Syllabus

Name of the Programme: B.Tech in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Managerial Economics and Financial Accounting	**Course Code**: HSUL301/401	**Credit**: 1
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs.	**Teaching Scheme:** 1+0+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite.	1
2	**Basic economic concepts** Meaning, nature and scope of managerial economics, deductive vs inductive methods. Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement.	4
3	**Demand and Supply analysis** Demand-types of demand, determinants of demand, demand function, demand forecasting –purpose, determinants, elasticity of demand. Supply-determinants of supply, supply function, elasticity of supply.	3
4	**Production and Cost analysis** Theory of production- production function, production optimization, least cost combination of inputs, isoquants, law of variable proportions, laws of returns to scale. Cost concepts-explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation.	3
5	**Financial statement analysis** Capital and accounting, profit and loss statement and related concepts, balance sheet and related concepts, financial ratio analysis .	4
	TOTAL	**15**

Text Books:

1. Managerial Economics by DN Dwivedi (Vikas publishing House)
2. Financial Management by MR Agarwal (Garima Publication)

Reference Books:

1. Managerial Economics by Varsheney & Maheswari, (S. Chand)
2. Managerial Economics and Financial Analysis by A,R.Aryasri: (TMH)

Prerequisite:

1. Knowledge of basic mathematics and business economics.

Name of the Programme: B.Tech. Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Technical Communication	**Course Code**: HSUL302/402	**Credit**: 1
Max Marks: 100	**CIE: 40**	**SEE: 60**
End Term Exam Time: 3hrs	**Teaching Scheme:** 1L+0T+0P	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Basics of Technical Communication** Meaning, aspects and style of technical communication Reading Strategies: Skimming, Scanning, SQ3R, ERRQ	2
3	**Advanced Grammar** Articles, Prepositions, Conditionals, Common Errors	6
4	**Technical Writing** Business Letters, E-mail Writing, Minutes of Meeting, Resume Writing	4
5	**Advanced Technical Writing** Technical Reports, Technical Proposals	2
	Total	**15**

Text Book:

1. Technical Communication: Principles and Practice by Meenakshi Raman and Sangeeta Sharma.Third Edition. New Delhi: OUP. 2017

Reference Books:

1. Effective Technical Communication by M. Ashraf Rizvi, New Delhi: Tata McGraw-Hill Publishing Company Ltd.
2. Effective Technical Communication edited by G. Venkatraman, Pearson, 2024
3. Technical Communication: Process and Product by Sharon Gerson and Steven Gerson, Pearson, 2014

Prerequisite:

1. **Basics of Technical Communication**
   - Introduction to technical communication
   - Knowledge of technical documents and tools for reading and writing.
2. **Advanced Grammar**
   - Basic Strategies of Grammar
3. **Technical Writing**
   - Differentiating between technical and creative writing
4. **Advanced Technical Writing**
   - Knowing the basics of advance writing strategies.
   - Knowing the part of language in advance writing

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Higher Engineering Mathematics	**Course Code**: MAUL303	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 3+0+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite.	1
2	**Numerical Methods – 1:** Finite differences, Relation between operators. Interpolation with equal intervals: Newton's forward and backward difference formulae, Gauss's forward and backward interpolation formulae, Stirling's Formula. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae. Numerical Differentiation. Numerical integration: Trapezoidal rule and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.	10
3	**Numerical Methods – 2:** Numerical solution of ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge- Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Solution of polynomial and transcendental equations: Bisection method, Newton-Raphson method and Regula-Falsi method.	10
4	**Laplace Transforms:** Definition and existence of Laplace transform, Properties of Laplace Transform and formulae, Unit Step function, Dirac Delta function, Heaviside function, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transforms, solving ODEs using Laplace transforms.	9
5	**Fourier Transforms:** Fourier Complex, Sine and Cosine transforms, properties and formulae, inverse Fourier transforms, Convolution theorem, application of Fourier transforms to partial differential equations (One dimensional heat and wave equations only).	8
6	**Z-Transforms:** Definition, properties and formulae, Convolution theorem, inverse Z-transform, application of Z-transforms to difference equation.	7
	Total	**45**

Text Books:

1. Grewal, B.S., "Higher Engineering Mathematics", Khanna Publishers (2012)

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley (2006)
2. John Bird, "Bird's Higher Engineering Mathematics" Routledge. Taylor & Francis Group (2021)

Prerequisite:

1. Understanding of concepts of Calculus, Series and progressions, Trigonometry, Matrix Algebra & Differential Equations.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Engineering Mechanics	**Course Code**: MEUL301	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 2+1+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite.	1
2	**Statics of particles and rigid bodies**: Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Varignon's theorem, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem. **Plane trusses**: Types of structures, Trusses, Support Conditions, Types of Loadings, Classification of trusses, Determinacy of trusses, Basic assumptions of truss analysis, Method of joints, Method of sections.	7
3	**Centroid & Moment of inertia**: Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite sections, Polar moment of inertia, M.I of solid bodies. **Lifting machines**: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines; System of pulleys, Simple wheel and axle, Screw jack.	7
4	**Friction**: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction. **Belt and Rope drive**: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Crowing of pulleys, Length of belt, Ratio of tensions in flat belt drive, Power transmission by belt drives, Advantage and disadvantages of V-Belt over Flat Belt.	5
5	**Kinematics of particles and rigid bodies**: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration, Radial and transverse velocities and accelerations, Relative Motion. **Kinetics of particles and rigid bodies**: Newton's second law, Equation of motion in rectangular coordinate, Equation of motion in radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle.	5
6	**Work, Energy and power**: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Non-Conservative Force, Conservation of energy. **Impulse and momentum**: Linear and angular momentum, Linear and angular impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular momentum, Angular momentum of rigid body, Principle of impulse and momentum for a rigid body, Central impact, Oblique impact.	5
	TOTAL	**30**

Text Books:

1. Engineering Mechanics, S. S. BHAVAKATTI, New Age International, New Delhi(India)

Reference Books:

