MITS Kochi
Muthoot Institute of Technology and Science (Autonomous)

B.Tech

CIVIL ENGINEERING

2025 REGULATION

SEMESTER 3

CURRICULUM & SYLLABUS

SEMESTER 3

CURRICULUM

SLOT	COURSE CATEGORY	COURSE CODE	COURSE NAME	L	T	J	P	S	C
A	BST	B250902/MA300A	Mathematics for Physical Science - 3	3	1	0	0	2	3
B	PCE	B250001/CE310B	Surveying and Geomatics	3	1	0	3	5	6
C	PCT	B250001/CE300C	Structural Analysis I	3	1	0	0	4	4
D	PCB	B250001/CE320D	Hydrology and Water Resources Engineering	2	1	1	0	4	4
E	EST	B250001/CE300E	Introduction to Artificial Intelligence and Data Science for Civil Engineering	2	0	0	2	4	4
F	HMT	B250908/CN900F	Management for Engineers	3	0	0	0	1	2
G	PCL	B250001/CE330U	Material Testing Lab I	0	0	0	3	0	2
	M		Minor	3	1	0	0	4	4
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work, C- Credit)									

COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**3-1-0-0-2**	**VERSION**	**25/0**	**CREDITS**	**3**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250902/ MA300A	**MATHEMATICS FOR PHYSICAL SCIENCE -3**	**BST**
PRE-REQUISITE		
• Sound knowledge in calculus of single variable and multi-variable functions • Basic knowledge in complex numbers		

TEACHING AND ASSESSMENT SCHEME												
Teaching Scheme / Week					**Hours / Semester**	**Credit**	**Examination Scheme**					
							Theory			**Practical**			**Total**
L	**T**	**J**	**P**	**S**	90	**C**	**CIA**	**ESE**	**Total**	**CIA**	**ESE**	**Total**	
3	1	0	0	2		3	40	60	100	-	-	-	100

***L**: Lecture (One unit is of one-hour duration), **T**: Tutorial (One unit is of one-hour duration), **P**: Practical (One unit is of one-hour duration), **J**: Project (One unit is of one-hour duration), **S**: Self-Learning & Team Work (One unit is of one-hour duration), **CIA**: Continuous Internal Assessment, **ESE**: End Semester Examination*

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Partial Differential Equations	Introduction to partial differential equations, formation of partial differential equations, Method of separation of variables, Vibrations of a stretched string - wave Equation, Solutions of one-dimensional wave equation using method of separation of variables and problems, One-dimensional Heat equation, Solutions of One-Dimensional Heat equation - A long insulated rod with ends at zero temperatures. **(Relevant topics from sections 17.1,17.2, 18.2,18.4,18.5 of Text 1)**.	12
2	Complex Differentiation and Conformal Mapping	Complex Function, Limit, Continuity, Derivative, Analytic functions, Cauchy-Riemann Equations (without proof), Laplace's Equations, Harmonic functions, Finding harmonic conjugate, Conformal mapping, Mappings of w=z2, w=ez, w=1z. w=sinz. **(Relevant topics from sections 13.3, 13.4, 17.1, 17.2, 17.4 of Text 2)**	12
3	Complex Integration	Line integrals in the complex plane (Definition & Basic properties), First evaluation method, second evaluation method, Cauchy's integral theorem on simply connected domain and multiply connected domain (without proof), Independence of path, Cauchy's Integral formula (without proof). **(Relevant topics from sections 14.1, 14.2, 14.3 of Text 2)**	10
4	Series representations and Residue integration methods	Introduction to convergence and divergence of sequences and series, Taylor series and Maclaurin series, Laurent's theorem (without proof), Singularities and Zeros – Isolated Singularity, Poles, Essential Singularities, Removable singularities, Zeros of Analytic functions – Poles and Zeros, Formulas for Residues, Residue theorem (without proof), Evaluation of real definite integrals- Integral of Rational Functions of cosθ and sinθ. **(Relevant topics from sections 15.4, 16.1, 16.2, 16.3, 16.4 of Text 2)**	11

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Higher Engineering Mathematics	B S Grewal	Khanna Publishers,44th edition,2017

