure, Essay writing, Report writing, Formal letter writing. Importance of Reading, Comprehension and solving case studies, Synthesis writing

Unit III	Fundamentals of Technical Communication	03 Hrs.

What is communication? Importance of communication, Communication Types – Verbal, Non-verbal, Why is non-verbal communication important? Making eye contact (or lack thereof), Shaking hands, -Crossing or uncrossing legs, Folding or unfolding arms, Fidgeting, Eye contact, Smiling or frowning, Communication styles

Unit IV	**Business Communication**	**03 Hrs.**

Business communication theory, Email Etiquette, Digital Communication, Presentation Skills, Ethics in Business Communication, Kinesics and Pitch modulation

Unit V	**Quantitative Aptitude**	**10 Hrs.**

1. Linear Equations, Quadratic Equations
2. Profit and Loss
3. Simple Interest and Compound Interest
4. Time, Speed, and Distance - Basic
5. Race & Game & Problem on Trains
6. Time and Work

Unit VI	**Verbal Ability**	**03 Hrs.**

1. Critical Reasoning & Analogies
2. Sentence Correction - Intermediate and Advanced

Reference Books

1. Communication Skills for Engineers by S. Mishra & C. Muralikrishna (Pearson),2011, ISBN - 8131799905, 9788131799901
2. Communication Skills for Technical Students by T.M. Farhathullah (Orient Longman)2002, ISBN - 9788125022473
3. Written Communication in English by Saran Freeman (Orient Longman) 1977, 8125004262
4. Essential English Grammar (Elementary & Intermediate) Raymond Murphy (CUP), 1990, ISBN 10-8175960299
5. Communication for Business: A Practical Approach by Shirley Tailor (Longman),2005, ISBN - 9780273687658
6. Developing Communication Skills by Krishna Mohan & Meera Banerji (Macmillan),2009, ISBN - 9780230638433
7. Business Correspondence and Report Writing, R. C. Sharma & Krishna Mohan (Tata McGraw Hill,2017, ISBN - 9789390113002
8. Technical communication: Principles and practice, Raman, Minakshi, and Sangita Sharma. 3rd ed. Oxford University Press, 2015, ISBN - 978-0199457496
9. https://ielts.org
10. NPTEL Course-Business English Communication IIT Madras
Link https://youtu.be/GwF4ypDSr-A
11 NPTEL Course- Introduction to Effective Communication
Link https://archive.nptel.ac.in/courses/109/104/109104030/

Course Category				PCC				Course Code	CV124PC401
Course Title				Concrete Technology					
Teaching Scheme				Evaluation Scheme					
L	T	P	Cr	Exam	Theory Marks			Practical Marks	
					Max	Min Marks for Pass		Max	Min for Pass
3	0	0	3	CCE	50	20	40	-	-
Total Hours				ESE	50	20			
39	0	0	Total hrs: 39		100	40			

Prerequisites: Engineering Mathematics, Engineering Mechanics

Course Objectives: (Min 3)

1. To know properties of various ingredients of concrete and concept of mix design.
2. To learn the behavior and properties of concrete in fresh and hardened state.
3. To understand special concrete and their applications.
4. To understand the durability aspects and preventive measures to enhance the fife of concrete.

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Classify the various ingredients of concrete and its suitable proportion to achieved desired strength.	3
CO2	Evaluate the properties of concrete in fresh and hardened state	3
CO3	Assess various concreting equipments, techniques and different types of special concrete	2
CO4	Design Concrete mix with desired strength	4
CO5	Predict deteriorations in concrete and get acquainted to various repairing methods and techniques	2

Syllabus

Unit I	**Introduction to Concrete and Ingredients of Concrete.**	**7 hrs**
	a) Cement and Aggregate– Manufacture, chemical composition, hydration, physical and mechanical properties, classification, types and application of cement, tests on cement, Classification of aggregate, physical and mechanical properties of aggregate, deleterious materials in aggregate, alkali aggregate reaction, Fineness and gradation of aggregates using sieve analysis, tests on aggregates. b) Water and Admixtures –Quality of water for use in concrete, role of admixture, classification and types of admixtures like accelerators, retarders, plasticizers, super plasticizers, mineral admixtures fly ash, silica fume, ground granulated blast furnace slag.	
Unit II	**Production, Properties and Testing of Fresh Concrete**	
	a) Production and Properties of Fresh Concrete: Nominal mixes, Water-cement ratio, Process of manufacturing fresh concrete-batching, mixing, transportation, compaction, curing of concrete, curing methods, influence of temperature, maturity rule, workability and factors affecting workability, cohesion and segregation.	**8 hrs**

	b) Tests on fresh concrete – Workability by slump cone, compaction factor, Vee-Bee consistometer and flow table apparatus, Effect of admixture on workability of concrete and optimum dosage of admixture by Marsh cone test.	
Unit III	**Properties and Testing of Hardened Concrete**	
	a) Hardened concrete – Strength of concrete, factors affecting strength, micro-cracking and stressstrain relationship, relation between tensile and compression strength, impact strength, abrasion resistance, creep and shrinkage. b) Testing of hardened concrete –Destructive tests -compression strength, flexural strength, indirect tensile strength, core test. Nondestructive tests: rebound hammer, ultrasonic pulse velocity, pullout test and impact echo test.	**8 hrs**
Unit IV	**Concrete Mix Design and Concreting Equipments**	
	a) Concrete Mix Design– Concept and objectives of concrete mix design, factors affecting the mix design, quality control, variability of laboratory test result, acceptance criteria, Grade designation and IS requirements as per IS 456 (Exposure conditions, minimum & maximum cement content and maximum W/C ratio b) Methods of Mix Design: IS code method and DOE method (with and without mineral admixture), b) Concreting Equipments and Techniques–Batching plants, concrete mixers, hauling, pumps, concrete vibrators and compaction equipments.	**8 hrs**
Unit V	**Deterioration and Repairs in Concrete**	
	a) Deterioration –Durability, factors affecting the durability of concrete, Permeability, sulphate attack, acid attack, chloride attack, corrosion of reinforcement, carbonation of concrete b) Repairs – Symptoms and diagnosis of distress, evaluation of cracks, selection of repair procedure, repair of defects using various types and techniques – shotcrete and grouting. Introduction to retrofitting of concrete structures by fiber reinforced polymer (FRP), polymer impregnated concrete. Corrosion monitoring and preventive measures.	**8 hrs**

References

Text Books:

1. Concrete Technology by M. S. Shetty, S Chand,New Delhi-110055
2. Concrete Technology by M. L. Gambhir, Tata McGraw-Hill.
3. Concrete technology by A. M. Neville, J.J. Brooks, Pearson**.**

Reference Books:

1. Concrete Technology by A. R. Shantakumar, Oxford University Press, 2018.
2. Properties of Concrete by A. M. Neville, Longman Publishers.
3. Concrete Technology by R.S. Varshney, Oxford and IBH.
4. Microstructure and Properties of Concrete by P. Kumar Mehta, Prentice Hall.
5. Concrete Mix Design by A. P. Remideos, Himalaya Publishing House.

6. Concrete Structures, Repair, Rehabilitation and Retrofitting by J. Bhattacharjee, CBS Publishers & Distributors Pvt. Ltd.
7. Durability Design of Concrete Structures, by A. Sarja and E. Vesiari, E & FN Spon Publication, 1996.

IS Codes : Latest revised editions of IS codes: IS 456, IS 269, IS 1489, IS 4031, IS 383, IS 2386, IS 9103, IS 516, IS 1199, IS 10262, SP 23.IS 13311.