2. Engineering mechanics. D. P. Sharma, Pearson Education, New Delhi(India)
3. Engineering Mechanics – Statics & Dynamics, N. H. Dubey, Tata Mc GrawHil, New Delhi (India)
4. Engineering Mechanics, Vol I – Statics, Vol II –Dynamics, J. L. Meriam and L. G. Kraige, John Wiley, Singapore
5. Vector Mechanics for Engineers Statics and Dynamics, By Ferdinand P. Beer, E. Russell Johnston, David Mazurek, Phillip J. Cornwell, Brian Self, Sanjeev Sanghi, Mc GrawHil, New Delhi (India)

Prerequisite:

1. Fundamental Knowledge of Physics at 10+2 level.
2. Mathematics fundamentals related to topics of menstruation, geometry, trigonometry, vectors, and calculus.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Engineering Thermodynamics	**Course Code**: MEUL302	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 3+0+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Basic Concepts of Thermodynamics**: System, Surroundings, Property, Energy, Thermodynamic Equilibrium, Process, work and modes of work. **Zeroth and First Law of Thermodynamics:** Zeroth law of Thermodynamics**,** Temperature scale, First law of thermodynamics for closed and open system, steady and unsteady flow processes.	8
3	**Second Law of Thermodynamics:** Heat engine, Heat pump and refrigerator, Second law of thermodynamics, Equivalence of the Kelvin-Plank and Clausius statements. Reversible and Irreversible Processes, Carnot engine, Efficiency of a Carnot engine, Carnot principle, thermodynamic temperature scale, Clausius Inequality. **Entropy**: Entropy, Calculation of Entropy change, Principle of entropy increase. Temperature-Entropy diagram, Second law analysis of a control volume. **Availability:** Available energy, Loss in available energy, Availability Function, Irreversibility.	10
4	**Thermodynamic Properties of Fluids:** Pure substance, development of p-v, T-s and h-s diagram. Properties of steam: use of steam tables and Mollier chart. **Ideal Gas and Real Gas**: Ideal gas, Real gas, Internal energy, enthalpy and specific heats of an ideal gas, equations of state, Dalton's law of partial pressures, Gibbs Dalton law, Thermodynamic properties of gas mixtures.	9
5	**Thermodynamic Relations:** Thermodynamic variables, Independent and dependent variables, Maxwell's thermodynamic relations, Thermodynamic relations involving entropy, Thermodynamic relations involving enthalpy and internal energy, Joule-Thomson coefficient, Clapeyron equation. **Gas Power Cycles:** Otto cycle, Diesel cycle, Dual cycle, Brayton cycle and Ericsson cycle.	9
6	**Vapour Power Cycle:** Rankine cycle, the effect of operating conditions on its efficiency, properties of an ideal working fluid in vapour power cycle, Reheat cycle, regenerative cycle, bleeding extraction cycle, feed water heating co-generation cycle.	8
	TOTAL	**45**

Text Books:

1. 1.Engineering Thermodynamics by PK Nag, TMH Publication
2. 2.Thermodynamics an Engineering Approach by Cengel & Boles, McGraw Hill

Reference Books:

1. Engineering Thermodynamics by P. Chattopadhyay Oxford Higher Education Publication
2. Basic Engineering Thermodynamics by A. Venkatesh, TMH Publication
3. Thermodynamics by J.P.Holman, McGraw Hill Publication
4. Engineering Thermodynamics by YVC Rao, Universities Press Publication

Prerequisite:

1. Basic knowledge of Physics and Chemistry
2. Engineering Mathematics

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Mechanics of Solids	**Course Code**: MEUL303	**Credit**: 4
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 3+1+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Compound stress and strains:** Introduction, normal stress and strain, shear stress and strain, stresses on inclines sections, strain energy, impact loads and stresses, state of plane stress, principal stress and strain, maximum shear stress, Mohr's stress circle, three dimensional state of stress & strain, equilibrium equations, generalized Hook's law, theories of failure	10
3	**Stresses in Beams**: Pure Bending, normal stresses in beams, shear stresses in beams due to transverse and axial loads, composite beams. **Deflection of Beams**: Equation of elastic curve, cantilever and simply supported beams, Macaulay's method, area moment method, fixed and continuous beams	10
4	**Torsion:** Torsion, combined bending & torsion of solid & hollow shafts, torsion of thin walled tubes. **Helical and Leaf Springs**: Deflection of springs by energy method, helical springs under axial load and under axial twist (respectively for circular and square cross sections) for open and closed coiled springs, laminated springs.	9
5	**Thin cylinders & spheres**: Introduction, difference between thin walled and thick walled pressure vessels, Thin walled spheres and cylinders, hoop and axial stresses and strain, volumetric strain. **Thick cylinders:** Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, compound cylinders, stresses in rotating shaft and cylinders, stresses due to interference fits.	9
6	**Columns and Struts:** Buckling and stability, slenderness ratio, combined bending and direct stress, middle third and middle quarter rules, struts with different end conditions, Euler's theory for pin ended columns, effect of end conditions on column buckling, Ranking Gordon formulae, examples of columns in mechanical equipment.	6
	TOTAL	**45**

Text Books:

1. Strength of Materials by Jindal, Pearson Education
2. Strength of Material by Bhavikatti, Vikas Publishing
3. Fundamentals of Solid Mechanics by Gambhir, PHI

Reference Books:

1. Mechanics of Materials by Hibbeler, Pearson
2. Mechanics of Materials by Beer, Jhonston, DEwolf and Mazurek, TMH
3. Strength of Materials by Ryder, Macmillan.