2	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons,10th edition, 2016

Reference			
Sl. No.	Title of Book	Author	Publication
1	Advanced Engineering Mathematics	H.C Taneja	I.K. International publishing House Pvt. Ltd, 2014.
2	Higher Engineering Mathematics	B. V. Ramana	McGraw-Hill Education, 39th Edition, 2023
3	Engineering Mathematics	Babu Ram	Dorling Kindersley (India) Pvt. Ltd, 2010
4	Complex Analysis	Dennis G. Zill & Patrick D. Shanahan, Jones & Bartlett,	3rd Edition, 2015
5	Fast Fourier Transform - Algorithms and Applications	K.R. Rao, Do Nyeon Kim, & Jae Jeong Hwang	Springer, 1st Edition, 2011

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COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**3-1-0-3-5**	**VERSION**	**25/0**	**CREDITS**	**6**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250001/CE310B	**SURVEYING & GEOMATICS**	**PCE**
PRE-REQUISITE		
Nil		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	**T**	**J**	**P**	**S**			**CIA**	**ESE**	**Total**	**CIA**	**ESE**	**Total**	
3	1	0	3	5	180	C 6	25	40	65	20	15	35	100

***L**: Lecture (One unit is of one-hour duration), **T**: Tutorial (One unit is of one-hour duration), **P**: Practical (One unit is of one-hour duration), **J**: Project (One unit is of one-hour duration), **S**: Self-Learning & Team Work (One unit is of one-hour duration), **CIA**: Continuous Internal Assessment, **ESE**: End Semester Examination*

SYLLABUS (Major Topics)

Module	Title	Major Topics	Hrs
1	Introduction to surveying	**Introduction:** objectives, principles, classification, linear and angular methods, survey stations, survey lines, and ranging. **Compass surveying:** bearing of survey lines, local attraction and correction, computation of angles, declination, and dip. **Triangulation (concepts only):** classification, triangulation figures, strength of figure, intervisibility of stations, satellite station, reduction to centre.	11
2	Levelling, Contouring, and Earthwork Computations	**Levelling:** principles of levelling, dumpy level, booking and reducing levels, methods- simple, differential, reciprocal, profile levelling and cross sectioning, errors in levelling. **Contouring:** characteristics and uses. **Areas and Volumes:** computation of area and volume (level section) by the prismoidal and trapezoidal rule. **Mass diagram:** construction, characteristics and uses.	18
3	Theodolite surveying, Curve surveying and Theory of errors	**Theodolite surveying**: terminologies, measurement of horizontal and vertical angles. **Tacheometric surveying:** principle of tangential tacheometry. **Traverse Surveying:** open and closed traverse, checks in closed traverse, traverse computations, balancing the traverse- Bowditch's rule. **Curve Surveying:** types of curves, elements, setting out of a simple curve (Rankine's method only). **Theory of errors:** theory of least squares, weighting of observations, most probable value, computation of MPV of observed quantities - method of normal equations.	16
4	Advanced surveying techniques	**Total Station:** concept of EDM, principles and working, advantages and applications. **Global Positioning System:** components and principles, satellite ranging, application of GPS, GPS surveying methods- static, rapid static, kinematic methods – DGPS. **Remote Sensing:** definition, electromagnetic spectrum, energy interactions with atmosphere and earth surface features, spectral reflectance, classification of sensors- active and passive, resolution- spatial, spectral radiometric and temporal resolution. **Drone surveying:** photogrammetric drone and LiDAR drone (concepts) **Geographical Information System**: components of GIS, GIS operations, map projections – methods.	15

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Surveying, Vol I and II	Dr. B.C Punmia , Asok Kumar Jain& Arun Kumar Jain	Lakshmi Publications
2	Surveying & Levelling	Prof T.P. Kanetkar & Prof. S. V. Kulkarni	Poune Vidyarthi Griha Prakashan, 2004
3	Introduction to Geographic Information Systems	Chang,K	Tata McGraw-Hill Publishing Co. Ltd, 2008

Reference			
Sl. No.	Title of Book	Author	Publication
1	Surveying & Levelling	N.N. Basak	Mc GrawHill Education
2	A textbook of Surveying & Levelling	R. Agor	Khanna Publishers

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COURSE DESCRIPTION							
Regulation	**2025**	**L-T-J-P-S**	**3-1-0-0-4**	**Version**	**25/0**	**Credits**	4
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