Journal Papers:

https://www.researchgate.net/publication/294104534_Sustainable_Concrete_Technology

https://www.researchgate.net/topic/Concrete-Technologies/publications

https://www.sciencegate.app/keyword/177216

https://onlinelibrary.wiley.com/doi/toc/10.1155/7074.si.985807

You Tube: https://onlinecourses.nptel.ac.in/noc25_ce10/preview

Website: https://www.indianconcreteinstitute.org/

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination,

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	2	0	0	1	0	0	0	0	2	2	2	2
CO2	1	1	2	0	0	1	0	0	0	0	2	2	2	2
CO3	1	1	2	0	0	1	0	0	0	0	2	2	2	2
CO4	1	1	2	0	0	1	0	0	0	0	2	2	2	2
CO5	1	1	2	0	0	1	0	0	0	0	2	2	2	2

3: High, 2: Moderate, 1: Low, 0: No Mapping

Course Category	PCC	Course Code	CV124PC402
Course Title	Concrete Technology Lab		

Teaching Scheme				Evaluation Scheme				
					Theory Marks		Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass	Max	Min marks for Pass
0	0	2	3	PE	-	-	50	20
				EE	-	-	50	20
0	0	2	Total hrs: 26			Total	100	40

Prerequisites: : Engineering Mathematics

Course Objectives:

1. To test various properties of fresh and hardened concrete as per IS standards
2. To test various properties of filler materials in concrete as per IS standards
3. To design concrete mix with given properties

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Test cement properties according to IS standards	2
CO2	Test properties of filler materials in concrete according to IS standards	4
CO3	Design concrete mix according to IS standards	2

Syllabus

A) Any nine experiments of below mentioned experiments, out of which first seven are compulsory:	
List of Laboratory Assignments The term work shall consist of a journal giving details of all the following experiments.	
A	Cementitious materials: 1. Fineness of cement and fly ash (by sieve method) 2. Standard consistency Initial and final setting time and Soundness of cement. 3. Compressive strength of cement 4. Tensile strength of cement (Optional) * Fineness of cement by Blains Air permeability method (Video demo) * Soundness of cement by Autoclave method (Video demo)
B	Filler Materials (Fine & coarse aggregate) 1. Fineness modulus, Moisture content, silt content, bulk density and specific gravity of fine aggregate. 2. Fineness modulus, Moisture content, water absorption, bulk density and specific gravity of coarse aggregate.
C	Concrete 1. Concrete mix design by IS code method and DOE using spread sheet/excel sheet. 2. Workability of concrete with and without admixture by slump cone, compaction factor, and or Vee-Bee Consistometer apparatus. 3. Compressive strength test of concrete on cubes by destructive and non-destructive method rebound Hammer and Quality of concrete by ultra-sonic pulse velocity (demo Video). 4. Compressive strength test of concrete on cylinder (Stress –strain behavior- demo Video). 5. Indirect tensile strength and flexural strength of hardened concrete. 6. Site visit to RMC plant.

References

Text Books:

4. Concrete Technology by M. S. Shetty, S Chand,New Delhi-110055
5. Concrete Technology by M. L. Gambhir, Tata McGraw-Hill.
6. Concrete technology by A. M. Neville, J.J. Brooks, Pearson.

Reference Books:

8. Concrete Technology by A. R. Shantakumar, Oxford University Press, 2018.
9. Properties of Concrete by A. M. Neville, Longman Publishers.
10. Concrete Technology by R.S. Varshney, Oxford and IBH.
11. Microstructure and Properties of Concrete by P. Kumar Mehta, Prentice Hall.
12. Concrete Mix Design by A. P. Remideos, Himalaya Publishing House.
13. Concrete Structures, Repair, Rehabilitation and Retrofitting by J. Bhattacharjee, CBS Publishers & Distributors Pvt. Ltd.
14. Durability Design of Concrete Structures, by A. Sarja and E. Vesiari, E & FN Spon Publication, 1996.

IS Codes : Latest revised editions of IS codes: IS 456, IS 269, IS 1489, IS 4031, IS 383, IS 2386, IS 9103, IS 516, IS 1199, IS 10262, SP 23.IS 13311.

Journal Papers:

https://www.researchgate.net/publication/294104534_Sustainable_Concrete_Technology
https://www.researchgate.net/topic/Concrete-Technologies/publications
https://www.sciencegate.app/keyword/177216
https://onlinelibrary.wiley.com/doi/toc/10.1155/7074.si.985807

Scheme for Practical Evaluation:

Component	Level	Parameters	Marks	Total	Pass
CCE	**Progressive Evaluation (PE)**	Viva Voce for assessment of Understanding	20	50	20
		Involvement, Participation, and Engagement	10		
		Quality of Submission of Report	10		
		Attendance	10		
	End Evaluation (EE)	Performance	25	50	20
		Oral Examination	25		

CCE: Continuous Comprehensive Evaluation

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	P78	P89	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	0	0	0	0	0	0	1	0	0	2	1	2	2	1
CO2	0	1	0	1	0	0	0	1	1	2	1	2	2	1
CO3	0	1	2	0	0	0	0	0	0	2	1	2	2	1

Course Category	PCC	Course Code	CV124PC404
Course Title	Building Technology & Architectural Planning		

Teaching Scheme				Evaluation Scheme					
					Theory Marks			Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass		Max	Min for Pass
3	0	0	3	CCE	50	20	40	-	-
Total Hours				ESE	50	20			
39	0	0	Total hrs: 39		100				

Prerequisites: Engineering Drawing.

Course Objectives: (Min 3)

1. To enumerate different types of structure and their requirement.
2. To describe all basic activities of construction.
3. To study different types of materials, byelaws and Architectural aspects used in construction for civil engineering projects.
   To plan different building units, Town planning parameters and safety of buildings.

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Identify types of building and basic requirements of building components.	2
CO2	Make use of Architectural Principles and Building byelaws for building construction.	3
CO3	Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code.	4
CO4	Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code.	4
CO5	Make use of Principles of Planning and legal aspects in development of a project	3

Syllabus

Unit I	**Introduction to Building Construction, Masonry and building components** **a) Introduction to building construction**– definition, types of building as per National Building Code. Building components and their basic requirements i.e. substructure and superstructure requirements. Introduction to automation in construction **b) Masonry**– Introduction of stone masonry and brick masonry, characteristics of good building bricks, IS specification and tests, classification of bricks, types of bonds: English, Flemish, Header, Stretcher, construction procedure, supervision. Recent trends in light weight construction Form work and casting procedure for reinforced concrete columns, R.C.C. beams, R.C.C. slabs, Slip formwork, introduction of underpinning and Scaffolding. **c) Building Components** **i.** **Doors and Windows**: Definition of technical terms, installation of doors and window frames and their size specifications, fixtures and fastenings. Different types of doors and windows: Ventilators: purpose and types. **ii.** **Arches and Lintels** – Introduction of arch construction, **Lintels:** necessity and types, chajja or weather shade necessity and types. **iii.** **Functional requirement of flooring**, types of floor finishes and their suitability, Types of flooring.	**8 hrs**

	iv. **Roofing Materials** – galvanized iron pre-coated aluminum sheets, fiber sheets. Roof construction types and their suitability, method of construction, Protective Coatings with plastering and finishing.	
Unit II	**Building bye laws and introduction to Architectural drawing** **a) Building Byelaws:** Necessity of bye-laws, plot sizes, road width, open spaces, floor area ratio (F.A.R.), concept of V.P.R. Marginal distances, building line, control line, height regulations, room sizes, Area calculations (built-up area, carpet area etc.), Rules for ventilation, lighting, Vertical circulation, Sanitation and Parking of vehicles. Minimum Standard Dimensions **b) Introduction to Architectural drawing:** Principles of Building Planning and Principles of Architectural design relation between form and function, utility, aesthetics, Concept of Line plan, Developed Plan, Elevation, Section, Selection of scales for various drawings, dimensioning, abbreviations and symbols as per IS 962	**7 hrs**
Unit III	**Residential Buildings and green buildings** **a) Residential Buildings**- Functional requirements and dimensions of Residential Buildings like Bungalows, Twin bungalows, Row houses, Apartment. Prepare Developed Plan, Elevation and Sectional Elevation of above mentioned categories. Design of staircase : Dog legged /Quarter turn **b) Green Building** -Salient features, benefits, planning concepts of Green Building (site selection, orientation, sun path and wind diagram etc.), introduction to Leadership in Energy and Environmental Design (LEED)	**8 hrs**
Unit IV	**Planning of Public Buildings** Functional requirements and dimensions and planning of Public Buildings like industrial Buildings, commercial buildings, School, Colleges, Hostel, Auditorium, Restaurant/ Hotel Building, Primary Health Center/ Hospital, Shopping complex, Sports complex, Vegetable market, Post office, and Bank buildings.	**8 hrs**
Unit V	**Town Planning and Legal Aspects** **a) Town Planning and legal aspects:** Necessity of town planning. Development plan and its importance, Land use zoning, N.A. Sanction procedure, Introduction to different zones of land in town planning, Aspects of zoning, 7/12 abstract, meaning of different terms of 7/12 abstract, Form 6 and its types, Concept of TDR, List of documents to be submitted to local authority. Introduction to RERA act. Introduction to Maharashtra Regional and Town Planning (MRTP) Act **b) Safety aspects and services** – a. **Fire load**- grading of occupancies by fire loads, Evacuation Time, fire escape elements, Need for earthquake resistant structures. b. **Noise and Acoustics** – Sound insulation, Acoustical defects, Reverberation time, Sabine's Formula, sound absorbents, planning for good acoustics. c. **Ventilation** – Necessity and types of Ventilation. d. **Lighting -** Principles of day lighting, Solar energy systems for lighting (BIPV). e. **Plumbing** –Types of plumbing system.	**8 hrs**