Prerequisite:

1. The course requires a good understanding of the mechanics of rigid bodies, elementary linear algebra, and multivariable calculus.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Materials Science and Engineering	**Course Code**: MEUL304	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 3+0+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Crystal structure-** BCC, FCC and HCP, unit cell, crystallographic planes and directions, miller indices. **Crystal defects-** point defects, line defects, surface defects and volume defects. Frank Reed source of dislocation, Elastic & plastic modes of deformation, Bauschinger's effect, slip & twinning, strain hardening, cold/hot working recovery, re-crystallization and grain growth.	8
3	**Solidification of metals and alloys**- Introduction, mechanism of crystallization, nuclear formation, crystal growth, general principles of phase transformation in alloys, phase rule and equilibrium diagrams, different equilibrium diagram of binary system. Allotropy of iron and Iron carbon equilibrium diagram, phase transformation in the iron carbon diagram and microstructures.	12
4	**Heat treatment processes-** annealing, normalizing, hardening and tempering of steel. Hardenability, Jominey end quench test, Austempering, martempering. Case hardening, carburizing, nitriding, cyaniding, carbonitriding. Flame and Induction hardening. Isothermal transformation diagrams(TTT) –cooling curves superimposed on Isothermal Transformation diagram, critical cooling rate. TTT diagram	8
5	**Engineering materials and their properties**: General classification, metals and alloys, ceramics, polymers and composites properties and applications. Ferrous and Non-Ferrous Metals- Effect of alloying additions on steel and cast iron, Classification of steels and cast-iron, constitution and properties. BIS standards. Constitution of alloys: Solid solutions - substitutional and interstitial. Solidification of metals and of some typical alloys.	10
6	**Testing of metals**: Types of fracture, testing of materials under tension, compression and shear loads – hardness tests (Brinell, Vickers and Rockwell) Impact test Izod and Charpy, fatigue and creep test.	6
	TOTAL	**45**

Text Books:

1. Introduction to engineering materials, B. K. Agarwal, McGraw Hill publication.

Reference Books:

1. Callister's Materials Science and Engineering, Wiley Publication.
2. Material Science, Narula & Narula, McGraw Hill publication.
3. Material Science, V. Raghvan, Prentice Hall India.
4. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev Sreedhar, New Age International Publishers

Prerequisite:

1. Basic knowledge of chemistry at 10+2 level.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Basic Mechanical Engineering Lab	**Course Code**: MEUP320	**Credit**: 1.5
Max Marks: 100	**CIE:** 60	**SEE:** 40
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 0+0+3	

S. No.	List of Experiments
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite To study different types of mechanical hand tools.
2	To study different automotive cooling systems.
3	To study the construction and working of air conditioners.
4	To study centrifugal and reciprocating pumps.
5	To study sewing machines.
6	To study simple and differential screw jacks.
7	To determine mechanical advantage, velocity ratio and efficiency of lifting machines.
8	To determine the velocity ratio of belt, rope and chain drives.
9	To determine the velocity ratio of gear trains.
10	To determine coefficient of friction for various materials.

Text Books:

1. Basic Mechanical Engineering, C. M. Agarwal, Wiley.

Reference Books:

1. Basic Mechanical Engineering, R. K. Singhal, Mridul Singhal, Rishi Singhal, R. P. H. Editorial.
2. Basic Mechanical Engineering, G. K. Pathak, D. K. Chavan, ST Book House

Pre-requisite:

1. Fundamental Knowledge of Basic Mechanical Engineering.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Computer Aided Design Lab	**Course Code**: MEUP321	**Credit**: 1.5
Max Marks: 100	**CIE:** 60	**SEE:** 40
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 0+0+3	

S. No.	List of Experiments
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite. Introduction to different computer aided design (CAD) software such as CREO/Solid Works/ AutoCAD Inventor, etc.
2	Drawing and Editing Tools/Commands.
3	2-D Drafting & Dimensioning.
4	3-D Modeling with basic features modification and manipulation.
5	3-D Modeling with advanced feature modification and manipulation.
6	Basic assembly modeling and detailing.
7	Advanced assembly modeling and detailing.
8	Modeling of Sheet Metal Operation
9	Basic surface modeling.
10	Advanced surface modeling.

Text Books:

1. Machine Drawing with AutoCAD by Goutam Pohit and Goutam Ghosh, Pearson Education
2. Machine Drawing includes AutoCAD by Ajeet Singh, Tata MacGraw Hill

Reference Books:

1. Engineering Drawing and Graphics using AUTOCAD by T.Jayapoovan, Vikas Publishing.
2. Creo Parametric 2.0 for Designer, Prof. Sham Tickoo, CADCIM Technologies.
3. Designing with Creo Parametric 2.0, Michael J. Rider, SDC Publications, Inc.

Prerequisite:

1. Basic knowledge of engineering graphics and machine drawing.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Materials Testing Lab	**Course Code**: MEUP322	**Credit**: 1.5
Max Marks: 100	**CIE:** 60	**SEE:** 40
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 0+0+3	

Module No.	Contents
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite
2	To study various crystals structures through physical models BCC, FCC, HCP, tetrahedral and octahedral voids.
3	To prepare specimen for metallographic and micro structural examination by cutting, grinding, polishing, etching of given specimen.
4	To study the effect on physical properties of a given specimen subjected to heat treatment using methods such as annealing/normalizing/quenching etc.
5	To study the torsional stress-strain relationship and determine shear modulus (G), Poisson's ratio (ν) and the relationship between torsional load angle of twist for a full range of strains till failure.
6	To perform tensile and compressive test on a given material (steel and polymer) and determine its related mechanical properties.
7	To determine macro -hardness of a given material using Rockwell and Brinell hardness tester.
	To determine micro -hardness of a given material using Viker hardness tester.
8	To perform impact test on a given material and to determine its resilience.
9	To study and perform fatigue test on a given material and to determine fatigue strength of the material.
10	To perform bending test and to determine the Young's Modulus of elasticity via deflection of beam.
11	To perform creep testing of specimen using creep testing machine.

