Detailed Curriculum for Undergraduate Degree
B.Tech in Mechanical Engineering
(w.e.f. AY: 2025-26)

Part VI: Detailed Curriculum of 3rd semester

Course Name:	**Materials Engineering**		
Course Code:	ES-ME301	**Category:**	Engineering Science
Semester:	Third	**Credit:**	3.0
L-T-P:	3-0-0	**Pre-Requisites:**	NIL
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	Broad understanding of different types of engineering materials and their applications
2	Various methods to quantify the mechanical integrity of materials and their failure criteria
3	Interpretation of equilibrium phase diagrams of alloys
4	Different heat treatment methods to tailor the properties of Fe-C alloys.

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	Engineering Materials and Classification: Metals, plastics, ceramics and composites; Relevant properties (physical, mechanical, thermal, electrical, chemical), Range of applications; Material designation and standards; Ashby diagrams; Selection criteria and process.	**6L**
2	Mechanical Properties and Testing: Tensile, compression, torsion, fatigue, fracture and wear tests; Young's modulus; Relations between true and engineering stress-strain curves; Generalized Hooke's law; Yielding and yield strength; ductility, resilience, toughness and elastic recovery; Hardness measurement their relation.	**6L**
3	Metal and Alloys: Iron and steel; Stainless steel and tool steels; Copper & its alloys – brass, bronze & cupro-nickel; Aluminium & Al-Cu-Mg alloys; Nickel based superalloys & Titanium alloys; Phase diagrams and interpretation of microstructure; Iron Iron-carbide phase diagram and cooling (TTT) diagrams.	**6L**
4	Heat Treatment: Heat treatment of Steel; Annealing, tempering, normalizing, spheroidising, austempering, martempering, case hardening, carburizing, nitriding, cyaniding, carbo-nitriding, flame and	**6L**

	induction hardening, vacuum and plasma hardening.	
5	Polymers, Ceramics and Composites: Polymers – Classification and applications; Polymerization techniques; Ceramics – Oxide ceramics, ceramic insulators, bio-ceramics and Glasses; Composites – Reinforcement, matrix, metal matrix composites, ceramic composites, polymer composites; Other advanced materials – biomaterials, optical materials, high temperature materials, energy materials, and nanomaterials.	**6L**
6	Electrical and Magnetic Materials: Conducting and resisting materials – types, properties and applications; Semiconducting materials – properties and applications; Magnetic materials – Soft and hard magnetic materials and applications; Superconductors and dielectric materials – properties and applications; Smart materials; Sensors and actuators; Piezoelectric, magneto strictive and electro strictive materials.	**6L**
Total		**36L**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Know the range of engineering materials, their mechanical properties and applications
2	Know various methods to measure the mechanical properties of materials
3	Learn how to improve the properties of ferrous alloys through various heat treatments

Learning Resources:	
1	W. D. Callister, "Materials Science & Engineering," Wiley India, 2014
2	K. G. Budinski and M.K. Budinski, "Engineering Materials", PHI India, 2002
3	V. Raghavan, "Material Science and Engineering', PHI India, 2015
4	U. C. Jindal, "Engineering Materials and Metallurgy", Pearson, 2011
5	M.F. Ashby and D.R.H. Jones, Engineering Materials 1 - An Introduction to Properties, Applications and Design, Butterworth-Heinemann, USA, 2011

Corresponding NPTEL/SWAYAM Courses:			
Sl. No.	**Course Name**	**Instructor Name**	**Host Institute**
1	Basics of Materials Engineering	Prof. Ratna Kumar Annabattula	IIT Madras
	Course Link: https://onlinecourses.nptel.ac.in/noc22_me90/preview		

Course Name:	**Engineering Mechanics**

Course Code:	ES-ME302	**Category:**	Engineering Sciences
Semester:	Third	**Credit:**	4.0
L-T-P:	3-1-0	**Pre-Requisites:**	Nil
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	The objective of this Course is to provide an introductory treatment of Engineering Mechanics to all the students of engineering, with a view to prepare a good foundation for taking up advanced courses in the area in the subsequent semesters.
2	A working knowledge of statics and dynamics with emphasis on force equilibrium and free body diagrams provides an understanding of the kinds of stress and deformation and how to determine them in a wide range of simple, practical structural problems, and an understanding of the mechanical behavior of materials under various load conditions.

