



Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur)

SCHEME OF INSTRUCTIONS & SYLLABI

Programme: Mechanical Engineering (NBA Accredited)

Scheme of Instructions: Second Year B. Tech. in Mechanical Engineering (As Per New NEP 2020)

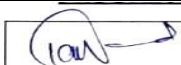
Semester-IV



Sr. No.	Sem	Type	BOS/Dept	Sub Code	Subject	T/P	Contact Hrs/Wk			Credits	% Weightage			ESE Duration	Total Marks
							L	P	Hrs		CT/IA	CA	ESE		
1	IV	PCC	ME	BME42401	Mechanics of Materials	T	3	-	3	3	30	10	60	3Hrs	100
2	IV	PCC	ME	BME42402	Fluids Mechanics and Hydraulic Machines	T	3	-	3	3	30	10	60	3Hrs	100
3	IV	PCC	ME	BME42403	Engineering Thermodynamics	T	3	-	3	3	30	10	60	3Hrs	100
4	IV	PCC	ME	BME42404	Mechanics of Materials Lab	P	-	2	2	1	-	25	25	2Hrs	50
5	IV	PCC	ME	BME42405	Fluids Mechanics and Hydraulic Machines Lab	P	-	2	2	1	-	25	25	2Hrs	50
6	IV	OEC	ME	BME42407	Open Elective-II	T	2	-	2	2	14	6	30	2 Hrs	50
7	IV	VEC	BSH	BSH42403	Human Value for Professional Society	T	2	-	2	2	14	6	30	2 Hrs	50
8	IV	VSEC	ME	BME42406	Basics of CNC Programming (IDEA Lab)	P	-	4	4	2	-	50	50	2Hrs	100
9	IV	AEC	BSH	BSH42404	Leadership and Team Dynamics	P	-	4	4	2	-	50	50	2Hrs	100
10	IV	MDM	EC	BEC42306	Basic of Electronics and communication	T	2	-	2	2	14	6	30	2 Hrs	50
11	IV	CC	BSH	BSH424XX	Liberal Learning Module-IV	P	-	2	2	1	-	50	-	2Hrs	50
Total							15	14	29	22	132	248	420	25 Hrs	800

Course Category	BSC/ESC (Basic Science Course/Engineering Science Course.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multi-disciplinary courses	VSEC (Skill Course)	VEC (Value Education Courses)	Humanities Social Science & Management		Experiential Learning Courses	CC (Liberal Learning Courses)
								AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)		
Credits	-	11	--	2	2	2	2	2		--	1
Cumulative Sum	16/13	21	--	6	4	6	4	8		2	6

PROGRESSIVE TOTAL CREDITS: 64+22=86

 Chairperson HOD	 Dean Academics/ Vice-Chancellor	 Director Administration	 Principal	October, 2026 Date of Release	1.00 Version	Applicable for AY 2026-27 Onwards
Mechanical Engineering (NBA Accredited)	Tulsiramji Gaikwad-Patil College of Engineering and Technology, Nagpur	Tulsiramji Gaikwad-Patil College of Engineering and Technology, Nagpur	Premanand Naktode Principal TGPCET, Nagpur			



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SCHEME OF INSTRUCTIONS & SYLLABI

Program: Mechanical Engineering (NBA Accredited)

List of Electives offered by

Mechanical Engineering (As Per New NEP 2020)

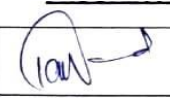


Program Elective- I	Program Elective-II	Program Elective- III	Program Elective- IV
Semester V	Semester VI	Semester VI	Semester VII
BME43504: Industrial Economics and Management	BME43605: Hydraulic and Pneumatic Systems	BME43609: Finite Element Method	BME44704: Material Handling System
BME43505: Computer Aided Design	BME43606: Mechanical Measurement and Metrology	BME43610: Advanced Manufacturing techniques	BME44705: Total Quality Management
BME43506: Automotive System	BME43607: Ginning Processes	BME43611: Operation Research	BME44706: Ginning Management
BME43507: Smart Manufacturing	BME43608: Control System Engineering	BME43612: Industrial Robotics	BME44707: Computer Integrated Manufacturing

Program: Mechanical Engineering

List of **Open Electives** offered Mechanical Engineering Department (NBA Accredited)

Open Elective-I	Open Elective-II	Open Elective-III
III-Semester	IV-Semester	V-Semester
BME42306: Basics of Manufacturing Technology and Processes	BME42407: Automobile Engineering	BME43504: Additive Manufacturing