Text Books:

1. Introduction to engineering materials, B. K. Agarwal, McGraw Hill publication.

Reference Books:

1. Material Science, Narula & Narula, McGraw Hill publication.
2. Material Science, V. Raghvan, Prentice Hall India.

Prerequisite:

1. Basic information of chemistry at 10+2 level.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Programming using MATLAB	**Course Code**: MEUP323	**Credit**: 1.5
Max Marks: 100	**CIE:** 60	**SEE:** 40
End Term Exam Time: 3 Hrs.	**Teaching Scheme:** 0+0+3	

Module No.	Contents
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite
2	Basics of MATLAB computer programming
3	Use of formulae and inbuilt functions
4	MATLAB scripts and functions (m-files)
5	Loops and nested loops
6	Array, vector and matrices
7	Plotting functions and vector plots
8	Solving differential equations using MATLAB
9	Reading and writing data, file handling
10	Using MATLAB toolboxes
11	MATLAB graphic functions

Text Books:

1. MATLAB Programming for Engineers, Stephen J. Chapman, Cengage Learning
2. MATLAB for Mechanical Engineers, Rao V. Dukkipati, New Age Science

Reference Books:

1. Essential MATLAB for Engineers and Scientists, Brian Hahn and Daniel T. Valentine, Academic Press
2. MATLAB for Engineers, Holly Moore, Pearson Publication
3. Introduction to MATLAB for Engineers and Scientists: Solutions for Numerical Computing and Modelling, Sandeep Nagar, APress Publication

Prerequisite:

1. Elementary Engineering Mathematics

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III
Course Name: Industrial Training	**Course Code**: MEUT330	**Credit**: 1
Max Marks: 100	**CIE:** 60	**SEE:** 40
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 0+0+2	

Note:

- The training will comprise a 15-day in-house training with primary objective to impart technical and professional skills, knowledge, attitude and behavior as expected from an industry-ready mechanical engineer.
- The training contents will focus on core mechanical engineering courses, computer-aided design (CAD) skills, modern tool usage, professionalism, work ethics and safety procedures.
- Assessment and evaluation will be based on class participation, performance in quizzes, presentations, reports and learning outcomes exhibited by students during and at the end of training.

Name of the Programme: B.Tech in Mechanical Engineering	**Year**: II	**Semester**: III/IV
Course Name: Technical Training	**Course Code**: NU99.4	**Credit**: 0
Max. Marks: 100	**Teaching Scheme:** 0+0+2	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite; Roles, scope and responsibilities of a mechanical engineer in nation building and society.	1
2	**Computer Proficiency for Mechanical Engineers** • Practical exercises on MS office, MS-Excel, Power Point tools. • Practical exercises on AutoCAD Software	8
3	**Hands-on-Training in Mechanical Workshop** • Understanding different operations and tools related to **Fitting shop** and preparing a job. • Understanding different operations and tools related to **Welding shop** and preparing a job. • Understanding different operations and tools related to **Carpentry shop** and preparing a job.	6
4	**Field Based Activity & Technical Presentations** • Student to conduct a case-study/literature survey of any mechanical engineering organization/industry/sector focusing on SDGs and submit a report/PPT. • The report should contain objectives, overview and scope of industry/sector, contribution towards SDG, safety principles, experiences gained etc.	15
	Total	**30**

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III/IV
Course Name: Soft Skills Training	**Course Code**: NU99.5	**Credit**:
Max. Marks: 100	**Teaching Scheme: 0+0+2**	

Module No.	Contents	Hours
1	**Teamwork Skills: Communicating Effectively in Groups** • Group development and decision making • Group conflict, difference, and diversity • Meeting Management	5
2	**Time Management for Personal & Professional Productivity** • Identify Important Time Wasters • Techniques for Time Management • Significance of prioritizing • Avoiding Procrastination of work	5
3	**Leadership and Negotiation Skills** • Managing Talent and Leading Team • Influence and Persuasion • Negotiation Skills, Negotiation Strategies and Styles • Leadership Skills	5
4	**Practical Components/ Field Based Assignments** 1. Watch one interview of any Business Personality of your choice, create and deliver a Power Point Presentation on same personality and include following heads: • Life story • Achievements • Challenges Faced • Your learnings 2. Shoot an Interview with five executives who travel outstation frequently. Ask them to describe what problems they face in communication during these visits and how they deal with such issues? Make checklist of Strategies and tactics that can be used when you travel outstation for business works, to deal with communication issues. Discuss in the class and share your experiences. 3. Create and deliver a Power Point Presentation after taking the editorial pages of the last five days of any business newspaper. Go through the contents and organise your findings under the following heads: • Nature of subject matter (Current affairs, economics, etc.) • Target audience of the various columns • Presentation and organisation of contents • Gaps in information that need to be addressed	10
5	**Business Ethics and Etiquette** • Code of conduct in corporate environments • Professional Values and Workplace Ethics • Business Etiquette Essentials • Workplace Interactions and Communication Etiquette	5
	Total	**30**

Teaching and Examination Scheme
II Year IV Semester: B.Tech. (ME)

S. No.	Course Code	Course Name	Category	Teaching Scheme			Exam Hrs.	Marks			Credit
				L	T	P		CIE	SEE	Total	
1	HSUL401/ HSUL402	Managerial Economics and Financial Accounting/ Technical Communication	HSMC	1	0	0	3	40	60	100	**1**
2	MEUL401	Data Analytics	BSC	3	0	0	3	40	60	100	**3**
3	MEUL402	Digital Electronics	ESC	2	0	0	3	40	60	100	**2**
4	MEUL403	Fluid Mechanics and Fluid Machines	PCC	3	1	0	3	40	60	100	**4**
5	MEUL404	Manufacturing Processes	PCC	3	0	0	3	40	60	100	**3**
6	MEUL405	Theory of Machines	PCC	3	1	0	3	40	60	100	**4**
7	MEUP420	Digital Electronics lab	ESC	0	0	2	3	60	40	100	**1**
8	MEUP421	Fluid Mechanics and Hydraulic Machines Lab	PCC	0	0	3	3	60	40	100	**1.5**
9	MEUP422	Production Engineering Lab	PCC	0	0	4	3	60	40	100	**2**
10	MEUP423	Theory of Machines Lab	PCC	0	0	3	3	60	40	100	**1.5**
11	MEUA400	Social Outreach, Discipline & Extra Curricular Activities	SODECA	-	-	-	-	-	-	100	**0.5**
12	NU99.4/NU99.5	Technical Training/ Soft Skills Training	MC	0	0	2	-	-	-	100	**0**
Total Credit											**23.5**

