

B. TECH

MECHANICAL ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER 3

2025 REGULATION



B.Tech in MECHANICAL ENGINEERING 2025 REGULATION CURRICULUM & SYLLABUS

CONTENTS

COURSE CODE	COURSE NAME	PAGE NO.
	Curriculum	4
B250902/MA300A	Mathematics for Physical Science - 3	5
B250002/ME300B	Mechanics of Solids	7
B250002/ME300C	Fluid Mechanics and Machinery	9
B250002/ME320D	Manufacturing Process	11
B250002/ME300E	AI for Mechanical Engineering	13
B250908/HU900F	Engineering Economics	15
B250908/CN900F	Management for Engineers	17
B250002/ME330T	Material Testing Lab	18
B250002/ME330U	Fluid Mechanics and Hydraulic Machines Lab	20
	Minor	

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	PCT	B250002/ME300B	Mechanics of Solids	3	1	0	0	4	4
C	PCT	B250002/ME300C	Fluid Mechanics and Machinery	3	1	0	0	4	4
D	PCB	B250002/ME320D	Manufacturing Process	2	1	1	0	4	4
E	EST	B250002/ME300E	AI for Mechanical Engineering	3	0	0	0	5	4
F	HMT	B250908/HU900F	Engineering Economics	3	0	0	0	1	2
		B250908/CN900F	Management for Engineers						
T	PCL	B250002/ME330T	Material Testing Lab	0	0	0	3	1	2
U	PCL	B250002/ME330U	Fluid Mechanics and Hydraulic Machines Lab	0	0	0	3	1	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	BS
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		90	3	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	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 $w = z^2$, $w = e^z$, $w = \frac{1}{z}$, $w = \sin z$. (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 method	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 $\cos\theta$ and $\sin\theta$. (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 (REF2)
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 (REF1)
5	Fast Fourier Transform - Algorithms and Applications	K.R. Rao, Do Nyeon Kim, & Jae Jeong Hwang	Springer, 1st Edition, 2011 (REF4)

Web Resource	
1	Lecture 27: Introduction to Fourier Transform
2	Mathematical Methods for Engineers
3	https://www.youtube.com/watch?v=gFjIBKW8aZU
4	Introduction - Complex Analysis
5	Advanced Engineering Mathematics - Course

COURSE DESCRIPTION							
REGULATION	2025	L-T-J-P-S	3-1-0-0-5	VERSION	25/0	CREDITS	4
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250002/ME310B	MECHANICS OF SOLIDS	PCE
PRE-REQUISITE		
Engineering Physics, Engineering Mechanics		

TEACHING AND ASSESSMENT SCHEME													
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	T	J	P	S		C	CIA	ESE	Total	CIA	ESE	Total	
3	1	0	0	5		4	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	Introduction to deformable bodies and axially loaded bars	Introduction to analysis of deformable bodies. Types of external loads - Normal, Shear, Bending, and Bearing stress- Linear and Shear strains. Hooke's law - Universal testing machine and Stress-Strain diagrams- Young's Modulus, Bulk Modulus, and Rigidity Modulus. Poisson's ratio - Relationship between elastic constants, concepts of Isotropy, Orthotropy, Anisotropy, Brinell, Vickers, and Rockwell hardness test. Deformation in axially loaded bars -uniform cross section, varying cross section, principle of superposition, dissimilar materials, composite bars. Thermal effects - simple, composite bars.	15
2	Torsion of shafts and SFD and BMD concept	Torsion: Shafts - torsion theory of elastic circular bars - assumptions and limitations - polar modulus - torsional rigidity - shaft design for torsional load, determining rigidity modulus using torsion testing machine. Beams- Classification - Diagrammatic conventions for supports and loading. Differential equations between load, Shear Force, and Bending Moment- Shear Force and Bending Moment Diagrams of Cantilever and Simply supported beam with Point load/UDL. Point of Inflection.	14
3	Pure bending and deflection of beams	Stresses in Beams: Pure Bending - Flexure formula for beams, assumptions and limitations - Section Modulus - Flexural Rigidity - derivation and problems for rectangular section only -assumptions and limitations. Flexural stiffness determination using UTM. Deflection of Beams: Moment-Curvature relation - assumptions and limitations - Double Integration method - Macaulay's method.	15
4	Stresses on inclined plane and analysis of columns	Stress on an inclined plane due to Uniaxial stress- Stress on an inclined plane due to Biaxial stress- Stress on an inclined plane due to two Normal Stresses accompanied by Shear stresses- principal planes and stresses. Mohr's circle of stress, Thin cylinders, Basics of failure theories: Rankine, Tresca, and Von Mises (only theory) Buckling and stability of long Columns-Euler's buckling/crippling load for columns with different end conditions- Euler equation derivation for both ends hinged only- Rankine's formula.	16