			October, 2026	1.00	Applicable for AY 2026-27 Onwards
Chairperson	Dean Academics/ Vice-Chairperson	Director Administration	Date of Release	Version	
Mechanical Engineering (NBA Accredited)	Tulsiramji Gaikwad-Patil College of Engineering and Technology, Nagpur	Tulsiramji Gaikwad-Patil College of Engineering and Technology, Nagpur	Principal Dr. Premanand Naktode	Principal TGPCET, Nagpur	



Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441108
NAAC Accredited with A+ Grade
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Second Year (Semester-IV) B.Tech. Mechanical Engineering

BME42401: Mechanics of Materials

Teaching Scheme		Examination Scheme	
Lectures	3 Hr / Week	CT	30
Tutorials	-	CA	10
Total Credits	3	ESE	60
		Total	100 Marks
		Duration of ESE: 03 Hrs	

Course Objectives:

At the end students will be able to

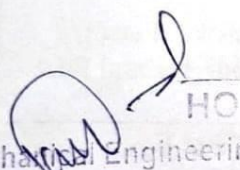
1	To understand stress, strain, elasticity, and material behavior under various loading conditions.
2	To understand the ability to determine shear forces, bending moments, and bending stresses in beams.
3	To provide knowledge of beam deflection, strain energy, and impact loading for mechanical components.
4	To understand torsional behavior and design criteria of circular shafts under different loading conditions.
5	To understand knowledge of column and strut behavior, stability, and failure criteria using standard theories.

Course Contents		Hours
Unit I	Concept of simple stresses and strains: Introduction, stress, strain, types of stresses, stress and strain diagram for brittle & ductile material, elastic limit, modified Hooks law, modulus of elasticity Modulus of rigidity, factor of safety, analysis of tapered rod, analysis of composite section, thermal stress and strain. Longitudinal strain & stress, lateral stresses and strains, Poisson's ratio, volumetric stresses and strain with uni-axial, bi-axial & tri-axial loading, bulk modulus, relation between Young's modulus and modulus of rigidity, Poisson's ratio and bulk modulus. Principal stresses and strains	(9)
Unit II	Shear force and bending moment: Relation between load, shear force and bending moment, Shear force and bending moment diagrams for different types of beams subjected to different types of loads (Concentrated and UDL). Stresses in beams: - Pure bending, theory of simple is bending with assumptions & expressions for bending stress, derivation of bending equation, bending stresses in symmetrical sections, section modulus for various shapes of beam sections.	(9)
Unit III	Deflection of beams:- Deflection & slope of cantilever, simply supported, overhung beams subjected to concentrated load, UDL, Relation between slope, deflection & radius curvature Macaulay's method to determine deflection of beam. Strain energy & impact loading: - Definition of strain energy stored in a body when it is subjected to gradually applied load, suddenly applied loads & impact loads, Strain energy stored in bending & torsion.	(9)
Unit IV	Torsion of circular shafts: - Derivation of torsion equation, Torsion shear stress induced in the shaft, when it is subjected to torque. Strength and rigidity criterion for design of shaft. Torque transmitted by solid & hollow circular shaft. Equivalent twisting and bending moment in shaft when it is subjected to bending moment, torque & axial load.	(9)
Unit V	Column & Struts: Failure of long & short column, slenderness ratio, Euler's column theory, End conditions for column. Expression for crippling load for various end conditions of column. Effective length of column, limitations of Euler's formula, Rankine formula, Johnson's parabolic formula.	(9)

Text Books	
T.1	Strength of Material, R.K. Rajput, S.Chand Publication
T.2	Strength of Materials, S. Ramamurtham, Dhanapat Rai Publication
Reference Books	
R.1	Strength of Materials, S S Rattan, Tata McGraw-Hill
R.2	Mechanics of Material, Beer & Johnson, Tata Mc-Graw Hill
R.3	Elements of Strength Of Materials ,Timoshenko S.P., Young D.H East West Press Pvt. Ltd.