Course Code	**Course Name**	**Course Category**
B250001/CE300C	STRUCTURAL ANALYSIS I	PCT
Pre-requisite		
B250902/CE100C ENGINEERING MECHANICS, B250001/CE200E MECHANICS OF SOLIDS		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					**Credit**	**Hours / Semester**	**Examination Scheme**		
							Theory		
L	**T**	**J**	**P**	**S**	**C**		**CIA**	**ESE**	**Total**
3	1	0	0	4	4	120	40	60	100

***L**: Lecture (One unit is of one-hour duration), **T**: Tutorial (One unit is of one-hour duration), **P**: Practical (One unit is of one-hour duration), **J**: Project (One unit is of one-hour duration), **S**: Self-Learning & Team Work (One unit is of one-hour duration), **CIA**: Continuous Internal Assessment, **ESE**: End Semester Examination*

SYLLABUS (Major Topics)

Module	Title	Major Topics	Hrs
1	Force responses of statically determinate arches and cables	Review of basic concepts in structural analysis - loads (direct and indirect loading); response (equilibrium, compatibility, force-displacement relations*) (Concepts only)* Analysis of statically determinate three-hinged, parabolic, and circular arches – Analysis of arches having abutments at different levels. Analysis of cables and suspension bridges – determination of maximum tension – Analysis of cables having different levels of support.	15
2	Force responses of trusses and Influence line diagrams	Analysis of statically determinate plane trusses by the method of joints and the method of section. Moving Loads and Influence Line Diagrams for Determinate Structures using Muller-Breslau Principle – conditions for maximum bending moment and shear force.	14
3	Displacement responses of statically determinate structures	Geometric methods (Differential equation of elastic curve, Double Integration method, Conjugate Beam method); Moment Area Theorems, Maxwell's reciprocal theorem, Maxwell-Betti's theorem. Work-energy methods (Principle of Virtual Work, Unit Load Method, Castigliano's theorem)	15
4	Analysis of indeterminate structures	Stability, determinacy, static and kinematic indeterminacies. Force methods - method of consistent deformations, strain energy method. Displacement methods - slope-deflection method, moment-distribution method. Introduction to computational analysis of structures. Demonstration of a software package for the analysis of simply supported beams and cantilever beams - vertical loads and moments only. *(Not for ESE; one LA from this portion)*	16

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Structural Analysis	Devdas Menon	Narosa Publishing House
2	Structural Analysis	Hibbeler R. C.	Pearson Education

Reference			
Sl. No.	Title of Book	Author	Publication
1	Structural Analysis	Kassimali A.	Cengage India Private Limited
2	Basic Structural Analysis	Reddy C.S.	Tata McGraw Hill
3	Theory of Structures	Ramamrutham S.	Dhanpat Rai Publications
4	Theory of Structures	Punmia B. C.	Laxmi Publication House

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COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**2-1-1-0-4**	**VERSION**	**25/0**	**CREDITS**	**4**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250001/CE320D	HYDROLOGY AND WATER RESOURCES ENGINEERING	PCB
PRE-REQUISITE		
Nil		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	**T**	**J**	**P**	**S**	**120**	**C**	**CIA**	**ESE**	**Total**	**CIA**	**ESE**	**Total**	
2	1	1	0	4		4	60	40	100	-	-	-	100

***L**: Lecture (One unit is of one-hour duration), **T**: Tutorial (One unit is of one-hour duration), **P**: Practical (One unit is of one-hour duration), **J**: Project (One unit is of one-hour duration), **S**: Self-Learning & Team Work (One unit is of one-hour duration), **CIA**: Continuous Internal Assessment, **ESE**: End Semester Examination*

SYLLABUS (Major Topics)

