Course Outcomes

B Tech – Mechanical

Department of Mechanical Engineering

Subject Code: MEC101A **Subject Name: Engineering Drawing**

Programme: B.Tech.(All Streams)	L: 2 T: 0 P: 4
Semester: 1	Teaching Hours: 36
Theory/Practical: Theory/ Practical	Credits: 4
Name of the Faculty: Dr. Harish Kr Garg	Module Coordinator: Dr. Harish Kr Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	At the end of the course a student will be able to understand the concepts of Engineering Drawing, understanding plain scale and diagonal scale and projection of point in different quadrants.
2	The student will have the basic understanding projection of Lines, Planes and Solids placed in 1st or 3rd quadrant
3	The student will be able to understand & draw the section of solids, and development of surfaces and learn about their physical significance.
4	The student will have a working knowledge of isometric projections and orthographic projection and will have exposed to basic commands of Auto CAD software.

Subject Code: MEC103 **Subject Name: Mechanical Engineering Fundamentals**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 1	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Vipan Bansal	Module Coordinator: Vipan Bansal

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and apply the different concepts of thermodynamic and heat transfer.
2	Understand the use of different pressure measuring units and devices.
3	Identify and recognize the different power transmission devices and machine elements and their applications.
4	Use the Knowledge of various power producing and power absorbing devices for their practical applications.
5	Familiarize and understand the terminology related to Mechanical Engineering.

Subject Code: MEC104 **Subject Name: Manufacturing Practice**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 4
Semester: 1	Teaching Hours: 48
Theory/Practical: Practical	Credits: 2
Name of the Faculty: Vipan Bansal	Module Coordinator: Dr. Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Explain and strictly adhere to the rules and safety regulations for work in the mechanical workshop.
2	Properly operate the manufacturing equipment in the mechanical workshop.
3	Create and document a typical process plan for manufacturing of a product in the mechanical workshop.
4	Read and use a manufacturing drawing as a definition for the manufacturing of a part.
5	Use gauging equipment to verify that a manufactured part fulfils the requirements specified on a manufacturing drawing.

Subject Code: MEC-201 **Subject Name: Kinematics of Machines**

Programme: B.Tech.(ME)	L: 3 T: 1 P: 0
Semester: 3	Teaching Hours: 36
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Sumit Nijjar	Module Coordinator: Sumit Nijjar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To learn basic concepts of machines and their mechanisms.
2	To learn about the various types of cams & followers, and Concept of Friction.
3	To learn the function brakes and various types of drives such as: belts, ropes, chains.
4	To learn function and application of gears and evaluate the velocity ratio and torque in different gear trains.

Subject Code: MEC207 **Subject Name: Mechanics of Solids-I**

Programme: B.Tech.(Mech)	L: 3 T: 1 P: 0
Semester: 3	Teaching Hours: 36
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr. Harish Kr. Garg	Module Coordinator: Dr. Harish Kr. Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understanding of basics of Engineering Mechanics. Knowledge to draw the free body diagrams, and concept of stresses, strains, and their relationships to determine the principal stresses and strains.
2	To understand concept elastic constants. Finding two-dimensional principal stresses and strains by analytical and Mohr's circle.
3	Construct and analyze the shear force and bending moment diagram under different loading conditions and to evaluate slope and deflection in different type of beams.
4	Design simple bars and shafts for allowable shearing stresses and loads and to calculate the bending stresses in different type of beams.

Subject Code: MEC208 **Subject Name: Applied Thermodynamics**

Programme: B.Tech.(ME)	L: 3 T: 1 P: 0
Semester: 3	Teaching Hours: 36
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and use basic concepts and First Law of Thermodynamics for engineering applications.
2	Apply the Second law of Thermodynamics and related properties for the feasibility of engineering systems and solve engineering problems.
3	Recognize the nature of substance from the understanding of its properties and use related Tables and Charts.
4	Understand working principles and performance parameters of reciprocating and rotary compressors.
5	Understand various types of steam turbines and analyze various performance parameters.
6	Estimate the amount of cooling water required in a specific type of condenser.

Subject Code: MEC209 **Subject Name: Manufacturing Processes**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 3rd	Teaching Hours: 36
Theory/Practical: Theory	Credits: 3
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and use basic concepts of manufacturing for engineering applications.
2	To provide an overview of a wide variety of manufacturing processes for processing of engineering materials.
3	To learn principles, operations, and capabilities of various metal casting processes.
4	To learn principles, operations, and capabilities of various welding processes.
5	To learn principles, operations, and capabilities of various forming processes.
6	To learn about the defects, their causes, and remedies in these processes.