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Mechanics of Solids	R K Bansal	Laxmi Publications
2	Mechanics of Solids	S. S. Bhavikatti	New Age International

Reference			
Sl. No.	Title of Book	Author	Publication
Sl. No.	Title of Book	Author	Publication
1	Mechanics of Materials	R. C. Hibbeler	Pearson Higher Education
2	Engineering Mechanics of Solids	Popov E	PHI
3	Mechanics of Materials	Beer & Johnston	McGraw Hills

Web Resource	
	https://www.youtube.com/watch?v=La4UEa7hA7Q&list=PLJoALJA_KMOARYNi50T6b488kPUBbOIsX
	https://eerc01-iiith.vlabs.ac.in/List%20of%20experiments.html

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
B250002/ME300A	FLUID MECHANICS & MACHINERY	PCT
PRE-REQUISITE		
Engineering Physics, Differential Calculus		

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	
3	1	0	0	4		120	4	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	Fluid Statics	Analysis of fluids at rest and evaluation of pressure distribution, hydrostatic forces, buoyancy, and stability of bodies.	16
2	Fluid Dynamics	Examination of fluids in motion using governing equations to determine velocity, pressure, and energy relationships.	12
3	Pipe Flow	Investigation of internal flow behaviour in pipes, including flow regimes, frictional losses, and energy variations.	16
4	Hydraulic Machines (Turbines and Pumps)	Exploration of the working principles and performance evaluation of machines that convert hydraulic energy to mechanical energy and vice versa.	16

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Fluid Mechanics: Fundamentals and Application	Yunus A. Cengel & John M. Cimbala.	McGraw-hill
2	Fluid Mechanics	Frank M White	McGraw-Hill
3	A Textbook of Fluid Mechanics and Hydraulic Machines	Dr R K Bansal	Laxmi
4	Hydraulic Machines	Dr R K Rajput	S Chand

Reference			
Sl. No.	Title of Book	Author	Publication
1	Introduction to Fluid Mechanics and Fluid Machines	Som S.K.	McGraw-hill
2	Engineering applications of Fluid dynamics	Fisher and Henly	Willford Press

Web Resource	
1	https://nptel.ac.in/courses/112105269
2	https://nptel.ac.in/courses/112105171
3	https://nptel.ac.in/courses/105101082

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
B250002/ME320D	MANUFACTURING PROCESS	PCB
PRE-REQUISITE		
Basic knowledge of Material Science and fundamental analytical skills		