Module	Title	Major Topics	Hrs
1	Components of Hydrologic cycle	**Precipitation**-mechanism, types, forms and measurement using rain gauges, Optimum number of rain gauges, representation of rainfall data-mass curve and hyetograph, computation of mean precipitation over a catchment, Design rainfall - probable maximum rainfall; IDF curves (conceptual idea only). **Infiltration** - Measurement by double ring, infiltrometer, Horton's model, infiltration indices. **Evaporation** – measurement by IMD land pan method and control of evaporation.	14
2	Runoff and Flood Estimation	**Runoff**-components of runoff- Hydrograph analysis-Hydrograph from isolated storm-Base flow, separation of direct runoff and base flow. Unit hydrograph – uses, assumptions and limitations of unit hydrograph theory. Computation of storm/flood hydrograph of different duration by method of superposition and by development of S– Hydrograph; Floods-methods of design flood estimation – Empirical methods; SPF and PMF, Return period, Flood routing (conceptual ideas only)	16
	Streamflow measurement	**Flow Rate Computation** - Area velocity method of stream gauging, selection of site for stream gauging station, Stage-discharge curve, flow duration curve uses and characteristics, River training methods.	
3	Irrigation	**Irrigation**– Necessity, Benefits and ill effects. Types: flow and lift irrigation- perennial and inundation irrigation. Methods of irrigation: flooding, furrow, sprinkler and drip irrigation (concepts only, no design aspects/problems). Irrigation structures – storage structures **Soil-Water –Plant Relationships** - Irrigation efficiencies, Computation of crop water requirement: depth and frequency of Irrigation. Duty and delta, duty-factors affecting and method of improving duty, Computation of crop water requirement by using the concept of duty and delta. Consumptive use of water: concept of Evapotranspiration (Concept only. No detailed discussion on estimation procedures). **Soil Moisture Content** – Saturation capacity, Field capacity, Permanent Wilting Point, Readily available water, Optimum moisture	12

		content, Root zone depth and computation of depth of water for healthy growth of plants.	
	Reservoirs	**Reservoirs** - types, zones, yield of reservoir; Mass Inflow Curve, determination of storage capacity and yield from mass curve method (Graphical method only); Reservoir sedimentation and control - trap efficiency- computation of life of reservoir.	
4	Ground Water Hydrology	**Vertical Distribution of Ground Water**- classification of saturated formation. Aquifer properties (Porosity, Specific yield), Darcy's law, Well hydraulics-Steady radial flow into a fully penetrating well in Confined and Unconfined aquifers; Yield of open wells pumping test and recuperation test. Types of wells. Tube wells – types (Strainer type, Cavity type, Slotted type).	8

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Irrigation, Water Resources and Water Power Engineering	Modi P N	S.B.H Publishers and Distributors, New Delhi, 2009
2	Irrigation and Water Power Engineering,	Punmia B.C., Ashok K Jain, Arun K Jain, B. B.L Pande	Laxmi Publications (P) Ltd, 2009

Reference			
Sl. No.	Title of Book	Author	Publication
1	Hand book of Applied Hydrology	Ven Te Chow	Tata McGraw Hill, 1988
2	Ground Water Hydrology	Todd D. K.	Wiley, 2005
3	Groundwater	H. M Raghunath	New age International New Delhi, 2007
4	Irrigation and Water Resources Engineering	G. L. Asawa.	New Age International New Delhi, 2008
5	Hydrology and Water Resources Engineering,	Garg S. K.	Khanna Publishers New Delhi, 2005
6	Irrigation Engineering and Hydraulic Structures	Garg S. K.	Khanna Publishers New Delhi, 2006
7	Engineering Hydrology	Subramanya K.	Tata McGraw Hill, 2013
8	Hydrology: Principles, Analysis and Design.	Raghunath H.M.	New Age International New Delhi, 2006

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COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**2-0-0-2-4**	**VERSION**	**25/0**	**CREDITS**	**4**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	**COURSE NAME**	**COURSE CATEGORY**
B250001/CE300E	INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND DATA SCIENCE FOR CIVIL ENGINEERING	**EST**
PRE-REQUISITE		
Algorithmic Thinking with Python		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					**Hours / Semester**	**Credit**	**Examination Scheme**						
							Theory			**Practical**			**Total**
L	**T**	**J**	**P**	**S**	**120**	**C**	**CIA**	**ESE**	**Total**	**CIA**	**ESE**	**Total**	
2	0	0	2	60		4	40	60	100	-	-	-	-

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SYLLABUS (Major Topics)