Subject Code: MEC210 **Subject Name: Engineering Materials and Metallurgy**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 3	Teaching Hours: 36
Theory/Practical: Theory	Credits: 3
Name of the Faculty: Dr. M P Garg	Module Coordinator: Dr. Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Student will be able to identify crystal structures for various materials and understand the defects in such structures.
2	Student will understand how to tailor material properties of ferrous and non-ferrous alloys.
3	Students will know how to quantify mechanical integrity and predict failure modes in materials.
4	Students will be familiar with various types of heat treatment operations and types.
5	Students will be able to draw Fe-C phase diagram and draw conclusions from it.

Subject Code: MEC211A **Subject Name: Machine Drawing**

Programme: B.Tech.(Mech)	L: 2 T: 0 P: 4
Semester: 3	Teaching Hours: L: 24 P: 48
Theory/Practical: Theory/ Practical	Credits: 3
Name of the Faculty: Dr. Harish Kr Garg	Module Coordinator: Dr. Harish Kr Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand basics of Limits, Fits & Tolerances. Different types of fasteners
2	To impart knowledge of orthographic views of keys, cotter joints, knuckle joint and shaft couplings
3	Drawing assembly views for different Boiler and I.C. Engine parts.
4	Drawing different bearings and other machine components such as Screw Jack, Tool Post, Tail Stock, Drilling jig, Machine vice, Bench Vice, cross head, Eccentric etc.

Subject Code: MEC212A **Subject Name: Mechanics of Solids Laboratory**

Programme: B.Tech.(Mech)	L: 0 T: 0 P: 2
Semester: 3	Teaching Hours: 24
Theory/Practical: Theory/ Practical	Credits: 1
Name of the Faculty: Dr. Harish Kr Garg	Module Coordinator: Dr. Harish Kr Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand to conduct a tensile test and compressive test on mild steel Specimen.
2	To determine the impact strength of a specimen of M.S/Cast Iron by Charpy test and Izod test.
3	Conduct torsion test on Mild steel/Cast iron specimen to find out modulus of rigidity.
4	To determine the Stiffness of the spring and modulus of rigidity of the open and closed spring wire.
5	To check behaviour of column under load for different end conditions.

Subject Code: MEC214 Subject Name: Applied Thermodynamics Laboratory

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 3	Teaching Hours:24
Theory/Practical: Practical	Credits:1
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Identify different types of IC engines and their parts; understand construction & working of IC engines.
2	To study the two-stage reciprocating air compressor and make calculations on it.
3	Demonstrate the construction and working of power plant parts like condensers.
4	Demonstrate the construction and working of different types of steam generators and their parts.
5	To study the cooling tower and make calculations on it.
6	To Study of the water and fire tube boiler (Model).

Subject Code: MEC21
Subject Name: Engineering Materials and Metallurgy Laboratory

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 3	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Dr. M P Garg	Module Coordinator: Dr. Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Students will be able to carry out annealing, hardening, and normalizing of steel specimens.
2	Students will be able to prepare samples of different metals for microstructural examination.
3	Students will be able to study the microstructure of steel and can differentiate different constituents.
4	Students will be familiar with procedure of hardening of specimen by using flame hardening method**.**

Subject Code: MEC250A Subject Name: Production and Operation Management

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 4	Teaching Hours: 36
Theory/Practical: Theory	Credits: 3
Name of the Faculty: Vipan Bansal	Module Coordinator: Vipan Bansal

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Students should be able to know the Group Technology, Cellular Manufacturing, MTO, MTS, assemble to order and further apply these skills to understand the real time case studies.
2	Analyze process planning activity charts.
3	Make forecasts in the manufacturing and service sectors using selected quantitative and qualitative techniques
4	Students should be able to take suitable decisions regarding location of the organization as well as layout of the department/workstations within the organization.
5	Students should be able to recognize the different material handing equipment's and the utility of these material handing equipment's.
6	Students should be able to know about different type of maintenance schedules and maintenance problems and further apply these skills to understand the real time case studies.

Subject Code: MEC-251A Subject Name: Dynamics of Machines

Programme: B.Tech.(ME)	L: 3 T: 1 P: 0
Semester: 3	Teaching Hours: 36
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Sumit Nijjar	Module Coordinator: Sumit Nijjar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To provide the basic concepts of forces in mechanisms.
2	To understand the balancing of machines (Rotating & Reciprocating Masses).
3	To understand mechanism working of mechanical devices viz. Flywheel & Governor.
4	To provide the information of gyroscopic couple and fuel regulation to engine.