Useful Links	
1	https://www.youtube.com/@nptel-nociitm9240
2	http://www.digimat.in/nptel/courses/video/112101095/L17.html

	Course Outcomes	CL
BME42401.1	Apply stress and strain concepts to different loading conditions.	3
BME42401.2	Analyze shear force, bending moment, and beam stresses.	4
BME42401.3	Determine beam deflection and strain energy under loading conditions.	3
BME42401.4	Analyze the torsional behavior of circular shafts.	4
BME42401.5	Evaluate columns and struts for safe design.	5


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Second Year (Semester-IV) B.Tech. Mechanical Engineering

BME42402: Fluids Mechanics and Hydraulic Machines

Teaching Scheme		Examination Scheme	
Lectures	3 Hr / Week	CT	30
Tutorials	-	CA	10
Total Credits	3	ESE	60
		Total	100 Marks
		Duration of ESE: 03 Hrs	

Course Objectives:

At the end students will be able to

1	To understand an fluid properties, fluid statics, pressure measurement, and hydrostatic principles.
2	To understand the fundamental principles of fluid dynamics and their applications in fluid-flow measurement.
3	To understand knowledge of flow through pipes, energy losses, and pipe-flow systems for engineering applications.
4	To understand the working principles, construction, analysis, and performance characteristics of hydraulic turbines.
5	To understand knowledge of the working principles, components, operation, and performance of centrifugal and reciprocating pumps.

Course Contents		Hours
Unit I	Fluid Properties: Types of fluids, Mass Density, Specific Weight, Specific Gravity, Newton's Law of Viscosity, Dynamic Viscosity, Surface Tension, Capillarity, Compressibility, Vapour pressure. Fluid Statics:- Pressure, Measurement of pressure using manometers, Hydrostatic law, Pascal's law.	(9)
Unit II	Fluid Dynamics Introduction to Navier-Stroke's Equation, Euler equation of motion along a stream line, Bernoulli's equation, application of Bernoulli's equation to pitot tube, venturi meter, orifices, orifice meter.	(9)
Unit III	Flow Through Pipes Flow Through Pipes:, Energy losses through pipe, Darcy-Weisbach equation, Chezy's Equation, Minor losses in pipes, pipes in series and parallel, Siphons, Transmission of power.	(9)
Unit IV	Theory of turbo machines Turbo Machine classification, Elements of hydro-electric power plant, Impulse Turbine: - principles of operation, constructional features, Velocity Diagram and Analysis, Design parameters, Performance characteristics. Reaction or pressure Turbine: - principles of operation, Classification, Degree of reaction, comparison over Pelton Turbine. Francis Turbine: - Types, Constructional features, Installations, Velocity Diagram and analysis, Design parameters, Performance characteristics. Propeller Turbine, Kaplan Turbine: -Constructional features, Velocity Diagram and analysis.	(9)

Unit V	Hydrodynamic pumps Centrifugal pumps: - Principle of operation, Classification, Component of Centrifugal Pump, Various heads, Velocity triangles and their analysis, N.P.S.H., Performance characteristics, Introduction to self-priming pumps Reciprocating pump:- Basic principle, Classification, Main Components, Slip, Work Done, Indicator Diagram, Cavitations', Air vessels. Latest trends in hydraulic machines	(9)
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Text Books

T.1	Fluid Mechanics, Dr. R.K. Bansal, Laxmi Publication (P) Ltd. New Delhi
T.2	Engineering Fluid Mechanics, Kumar K.L., S. Chand & company Ltd. Eurasia
T3	Fluid Mechanics and Hydraulic Mahine P.N. Modi & S M Seth

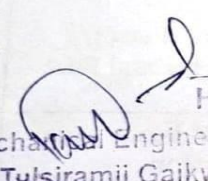
Reference Books

R.1	Introduction to Fluid Mechanics, James E.A., John and Haberm W.A., Prentice Hall of India
R.2	Fluid Mechanics, Jain A.K., Khanna Publication
R.3	Engineering Fluid Mechanics, Garde R.J. and Miraj Goankar, Nem chand & Bros, Roorkee, scitech, Publication (India) Pvt. Ltd.

Useful Links

1	http://www.nptelvideos.com/lecture.php?id=3999
2	http://www.nptelvideos.com/lecture.php?id=4007

	Course Outcomes	CL
BME42402.1	Describe fluid properties, flow types, and pressure-measuring devices.	2
BME42402.2	Demonstrate the application of Bernoulli's principle to fluid flow and measuring devices.	3
BME42402.3	Determine fluid flow losses through pipes using Darcy-Weisbach and Chezy's equations.	3
BME42402.4	Assess the performance and characteristics of impulse and reaction turbines.	5
BME42402.5	Analyze the operating characteristics of centrifugal and reciprocating pumps.	4


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Second Year (Semester-IV) B.Tech. Mechanical Engineering

BME42403: Engineering Thermodynamics

Teaching Scheme		Examination Scheme	
Lectures	3 Hr / Week	CT	30
Tutorials	-	CA	10
Total Credits	3	ESE	60
		Total	100 Marks
		Duration of ESE: 03 Hrs	

Course Objectives:

At the end students will be able to

1	To understand an fundamental thermodynamic concepts, properties, and energy interactions.
2	To understand knowledge of the First Law and its application to flow and non-flow processes.
3	To understand the Second Law, entropy, and performance of thermodynamic devices.
4	To understand knowledge of pure substances, steam properties, steam tables, and Mollier charts.
5	To understand and analyze vapour power and air-standard power cycles.