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III/IV
Course Name: Managerial Economics and Financial Accounting	**Course Code**: HSUL301/HSUL401	**Credit**: 1
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs.	**Teaching Scheme:** 1+0+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Basic economic concepts-** Meaning, nature and scope of managerial economics, deductive vs inductive methods, Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement.	4
3	**Demand and Supply analysis-** Demand-types of demand, determinants of demand, demand function, demand forecasting –purpose, determinants, elasticity of demand Supply-determinants of supply, supply function, elasticity of supply.	3
4	**Production and Cost analysis-** Theory of production- production function, production optimization, least cost combination of inputs, isoquants, law of variable proportions, laws of returns to scale. Cost concepts-explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation.	3
5	**Financial statement analysis-** Capital and accounting, profit and loss statement and related concepts, balance sheet and related concepts, financial ratio analysis .	4
	TOTAL	**15**

Text Books:

1. Managerial Economics by DN Dwivedi (Vikas publishing House)
2. Financial Management by MR Agarwal (Garima Publication)

Reference Books:

1. Managerial Economics by Varsheney & Maheswari, (S. Chand)
2. Managerial Economics and Financial Analysis by A,R.Aryasri: (TMH)

Prerequisite:

1. Fundamentals of 10^{th} level mathematics.
2. Knowledge of basic terms of economics and accounting.

Name of the Programme: B.Tech. Mechanical Engineering	**Year**: II	**Semester**: III/IV
Course Name: Technical Communication	**Course Code**: HSUL302/402	**Credit**: 1
Max Marks: 100	**CIE: 40**	**SEE: 60**
End Term Exam Time: 3hrs	**Teaching Scheme:** 1L+0T+0P	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Basics of Technical Communication** Meaning, aspects and style of technical communication Reading Strategies: Skimming, Scanning, SQ3R, ERRQ	2
3	**Advanced Grammar** Articles, Prepositions, Conditionals, Common Errors	6
4	**Technical Writing** Business Letters, E-mail Writing, Minutes of Meeting, Resume Writing	4
5	**Advanced Technical Writing** Technical Reports, Technical Proposals	2
	Total	**15**

Text Book:

2. Technical Communication: Principles and Practice by Meenakshi Raman and Sangeeta Sharma.Third Edition. New Delhi: OUP. 2017

Reference Books:

4. Effective Technical Communication by M. Ashraf Rizvi, New Delhi: Tata McGraw-Hill Publishing Company Ltd.
5. Effective Technical Communication edited by G. Venkatraman, Pearson, 2024
6. Technical Communication: Process and Product by Sharon Gerson and Steven Gerson, Pearson, 2014

Prerequisite:

1. **Basics of Technical Communication**
   - Introduction to technical communication
   - Knowledge of technical documents and tools for reading and writing.
2. **Advanced Grammar**
   - Basic Strategies of Grammar
3. **Technical Writing**
   - Differentiating between technical and creative writing
4. **Advanced Technical Writing**
   - Knowing the basics of advance writing strategies.
   - Knowing the part of language in advance writing

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: IV
Course Name: Data Analytics	**Course Code**: MEUL401	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 hrs	**Teaching Scheme:** 3+0+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	Introduction to statistics: types of data, measures of central tendency: mean, median, mode, quartiles; measures of dispersion: range, standard deviation, variance, inter quartile range, skewness, kurtosis.	8
3	Data visualization: bar charts, line charts, pie charts, scatter plots, histograms, Pareto chart, box plot, stem and leaf plot, etc. Discrete and Continuous probability distributions: binomial, Poisson, normal, exponential. Central limit theorem.	9
4	Sampling and statistical inferences, Hypothesis testing, Type-I and Type-II errors, hypothesis testing for variance, difference of two means, problems on hypothesis testing. Nonparametric tests.	9
5	Simple linear regression and correlation analysis, problems on least square estimation, Karl Pearson correlation coefficient, rank correlation.	9
6	Introduction to multivariate statistics: screening data prior to analysis, missing data, outliers, multiple regression model. Analysis of variance (ANOVA) and covariance, multivariate analysis of variance and covariance. Introduction to Big data management.	9
	TOTAL	**45**

Text Books:

1. Research Methodology by C. R. Kothari & Gaurav Garg, New Age Publication
2. Introduction to Statistical Quality Control by D. Montgomery, Wiley

Reference Books:

1. Multivariate Data Analysis by Joseph S. Hair, Pearson Publication
2. Data Analytics by Dr. Anil Maheshwari. Mc Graw Hill

Prerequisite:

1. Fundamentals of mathematics & statistics.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: IV
Course Name: Digital Electronics	**Course Code**: MEUL402	**Credit**: 2
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 2+0+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	Digital Electronics Fundamentals: Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, demultiplexers, flip-flops, shift registers, counters, Block diagram of microprocessor/microcontroller and their applications.	6
3	Electronic Communication Systems: The elements of communication system, IEEE frequency spectrum, Transmission media: wired and wireless, need of modulation, AM and FM modulation schemes, Mobile communication systems: cellular concept and block diagram of GSM system	6
4	Semiconductor Devices and Applications: Introduction to P-N junction Diode and V-I characteristics, Half wave and Full-wave rectifiers, capacitor filter. Zener diode and its characteristics, Zener diode as voltage regulator. Regulated power supply IC based on 78XX and 79XX series, Introduction to BJT, its input-output and transfer characteristics, BJT as a single stage CE amplifier, frequency response and bandwidth.	5
5	Operational amplifier and its applications: Introduction to operational amplifiers, Op-amp input modes and parameters, Op-amp in open loop configuration, op-amp with negative feedback, study of practical op-amp IC 741, inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.	7
6	Timing Circuits and Oscillators: RC-timing circuits, IC 555 and its applications as astable and mono-stable multi-vibrators, positive feedback, Barkhausen's criteria for oscillation, R-C phase shift and Wein bridge oscillator	5
	TOTAL	**30**