Module	Title	Major Topics	Hrs
1	Fundamentals of AI, ML and Data Science for Civil Engineers	Introduction to AI, ML and Data Science – Types of ML (conceptual) – Civil engineering data landscape – Problem formulation and ethics. Introduction to civil engineering datasets using spreadsheets – Descriptive statistics for engineering data – Basic data visualisation (histograms, scatter plots, trendlines) – Introduction to data-driven relationships and identification of problem types.	10
2	Data Preparation and Supervised Learning in Civil Engineering	Data preparation and data quality – Train/test split and simple modelling workflow – Basics of regression models for civil applications – Basics of simple classification models – Introduction to model evaluation and overfitting (conceptual). Data preprocessing of civil engineering datasets – Simple regression modelling using spreadsheets and Python – Basic classification modelling using prepared notebooks – Practical interpretation of model performance and reliability.	15
3	Unsupervised Learning and AI/DS Workflow	Unsupervised learning concepts – Clustering for civil engineering data – Introductory idea of dimensionality reduction –Structured AI/DS workflow and introductory feature perspective. Clustering and pattern discovery in civil engineering datasets – Exploratory view of dimensionality reduction –Application of AI/DS workflow to selected civil engineering scenarios.	20
4	AI Applications, Deep Learning and Responsible Practice in Civil Engineering	AI applications in civil engineering – Introductory concepts of neural networks and deep learning – Concept of computer vision in civil engineering – Model deployment, reliability, limitations – Ethics, responsibility and AI-assisted workflows. Case-study based exploration of AI applications – Demonstration of basic computer vision workflows using prepared tools/notebooks – Practical study of model reliability and validation – Small end-to-end mini-project on a civil engineering problem.	15

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Introduction to AI & Machine Learning	M.C. Trivedi	Khanna Book Publishing
2	Data Science with Artificial Intelligence, Machine Learning and Deep Learning	Rajiv Chopra	Khanna Book Publishing

3	Introduction to Machine Learning with Python: A Guide for Data Scientists	Andreas C. Müller, Sarah Guido	O'Reilly / Shroff (Indian edition)

Reference			
Sl. No.	Title of Book	Author	Publication
1	Artificial Intelligence: A Modern Approach	Stuart Russell & Peter Norvig	Pearson / Prentice Hall
2	Machine Learning	Tom M. Mitchell	McGraw Hill
3	Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow	Aurélien Géron	O'Reilly / Shroff
4	Pattern Recognition and Machine Learning	Christopher M. Bishop	Springer
5	Practical Statistics for Data Scientists (2nd Ed.)	Peter Bruce, Andrew Bruce, Peter Gedeck	O'Reilly / Shroff

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COURSE DESCRIPTION							
REGULATION	**2025**	**L-T-J-P-S**	**3-0-0-0-1**	**VERSION**	**25/0**	**CREDITS**	**2**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250908CN900F	**MANAGEMENT FOR ENGINEERS**	**Humanities & Management - Experiential Learning Theory**
PRE-REQUISITE		
NIL		

TEACHING AND ASSESSMENT SCHEME										
Teaching Scheme / Week					**Hours / Semester**	**Credit**	**Examination Scheme**			
							Theory			**Total**
L	**T**	**J**	**P**	**S**	**60**	**C**	**CIA**	**ESE**	**Total**	
3	0	0	0	1		2	60	40	100	100

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SYLLABUS			
Module	Title	Major Topics	Hrs
1	Foundations of Management & Contemporary Thinking	Evolution & Functions of Management, Planning, Organising, Controlling, Contemporary Strategy	11
2	Human Resource Management, Leadership & Organisational Behaviour	Human Resource Management, Motivation, Leadership, Organisational Behaviour, Change Management	9
3	Decisions – Making	Quantitative Techniques for Decisions, Network Diagrams – CPM, PERT	9
4	Operations, Strategy & Entrepreneurship	Operations and Quality Management, Project Management and Agile Methods	7

SUGGESTED LEARNING RESOURCES

Text Books			
Sl. No.	Title of Book	Author	Publication
1	Essentials of Management	Koontz, H. & Weihrich, H	McGraw Hill, 11th Edition
2	Management	Robbins, S.P. & Coulter, M	Pearson Education, 14th Edition
3	Financial Management: Theory and Practice	Prasanna Chandra	McGraw Hill, 11th Edition

Reference			
Sl. No.	Title of Book	Author	Publication
1	Blue Ocean Strategy	Kim, W.C. & Mauborgne, R.	Harvard Business Review Press, 2004
2	The Lean Start-up	Ries, E.	Crown Business, 2011
3	Change by Design	Brown, T.	Harper Business, 2019