Course Contents		Hours
Unit I	Introduction to Thermodynamics: Fundamental Concepts and Definitions, Modes of energy transfer, heat and work, thermodynamic definition of work, internal energy, enthalpy, temperature, zeroth law of thermodynamics and its application. Ideal Gas, Equation of state, Thermodynamic Processes, representation of these processes on P-v, T-s planes, First Law of Thermodynamics: First law applied to a system undergoing a process and a cycle.	(9)
Unit II	Application of first law of thermodynamics to non-flow processes, determination of work, heat, internal energy and enthalpy changes during the various thermodynamic processes. First law applied to flow processes, general energy equation, steady flow energy equation on unit mass and time basis, application of SFEE for devices such as boiler, turbine, heat exchangers, pumps, nozzles, etc.	(9)
Unit III	Second Law of Thermodynamics: Limitations of the first law, Thermal Energy Reservoirs, definition of a heat engine, heat pump, refrigerator, thermal efficiency and the coefficient of performance. Kelvin-Planck and Clausius statements of the second law, their equivalence, reversible heat engine, Carnot theorems. Carnot cycle, Entropy: Entropy as a property, Clausius inequality.	(9)
Unit IV	Pure Substance: Behavior of pure substance (steam) with reference to P-V, T-s and h-s diagrams, properties of steam, Sensible Heat, Latent Heat, Critical State, Triple Point, Wet Steam, Dry Steam, Superheated Steam, Dryness Fraction, saturation state, Steam tables and Mollier chart, Determination of properties of steam using steam tables and Mollier chart.	(9)
Unit V	Vapour power cycle: Introduction; vapour Carnot cycle, simple Rankine cycle, methods to improve the efficiency of simple Rankine cycle, Analysis of simple Rankine cycle. Air standard cycles, introduction to air standard cycles, Otto cycle, Diesel cycle, air standard efficiency, mean effective pressure, Analysis of air standard cycles.	(9)

Text Books

T.1	Cengel Y.A., Boles M.A., A Text Book of Thermodynamics, McGraw-Hill, 6th Edition
T.2	Basic and Applied Thermodynamics, 2nd Edition, Nag P. K., Tata McGraw-Hill.

Reference Books

R.1	Fundamentals of Thermodynamics, 5th Edition, Richard E. Songtag, Claus Borgnakke and Gordon J. Van Wylen, John Wiley and Sons, Inc.
R.2	Thermodynamics, 5th Edition, K. Wark, McGraw-Hill
R.3	Arora, C.P., Thermodynamics, 1st ed, Tata McGraw Hill Education.

Useful Links

1	https://nptel.ac.in/courses/112/108/112108148/
2	https://nptel.ac.in/courses/112/105/112105123/

	Course Outcomes	CL
BME42403.1	Explain thermodynamic principles and gas laws for basic processes.	2
BME42403.2	Analyze energy interactions using the First Law for flow and non-flow processes.	4
BME42403.3	Apply the Second Law to analyze entropy and thermal devices.	3
BME42403.4	Determine steam properties using steam tables and Mollier charts.	3
BME42403.5	Analyze air-standard and vapour power cycles using P-V and T-s diagrams.	4


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Second Year (Semester-IV) B.Tech. Mechanical Engineering

BME42404: Mechanics of Materials lab

Teaching Scheme		Examination Scheme	
Lectures	2 Hr / Week	CT	-
Tutorials	-	CA	25 Marks
Total Credits	1	ESE	25 Marks
		Total	50 Marks
		Duration of ESE: 02 Hrs	

Course Objectives:

At the end students will be able to

1	To understand the mechanical behavior of materials under various loading conditions.
2	To learn material properties such as strength, stiffness and elasticity while applying theoretical concepts to practical situations.
3	To understand comprehension of stress-strain relationships and structural performance.