Text Books:

1. Modern digital Electronics - R.P. Jain
2. Digital Logic & Computer Design - M. Morris Mano
3. Fundamentals of Digital circuits - A. Anand Kumar

Reference Books:

1. Digital Electronics- An introduction to theory and practice - W.H. Gothmann
2. Digital System Design using VHDL - Charles Roth

Prerequisite:

1. Basic concepts of number system
2. Basic knowledge of digital logic gates & circuit theory.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: IV
Course Name: Fluid Mechanics and Fluid Machines	**Course Code**: MEUL403	**Credit**: 4
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs.	**Teaching Scheme:** 3+1+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Fluid Properties:** Basic properties of fluids, compressibility and elasticity, Viscosity, Newton's law of viscosity, types of fluids, surface tension and capillarity, vapor pressure & cavitation.	4
3	**Fluid Statics:** fluid pressure and its measurement, pressure variation in fluid at rest; manometers; hydrostatic force on surfaces- total pressure and center of pressure; buoyancy and floatation-centre of buoyancy, meta-centre and meta-centric height, Stability criteria for floating and submerged bodies. **Fluid Kinematics:** Eulerian and Lagrangian description of fluid flow; types of fluid flow, continuity equation, velocity and acceleration of a fluid particle; velocity potential & stream function, flow visualization; free & forced vortex flow.	10
4	**Fluid Dynamics:** Euler and Bernoulli equation of motion and their applications: Venturimeter, orifice meter, pitot tube, orifice and mouthpiece, Notches & Weirs. Momentum equation & its application, viscous flow through circular pipe (Hagen-Poiseuille equation), elementary turbulent flow- Darcy-Weisbach equation , Major and minor head losses in pipes, Boundary layer flow-definition and types	11
5	**Dimensional and Model analysis:** Units & Fundamental dimensions, methods of dimensional analysis, modelling and similitude, Dimensionless Numbers and their significance, Model laws	6
6	**Impact of jets:** Force exerted by jet on stationary/moving plate, velocity components at entry and exit of the rotor, velocity triangles, Euler's equation and efficiency **Turbines:** Classification of turbines, different heads and efficiencies, working principles, velocity triangles and work done by water on the runner for Pelton wheel turbine, Francis turbine and Kaplan turbines, draft tube, Specific speed, unit quantities, performance curves for turbines, governing of turbines. **Pumps:** Classification of pumps, Centrifugal pumps– working principle and work done by the impeller, performance curves, Reciprocating pump- working principle, Discharge and work done.	12
	TOTAL	**45**

Text Books:

1. Fluid Mechanics and Hydraulic Machines, R K Bansal, Laxmi Publications
2. Fluid Mechanics and Fluid Power Engineering, D S Kumar, Katson Publications

Reference Books:

1. Fluid Mechanics, Y A Cengel, J M Cimbala, McGraw Hill
2. Fluid Mechanics, R C Hibbeler, Perason Publications
3. Fluid Mechanics, F. M. White, McGraw Hill
4. Introduction to Fluid Mechanics, Fox and McDonald, Wiley

Prerequisite:

1. Basic concepts of physics, mathematics and engineering mechanics.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: IV
Course Name: Manufacturing Processes	**Course Code**: MEUL404	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 3+0+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite. General Classification and Introduction to Manufacturing processes.	1
2	**Metal Casting:** Classification of casting process, Casting materials, Patterns: types, materials and pattern allowances, Moulding sands: types, composition, applications, properties and testing; core & core prints. Gating system design: types, pouring basin, sprue, runner and risers; Metal melting and pouring techniques.	10
3	**Special Casting Processes**: Floor mould casting, Shell mould casting, Pit mould, Loam mould casting; Centrifugal casting, Investment casting; Permanent mould casting. Die casting; Slush casting; Continuous casting. Casting defects - causes and remedies.	8
4	**Metal Forming:** Classification; hot and cold working, applications. Forging: classification, drop forging and press forging methods, Rolling- principle, classification, hot and cold rolling; Extrusion: principle, types, applications, wire and tube drawing. **Press tool operations:** Principle and applications of shearing, parting, notching, trimming, nibbling, blanking and piercing operation, deep drawing operations.	10
5	**Metal Joining:** Definition and terminology, classification of metal joining processes; Working principle, components and applications of Electric arc welding, Submerged arc welding, TIG and MIG welding; Welding electrodes. **Gas welding**: working principle, types of flames and applications. **Other Welding Processes:** Working principle, components and applications of thermit welding, resistance welding; forge welding; friction welding; diffusion welding; ultrasonic welding; explosive welding. Welding defects: types, causes, effects and remedy. **Brazing and soldering:** working principle, components and applications.	11
6	**Powder Metallurgy:** Introduction, powder manufacturing techniques, powder properties, compaction, sintering, finishing methods; applications of powder metallurgy in refractory metals, cemented carbides, porous parts, structural parts, aerospace applications and magnetic applications. **Plastic Technology:** Introduction to plastics, types of plastics, manufacturing methods (compression and transfer moulding), applications of plastics.	5
	TOTAL	**45**

Text Books:

1. Manufacturing Technology Vol.-1 by P.N.Rao, McGraw Hill Publications.
2. Production Technology by P C Sharma, S.Chand Publications.

Reference Books:

1. A textbook of Manufacturing Technology by R.K.Rajput, Kataria & Sons Publication.
2. Modern Manufacturing Technology by Mikel P Groover, McGraw Hill Publications.
3. Manufacturing Engineering and Technology (SI Edition) by Serope Kalpakjian, Steven R. Schmid, Pearsons Publication.