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	Introduction to Engineering Mechanics covering Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D, Rigid Body equilibrium, System of Forces, Coplanar Concurrent Forces, Components in Space-Resultant-Moment of Forces and its Application, Couples and Resultant of Force System. Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems, Static Indeterminacy, Tutorials of Free body diagrams various systems including block-pulley.	**4L**
2	Friction covering types of friction, Limiting friction, Laws of Friction. Static and Dynamic Friction, Motion of Bodies, wedge friction. Numerical on Static and Dynamic Friction, Tutorials to find coefficient of friction between various materials on inclined plane, Numerical on ladder problems.	**8L**
3	Basic Structural Analysis covering Equilibrium in three dimensions. Method of Sections, Method of Joints, How to determine if a member is in tension or compression, Simple Trusses, Zero force members, Beams & types of beams, Frames & Machines. Simple truss problems.	**6L**
4	Centroid and Centre of Gravity covering Centroid of simple figures from first principle, centroid of composite sections, Centre of Gravity and its implications. Numericals and tutorials based on Centroid and Centre of Gravity problems of standard and composite sections. Area moment of inertia - Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard	**9L**

	sections and composite sections, Mass moment inertia. Numerical and tutorials based on moment of inertia.	
5	Virtual Work and Energy Method - Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.	**3L**
6	Review of particle dynamics - Rectilinear motion, Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion, Relative and constrained motion, Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular), Impact (Direct and oblique).	**5L**
7	Introduction to Kinetics of Rigid Bodies covering basic terms, general principles in dynamics, Types of motion, Instantaneous centre of rotation in plane motion and simple problems. D'Alembert's principle and its applications in plane motion and connected bodies, Work energy principle and its application in plane motion of connected bodies, Kinetics of rigid body rotation.	**5L**
Total		**40L**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Describe different types of forces and their effect on rigid bodies.
2	Employ basic laws of vector algebra.
3	Analyze system of forces and condition of equilibrium.
4	Recognize laws of friction and solve problems related to it, basic concepts of center of gravity and moment of inertia.
5	Identify laws of dynamics and solve related problems.
6	Solve simple truss problems and study of virtual work.

Learning Resources:	
1	Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall.
2	F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II – Dynamics, 9th Ed, Tata McGraw Hill.
3	R. C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
4	J. L. Meriam and L. G. Kraige (2006), Engineering Mechanics: Statics- Vol. 1 and Dynamics - Vol. 2, Wiley India Private Limited.
5	P. K. Nag, S. Pati and T. K. Jana (2013), Engineering Mechanics, McGraw Hill Education.
6	Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education.

7	B. Bhattacharyya and S. C. Bera (2009), Basic Mechanics, New Age International Private Limited.
8	Bansal R. K. (2010), A Text Book of Engineering Mechanics, Laxmi Publications.
9	Dr. D. S. Kumar (2013), Engineering Mechanics (Statics & Dynamics), S.K. Kataria & Sons.

Corresponding NPTEL/SWAYAM Courses:			
Sl. No.	**Course Name**	**Instructor Name**	**Host Institute**
1	Engineering Mechanics	Prof. K. Ramesh, Prof. Tarkes Dora Pallicity	IIT Madras
	Course Link: https://nptel.ac.in/courses/112106286		
2	Engineering Mechanics	Prof. U.S. Dixit, Dr. G. Saravana Kumar	IIT Guwahati
	Course Link: https://nptel.ac.in/courses/112103108		

Course Name:	**Thermodynamics**		
Course Code:	PC-ME301	**Category:**	Professional Core
Semester:	Third	**Credit:**	4.0
L-T-P:	3-1-0	**Pre-Requisites:**	Nil
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To learn about work and heat interactions, and balance of energy between system and its surroundings.
2	To learn about application of laws to various energy conversion devices.
3	To evaluate the changes in properties of substances in various processes.
4	To understand the difference between high grade and low grade energies and II law limitations on energy conversion.

Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	Fundamentals - System & Control volume; Property, State & Process; Exact & Inexact differentials; Work-Thermodynamic definition of work; examples; Displacement work; Path dependence of displacement work	**5L**

	and illustrations for simple processes; electrical, magnetic, gravitational, spring and shaft work.	
2	Temperature, Definition of thermal equilibrium and Zeroth law; Temperature scales; Various Thermometers- Definition of heat; examples of heat/work interaction in systems- First Law for Cyclic & Non-cyclic processes; Concept of total energy E ; Demonstration that E is a property; Various modes of energy, Internal energy and Enthalpy.	**5L**
3	First Law for Flow Processes - Derivation of general energy equation for a control volume; Steady state steady flow processes including throttling; Examples of steady flow devices; Unsteady processes; examples of steady and unsteady I law applications for system and control volume.	**5L**
4	Second law - Definitions of direct and reverse heat engines; Definitions of thermal efficiency and COP; Kelvin-Planck and Clausius statements; Definition of reversible process; Internal and external irreversibility; Carnot cycle; Absolute temperature scale.	**5L**
5	Clausius inequality; Definition of entropy (S) ; Demonstration that entropy (S) is a property; Evaluation of S for solids, liquids, ideal gases and ideal gas mixtures undergoing various processes; Determination of s from steam tables- Principle of increase of entropy; Illustration of processes in T-s coordinates; Definition of Isentropic efficiency for compressors, turbines and nozzles- Irreversibility and Availability, Availability function for systems and Control volumes undergoing different processes, Lost work. Second law analysis for a control volume. Exergy balance equation and Exergy analysis.	**8L**
6	Definition of Pure substance, Ideal Gases and ideal gas mixtures, Real gases and real gas mixtures, Compressibility charts, Properties of two phase systems - Const. temperature and Const. pressure heating of water; Definitions of saturated states; P-v-T surface; Use of steam tables and R134a tables; Saturation tables; Superheated tables; Identification of states & determination of properties, Mollier's chart.	**8L**
7	Thermodynamic cycles - Basic Rankine cycle; Basic Brayton cycle; Basic vapor compression cycle and comparison with Carnot cycle.	**4L**
Total		**40L**

Course Outcomes:	
After completion of the course, students will be able to:	
1	apply energy balance to systems and control volumes, in situations involving heat and work interactions.
2	evaluate changes in thermodynamic properties of substances.
3	evaluate the performance of energy conversion devices.
4	differentiate between high grade and low grade energies.

Learning Resources:	
1	Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley and Sons.
2	Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India
3	Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.
4	Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd.

Alternative NPTEL/SWAYAM Courses:			
Sl. No.	**NPTEL Course Name**	**Instructor**	**Host Institute**
1	Basic Thermodynamics	Prof. S. K. Som	IIT Kharagpur
	https://www.youtube.com/watch?v=9GMBpZZtjXM&list=PLD8E646BAB3366BC8		
2	Engineering Thermodynamics	Prof. Jayant K. Singh	IIT Kanpur
	https://onlinecourses.nptel.ac.in/noc26_me43/preview		
3	Thermodynamics	Prof. S. R. Kale	IIT Delhi
	https://onlinecourses.nptel.ac.in/noc26_me10/preview		

Course Name:	**Basic Manufacturing Processes**		
Course Code:	PC-ME302	**Category:**	Professional Core
Semester:	Third	**Credit:**	4.0
L-T-P:	4-0-0	**Pre-Requisites:**	Nil
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To motivate and challenge students to understand and develop an appreciation of theprocesses in correlation with material properties which change the shape, size and form of the raw materials into the desirable product by conventional or unconventional manufacturing methods.
2	To learn about application of different manufacturing processes.

Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	**Introduction to manufacturing processes:** Importance of Manufacturing, Economics and Technological Definition, Classification and Selectionof Manufacturing Processes.	**1L**

2	**Conventional manufacturing processes:** Patterns, types of patterns, material used for patterns and allowances. Mould making procedure; definition & meaning of different terms, cope & drag and gating system, properties of moulding sand. Metal casting processes and equipment, different types of casting, defects in sand casting and remedies.	**10L**
3	**Forming process:** Introduction to bulk and sheet metal forming, plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk forming (forging, rolling, extrusion, drawing) and sheet forming (shearing, deep drawing, bending).	**12L**
4	**Joining/fastening processes:** Welding definition, arc welding, gas welding, shielded metal arc welding; GMAW (MIG) and GTAW (TIG); Brazing and soldering; Solid state joining; Adhesive bonding.	**10L**
5	**Machining process:** Basic principle of machining, purpose, definition and requirements. Different material removal process (Turning, Drilling, Milling and other finishing processes).	**7L**
Total		**40L**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Understand the different conventional manufacturing methods employed for making different products.
2	Acquire working knowledge of moulding and casting processes.
3	Familiarize with different forming processes and their specific applications.
4	Know about different solid and liquid state joining processes and also select the proper welding process for manufacturing a product.
5	Apply the basic knowledge of principle of machining.

Learning Resources:	
1	Kalpakjian and Schmid, Manufacturing Processes for Engineering Materials (5th Edition)-Pearson India, 2014
2	Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, Wiley Publication.
3	Degarmo, Black & Kohser, Materials and Processes in Manufacturing, Wiley Publication.
4	Ghosh A. & Mallick A. K., Manufacturing Science, East-West Press Pvt. Ltd.

Corresponding NPTEL/SWAYAM Courses:			
Sl. No.	**Course Name**	**Instructor Name**	**Host Institute**
1	Manufacturing Process Technology I & II	Prof. Shantanu Bhattacharya	IIT Kanpur

	Course Link: https://nptel.ac.in/courses/112104195

Course Name:	**Mathematics-III**		
Course Code:	BS-M302	**Category**	Basic Science Course
Semester:	Third	**Credit:**	3.0
L-T-P:	2-1-0	**Pre-Requisites:**	High School Mathematics, BS-M101, BS-M201
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment:25	Attendance: 05

Course Objectives:	
1	To understand probability distributions and their applications.
2	To apply basic statistical methods and regression analysis for data interpretation.
3	To use complex differentiation and integration techniques in engineering problems
4	To study Bessel and Legendre functions and their applications in physical systems.
5	To solve partial differential equations related to heat, wave, and Laplace equations.

Course Contents:		
Module No.	**Description of Topic**	**Conduct Hrs.**
1	**Probability Distribution:** (i) Introduction to probability theory (ii) Discrete and continuous random variable: Probability mass function (p.m.f.) and probability density function (p.d.f.) of single random variable; Cumulative distribution function (c.d.f.); Applications; (iii) Expectation and variance of random variable; **Some special types of distributions** (i) **Discrete probability distribution:** Binomial and Poisson distributions; Mean and variance; (ii) **Continuous probability distribution:** Uniform, Exponential and Normal distributions; Mean and variance.	**8L**
2	**Statistics:** **Measure of Central Tendency & Dispersion** (i) Statistical data and frequency distribution; (ii) Mean, Median and Mode (iii)Variance and standard deviation **Correlation & Regression** (i) Introduction to bivariate data; Scatter diagram; (ii) Correlation and Correlation Coefficient, Rank Correlation; (iii) Linear Regression and properties (iv) Introduction to non-linear regression.	**6L**
3	**Calculus of Complex Variables:** (i) Function of complex variable; Limit, continuity and differentiability;	**10L**