Sr.No.	List of Experiment	CO
1	Demonstrate Universal Testing Machine.	CO1
2	Analyze tension test on metals using universal testing machine.	CO2
3	Illustrate compression test on metals using universal testing machine.	CO2
4	Analyze shear test on metals using universal testing machine.	CO2
5	Calculate impact resistance of mild steel using Charpy impact test on metals.	CO3
6	Calculate impact resistance of mild steel using I-Zod Impact test on metals.	CO3
7	Analyze Hardness test on metals.	CO3
8	Illustrate Torsion test on metals.	CO3
9	Calculate the values of bending stress and Young's modulus of elasticity for the material of the beam.	CO4
10	Calculate the stiffness and modulus of rigidity of the spring wire under deflection.	CO5

Text Books

T.1	"Strength of Materials" by S. Ramamrutham, Dhanpant Rai
T.2	"Materials Science and Engineering: An Introduction" by William D. Callister and David G. Rethwisch

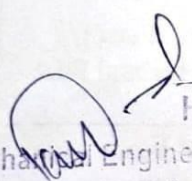
Reference Books

R.1	"Strength of Materials" by R. K. Bansal., Laxmi Publication
R.2	"Mechanics of Materials" by James M. Gere and Barry J. Goodno

Useful Links

1	https://archive.nptel.ac.in/courses/113/104/113104104/
2	https://nptel.ac.in/courses/112107146

	Course Outcomes	CL
BME42404.1	Demonstrate the operation of a Universal Testing Machine for material testing.	3
BME42404.2	Analyze the tensile, compressive, and shear properties of metals.	5
BME42404.3	Determine the impact strength, hardness, and torsional properties of metals.	3
BME42404.4	Determine bending stress and Young's modulus of beam materials.	3
BME42404.5	Analyze spring deflection under different loading conditions.	4

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Second Year (Semester-IV) B.Tech. Mechanical Engineering

BME42405: Fluids Mechanics and Hydraulic Machines Lab

Teaching Scheme		Examination Scheme	
Lectures	2 Hr / Week	CT	-
Tutorials	-	CA	25 Marks
Total Credits	1	ESE	25 Marks
		Total	50 Marks
		Duration of ESE: 02 Hrs	

Course Objectives:

At the end students will be able to

1	To understand and Apply Fundamental Fluid Mechanics Principles
2	To analyze Fluid Flow Behavior and Stability
3	To evaluate and Optimize Flow Measurement Devices
4	To understand Energy Conversion and Performance in Turbomachinery
5	To apply Experimental Data to Design and Efficiency Calculations

Sr.No.	List of Experiment	CO
1	Determine the Metacentric height of given floating vessel	CO 1
2	Verify Bernoulli's theorem.	CO 2
3	Determine the value of co-efficient of discharge of given venture meter fitted in a pipe.	CO 2
4	Determine the value of co-efficient of discharge for a given orifice meter	CO 2
5	Determine Frictional Losses in pipe	CO 3
6	Performance characteristics of Pelton wheel	CO 4
7	Performance characteristics of Francis turbine	CO 4
8	Performance characteristic of Kaplan Turbine	CO 4
9	Performance characteristics of variable centrifugal Speed Pump	CO 5
10	Performance characteristics of Reciprocating Pump	CO 5

Text Books

T.1	Fluid Mechanics, Dr. R.K. Bansal, Laxmi Publication (P) Ltd. New Delhi
T.2	Engineering Fluid Mechanics, Kumar K.L., S. Chand & company Ltd. Eurasia

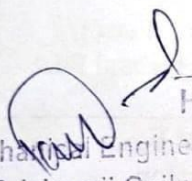
Reference Books

R.1	Introduction to Fluid Mechanics, James E.A., John and Haberm W.A., Prentice Hall of India
R.2	Fluid Mechanics, Jain A.K., Khanna Publication

Useful Links

1	http://www.nptelvideos.com/lecture.php?id=3999
2	http://www.nptelvideos.com/lecture.php?id=4007

	Course Outcomes	CL
BME42405.1	Describe buoyancy and metacentric height concepts.	2
BME42405.2	Apply Bernoulli's theorem to fluid flow.	3
BME42405.3	Determine energy losses in pipe flow.	3
BME42405.4	Calculate energy losses in pipe flow.	5
BME42405.5	Analyze the performance of different types of pumps.	4


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Second Year (Semester-IV) B.Tech. Mechanical Engineering

BME42407: Open Elective-II (Automobile Engineering)

Teaching Scheme		Examination Scheme	
Lectures	2 Hr / Week	CT	14
Tutorials	-	CA	06
Total Credits	2	ESE	30
		Total	50 Marks
		Duration of ESE: 02 Hrs	

Course Objectives:

At the end students will be able to

1	To understand an automobile components, chassis, layouts, and powertrain systems.
2	To understand the principles and operation of clutch, transmission, steering, and differential systems.
3	To understand knowledge of tyres, suspension, and braking systems for vehicle performance and safety.