Prerequisite:

1. Fundamentals of 10^{th} level mathematics.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: IV
Course Name: Theory of Machines	**Course Code**: MEUL405	**Credit**: 4
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 3+1+0	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Introduction to mechanism:** Basic concept of machines, links, kinematic pair, kinematic chain and mechanism. Inversions of kinematic chains: four bar chain mechanisms, quick return mechanisms, inversions of double slider crank mechanisms. **Velocity and acceleration in mechanism:** Velocity and acceleration polygons, relative velocity and instantaneous centre method.	11
3	**Friction devices:** Pivots and collars. **Clutches:** Single and multi-plate clutches. **Brakes:** Band, block and band and block brakes. Basic introduction of hydraulic and pneumatic brakes and their applications.	8
4	**Gears:** Laws of gearing, gears terminology; tooth form; interference, undercutting and minimum number of teeth on gear and pinion. Basic introduction of Spur, helical, bevel, worm and worm gears, rack and pinion, **Gear Trains:** Simple, compound, reverted and epicyclic gear trains.	9
5	**Cams:** Type of cams; displacement, velocity and acceleration curves for different cam followers. **Gyroscope:** Principles of gyroscopic couple, effect of gyroscopic couple and centrifugal force on vehicles taking a turn, stabilization of ship and aeroplane.	9
6	**Balancing:** Balancing of rotating masses in same and different planes, balancing of reciprocating masses, swaying couple, hammer blow and tractive effort.	7
	TOTAL	**45**

Text Books:

1. Theory of Machines, S S Rattan, Tata McGraw Hill

Reference Books:

1. Theory of Machines, Bevan, T., Pearson Education, New Delhi (India)
2. Theory of Machines and Mechanisms Uicker, J.J., Pennocle, G.R, and Shigley, J.E, Oxford University Press
3. Theory of Machines, R S Khurni and J K Gupta, S. Chand & Company LTD.

Prerequisite:

1. Fundamental Knowledge of Basic Mechanical Engineering and Engineering Mechanics.
2. Mathematics fundamentals related to menstruation, geometry, trigonometry, vectors, and calculus.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: IV
Course Name: Digital Electronics lab	**Course Code**: MEUP420	**Credit**: 1
Max Marks: 100	**CIE:** 60	**SEE:** 40
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 0+0+2	

S. No.	Contents
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite
2	• To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR (For 2, 3 & 4 inputs using gates with 2, 3, & 4 inputs). • To verify the truth table of OR, AND, NOR, Ex-OR. Ex-NOR realized using NAND & NOR gates
3	• To realize an SOP and POS expression. • To realize Half adder/ Subtractor & Full Adder/ Subtractor using NAND & NOR gates and to verify their truth tables. • To realize a 4-bit ripple adder/ Subtractor using basic half adder/ Subtractor & basic Full Adder/ Subtractor.
4	• To verify the truth table of 4-to-l multiplexer and l-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and l-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demulriplexer. • Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -3 I 2 seven-segment display.
5	• Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table. • Construct a divide by 2, 4 & 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
6	• Perform input/output operations on parallel in/parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer

Text Books:

1. Modern digital Electronics - R.P. Jain
2. Digital Logic & Computer Design - M. Morris Mano
3. Fundamentals of Digital circuits - A. Anand Kumar

Reference Books:

1. Digital Electronics- An introduction to theory and practice - W.H. Gothmann
2. Digital System Design using VHDL - Charles Roth

Prerequisite:

1. Basic concepts of number system
2. Basic knowledge of digital logic gates & circuit theory.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: IV
Course Name: Fluid Mechanics and Hydraulic Machines Lab	**Course Code**: MEUP421	**Credit**: 1.5
Max Marks: 100	**CIE:** 60	**SEE:** 40
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 0+0+3	

S. No.	Contents
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite
2	To study different types of manometers and pipe fitting accessories.
3	To determine Meta-centric height of a given body.
4	To determine C_d, C_v & C_c for a given Orifice/Mouthpiece.
5	To determine discharge for open channel flow devices (Rectangular Notch/Triangular (V) Notch)
6	To determine velocity of water by Pitot tube and plot velocity distribution in a pipe flow.
7	To verify the Bernoulli's theorem and explain its applications.
8	To determine discharge through pipe flow measuring devices (Venturimeter/ Orifice meter /Nozzle meter)
9	To determine head loss and type of flow (using Reynold's number) in given length of pipe.
10	To determine coefficients for minor losses in pipes.
11	To study the boundary layer velocity profile over a flat plate and to determine the boundary layer thickness.
12	To evaluate the performance and plot the characteristics curves of hydraulic pump (centrifugal pump/reciprocating pump).
13	To evaluate the performance and plot the characteristics curves of hydraulic turbines (Pelton wheel/Francis/Kaplan turbine).

Text Books:

1. Fluid Mechanics and Hydraulic Machines, R K Bansal, Laxmi Publications
2. Fluid Mechanics and Fluid Power Engineering, D S Kumar, Katson Publications

Reference Books:

1. Fluid Mechanics, Y A Cengel, J M Cimbala, McGraw Hill
2. Fluid Mechanics, R C Hibbeler, Perason Publications
3. Fluid Mechanics, F. M. White, McGraw Hill
4. Hydraulics, Fluid Mechanics including Hydraulic Machines P M Modi, S M Seth, Standard Book House

Prerequisite:

1. Basics concepts of physics
2. Basics of engineering mathematics and mechanics.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: IV
Course Name: Production Engineering Lab	**Course Code**: MEUP422	**Credit**: 2
Max Marks: 100	**CIE:** 60	**SEE:** 40
End Term Exam Time: 3 Hrs.	**Teaching Scheme:** 0+0+4	

Exp. No.	List of Experiments
	Foundry Shop
1.	To prepare a simple pattern as per given drawing using carpentry skills.
2.	To prepare a green sand mould of a single and split pattern and cast it in aluminum.
3.	To perform moisture test and permeability test for a moulding sand.
4.	To perform A.F.S. Sieve analysis test and Clay content test of a moulding sand.
5.	To perform strength and hardness test of a green sand mould.
	Machine Shop
6.	To study construction, working, various tools and accessories and operations performed on a centre lathe machine.
7.	To perform facing, step turning, taper turning, knurling, chamfering and threading operations on centre lathe machine as per drawing.
8.	To study a milling machine, milling cutters, indexing head and indexing methods.
9.	To machine a gear/ hexagonal nut using indexing head on milling machine.
10.	To calculate the quick return ratio and prepare a job as per given drawing on shaper.
11.	To prepare a square notch on a mild steel job as per given drawing using fitting shop skills.
	Welding Shop
12.	To prepare lap and butt joint on mild steel pieces using gas and electric arc welding.
13.	To perform hands-on-practice on TIG, MIG and Spot welding machine.