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COURSE DESCRIPTION							
Regulation	**2025**	**L-T-J-P-S**	**0-0-0-3-0**	**Version**	**25/0**	**Credits**	**2**
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

Course Code	**Course Name**	**Course Category**
B25001/CE330U	MATERIAL TESTING LAB-I	PCL
Pre-requisite		
B250001/CE200E Mechanics of Solids		

TEACHING AND ASSESSMENT SCHEME									
Teaching Scheme / Week					**Credit**	**Hours / Semester**	**Examination Scheme**		
							Practical		
L	**T**	**J**	**P**	**S**	**C**		**CIA**	**ESE**	**Total**
0	0	0	3	0	2	60	60	40	100

***L**: Lecture (One unit is of one-hour duration), **T**: Tutorial (One unit is of one-hour duration), **P**: Practical (One unit is of one-hour duration), **J**: Project (One unit is of one-hour duration), **S**: Self-Learning & Team Work (One unit is of one-hour duration), **CIA**: Continuous Internal Assessment, **ESE**: End Semester Examination*

SYLLABUS (Major Topics)		
Title	Major Topics	Hrs
Mechanical Behaviour under Axial and Shear Loading	Uniaxial tensile testing of metals and Tor steel, compression testing of metals, stress–strain behaviour, determination of elastic and strength properties, shear strength of metallic materials	12
Flexural and Torsional Behaviour of Materials	Bending behaviour of steel and timber, torsion testing of rods, modulus of rigidity determination using static torsion and torsional pendulum	15
Impact and Hardness Properties of Materials	Impact testing using Izod and Charpy methods, Brinell, Rockwell and Vickers hardness testing of engineering materials	9
Elastic Behaviour of Materials	Verification of Maxwell's reciprocal theorem and observation of elastic deformation behaviour in structural members	3
Fatigue and Experimental Stress Analysis	Fatigue behaviour of materials, endurance limit, study of strain gauges and load cells	6

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	History of Strength of Materials	S.P. Timoshenko	Dover publications
2	Engineering Mechanics of Solids	Egor P. Popov	Pearson

Reference			
Sl. No.	Title	Author	Publication
1	Metallic materials – Tensile testing – Part 1: Method of test at room temperature	Bureau of Indian Standards	IS 1608 (Part 1): 2022
2	Method for Izod Impact Test of Metals	Bureau of Indian Standards	IS 1598: 1977 (Reaffirmed 2020)
3	Metallic materials – Charpy Pendulum Impact Test – Method	Bureau of Indian Standards	IS 1757 (Part 1): 2020
4	Method of Test for Determining Shear Strength of Metals	Bureau of Indian Standards	IS 5242: 1979 (Reaffirmed 2022)
5	Metallic materials – Brinell Hardness Test – Part 1: Test Method	Bureau of Indian Standards	IS 1500 (Part 1): 2019

6	Metallic materials – Brinell Hardness Test – Part 4: Tables of Hardness Values	Bureau of Indian Standards	IS 1500 (Part 4): 2019
7	Metallic materials – Vickers Hardness Test – Part 1: Test Method	Bureau of Indian Standards	IS 1501 (Part 1): 2020
8	Metallic materials – Vickers Hardness Test – Part 4: Tables of Hardness Values	Bureau of Indian Standards	IS 1501 (Part 4): 2020
9	Metallic materials – Rockwell Hardness Test – Part 1: Test Method	Bureau of Indian Standards	IS 1586 (Part 1): 2018
10	Metallic materials – Rockwell Hardness Test – Part 3: Calibration of Reference Blocks	Bureau of Indian Standards	IS 1586 (Part 3): 2018
11	Metallic Materials – Wire – Simple Torsion Test	Bureau of Indian Standards	IS 1717: 2018
12	Design of Structural Timber in Buildings – Code of Practice	Bureau of Indian Standards	IS 883: 2016 (Reaffirmed 2021)
13	Metallic Materials – Torsion Test at Room Temperature	Bureau of Indian Standards	IS 17415: 2023
14	Metallic materials – Compression testing at room temperature	Bureau of Indian Standards	IS 1599: 2012

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