References

Text Books:

1. Building Construction by B.C. Punmia, Laxmi Publications.
2. Building Materials by S.V.Deodhar, Khanna Publication.
3. Building Construction by Bindra and Arora, Dhanpat Rai Publications.
4. Building Drawings with an integrated Approach to Built-Environment by M. G. Shah, C. M. Kale and S. Y. Patki, New Delhi, Tata McGraw Hill. (5th edition.)

References Books:

1. Building Materials by S. K. Duggal, New Age International Publishers.
2. Building Construction by S.C. Rangwala, Charotdar Publications.
3. The construction of buildings; seventh edition, Vol.1 & Vol.2 by R. Barry, Oxford: Blackwell Science.
4. Building Materials Technology by Ruth T. Brantley & L. Reed Brantley, Tata McGraw Hill.
5. National Building Code (latest).
6. Building Design and construction by Frederick Merrit, Tata McGraw Hill.
7. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.
8. Development plan and DCP Rules of urban local body, New Delhi, Volume 12.

Research paper:

1. Wanberg, J., Harper, C., Hallowell, M. R., & Rajendran, S. (2013). Relationship between construction safety and quality performance. *Journal of construction engineering and management*, *139*(10), 04013003.
2. McGuire, R. H., & Schiffer, M. B. (1983). A theory of architectural design. *Journal of anthropological archaeology*, *2*(3), 277-303.
3. Carpenter, W. J. (1997). *Learning by building: Design and construction in architectural education*. John Wiley & Sons.

You Tube:

1. Green buildings: https://www.youtube.com/watch?v=VE2tpwGCN0U
2. Building construction & Components: https://www.youtube.com/watch?v=UNAV8qs11OE
3. Planning of public buildings https://www.youtube.com/watch?v=yT8IHC5KEUE
4. principles of building planning: https://www.youtube.com/watch?v=9ra0XT_MT-s
5. Building byelaws: https://www.youtube.com/watch?v=SGaoIcznV6o

Website:

5. National Building code: https://nmc.gov.in/assets/admin/upload/download/National_Bild_CODE.pdf
6. MRTP Act: https://www.indiacode.nic.in/handle/123456789/16117?view_type=browse
7. Construction safety: https://www.cidc.in/articles1.html

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination,

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	0	0	0	0	0	0	1	0	0	2	1	2	2	1
CO2	0	1	0	1	0	0	0	1	1	2	1	2	2	1
CO3	0	1	2	0	0	0	0	0	0	2	1	2	2	1
CO4	0	0	2	1	0	0	0	1	1	2	1	2	2	1
CO5	0	0	2	1	0	0	0	1	1	2	1	2	2	1

3: High, 2: Moderate, 1: Low, 0: No Mapping

Course Category				PCC			Course Code	CV124PC405
Course Title				Building Technology & Architectural Planning (Lab)				
Teaching Scheme				Evaluation Scheme				
L	T	P	Cr	Exam	Theory Marks		Practical Marks	
					Max	Min Marks for Pass	Max	Min marks for Pass
0	0	2	3	PE	-	-	50	20
				EE	-	-	50	20
0	0	2	Total hrs: 26			Total	100	40

Prerequisites: Fundamentals of Engineering Graphics

Course Objectives: (Min 3)

1. To demonstrate the design requirements of residential and public buildings
2. To gain hands-on experience of Computerised drawing
3. To appraise the construction of building processes and its components

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Identify various types of masonry, doors, windows and arches	2
CO2	Design a residential unit by considering different requirements as specified by authorities	4
CO3	Plan a public building by considering different requirements as specified by authorities	4
CO4	Develop sanitation drawing for residential unit	4
CO5	Develop the plan using computer aided drawing software	4

Syllabus

The Term work shall consist of Drawing sheets (06), Site Visit Report (01) and file (01) containing documents.

List of Laboratory Assignments (Students should use Full Imperial sheet for all assignments)	
1.	Prepare drawings of types of masonry and Brick bonds
2.	Prepare sheet showing details of Doors, windows and Arches.
3.	Draw the line plans of any one residential building and any two Public Buildings (Graph Paper)
4.	Floor Plan/ Typical floor plan with construction notes, schedule of openings, of any type of building, Plan, Elevation and Section on separate sheet
5.	Developing typical floor plan drawing exercise completed in assignment number 5, using CAD and Printout of the same.
6.	Layout/ Site plan indicating water supply and drainage line (with area statement).
7.	**Site Visit** : Any on-going Construction Site (visit report should contain: details of the project, stage of construction, sketches of components with cross section & dimensions, materials used and site plan, etc.) **OR**

	Green Building, Salient features like materials used/technology etc, benefits, planning concepts of Green Building (site selection, orientation, sun path and wind diagram etc.)
8.	Document collection: Different sanction forms and at least six brochures of building materials

Scheme for Practical Evaluation:

Component	Level	Parameters	Marks	Total	Pass
CCE	**Progressive Evaluation (PE)**	Viva Voce for assessment of Understanding	20	50	20
		Involvement, Participation, and Engagement	10		
		Quality of Submission of Report	10		
		Attendance	10		
	End Evaluation (EE)	Performance	25	50	20
		Oral Examination	25		

CCE: Continuous Comprehensive Evaluation

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	0	0	0	0	0	0	0	0	0	0	0	2	2	2
CO2	0	0	0	2	0	2	2	0	0	0	0	2	2	2
CO3	0	0	0	2	0	2	2	0	0	0	0	2	2	2
CO4	0	0	0	2	0	2	0	0	0	0	0	2	2	2
CO5	0	0	0	0	2	0	0	0	0	0	0	2	2	2

3: High, 2: Moderate, 1: Low, 0: No Mapping

Course Category	PCC	Course Code	CV124PC406
Course Title		Structural Analysis	

Teaching Scheme				Evaluation Scheme					
					Theory Marks			Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass		Max	Min for Pass
3	0	0	3	CCE	50	20	40	-	-
Total Hours				ESE	50	20			
39	0	0	Total hrs: 24		100				

Prerequisites: Engineering Mathematics, Engineering/Applied Mechanics, Mechanics of Structures

Course Objectives: (Min 3)

1. To provide a comprehensive understanding of the behavior of structures under various types of loads and Degree of Static and Kinematic Indeterminacy
2. To enable students to apply energy methods in structural analysis to solve determinate and indeterminate structures such as beams, trusses, and frames.
   To introduce students with modern analytical techniques, including plastic analysis and approximate methods.