	(ii) Analytic function; Cauchy-Riemann equations (Statement only); Sufficient conditions for a function to be analytic; Harmonic function and Conjugate Harmonic function; Milne-Thomson Method; (iii) Zeros and singularities (iv) Cauchy's Theorem (statement only), Cauchy-Goursat Theorem (statement only); Cauchy's Integral Formula; (v) Taylor's and Laurent's series; (vi) Residues of a given function; Cauchy's Residue Theorem (statement only); evaluation of definite integrals involving sine and cosine.	
4	**Series Solution of Ordinary Differential Equations:** (i) Introduction to Series solution; Ordinary and Singular points; (ii) Bessel's equation; Bessel's function; Recurrence relations of Bessel's function of first kind; (iii) Legendre's equation; Legendre's Polynomials; Generating function and Orthogonal Properties; Recurrence relations; Rodrigue's Formula (statement only).	**6L**
5	**Solution of Partial Differential Equations:** (i) Brief introduction to PDEs; Types of PDEs; Solutions of PDE by Lagrange's Method; (ii) Solution of Boundary Value Problems by Method of Separation of Variables; (a) Two dimensional Laplace equation; (b) One dimensional heat conduction equation; (c) One dimensional wave equation.	**6L**
Total		**36L**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Apply the concepts of probability distributions to model random variables and solve engineering and scientific problems involving uncertainty.
2	Analyze data using basic statistical measures and regression analysis to interpret relationships between variables and support data-driven decision making.
3	Apply techniques of complex differentiation and integration to solve problems involving analytic functions and engineering applications.
4	Analyze and solve problems involving Bessel and Legendre functions, and apply these special functions in boundary-value and physical system problems.
5	Solve partial differential equations associated with heat, wave, and Laplace equations using appropriate analytical methods for engineering applications.

Learning Resources:	
1	"Advanced Engineering Mathematics" by Erwin Kreyszig, John Wiley & Sons.
2	"Advanced Engineering Mathematics" by Michael Greenberg, Pearson
3	"Higher Engineering Mathematics" by B.S. Grewal, Khanna Publishers
4	"Statistical Methods (Combined Volume)" by N.G. Das, Tata-McGraw Hill
5	"A First Course in Probability" by S. Ross, Pearson Education India
6	"An Introduction to Probability Theory and its Applications, Vol. 1" by W. Feller, Wiley

7	"A text book of Engineering Mathematics" by N.P. Bali and Manish Goyal, Laxmi Publications
8	"Advanced differential equation" by M. D. Raisinghania, S. Chand Publication.

Alternative NPTEL/SWAYAM Courses:			
Sl. No.	**NPTEL Course Name**	**Instructor Name**	**Host Institute**
1	Introduction to Probability Theory and Statistics	Prof. S Dharmaraja	IIT Delhi
	Course Link: https://onlinecourses.nptel.ac.in/noc23_ma77/preview		
2	Probability and Statistics	Prof. Somesh Kumar	IIT Kharagpur
	Course Link: https://onlinecourses.nptel.ac.in/noc21_ma74/preview		
3	First Course on Partial Differential Equations – I	Prof. P.S. Datti, Prof. A. K. Nandakumaran	IISc Bangalore
	Course Link: https://onlinecourses.nptel.ac.in/noc26_ma11/preview		

Course Name:	**Environmental Science**		
Course Code:	AU-BS371	**Category:**	Audit Courses
Semester:	Third	**Credit:**	0
L-T-P:	2-0-0	**Pre-Requisites:**	NIL
Full Marks:	100		
Examination Scheme:	Teacher Assessment: 70 (30 + 40)	Participation in Events: 15	Attendance: 05

Course Objectives:	
1	To solve various engineering problems applying ecosystem to produce eco-friendly products.
2	To use relevant air, noise, water and soil control method to solve domestic and industrial problems.
3	To recognize relevant energy sources required for domestic and industrial applications.
4	To solve local solid and e-waste problems.

Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	**Ecosystem:**	**2L**

	Structure of ecosystem, Food chain and food web, Aquatic and terrestrial ecosystem, Carbon, Nitrogen, Sulphur and Phosphorous cycle, Depletion of ozone.	
2	**Environmental Degradation:** Air Pollution: Natural and manmade sources of air pollution, Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator) Noise Pollution: Sources and effects of pollution, measurement of pollution level, Noise pollution Rules-2000 Water Pollution: Types of water pollutants, BOD and COD, Waste Water Treatment (Primary, Secondary and Tertiary methods). Soil Pollution: Causes, Effects and Preventive measures of soil pollution, E- waste, Plastic waste.	**7L**
3	**Renewable sources of Energy:** Solar Energy: Basics of Solar energy, Solar Pond, Solar water heater, solar dryer, Solar stills. Biomass: Biogas production mechanism, Utilization and storage of biogas. Wind Energy: Current status and future prospects of wind energy. New Energy sources: Hydrogen energy, Ocean energy resources, Tidal energy conversion.	**7L**
4	**Solid Waste Management, ISO 14000 & Environmental Management:** Solid waste: Municipal solid waste, Biomedical waste, Metallic and Non-metallic wastes, Hazardous waste, Collection and disposal of municipal solid waste, Waste to wealth. Concept of carbon footprint Environmental management in fabrication industry ISO14000: Implementation in industries, Benefits.	**8L**
Total		**24L**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Understand the ecosystem and terminology and solve various engineering problems applying ecosystem knowledge to produce eco-friendly products.
2	Analyse the air, water, soil and noise pollution, and control measures and acts.
3	Understand different renewable energy resources and efficient process of harvesting.
4	Understand solid waste management, ISO 14000 & Environmental Management.

Learning Resources:

1	"Fundamentals of Environment and Ecology" by D. De & D. De, S Chand Publication
2	"Text Book of Environmental Studies" by E. Bharucha, Byju's
3	"Environmental Studies" by S. C. Sharma and M. P. Poonia, Khanna Book Publishing
4	"Environmental Studies" by M. Basu, Cambridge University Press
5	"Fundamentals of renewable energy processes" by A. Vieira & D. Rosa, Academic Press Inc
6	"Principles Solar Engineering" by F. Kreith and J. F. Kreider, CRC Press.

Alternative NPTEL/SWAYAM Courses:			
Sl. No.	**NPTEL Course Name**	**Instructor Name**	**Host Institute**
1	Environmental Science	Prof. Shamik Chowdhury, Prof. Sudha Goel	IIT Kharagpur
	Course Link: https://nptel.ac.in/courses/109105203		
2	Introduction to Environmental Engineering and Science – Fundamental and Sustainability Concepts	Prof. Brajesh K Dubey	IIT Kharagpur
	Course Link: https://nptel.ac.in/courses/127105018		

Course Name:	**Basic Manufacturing Processes Laboratory**		
Course Code:	PC-ME391	**Category:**	Professional Core
Semester:	Third	**Credit:**	1.5
L-T-P:	0-0-3	**Pre-Requisites:**	Nil
Full Marks:	100		
Examination Scheme:	Semester Examination: 60	Continuous Assessment: 35	Attendance: 05

Course Objectives:	
1	To have real time experience of different conventional manufacturing processes.
2	To gain knowledge about manufacturing processes.

Course Contents:		
Module No.	**Description of Topic/ Experiment**	**Contact Hrs.**
1	Pattern Making, Moulding and Casting.	**6P**
2	Smithy Shop: Forge Welding	**3P**
3	Welding Shop: Gas Welding, Spot Welding, MMAW and GMAW	**9P**
4	Fitting Shop	**3P**

5	Sheet Metal Shop	**3P**
6	Machine Shop: Lathe (Eccentric turning, Taper Turning), Straight & Angular Drilling, Boring, Shaping (Straight & Dovetail) and Milling operations (Gear Cutting).	**12P**
Total		**36P**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Understand the idea for selecting materials for patterns. Types and allowances of patternsused in casting and analyze the components of mould.
2	Understand the application of arc and gas welding in industries.
3	Know how casting, drilling, shaping, milling are done and demonstrate primary workingskills on lathe.
4	To know and implement different safety precautions to be taken during manufacturingprocesses.

Learning Resources:	
1	Laboratory Manual.

MCKV INSTITUTE OF ENGINEERING
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Detailed Curriculum for Minor Degree under Department of Mechanical Engineering (w.e.f. AY: 2025-26)

Part VII: Detailed Syllabus of 3rd semester for Minor Degree

No Minor paper in 3rd Semester