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		4		120	4	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)			
Module	Title	Major Topics	Hrs
1	Casting Processes and Powder Metallurgy	General Classification of Manufacturing Processes. Casting - Characteristics of sand, design of patterns, cores, chaplets, solidification of metals and Chvorinov's rule, elements of gating system, risers, chills, numerical problems, defects in castings. Special casting process- Shell moulding, precision investment, die casting, centrifugal casting, continuous casting and squeeze casting. Powder Metallurgy - Powder Production, powder characteristics, mixing, compaction methods, sintering	12
2	Welding and Joining Processes	Welding : Classification, Fusion and Solid-state welding processes Gas Welding - Oxyacetylene welding-chemistry, types of flame and its applications. Arc welding- applications, numerical problems, consumable and non-consumable arc welding. Thermit welding, friction welding, electro slag welding, ultrasonic welding, electron beam welding and laser beam welding. Resistance welding-applications, process parameters, numerical problems Heat Affected Zone, residual stresses and distortion, defects in welding Brazing - soldering - adhesive bonding .	12
3	Metal Forming and Rolling Processes	Metal Forming : Plastic deformation and yield criteria - hot and cold working processes Rolling - Flat-rolling process, types of rolling mills, rolling defects. Sheet metal operations - Press tool operations. Types of die-Progressive dies, Compound dies, and Combination dies.	11
4	Forging, Drawing, Bending and Extrusion	Forging -Forging load, numerical problems, Various methods, applications, defects in forging - Wire, Rod, and tube drawing , drawing defects - Deep drawing. Bending - Details of bending, Determination of workload, estimation of spring back, numerical problems. Extrusion - Metal flow, mechanics of extrusion, numerical problems, defects in extrusion, applications.	14

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Manufacturing Science	Amitabha Ghosh and Ashok Kumar Mallick	Affiliated East West Press Ltd, New Delhi, 2002
2	Manufacturing Engineering and Technology	S.Kalpakistan and Steven R Schmid	Pearson, 2001

3	Manufacturing Technology	S. Jose	Pentage educational services 2024
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Reference			
Sl. No.	Title of Book	Author	Publication
1	Manufacturing Technology	RAO	Vol 2 3e, McGraw Hill Education India, 2013
2	Principles of Manufacturing Materials and Processes	Campbell J. S.	Tata McGraw Hill, 1999
3	Foundry Technology	P R Beeley	Elsevier, 2001
4	Materials and Processes in Manufacturing	Paul Degarma E and Ronald A. Kosher	Wiley, 2011
5	Manufacturing Technology Foundry, Forming and Welding	P. N. Rao	Tata McGraw-Hill Education, 2011
6	Principles of Metal Casting	Richard W. Heine, Carl R. Loper, Philip C. Rosenthal	Tata McGraw Hill Education, 2001

Web Resource	
1	https://nptel.ac.in/courses/112107219
2	https://nptel.ac.in/courses/112107215
3	https://nptel.ac.in/courses/112107089
4	https://nptel.ac.in/courses/112107144

COURSE DESCRIPTION							
REGULATION	2025	L-T-J-P-S	3-0-0-0-5	VERSION	25/0	CREDITS	4
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250002/ME300E	AI FOR MECHANICAL ENGINEERING	EST
PRE-REQUISITE		
B250903/CN110E - Programming in 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	
3	0	0	0	5		120	4	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)			
Module	Title	Major Topics	Hrs
1	Foundations of AI/ML and Python for Data Handling	Introduction to Artificial Intelligence and Machine Learning: concept of AI as a discipline and ML as its subset, motivating example of the self-driving car. Paradigms of machine learning: supervised learning, unsupervised learning, and reinforcement learning. Core ML task types: classification, regression, and clustering, all treated at an intuitive level without mathematical formalism. Python for data handling: numerical computation using NumPy, structured data manipulation using Pandas, and data visualisation using Matplotlib and Seaborn.	10
2	ML Algorithms, and Model Evaluation	Supervised learning algorithms — simple linear regression, multiple linear regression, K-Nearest Neighbors, and Naive Bayes classifier, including mathematical formulation and hand-calculation problems. Unsupervised learning — K-Means clustering algorithm, centroid initialisation, iterative assignment, convergence, and the elbow method for selecting the number of clusters. Model evaluation and performance metrics — Root Mean Square Error (RMSE), R-squared for regression models, confusion matrix, precision, recall, and F1-score for classification models.	12
3	Dimensionality Reduction, Deep Learning	Dimensionality reduction — Principal Component Analysis (PCA), covariance matrix, eigenvalues and eigenvectors, extraction of principal components, and explained variance ratio. Artificial Neural Networks — perceptron model, multi-layer perceptrons, activation functions (Sigmoid, Tanh, ReLU, Softmax), forward and backward pass concepts. Convolutional Neural Networks — digital image representation, convolutional filters and feature maps, padding, stride, max pooling, and the layered CNN architecture.	13
4	AI in Robotics and Autonomous Systems	Reinforcement learning basics: agent, environment, state, action and reward; Path planning and adaptive control: concepts and engineering relevance; AI in Digital Twins: virtual models for monitoring and prediction; Smart manufacturing and Industry 4.0: AI-driven quality control and automation; Future trends in AI for mechanical systems: digital manufacturing and smart factories	10