Course Contents

**Hou
rs**

Unit I	Introduction: Classification of automobiles, Major components and their functions. Chassis Different vehicle layout. Powertrain: Engine, Basic Components, Classification, Two Stroke, Four Stroke, Petrol Engine, Diesel Engine, Fuel Supply systems: Necessity, Introduction to Carburetor and Fuel Injection system.	(9)
Unit II	Clutch: Necessity, requirements of a clutch system. Types of Clutches, Gear box - Necessity of transmission, principle, types of transmission, Automatic Transmission. Transmission system: Propeller shaft, Universal joint, constant velocity joint, Differential, 2 Wheel Drive, 4Wheel drive. Steering systems: Principle of steering, steering geometry and wheel alignment, balancing of wheel , Power Steering. Under steer, Over steer.	(9)
Unit III	Suspension systems: Need, Function of spring and shock absorber, conventional suspension, Independent suspension System, Active suspension Introduction to Electric Vehicles -Evolution and history of electric vehicles, Conventional vehicles vs. electric vehicles Powertrain and Motors Batteries and Energy Storage- Charging- Role of power electronics in EVs,DC-DC converters, Inverters Introduction to hybrid Vehicles - basic components of hybrid vehicles, Working Principle of a Hybrid Vehicle, Applications of Hybrid Vehicles	(9)

Text Books

T.1	Automobile Engineering Vol. I & II, Kirpal Singh, Standard Publishers.
T.2	Automobile Engineering, R.K.Rajput, Laxmi Publications.
T.3	Automobile Engineering Rajput,R.K. Tata McGraw Hill.
T4	Electric Vehicle Technology- Iqbal Husain , CRC Press
T5	Electric Vehicle Technology-James Larminie and John Lowry, Wiley, 2nd edition

Reference Books

R.1	Automotive Mechanics: Principles And Practices Heitner Joseph Publications
R.2	Automobile Mechanics, Crause, W.H., Tata McGraw Hill

R.3	Design And Implementation Of Anticipating Mechanism For An Automobile To Reduce The Injuries And Sometime Death Happen In Road Accident
R.4	Automotive Engines, Srinivasan S., Tata McGraw Hill
R.5	Automotive Machanics -- Joseph Heitner, Van Nostrand Reinhold
R6	Electric Vehicle Engineering — Per Enge, Nick Enge and Stephen Zoepf, ,McGraw Hill
R7	Power Electronics: Circuits, Devices, and Applications, Muhammad H. Rashid, Pearson

Useful Links

1	www.howacarworks.com/basics
2	https://www.iav.com/us/engineering
3	http://www.sae.org/automotive/

	Course Outcomes	CL
BME42407.1	Identify automobile components and layouts.	1
BME42407.2	Analyze the mechanics of automotive transmission systems.	4
BME42407.3	Describe the components, working principles, and applications of hybrid vehicles.	2


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Second Year (Semester-IV) B.Tech. Mechanical Engineering

BSH42403: Human Values for Professional Society

Teaching Scheme		Examination Scheme	
Lectures	2 Hr / Week	CT	14
Tutorials	-	CA	06
Total Credits	2	ESE	30
		Total	50 Marks
		Duration of ESE: 02 Hrs	

Course Objectives:

At the end students will be able to

1	To understand an human values, their importance, and their role in personal and social life.
2	To understand harmony in self, family, society, human relationships, and nature.
3	To understand awareness of professional ethics, values, accountability, and responsible professional conduct.

Course Contents		Hours
Unit I	Need, Content and Process for Value Education:- Meaning and importance of Value Education, Types of Values - Personal Values, Social Values, and Moral Values & Spiritual Values, Relevance of Human values: Integrity, Empathy.	(9)
Unit II	Harmony in the Human Life:- Define Harmony and significance of Harmony, Importance of - Harmony in the family, society and human relationship, and understand Harmony with self and Nature.	(9)
Unit III	Ethics in the Professional Society:- Nature, characteristics and scope of professional ethics; Types of Professional Ethics, Professional Values: Trusteeship, Inclusiveness, Commitment, Sustainability, Accountability, Transparency, Impartiality.	(9)

Text Books

T.1	R.R. Gaur, R Sangal, G.P. Bagaria (2009): A Foundation Course in Human Values and Professional Ethics, Excel Books
T.2	D.R. Kiran (2014) Professional Ethics and Human Values, McGraw Hill Education (India).