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Understand the fundamental concepts of static and kinematic indeterminacy and analyze indeterminate beams.	2
CO2	Analyze redundant trusses and perform approximate analysis of frames.	3
CO3	Apply the slope-deflection method to the analysis of beams and portal frames.	3
CO4	Utilize the moment distribution and stiffness method to analyze beams and portal frames.	3
CO5	Understand plastic analysis of structures.	2

Syllabus

Unit I	**Fundamentals of Structural Analysis and Energy Method**	**7 hrs**
	a) Classification of structures based on structural forms, including types and the concept of indeterminacy. Introduction to static and kinematic degrees of indeterminacy. b) Analysis of propped cantilevers, fixed beams, and continuous beams with indeterminacy up to the second degree using the strain energy method.	
Unit II	**Unit load method**	**8 hrs**
	For Indeterminate trusses and Approximate methods for Multi-Stored 2D Rigid Jointed Frames a) Analysis of redundant trusses using the unit load method, considering external loading, lack of fit, support sinking, and temperature changes (up to second-degree indeterminacy). b) Approximate methods for analyzing multi-stored, multi-bay 2D rigid jointed frames using the Cantilever and Portal methods.	
Unit III	**Slope-Deflection Method**	**8 hrs**
	a) Derivation of slope-deflection equations. Application of the slope-deflection method to analyze beams, yielding of supports, and non-sway	

	rigid jointed rectangular portal frames. Shear force and Bending moment diagrams. b) Sway analysis of single-bay, single-storey rigid jointed rectangular portal frames using the slope-deflection method (limited to three unknowns).	
Unit IV	**Moment Distribution Method and Stiffness Method**	**8 hrs**
	a) Key concepts including stiffness factors, carry-over factors, and distribution factors. Application of the moment distribution method to analyze beams with yielding supports, Sway and non-sway rigid jointed rectangular portal frames. Shear force and Bending moment diagrams.. b) Fundamental principles of flexibility and stiffness, and the relationship between them. Application of the stiffness method (structure approach) to analyze beams and frames.	
Unit V	**Plastic Analysis of Structures**	**8 hrs**
	Understanding the true and idealized stress-strain curves for mild steel in tension, and stress distribution during elastic, elasto-plastic, and plastic stages. Introduction to the concepts of plastic hinges and collapse mechanisms. Analysis using static and kinematic methods, including the upper bound, lower bound, and uniqueness theorems. Key parameters include the plastic modulus of a section, plastic moment, and shape factor. Plastic analysis of determinate and indeterminate beams and single-bay, single-storey portal frames.	

References

Text Books:

S. B. Junnarkar and Dr. H. J. Shah, *Mechanics of Structures* Vol. I &II by, Twenty second edition, Charotar Publishing House Pvt Ltd.

G.S.Pandit and S. P. Gupta, *Structural Analysis: A Matrix Approach* by, Tata McGraw Hill Education Pvt. Limited.

References Books:

1. R. C. Hibbler, *Structural Analysis* by Pearson Education.
2. B. G. Neal, *The Plastic Methods of Structural Analysis* by Chapman & Hall.
3. Aslam Kassimali, *Structural Analysis* by, Cengage Learning India Private Limited
4. William Weaver Jr. and James M. Gere, *Matrix Analysis of Framed Structures* by, Springer

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Website: https://archive.nptel.ac.in/courses/105/105/105105166/

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
		5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination,

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	0	0	0	0	0	0	0	3	3	0
CO2	3	3	3	3	0	0	0	0	0	0	0	3	3	0
CO3	3	3	3	3	0	0	0	0	0	0	0	3	3	0
CO4	3	3	3	3	0	0	0	0	0	0	0	3	3	0
CO5	3	3	3	3	0	0	0	0	0	0	0	3	3	0

3: High, 2: Moderate, 1: Low, 0: No Mapping

Course Category	**MDM II (Environmental Management and Urban Sustainability)**	**Course Code**	**CV124MD407**
Course Title	Air Pollution and Solid waste Management		

Teaching Scheme				**Evaluation Scheme**					
					Theory Marks			**Practical Marks**	
L	**T**	**P**	**Cr**	**Exam**	**Max**	**Min Marks for Pass**		**Max**	**Min for Pass**
2	0	0	2	CCE	50	20			
Total Hours				ESE	50	20	40	-	-
26	0	0	Total hrs: 26		100				

Prerequisites:

Understanding of environmental systems, pollution types, and their effects on ecosystems and human health. Understanding waste types, their environmental impact, and basic concepts of waste management and sustainability.

Course Objectives: (Min 3)

1. Provide the scientific and technical background of state of the air pollution control technologies.
2. Impart the knowledge and understanding of outdoor and indoor air pollution, its impact and existing legislation and regulation.
3. To understand problems of solid waste, estimate and characterize the solid waste

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Analyze different air pollution effects	2
CO2	Design Particulate pollutant control Equipments	3
CO3	Design gaseous pollutant control Equipments	2
CO4	Outline solid waste management systems with respect to its generation rate, and characteristics and regulatory/legal requirements	3
CO5	Analyze processing of solid waste, material recovery facility	3

Syllabus

Unit I	**Air Pollution** Definition. Natural and man-made Air pollution. Types and classification of air pollutants. Transport and diffusion of pollutants. Laws governing behaviour of pollutants in the atmosphere. Effect of air pollutants on human health, plants, animals, microbes and materials. Acid rain. Ozone depletion. Global warming and climate change. Meteorological Aspects –Meteorology, meteorological parameters, and measurement instruments; CPCB recommendations	**5 hrs**
Unit II	**Control of Particulate Air Pollutant** Natural self-cleansing properties of the environment, including dispersion, gravitational settling, absorption, rainout, and adsorption. Control methods through process modification, raw material or fuel changes, and equipment adjustments. Control of particulate emissions with factors affecting device selection	**5 hrs**
Unit III	**Control of Gaseous Air Pollutant** Control of gaseous pollutants through absorption, adsorption, incineration, and carbon sequestration for CO2. Emission control from mobile sources, including identification and management of emission sources.	**5 hrs**
Unit IV	**Introduction to Solid Waste**	**6 hrs**

	Definition, objectives of SWM, impacts of improper SWM: soil, water and air, functional outlines of SWM, sources and types of solid waste. Composition, characteristics: physical, chemical, biological and generation rate, factors affecting generation rate, estimation of quantity of solid waste. Rules of solid waste management in INDIA	
Unit V	**Recycling and Resource Recovery** Methods of solid waste management, Principles and importance of recycling in solid waste management, Environmental pollution due to improper waste management: soil, water, and air contamination. Public health risks associated with solid waste mismanagement, Smart waste management systems and the role of technology.	**5 hrs**

References

Text Books

1. Air Pollution: Its origin and control, 3rd Edition, Kenneth Wark, Cecil F. Warner, Wayne T. Davis, Addison-Wesley Longman. 1998. 0
2. Air Pollution: Health and Environmental Impacts, Gurjar, B.R., Molina, L., Ojha, C.S.P. (Eds.), CRC Press, 2010
3. Solid waste management, Dr. A.D. Bhide
4. Solid Waste Management, Sasikumar K and Sanoop Gopi Krishna, PHI.

Reference Books

1. Air Pollution, M. N. Rao, H. V. N. Rao, McGraw Hill, 2004. 0
2. Air Pollution and Control, K.V.S.G. Murali Krishna, University Science Press, 2015. Fundamental of Air pollution. 4th Edition, Daniel Vallero, Academic Press, Elsevier . H. Fulekar;.
3. Solid waste Engineering, Vesilind P. A., Worrell W and Reinhart, Thomson Learning Inc., Singapore.