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Artificial Intelligence and Machine Learning	Lyla B Das	Techsar Publications
2	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow	Aurélien Géron	Shroff Publishers & Distributors
3	Introduction to Industrial Internet of Things and Industry 4.0	Sudip Misra, Chandana Roy, and Anandarup Mukherjee	CRC Press

Reference			
Sl. No.	Title of Book	Author	Publication
1	Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter	Wes McKinney	Shroff Publishers & Distributors
2	Industry 4.0: The Industrial Internet of Things	Alasdair Gilchrist	Apress (Springer Nature)

Web Resource	
1	Python for Data Science - https://onlinecourses.nptel.ac.in/noc22_cs32/preview
2	Industry 4.0: Managing the Digital Transformation - https://onlinecourses.nptel.ac.in/noc26_ge04/preview

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
B250908/HU900F	ENGINEERING ECONOMICS	HM
PRE-REQUISITE		
There are no prerequisites for taking this course.		

TEACHING AND ASSESSMENT SCHEME													
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	T	J	P	S	30	C	CIA	ESE	Total	CIA	ESE	Total	
3				1		30	2	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)			
Module	Title	Major Topics	Hrs
1	Economic Foundations for Engineering Decision-Making	Introduction to Economics, Demand and Supply Analysis, Elasticity of Demand, Market Structures Relevant topics from Text 1,2 & 3	9
2	Production Economics	Cost and Revenue Analysis, Break Even and Decision Analysis, Equipment Replacement Analysis Relevant topics from Text 4,5 & 6	9
3	Investment Decision Techniques	Introduction to Capital Budgeting, Non-Discounted Techniques, Discounted Techniques - Evaluation Methods and Economic Comparison Methods Relevant topics from Text 7 & 8	9
4	Project Economics, Sustainability & Contemporary Engineering Decisions	Project Economic Analysis & Public Sector Decisions, Life Cycle Cost Analysis Relevant topics from Text 6,7, 9 & 10.	9

SUGGESTED LEARNING RESOURCES			
Text Book			
Sl. No.	Title of Book	Author	Publication
1	Macro-Economic Theory and Policy	D. N. Dwivedi	McGraw Hill
2	Principles of Macroeconomics	N. Gregory Mankiw	Cengage
3	Principles of Economics	N. Gregory Mankiw	Cengage
4	Managerial Economics	D. N. Dwivedi	Vikas Publishing House
5	Engineering Economics	R. Panneerselvam	PHI Learning
6	Engineering Economy	William G. Sullivan, Elin M. Wicks & C. Patrick Koelling	Pearson
7	Engineering Economy	Leland Blank & Anthony Tarquin	McGraw Hill
8	Financial Management	Prasanna Chandra	Tata McGraw Hill
9	Macroeconomic Theory	M. L. Jhingan	Vrinda Publications
10	Sustainable Engineering: Concepts, Design and Case Studies	David T. Allen & David R. Shonnard	Pearson-Prentice Hall

Reference			
Sl. No.	Title of Book	Author	Publication
1	Contemporary Engineering Economics	Chan S. Park	Pearson-Prentice Hall

2	Principles of Engineering Economy	Eugene L. Grant, W. Grant Ireson & Richard S. Leavenworth	Wiley
3	Economic Analysis of Investment Projects	World Bank Group	World Bank Publications
4	LCOE and Renewable Energy Economics in India	NITI Aayog or MNRE	NITI Aayog or MNRE Publications

Web Resource	
1	Engineering Economic Analysis - Prof. Pradeep K. Jha - IIT Roorkee (NPTEL)