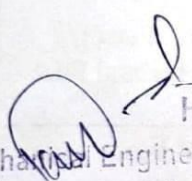
Reference Books

R.1	LaFollette, Hugh, ed. Ethics in Practice: An Anthology. Cambridge: Blackwell,1997.
R.2	Vivian L Vignoles (2017): Identity: Personal and Social, Chapter to appear in Oxford Handbook of Personality and Social Psychology (2nded.), edited by Kay Deaux and Mark Snyder.
R.3	Happiness and Well-Being, NIOS Module V (Health and well-being).

Useful Links

1	https://onlinecourses.nptel.ac.in/noc23_hs89/preview
2	https://archive.nptel.ac.in/courses/109/104/109104068

	Course Outcomes	CL
BSH42403.1	Explain the importance of value education in life.	2
BSH42403.2	Describe harmony in family and society.	2
BSH42403.3	Apply ethical values in personal and professional life.	3


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Second Year (Semester-IV) B.Tech. Mechanical Engineering

BME42406: Basics of CNC Programming (IDEA Lab)

Teaching Scheme		Examination Scheme	
Lectures	4 Hr / Week	CT	-
Tutorials	-	CA	50 Marks
Total Credits	2	ESE	50 Marks
		Total	100 Marks
		Duration of ESE: 02 Hrs	

Course Objectives:

At the end students will be able to

1	To Identify different metal removal processes.
2	To understand application and advantage of CNC machines and technology.
3	To learn controls of different CNC machines.

Sr.No.	List of Experiment	CO
1	Produce simple job on lathe including turning, facing, chamfering and drilling Operation.	CO1
2	Produce simple job on Machine including face Milling and Slotting operation.	CO1
3	Identify and draw various components of CNC lathe machine	CO2
4	Identify and draw various components of CNC milling machining centre.	CO2
5	Demonstration of various safety symbols for the CNC machines	CO3
6	Demonstration of various controls and feeds for the CNC machines	CO3
7	Demonstration of CNC machine referencing and manual Jog mode.	CO4
8	Demonstration of setting and presetting of tools on CNC machine	CO4
9	Demonstration of Programming input on CNC machine	CO5
10	Operate CNC machine and try to change different parameters and controls to observe their effects during machining	CO5

Text Books

T.1	CNC Machines, HMT, Bangalore, New age International Limited
T.2	CNC Programming made easy, Binit kumar Jha, Vikas publishing house Pvt. Ltd.

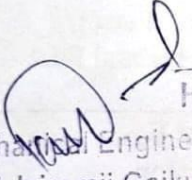
Reference Books

R.1	CAD/CAM Computer Aided Design and manufacturing, Groover, Zimmers, Pearsons
R.2	Computer Numerical Control-Turning And Machining Centres, Quesada Robert, Prentice Hill India, New Delhi

Useful Links

1	https://nptel.acin/courses/112105211/
2	https://www.autodesk.com/solutions/cnc-machining-software

	Course Outcomes	CL
BME42406.1	Differentiate various metal removal processes.	2
BME42406.2	Explain the applications and advantages of CNC machines.	2
BME42406.3	Operate the controls of different CNC machines.	3
BME42406.4	Explain the construction and working principles of CNC systems.	2
BME42406.5	Identify CNC turning axes, machine zero, and home position.	1


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Second Year (Semester-IV) B.Tech. Mechanical Engineering

BSH42404: Leadership and Team Dynamics

Teaching Scheme		Examination Scheme	
Lectures	4 Hr / Week	CT	-
Tutorials	-	CA	50
Total Credits	2	ESE	50
		Total	100 Marks
		Duration of ESE: 02 Hrs	

Course Objectives:

At the end students will be able to

1	To understand an understanding of leadership theories, models, styles, and leadership development approaches.
2	To understand the role of personality, emotional intelligence, ethics, values, and power in effective leadership.
3	To understand awareness of leadership behaviors, conflict management, negotiation, crisis management, and global leadership.