Journal Papers:

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You Tube: https://www.youtube.com/watch?v=E2gGF1rburw

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Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination,

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	0	0	0	2	2	0	0	0	0	2	0	0
CO2	2	1	0	0	0	2	2	0	0	0	0	2	0	0
CO3	2	1	0	0	0	2	2	0	0	0	0	2	0	0
CO4	2	1	0	0	0	2	2	0	0	0	0	2	0	0
CO5	2	1	0	0	0	2	2	0	0	0	0	2	0	0

3: High, 2: Moderate, 1: Low, 0: No Mapping

Course Category	OE	Course Code	CV124OE408
Course Title	Investment Management		

Teaching Scheme				Evaluation Scheme					
					Theory Marks			Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass		Max	Min for Pass
2	0	0	2	CCE	50	20	40	-	-
Total Hours				ESE	50	20			
26	0	0	Total hrs: 26		100				

Prerequisites: Fundamental Knowledge of Finance		
Course Objectives: (Min 3)		
1. To understand the importance of investment in industry 2. To analyse the technical indicators for investment 3. To evaluate portfolio requirements for a company		
Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Understand the investment management processes	2
CO2	Assess risk and return phenomenon in investments	3
CO3	Evaluate valuation of shares and bonds	3
CO4	Overview fundamental and technical analysis	3
CO5	Evaluate portfolio management using various indices	3

Syllabus

Unit I	**Introduction to Investment and Securities** Introduction & overview, Investment management process, Investment alternatives, Qualities of investors, Errors in investment management, Financial markets, Primary & Secondary markets, Regulatory bodies, Participants in securities market	**5 hrs**
Unit II	**Risk and return** Introduction risk & return, Types of risk, Measures of risk-I & II, Measures of risk-III, Implications and drawbacks of risk-return analysis	**6 hrs**
Unit III	**Valuation of equity shares and Bonds** Balance sheet valuation, Dividend discount model, Free cash flow model, Earnings multiplier approach, Comparative valuation ratio, Bond risk, Interest rate structure, Valuation of bonds, Immunisation	**5 hrs**
Unit IV	**Fundamental and Technical Analysis** Overview, Economic Analysis, Industry Analysis, Company Analysis, Overview, Charting techniques, Technical indicators, Pricing patterns	**5 hrs**
Unit V	**Portfolio Analysis & Evaluation** Random walk theory, Efficient Market Hypothesis, Traditional approach to portfolio construction, Modern approach to portfolio construction, Sharpe's Performance Index, Treynor's Performance Index, Jensen's Performance Index, Active & Passive strategy, Formula Plans	**5 hrs**

References

References Books:

1. Fischer Donald E, & Jordan Ronald J: Security Analysis and Portfolio Management, Prentice-Hall
2. Pandian Punithavathy: Security Analysis and Portfolio Management, Himalaya Publishing House Pvt Ltd
3. Gitman & Joehuk: Fundamentals of Investing, Pearson Addison Wesley
4. Prasanna Chandra: Investment Analysis & Portfolio Management, Mc Graw Hill Education

5. Bodie, Z., Kane, A, Marcus, A.J., and Mohanty, P. :Investments, Tata McGraw-Hill.

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https://www.youtube.com/watch?v=uguNb7qIyhY

Website: https://onlinecourses.swayam2.ac.in/ini25_mg01/preview

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	0	0	0	2	0	0	0	0	0	1	1	1
CO2	2	1	0	0	0	2	0	0	0	0	0	1	1	1
CO3	2	1	0	0	0	2	0	0	0	0	0	1	1	1
CO4	2	1	0	0	0	2	0	0	0	0	0	1	1	1
CO5	2	1	0	0	0	2	0	0	0	0	0	1	1	1

3: High, 2: Moderate, 1: Low, 0: No Mapping

Course Category	VSEC3	Course Code	CV124VS409
Course Title	Computer Aided Design		

Teaching Scheme				Evaluation Scheme					
L	T	P	Cr	Exam	Theory Marks			Practical Marks	
					Max	Min Marks for Pass		Max	Min for Pass
1	0	2	2	CCE	50	20	40	-	-
Total Hours				ESE	50	20			
13	0	26	Total hrs: 39		100				

Prerequisites:

- **Basic Engineering Drawing:** Familiarity with manual drafting techniques, basic symbols, and drawing standards.
- **Fundamental Computer Skills:** Proficiency in operating a computer, navigating interfaces, and using basic software.
- **Mathematics:** Understanding geometric concepts such as coordinate systems and scaling.

Course Objectives: (Min 3)

1. To develop a strong foundation in AutoCAD 2D by understanding its user interface, drawing tools, and coordinate systems for precise drafting in civil engineering.

2. To enable students to create, modify, and annotate technical drawings using various editing tools, dimensioning techniques, layers, and hatching for professional documentation.

3. To introduce advanced drafting techniques such as working with blocks, layouts, plotting, and isometric drawings, preparing students for real-world engineering applications.

Course Outcomes: After successful completion of the course the student will be able to		**BT Level**
CO1	Understand and navigate the AutoCAD user interface efficiently.	2
CO2	Apply various drawing and modification commands to create precise 2D drawings.	3
CO3	Implement annotations, dimensions, and hatching for professional-quality drafting.	3
CO4	Utilize blocks, attributes, and layouts for structured and reusable design elements.	3
CO5	Apply advanced drafting techniques and plotting methods for civil engineering projects.	3

Syllabus

Unit I	Introduction to AutoCAD	3 hrs
	Overview of CAD Software: Purpose and Applications in Civil Engineering. **User Interface:** Navigation, Toolbars, and Workspace Settings. **Basic Drawing Tools:** Line, Circle, Rectangle, and Polygon. **Coordinate System in AutoCAD:** Absolute, Relative, and Polar.	

Unit II	**Editing and Modifying Tools**	**3 hrs**
	Editing Commands: Trim, Extend, Offset, Mirror, Fillet, and Chamfer**.** **Object Properties:** Layers, Line Types, Colors, and Line Weights**.** **Selection Methods and Object Grouping.** **Undo, Redo, and Advanced Modify Commands.**	
Unit III	**Annotation and Dimensioning**	**3 hrs**
	· Text and Multiline Text (MText). · Dimensions: Linear, Angular, Radial, and Ordinate Dimensioning. · Leaders and Annotations for Construction Drawings. · Hatching and Gradient Fills for Section Representation.	
Unit IV	**Blocks and Layouts**	**2 hrs**
	· Creating and Inserting Blocks. · Attributes and Dynamic Blocks. · Layouts and Viewports for Print Setup. · Introduction to Plotting and Scaling Drawings.	
Unit IV	**Advanced Drafting Techniques**	**2 hrs**
	· Introduction to Templates and Standards in Drafting. · Working with External References (Xrefs). · Introduction to Isometric Drawing in 2D. · Best Practices for Civil Engineering Drawings.	

References

Text Books:

- AutoCAD 2023 for Beginners" – CADFolks
- "Mastering AutoCAD 2023 and AutoCAD LT 2023" – George Omura & Brian C. Benton

References Books:

1. "AutoCAD Training Guide" by Linkan Sagar (BPB Publications, India)
2. "Civil Engineering Drawing and Design" by D.N. Ghose (CBS Publishers & Distributors Pvt. Ltd.)
3. "AutoCAD 2023 Instructor: A Tutorial Guide to AutoCAD 2023" – James Leach
4. "AutoCAD for Civil Engineering Drawings" – Sandeep Dogra

You Tube: *https://youtu.be/cmR9cfWJRUU?feature=shared*

Website: *https://nptel.ac.in/courses/112102101*

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Assessment (CCE), ESE: End Semester Examination, UT: Unit Test

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	1	0	0	0	0	2	0	0	2
CO2	3	2	2	2	3	1	0	0	0	0	2	0	0	2
CO3	3	3	3	3	3	1	0	0	0	0	2	0	0	2
CO4	3	3	3	2	3	1	0	0	0	0	2	0	0	2
CO5	3	2	3	2	3	1	0	0	0	0	2	0	0	2

3: High, 2: Moderate, 1: Low, 0: No Mapping

List of Practicals

1. Create a rectangle, circle, polygon, and arc using different drawing commands..
2. Draw a basic floor plan and use Trim, Extend, Offset, Mirror, Fillet, and Chamfer to modify it.
3. Annotate a building plan or mechanical component using Text, MText, Leaders.
4. Create blocks for a door, window, furniture in a floor plan.
5. Create an **isometric view** of a small structure using 2D tools.
6. Develop a simple residential floor plan with dimensions, annotations, and layers.