Text Books:

1. S. K. H. Choudhury, A. K. H. Choudhury and N. Roy, Elements of Workshop Technology, Volume I, II, Media Promoters & Publishers Pvt. Ltd., 2008.
2. H.S. Bawa, Workshop Practice, 2nd Edition, McGraw Hill Education, 2017
3. B. S. Raghubanshi, Workshop Technology Vol-I, II, Dhanpat Rai and Sons, 2022

Reference Books:

1. Bruce J. Black, Basic Engineering Practices (Workshop Technology Series), Butterworth-Heinemann Ltd., 199
2. W. A. J. Chapman, Workshop Technology, 4th Edition, Viva Books, 1998
3. K. C. John, Mechanical Workshop Practice, PHI Learning Pvt. Ltd., 2010

Prerequisite:

1. Basic knowledge of mathematics.

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: IV
Course Name: Theory of Machines Lab	**Course Code:** MEUP423	**Credit**: 1.5
Max Marks: 100	**CIE:** 60	**SEE:** 40
End Term Exam Time: 3 Hrs.	**Teaching Scheme:** 0+0+3	

S. No.	List of Experiments
1.	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite.
2.	Study of inversions of four bar chain and their practical applications. (Simulation on Virtual Lab)
3.	Study of various types of cam-follower arrangements. (Simulation on Virtual Lab)
4.	Study of various types of clutches, brakes, and dynamometers.
5.	Study of various types of gear boxes.
6.	Verify the torque relation for gyroscope.
7.	Perform static and dynamic balancing on balancing set up.
8.	Determine efficiency of epicyclic gear train.
9.	Perform clutch slip test on clutch slip test rig.
10.	Plot force vs. radius and lift vs. speed curves for watt and porter governors.
11.	Plot pressure distribution curves of a journal bearing.

Text Books:

1. Theory of Machines, S. S. Rattan, Tata McGraw Hill
2. Theory of Machines, Bevan, T., Pearson Education, New Delhi (India)

Reference Books:

1. Theory of Machines and Mechanisms Uicker, J.J., Pennocle, G.R, and Shigley, J.E, Oxford University Press
2. Theory of Machines, R S Khurni and J K Gupta, S. Chand & Company LTD.

Prerequisite:

1. Fundamental Knowledge of Basic Mechanical Engineering and Engineering Mechanics.
2. Mathematic fundamentals related to menstruation, geometry, trigonometry, vectors, and calculus.

Name of the Programme: B.Tech in Mechanical Engineering	**Year**: II	**Semester**: III/IV
Course Name: Technical Training	**Course Code**: NU99.4	**Credit**: 0
Max. Marks: 100	**Teaching Scheme: 0+0+2**	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite; Roles, scope and responsibilities of a mechanical engineer in nation building and society.	1
2	**Computer Proficiency for Mechanical Engineers** • Practical exercises on MS office, MS-Excel, Power Point tools. • Practical exercises on AutoCAD Software	8
3	**Hands-on-Training in Mechanical Workshop** • Understanding different operations and tools related to **Fitting shop** and preparing a job. • Understanding different operations and tools related to **Welding shop** and preparing a job. • Understanding different operations and tools related to **Carpentry shop** and preparing a job.	6
4	**Field Based Activity & Technical Presentations** • Student to conduct a case-study/literature survey of any mechanical engineering organization/industry/sector focusing on SDGs and submit a report/PPT. • The report should contain objectives, overview and scope of industry/sector, contribution towards SDG, safety principles, experiences gained etc.	15
	Total	**30**

Name of the Programme: B.Tech. in Mechanical Engineering	**Year**: II	**Semester**: III/IV
Course Name: Soft Skills Training	**Course Code**: NU99.5	**Credit**:
Max. Marks: 100	**Teaching Scheme: 0+0+2**	

Module No.	Contents	Hours
1	**Teamwork Skills: Communicating Effectively in Groups** • Group development and decision making • Group conflict, difference, and diversity • Meeting Management	5
2	**Time Management for Personal & Professional Productivity** • Identify Important Time Wasters • Techniques for Time Management • Significance of prioritizing • Avoiding Procrastination of work	5
3	**Leadership and Negotiation Skills** • Managing Talent and Leading Team • Influence and Persuasion • Negotiation Skills, Negotiation Strategies and Styles • Leadership Skills	5
4	**Practical Components/ Field Based Assignments** 4. Watch one interview of any Business Personality of your choice, create and deliver a Power Point Presentation on same personality and include following heads: • Life story • Achievements • Challenges Faced • Your learnings 5. Shoot an Interview with five executives who travel outstation frequently. Ask them to describe what problems they face in communication during these visits and how they deal with such issues? Make checklist of Strategies and tactics that can be used when you travel outstation for business works, to deal with communication issues. Discuss in the class and share your experiences. 6. Create and deliver a Power Point Presentation after taking the editorial pages of the last five days of any business newspaper. Go through the contents and organise your findings under the following heads: • Nature of subject matter (Current affairs, economics, etc.) • Target audience of the various columns • Presentation and organisation of contents • Gaps in information that need to be addressed	10
5	**Business Ethics and Etiquette** • Code of conduct in corporate environments • Professional Values and Workplace Ethics • Business Etiquette Essentials • Workplace Interactions and Communication Etiquette	5
	Total	**30**