Course Contents

Hours

Unit I	Introduction to Leadership & Team Management: Leadership Myths; Interactional Framework for analyzing leadership; Leadership Development: The First 90 Days as a Leader; Leader Development- The Action-Observation-Reflection Model, LMX Theory and Normative Decision Model; Situational Leadership Model; Contingency Model and Path Goal Theory; Emotional Approach Charismatic and Transformational Leadership; Leadership for Tomorrow.	(9)
Unit II	Leadership Attributes: Personality Traits and Leadership: Personality Types and Leadership; Intelligence and Leadership; Emotional Intelligence and Leadership, Power and Leadership: The art of influence in leadership: Leadership and —Doing the Right Things: Character-Based Approach to Leadership; Role of Ethics and Values in Organizational Leadership.	(9)
Unit III	Leadership Behavior: Leadership Pipeline, Assessing Leadership Behaviors: Multi-rater Feedback Instruments: The Dark Side of; Leadership- Destructive Leadership; Managerial Incompetence and Derailment Conflict Management, Negotiation and Leadership, Leadership under a crisis situation: The Situation and the Environment: Culture and Leadership: Global Leadership.	(9)

Text Books

T.1	Leadership: Enhancing the lessons of experience by Hughes, R.L., Ginnett, R.C., & Curphy, G.J. (2019), 9th Edition, McGraw Hill Education, Chennai, India.
T.2	Robbins, S.P. Judge, T.A. & Vohra, N., —Organizational Behavior, 18th Ed, Pearson Education. (2019).

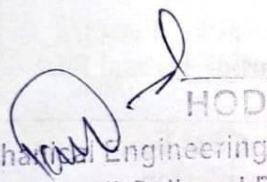
Reference Books

R.1	Baron R. A. and Byrne D., —Social Psychology, 10th Ed., Pearson Education, Inc. (2004)
R.2	Luthans F., —Organizational Behavior, 10th Ed., McGraw-Hill Companies. (2004)

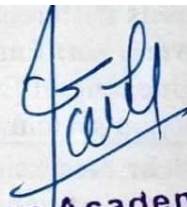
Useful Links

1	https://onlinecourses.nptel.ac.in/noc22_mg39/preview
2	https://www.summary.com/book-summary/the-first-90-days

	Course Outcomes	CL
BSH42404.1	Explain global leadership skills for effective leadership.	2
BSH42404.2	Analyze the role of leaders in team-based organizations.	4
BSH42404.3	Evaluate the contribution of outdoor training to team leadership development.	5


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Second Year (Semester-IV) B.Tech. Mechanical Engineering

BEC42306: Basic of Electronics and Communication

Teaching Scheme		Examination Scheme	
Lectures	2 Hr / Week	CT	14
Tutorials	-	CA	06
Total Credits	2	ESE	30
		Total	50 Marks
		Duration of ESE: 02 Hrs	

Course Objectives:

At the end students will be able to

1	To understand an understanding of semiconductor diodes, rectifiers, filters, and voltage regulator circuits.
2	To understand BJT operation, characteristics, configurations, amplification, and oscillator circuits.
3	To understand knowledge of basic communication systems, modulation techniques, transmission modes, and noise.

Course Contents		Hours
Unit I	Semiconductor Diodes and Applications - P-n junction diode, Characteristics and Parameters Diode approximations, DC load line analysis, Half-wave rectifier, Two-diode Full-wave rectifier, Bridge rectifier, Capacitor filter circuit, Zener diode voltage regulators: Regulator circuit with no load, and with load.	(9)
Unit II	Bipolar Junction Transistors: Types of transistors, BJT operation, BJT Voltages and Currents, BJT amplification, Common Base, Common Emitter and Common Collector Characteristics. Comparison between CC, CE, CB configurations, RC and LC Oscillators.	(9)
Unit III	Elements of basic electronic communication system, Need of modulation, transmission modes-simplex, half duplex full duplex, synchronous and asynchronous, sources of noise (internal and external) signal to noise ratio Types of modulation AM, FM, PM.	(9)

Text Books

T.1	The raja b.l: —basic electronics solid state, s.chand and co.
T.2	Gayakwad ramakant a: —op-amps and linear integrated circuits, prentice hall of india

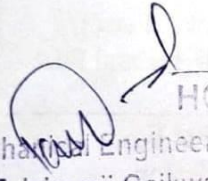
Reference Books

R.1	Bhargava n.n. kulshreshtha d.c.gupta s.c. —basic electronics and linear circuits, tata mcgraw hill
R.2	Salivahanan,s;bhaaskaran,v.s.kanchana —linear integrated circuits, tata mcgraw hill
R.3	—Basics of electronics communication, Tata mcgraw hill

Useful Links

1	https://archive.nptel.ac.in/courses/108/108/108108122/
2	https://avcce.digimat.in/nptel/courses/video/108108111/L15.html

	Course Outcomes	CL
BEC42306.1	Analyze the operation of diode-based rectifier and filter circuits.	4
BEC42306.2	Analyze the input and output characteristics of CE, CB, and CC transistor configurations.	4
BEC423063	Explain the fundamental principles of communication systems.	2


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