Course Category	AE	Course Code	CV124AE410
Course Title	Workplace and Life Readiness Category		

Teaching Scheme				Evaluation Scheme					
L	T	P	Cr	Exam	Theory Marks			Practical Marks	
					Max	Min Marks for Pass		Max	Min for Pass
1	0	2	2	ISE	50	-	-	100	40
Total Hours				ESE	50	-			
13	0	26	Total hrs: 39		100				

Prerequisites: Basic English Grammar Skills

Course Objective: Purposes of Course are:

1. This course is designed to equip students with essential professional and technical communication skills necessary for success in the modern workplace.
2. Emphasizing both written and verbal communication
3. The course covers a wide range of topics, including effective written communication, active listening and public speaking.

Course Outcomes: After Successful completion of course units, students will

CO1	Express effectively through verbal or oral communication and Write precise briefs, essays, summaries or reports and technical documents for official communication.
CO2	Students will understands ethics and values for being a good professional
CO3	Learn to work in a heterogeneous and multidisciplinary teams and handle conflicting situations in corporate world
CO4	Students will develop their leadership qualities for being a successful professional
CO5	Students will be able to constructively participate in group discussion, meetings, prepare and deliver presentations

Syllabus

Unit I	Self-Introduction & SWOC Analysis	02 Hrs.

Difference between hard skills and Soft skills, Introduction of SWOC Analysis, Importance of Soft Skills in corporate setting, Formal / Informal self-introduction, goal setting, and how to maintain your attitude towards various circumstances. Applications of SWOC in domain specific Industry

Unit II	Writing Skills	02Hrs.

Practicing and understanding various formats of writing skills. Discussion on types of reports, various formats of report writing. Understanding Email etiquette and types of email. Writing emails on different topics. Practicing resume writing and its various formats. Types of application and how to write them.

Unit III	Professionalism & Ethics	03 Hrs.

Understanding ethics and morals, Importance of Professional Ethics, hindrances due to absence of Work ethics, Professional etiquette – Introductions, with colleagues, attire, events, dinning, telephone, travelling, netiquette, social media, writing. Stress as integral part of life, Identifying signs and sources of stress, Steps to cope with stress – open communication, positive thinking, Belief in oneself, ability

to handle failure, Retrospective thinking for future learning, Organizing skills to enhance time management, Focusing on goals, smart work vs hard work, Prioritizing activities, Perils of procrastination, Daily evaluation of "to-do" list. Case studies about development of ethics

Unit IV	**Group Discussion & Personal Interview**	**03 Hrs.**

Introduction to Group Discussion, Difference between Group Discussion and debate, Etiquettes while conducting Group Discussion, Professional Phases to be used in Group Discussion, handling complexities in GD, Understanding types of Interview, Grooming and etiquette while giving an Interview, Understanding Job Description and Studying Company Profile, Strategies and techniques to ace the interview.

Unit V	**Interpersonal & Intrapersonal Skills**	**03 Hrs.**

Differences of interpersonal and interpersonal skills, Introduction of team building, Introduction to leadership and types of Leadership, Identifying your weakness and focussing on your strength to become a good leader, Introduction to Presentation Skills, 5P's of Presentation, Types of Presentation

Practical/ Lab Sessions

Lab Session	**Activities**	**Duration (Hrs.)**
1	Speaking Skills- Self Introduction: Introduce your friend	2
2	Team Building Activity	2
3	How to study job description and company profile : "Job Detective"	2
4	Grooming and image management	2
5	Speaking Skills- JAM Session	2
6	Speaking Skills- Debate session	2
7	Group Discussion	2
8	Group Discussion	2
9	Case study analysis : Problem solving and critical thinking : "The Problem-Solvers' Challenge"	2
10	Presentation Skills	2
11	Presentation Skills	2
12	Personal Interview – Conducting of mock interview	2
13	Personal Interview – Conducting of mock interview	2

Reference Books

1. Indrajit Bhattacharya, "An Approach to Communication Skills", Dhanpat Rai.
2. Simon Sweeney, "English for Business Communication", Cambridge University Press.
3. Sanjay Kumar and Pushpa Lata, "Communication Skills", Oxford University Press.
4. Atkinson and Hilgard's, "Introduction to Psychology", 14th Edition.
5. Kenneth G. Mcgee, "Heads Up: How to Anticipate Business Surprises & Seize Opportunities First", Harvard Business School Press, Boston, Massachusetts.
6. R. Gajendra Singh Chauhan and Sangeeta Sharma, "Soft Skills-An integrated approach to maximize personality", Wiley Publication, ISBN: 987-81-265-5639-7

MOOC / NPTEL Courses:

1. NPTEL Course "Developing Soft skills & Personality" https://nptel.ac.in/courses/109/104/109104107/
2. NPTEL Course "Communication Skills" https://nptel.ac.in/courses/109/104/109104030/
3. NPTEL Course "Effective Writing" https://nptel.ac.in/courses/109/107/109107172/
4. NPTEL Course "Interpersonal Skills" https://nptel.ac.in/courses/109/107/109107155/

Marking Scheme for Evaluation

Marking Scheme for ISE (100)		
No	**Component**	**Marks**
1	Assignment 6 Assignments*5 Marks each = 30Marks	30
2	Quiz - Pre & Post Diagnostic Test-15 Marks Quiz on Unit 1 & 2 -15 Marks	30
3	Micro Project: Content creation- 15 Marks Presentation of the Report-15 Marks	30
4	Participation in Teaching Learning Process	10
	Total Marks:	**100**

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	0	0	0	0	0	0	1	3	0	2
CO2	0	2	0	0	0	0	3	1	0	0	2
CO3	0	0	2	0	0	1	3	3	1	3	2
CO4	0	0	0	2	0	0	3	1	0	2	2
CO5	0	0	0	0	2	0	2	2	1	1	3

3: High, 2: Moderate, 1: Low, 0: No Mapping

Course Category	EEM	Course Code	CV124EE411
Course Title	Entrepreneurship, Economics and Financial Management		

Teaching Scheme				Evaluation Scheme					
					Theory Marks			Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass		Max	Min for Pass
2	0	0	2	CCE	50	20	40	-	-
Total Hours				ESE	50	20			
26	0	0	Total hrs: 26		100	40			

Prerequisites: Fundamentals of Management, Mathematics

Course Objectives: (Min 3)

1. Describe the various concepts involved in Project Economics.
2. Select most feasible project based on different appraisal techniques
3. Summarize the sources of project finance
4. Estimate working capital required for a project

Course Outcomes: After successful completion of the course the student will be able to		**BT level**
CO1	Classify various concepts in project economics	2
CO2	Classify the project appraisal methods	3
CO3	Apply the methods of project selection and recommend the best economical project.	3
CO4	Develop an understanding of financial management in Engineering projects	3
CO5	Understand working capital and its estimation for civil engineering projects	2

Syllabus

Unit I	**Project Economics**: Introduction to Project Economics - Definition, Principles, Importance in Construction Industry, Difference between Cost, Value, Price, Rent, Simple and Compound Interest, Profit, Cash flow Diagram, Annuities and its Types, Concept of Cost of Capital, Time Value of Money, assets, liabilities, balance sheet, numerical on preparation balance sheet, profit & loss account, difference between microeconomics and macroeconomics	**8 hrs**
Unit II	**Project Appraisal**: Types of Appraisals such as Political, Social, Environmental, Techno-Legal, Financial and Economical, Criteria for Project Selection - Benefit - Cost Analysis, NPV, IRR, Pay-Back Period, Break Even Analysis [Fundamental and Application Component],	**8 hrs**
Unit III	**Project Feasibility Studies** Study of Project Feasibility Report and Detailed Project Report (DPR) Project Selection – Decision Matrix, Technique for Order Preference using Similarity to Ideal Solution (TOPSIS), Simple Additive Weighting (SAW).	
Unit IV	**Project Finance:** Long- and short-term sources of finance, equity, debt government grants & alternative sources, numerical on calculation of leverage ratio, EBIT & dividend pay-out, financial market & instruments: money, market, secondary market, credit, bill & income security market; goal of financial management, key activities in financial management, banking institutions, Non Banking Financial Corporation (NBFC)	**8 hrs**

Unit V	**Working Capital:** Meaning, types of working capital, components of working capital, operating cycle, factors affecting working capital requirement, working capital management, estimation of working capital, components of working capital, financing resources of working capital	**8 hrs**

References

Text Books:

01 Engineering Economics Management, Dr. Vilas Kulkarni and Hardik Bavishi, S. Chand Publication
02 Laws for Engineers, Vandana Bhatt and Pinky Vyas, Pro Care Publisher
03 Indian Economy, Gaurav Datt and Ashwani Mahajan, S. Chand Publication
04 Industrial Organization & Engineering Economics, T. R. Banga and S. C. Sharma, Khanna Publisher

Reference Books:

1. Engineering Economy, Theusen G. J. and Fabrycky W. J., 9th Edition, Prentice-Hall, Inc., New Delhi
2. Finance for Engineers: Evaluation and Funding of Capital Projects, Crundwell F. K., Springer, London
3. Financial Management, Khan and Jain, Tata McGraw-Hill Education
4. Engineering Economy, Leland T. Blank and. Anthony Tarquin, McGraw Hill
5. Case studies in Finance, Burner, McGraw Hill
6. Engineering Economics by R.Panneerselvam, PHI Learning; 2nd edition (2014)
7. Essentials for Decision Makers by Asok Mukherjee, Scitech Publication, New Delhi.