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	HM
PRE-REQUISITE		
NIL		

TEACHING AND ASSESSMENT SCHEME										
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme			
L	T	J	P	S	30	C	Theory			Total
							CIA	ESE	Total	
3	0	0	0	1		2	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			
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, 11 th Edition
2	Management	Robbins, S.P. & Coulter, M	Pearson Education, 14 th Edition
3	Financial Management: Theory and Practice	Prasanna Chandra	McGraw Hill, 11 th 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

Web Resource	
NPTEL	Principles of Management - Prof. Susmita Muhopadhyay, Prof. S. Srinivasan - IIT Kharagpur
	Organisation of Engineering Systems and Human Resources Management - Prof. Vinayshil Gautam, IIT Delhi

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

COURSE CODE	COURSE NAME	COURSE CATEGORY
	Materials Testing Lab	
PRE-REQUISITE		
Engineering, Mechanics, Mechanics of solids		

TEACHING AND ASSESSMENT SCHEME													
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	T	J	P	S		C	CIA	ESE	Total	CIA	ESE	Total	
										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													

Experiment No.	Major Topics (10 experiments are mandatory)	Hrs
1	Evaluate the tensile properties of a ductile material (mild steel, high-strength steel, or torsteel) using a Universal Testing Machine (UTM) equipped with an extensometer.	3
2	Conduct compressions test on a ductile material (mild steel, tor-steel, or high-strength steel) using a Universal Testing Machine (UTM) equipped with an extensometer.	3
3	Determine the tensile properties of cast iron (a brittle material) using a Universal Testing Machine (UTM) equipped with an extensometer.	3
4	Determine the shear strength of a mild steel rod using a shear test.	3
5	Perform Brinell/Vickers/Rockwell hardness tests on a given material	3
6	Determine the torsional rigidity of mild steel/copper/brass rods.	3
7	Evaluate the flexural stiffness (flexural rigidity) of mild steel/copper/brass specimens using a three-point bend test on a Universal Testing Machine (UTM)	3
8	Determine the notch toughness of the material at room temperature using Izod and Charpy impact testing.	3
9	Investigate the effect of coil type (close-coiled vs. open-coiled) and arrangement (series vs. parallel) on spring stiffness.	3
10	Microstructure of mild steel/copper/ brass/aluminium using optical microscope, double disc polishing machine, emery papers and etchant.	3
11	Analyse the fracture surface morphology of a ductile or brittle material using an optical microscope for fractographic characterisation.	3
12	Evaluate the fracture toughness of a material with a Universal Testing Machine (UTM)	3
13	To study the procedure for plotting S-N curve using Fatigue testing machine	3
14	Perform stress analysis using photoelasticity.	3
15	Measure the deformation (strain) of an object using strain gauges.	3
16	Perform a bending test on a wooden beam to assess its load-carrying capacity.	3

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Callister's Materials Science and Engineering	D. Wayne Callister and David G. Rethwisch	Wiley
2	Mechanical Testing and Evaluation	Howard Kuhn; Dana Medlin	ASM International

Reference			
Sl. No.	Title of Book	Author	Publication
1	Mechanics of Materials	James M. Gere and Barry J. Goodno	Cengage Learning
2	Introduction to Materials Science for Engineers	James F. Shackelford	Pearson

Web Resource / Virtual Lab	
	https://onlinecourses.nptel.ac.in/noc23_mm38/preview
	https://archive.nptel.ac.in/courses/112/107/112107146/
	https://archive.nptel.ac.in/courses/112/106/112106293/

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

COURSE CODE	COURSE NAME	COURSE CATEGORY
B250002/ME330D	Fluid Mechanics & Hydraulic Machines Lab	PCL
PRE-REQUISITE		
Basic knowledge of fluid mechanics principles, hydraulic machines, flow measurement techniques		

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

SUGGESTED LEARNING RESOURCES

Web Resource / Virtual Lab	
1	https://fm-iitk.vlabs.ac.in
2	https://eerc03-iiith.vlabs.ac.in
3	https://ce-iitb.vlabs.ac.in/