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1. https://www.youtube.com/watch?v=Ilv049mphtE
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2. https://oldsite.pup.ac.in/e-content/education/Med73.pdf
3. https://www.tsu.edu/academics/colleges-and-schools/jesse-h-jones-school-of-business/pdf/fin-capital-budgeting.pdf
4. https://mgcub.a https://aits-tpt.edu.in/wp-content/uploads/2018/08/Capital-Budgeting.pdfc.in/pdf/material/2020042918503348c3ec74a6.pdf
5. https://www.srcc.edu/sites/default/files/B.A.(Hons.)%20Eco_Sem-II_Finance(GE)_WorkingCapital_RuchikaChoudhary.pdf
6. https://dducollegedu.ac.in/Datafiles/cms/ecourse%20content/Working%20Capital-BMS.pdf

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Unit V	Total	Pass
CCE	Faculty	5	5	5	5	5	25	20
	Department	5	5	5	5	5	25	
ESE	Institute	10	10	10	10	10	50	20

CCE: Continuous Comprehensive Evaluation (CCE), ESE: End Semester Examination,

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	0	0	1	0	0	1	0	0	2	1	2	2	0
CO2	1	1	0	0	1	0	0	1	0	0	2	1	2	2	0
CO3	1	1	0	0	1	0	0	1	0	0	2	1	2	2	0
CO4	1	1	0	0	1	0	0	1	0	0	2	1	2	2	0
CO5	1	1	0	0	1	0	0	1	0	0	2	1	2	2	0

3: High, 2: Moderate, 1: Low, 0: No Mapping

Course Category	Value Education Course 2	Course Code	CV124VE412
Course Title	Sustainable Development - 2		

Teaching Scheme				Evaluation Scheme				
					Theory Marks		Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass	Max	Min for Pass
2	0	0	2	CCE	100	40	-	-
Total Hours								
26	0	0	Total hrs: 26					

Prerequisites:

None

Subjects Included:

Universal Human Values (UHV) 3 units

Constitution of India 1 unit

Corporate Laws 1 unit

Course Objectives: (Min 3)

Understand Universal Human Values (UHV) – Develop ethical, moral, and professional values in students.

Apply UHV in Personal and Professional Life – Explore human relationships, harmony, and responsible behavior.

Develop Ethical Decision-Making Skills – Analyze real-life scenarios and case studies to build decision-making abilities.

Study Constitutional Rights and Duties – Understand fundamental rights, directive principles, and governance structure.

Understand Corporate Laws – Explore the regulatory framework governing businesses and corporate ethics.

1.

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

CO1	**DEFINE** the fundamental concepts of Universal Human Values (UHV).
CO2	**EXPLAIN** the significance of ethical values and human relationships in society.
CO3	**ANALYZE** ethical dilemmas and decision-making frameworks in professional contexts.
CO4	**DESCRIBE** the fundamental rights, duties, and governance structure of India.
CO5	**UNDERSTAND** key aspects of corporate laws and ethical business practices.

Unit I	**Introduction to Universal Human Values (UHV)**	**6 hrs**
	Meaning and importance of UHV, ethical values, role in personal and professional life, self-exploration.	
Unit II	**Human Relationships & Harmony**	**6 hrs**
	Role of relationships in family, society, and workplace; conflict resolution; social responsibility; sustainability in human interactions.	
Unit III	**Ethical Decision-Making**	**6 hrs**
	Case studies on ethical dilemmas, corporate ethics, moral reasoning, frameworks for ethical decision-making.	
Unit IV	**Constitution of India**	**4 hrs**
	Fundamental rights and duties, directive principles, governance structure, significance of constitutional amendments, case laws.	
Unit V	**Corporate Laws & Business Ethics**	**4 hrs**
	Overview of business laws, corporate governance, ethical leadership, corporate social responsibility (CSR), impact of regulations on industries.	

Scheme for Examination

Component	**Parameters**	**Marks**	**Total**	**Pass**
CCA	Viva Voce for assessment of Understanding	20	50	20
	Involvement, Participation, and Engagement	10		
	Quality of Submission of Report	10		
	Attendance	10		
End Evaluation	Performance (Internal)	25	50	20
	Oral Examination (Internal)	25		

CCA: Continuous Comprehensive Evaluation (CCE)

CO-PO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	0	0	0	0	0	0	0	0	3	3
CO2	3	3	3	3	0	0	0	0	0	0	0	0	3	3
CO3	3	3	3	3	0	0	0	0	0	0	0	0	3	3
CO4	3	3	3	3	0	0	0	0	0	0	0	0	3	3
CO5	3	3	3	3	0	0	0	0	0	0	0	0	3	3

3: High, 2: Moderate, 1: Low, 0: No Mapping

D Y Patil College of Engineering, Akurdi, Pune

An Autonomous Institute from AY 2024-25, Affiliated to Savitribai Phule Pune University, Pune

Course Category	NC	Course Code	NC3
Course Title	Geology & Rock Mechanics		

Teaching Scheme				Evaluation Scheme					
					Theory Marks			Practical Marks	
L	T	P	Cr	Exam	Max	Min Marks for Pass		Max	Min for Pass
2	0	0	0	CCE	50	20		-	-
Total Hours									
26	0	0	Total hrs: 26		50				

Prerequisites:

Course Objectives: (Min 3)

1. To get the knowledge of the physical properties of mineral, types of rocks and their inherent characteristics with Civil Engineering applications.
2. To learn geomorphic features formed by fluvial, marine processes and their role, Indian stratigraphy and historical geology in civil engineering projects.
3. To comprehend Structural geology applied to civil engineering projects and to get idea about plate tectonics.
4. To learn the physical and mechanical properties of Rock and its engineering classification.
5. To explain principles of rock mechanics for effective strata stability.
6. To learn the various rock exploration methods and feasibility of rock testing

Course Outcomes: After successful completion of the course the student will be able to		**BT Level**
CO1	To explain the basic concepts of engineering geology, minerals and various rocks.	*2*
CO2	To recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities.	*3*
CO3	To describe the physical properties of rock and to classify the rock	*3*
CO4	To describe the mechanical properties of rock and to classify the rock	*3*
CO5	To elaborate the process of rock exploration, sampling and testing.	*3*

Syllabus

Unit I	**General Geology, Mineralogy and Petrology (07 Hours)** **a)** Introduction to the subject, scope and sub divisions. **General Geology:** The Earth as a planet, Interior & General composition of the Earth, The rock cycle	**6 hrs**
	b) Introduction to mineralogy: Physical Properties of Minerals, Classification of Minerals, Rock forming minerals.	
	c) Introduction to petrology and Broad classification of rocks. **Igneous Petrology:** Plutonic, Hypabyssal and Volcanic rocks, Structures, Textures and Classification of Igneous rocks. Study of common rock and their civil engineering applications.	

	Secondary Petrology: Genetic classification of secondary rocks and grain size classification and Textures, Study of common rock and their civil engineering applications.	
	Metamorphic Petrology: Agents, Types of metamorphism, Texture and structures. Study of common rock types and their civil engineering applications	
Unit II	**Geomorphology and Structural Geology** **a) Geomorphology:** Endogenic and Exogenic processes, Geological action by fluvial process i.e. river and Landforms formed it, Aeolian and glacial process, Coastal geomorphology.	**5 hrs**
	b) Structural Geology: Out crop, dip and strike, conformable series, unconformity, its types and overlap, faults and their types, folds and their types, inliers and outlier. Civil engineering, importance of faults and folds with examples.	
	c) Structures of rocks: Igneous intrusions and their types, joints and their types, stratification and lamination.	
Unit III	**Physical and Mechanical Properties of Rock** a) Definition & its importance, Rock mass & material form; Effects of discontinuities on rock	**5 hrs**
	b) Physical properties of rocks- - Porosity, Density, Moisture content, Degree of saturation, Coefficient of permeability, Electrical properties, Thermal properties, Swelling, Anisotropy, Durability	
Unit IV	**Mechanical Properties of Rock**	**5 hrs**
	(a) Mechanical properties of rocks- Strength (Compressive, Tensile & Shear), Deformability, Elasticity & Plasticity, Hardness (b) Engineering Classification of Rock	
Unit V	**Introduction to Rock Exploration and Testing** a) Introduction and Objectives of exploration, Methods of rock exploration, Rock exploration- core boring, core recovery, Rock Quality Designation (RQD) **b) Rock Testing -** Uni-axial compressive strength Test, Tensile strength tests (Brazilian tests, Bending tests), Flexural strength test- Three point, Four-point load test, Shear strength test (Direct Shear strength test, Direct shear test on rock cubes), Indirect Shear strength test- Punch shear test. c) **In situ tests**: Flat jack & load cells for load measurement.	**5 hrs**

References

Text Books:

1.Text Book of Engineering Geology by R.B. Gupte , 2001, P.V.G. Publications, Pune.
2. A Text Book of Engineering Geology by N. ChennaKesavulu. 2010, McMillan India Ltd.
3. Principles of Engineering Geology by D. Venkat Reddy. 2010, Vikas Publishers.

Reference Books:

1. Geology P. K. Mukerjee, World Press
2. Engineering Geology by F. G. H Blyth and De Frietus, Reed Elsevier India
3. Geology for geotechnical engineers, J. C. Harvey, Cambridge University Press
4. Principles of Engineering Geology,S.K. Garg, VikasPublisher
5. Engineering Geology, Parbin Singh
6. Geology and Engineering, K. V. G. K. Gokhale, D. M. Rao ,Tata McGraw Hill.
7. Structural Geology, M. P. Billings, Pearson India Pvt. Ltd.
8. Rock Mechanics for Engineers , B.P.Verma, Khanna Publishers
9. Elements of Mining Technology – I, D. J. Deshmukh, Central techno publication

Any Other book of a prominent publisher that is recommended by Geology faculty.

You Tube: https://www.youtube.com/watch?v=aTVDiRtRook&t=2548s

Website: https://onlinecourses.nptel.ac.in/noc23_ce107/preview

Scheme for Examination

Component	Level	Unit I	Unit II	Unit III	Unit IV	Total	Pass
CCE	Faculty	12	12	13	13	50	20

CCE: Continuous Comprehensive Evaluation (CCE)

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	0	0	0	2	1	0	0	0	0	1	1	2
CO2	2	1	0	0	0	1	1	0	0	0	0	1	2	2
CO3	2	1	0	0	0	1	1	0	0	0	0	2	2	2
CO4	2	2	0	0	0	1	1	0	0	0	0	1	1	2
CO5	2	2	0	0	0	1	1	0	0	0	0	1	1	2

3: High, 2: Moderate, 1: Low, 0: No Mapping

Course Category	Non Credit	Course Code	NC4
Course Title		Professional and Technical Communication	

Teaching Scheme				Evaluation Scheme					
L	T	P	Cr	Exam	Theory % Marks			Practical % Marks	
					Max	Min for Pass		Max	Min for Pass
0		2			--	--	--	50	20
Total Hours							-		
0		26	Total: 26		---	--			

prerequisites: Basic English Grammar Skills

Course Objective: Purposes of Course are:

4. This course is designed to equip students with essential professional and technical communication skills necessary for success in the modern workplace.
5. Emphasizing both written and verbal communication
6. The course covers a wide range of topics, including effective written communication, active listening and public speaking.
7. Develop strong logical reasoning aptitude & problem solving to clear company selection tests

Course Outcomes: After Successful completion of course units, students will

CO1	Analyse and evaluate spoken information critically for understanding the context and credibility of the source.
CO2	Demonstrate effective interpersonal communication skills for harmonious and productive interactions.
CO3	Articulate strategies for clear and coherent writing skills for personal & professional communication needs.
CO4	Develop skills for effective and authentic non-verbal communication to ace the professional communication needs.
CO5	Solve complex logical reasoning aptitude problems efficiently, improving selection test performance.

Syllabus

Unit I	Development of Listening and Speaking Skills	04 Hrs.

Introduction to Listening skills, Barriers to Listening skills, active Listening techniques, Listening for main ideas and details, Note taking strategies. Introduction to Speaking skills, Building vocabulary and fluency, Conversational Skills, Public speaking fundamentals. Speed and Fluency, Removing MTI.

Unit II	Development of Writing and Reading Skills	03 Hrs.

Introduction to Effective Written Communication, fundamentals of grammar and punctuation, Paragraph Structure, Essay writing, Report writing, Formal letter writing. Importance of Reading, Comprehension and solving case studies, Synthesis writing		
Unit III	**Fundamentals of Technical Communication**	**03 Hrs.**
What is communication? Importance of communication, Communication Types – Verbal, Non-verbal, Why is non-verbal communication important? Making eye contact (or lack thereof), Shaking hands, -Crossing or uncrossing legs, Folding or unfolding arms, Fidgeting, Eye contact, Smiling or frowning, Communication styles		
Unit IV	**Business Communication**	**03 Hrs.**
Business communication theory, Email Etiquette, Digital Communication, Presentation Skills, Ethics in Business Communication, Kinesics and Pitch modulation		
Unit V	**Quantitative Aptitude**	**02 Hrs.**
Recap & Time and Work		
Unit VI	**Reasoning Ability**	**08 Hrs.**
1. Analytical Reasoning - I 2. Clock & Calendars 3. Coding and Decoding & Odd Man Out 4. Data Interpretation - Advanced **5.** Cubes & Dices		
Unit VII	**Career Skills**	**03 Hrs.**
1. Networking Skills 2. Linked In Profile Building & Internship Outreach **3.** ATS Resume		
Reference Books		

11. Communication Skills for Engineers by S. Mishra & C. Muralikrishna (Pearson),2011, ISBN - 8131799905, 9788131799901
12. Communication Skills for Technical Students by T.M. Farhathullah (Orient Longman)2002, ISBN - 9788125022473
13. Written Communication in English by Saran Freeman (Orient Longman) 1977, 8125004262
14. Essential English Grammar (Elementary & Intermediate) Raymond Murphy (CUP), 1990, ISBN 10-8175960299
15. Communication for Business: A Practical Approach by Shirley Tailor (Longman),2005, ISBN - 9780273687658
16. Developing Communication Skills by Krishna Mohan & Meera Banerji (Macmillan),2009, ISBN - 9780230638433

17. Business Correspondence and Report Writing, R. C. Sharma & Krishna Mohan (Tata McGraw Hill,2017, ISBN - 9789390113002
18. Technical communication: Principles and practice, Raman, Minakshi, and Sangita Sharma. 3rd ed. Oxford University Press, 2015, ISBN - 978-0199457496
19. https://ielts.org
20. NPTEL Course-Business English Communication IIT Madras
    Link https://youtu.be/GwF4ypDSr-A
11 NPTEL Course- Introduction to Effective Communication
    Link https://archive.nptel.ac.in/courses/109/104/109104030/