Subject Code: MEC257A **Subject Name: Mechanics of Solids-II**

Programme: B.Tech.(Mech)	L: 3 T: 1 P: 0
Semester: 4	Teaching Hours: 36
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr. Harish Kr Garg	Module Coordinator: Dr. Harish Kr Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Develop understanding of failure theories and their application, concept of strain energy under different type of loading.
2	To understand failure criterion of column under different end conditions. Perform design analysis of pressure vessels.
3	To calculate shear stress distribution for different sections-rectangular, circular, I, T and miscellaneous sections
4	Perform design analysis of springs and to design disc of uniform strength.

Subject Code: MEC258 **Subject Name: I. C. Engines**

Programme: B.Tech.(ME)	L: 3 T: 1 P: 0
Semester: 3	Teaching Hours: 36
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand the concept Heat Engine and various Air-Standard cycles.
2	Analyze the fuel-air and actual cycles and their response to influencing variables.
3	Evaluate different types of conventional IC engine fuels, their combustion requirements.
4	Design of carburetion and fuel injection system for SI and CI engines.
5	Calculate various combustion stages and design requirements for combustion chambers of SI and CI engines.
6	Apply their knowledge in measuring various performance parameters of IC engine.

Subject Code: MEC-259 **Subject Name: Metal Cutting and Machine Tools**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 4	Teaching Hours: 36
Theory/Practical: Theory	Credits: 3
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and use basic concepts of metal cutting for engineering applications.
2	To learn principles, operations and capabilities of various metal machining and metal forming processes.
3	To learn the importance of process variables controlling these processes
4	To recognize the inter-relationships between material properties and manufacturing processes.
5	To learn various sheet metal operation and designing of work holding devices.

Subject Code: MEC260 **Subject Name: Mechanical Measurement**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 4	Teaching Hours: 48
Theory/Practical: Theory	Credits: 3
Name of the Faculty: Dr. M P Garg	Module Coordinator: Dr. M P Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Students will be familiar with the basic terminology and classification of mechanical measurements.
2	Students will Understand the methods of measurement and selection of measuring instruments and standards of measurement
3	Students will be familiar with the operation of displacement, velocity, pressure, temperature, and force measuring instruments.
4	Students will develop an understanding of different sensors and transducers
5	Students will be able to identify error in measuring instruments and their correction.

Subject Code: MEC-261A **Subject Name: Dynamics of Machines Laboratory**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 3	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Sumit Nijjar	Module Coordinator: Sumit Nijjar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To know about inversions of 4 Bar Mechanisms, Single and double slider crank mechanisms.
2	To learn various type of cam and follower arrangements.
3	To learn about various Governors and prepare performance characteristic Curves, and to find stability & sensitivity.
4	To learn about the static/dynamic balancing on static/dynamic balancing machine.

Subject Code: MEC263 **Subject Name: I. C. Engines Laboratory**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 4	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand the practical operation of 2 stroke and 4 stroke I.C engines using valve timing diagram.
2	Analyze the performance of multi cylinder engines with the variation of various performances like load and speed.
3	Determine the quality of Engine fuels by analyzing its calorific value
4	Estimate the constituents of combustion products for emission characteristics related to public safety.

Subject Code: MEC-264 Subject Name: Manufacturing Technology Laboratory

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 4	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and use different machines in machine shop. .
2	Understand the concept of welding and use of different welding machines.
3	Understand the concept of casting and foundry.
4	Understand the use of furnaces in casting.

Subject Code: MEC265 Subject Name: Mechanical Measurement Laboratory

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 4	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Dr. M P Garg	Module Coordinator: Dr. M P Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Students will be able to measure the various parameters like length, height, angle, displacement, flatness etc., by using various instruments like vernier callipers, micrometre, dial indicator, etc.
2	Students will be able to measure angle of specimen using sine bar and angle protector.
3	Students will be able to carry out surface roughness measurement.
4	Students will be familiar with the use of profile projector for estimation of various parameters.
5	Students will be able to use thermocouples for temperature measurement and strain gauges for measurement of strains.

Subject Code: MEC303B **Subject Name: Heat Transfer**

Programme: B.Tech.(ME)	L: 3 T: 1 P: 0
Semester: 5	Teaching Hours: 36
Theory/Practical: Theory	Credits: 4
Name of the Faculty: M P Garg	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Students will be able to apply the principles and analytical equations of conduction and convention heat transfer to solve heat transfer problems.
2	Students will get acquainted with the analysis of promotion in heat transfer with the use of fins.
3	Students will develop an understanding of radiation phenomenon and will be able to answer problems related to real world.
4	Students will be able to develop analytical equations to predict heat transfer in wide variety of convection problems.
5	Students will develop analytical skills to evaluate the thermal performance of heat exchangers and analyze and recognize their requirements of heat transfer optimization.

Subject Code: MEC306B **Subject Name: Mechanics of Fluids**

Programme: B.Tech.(ME)	L: 3 T: 1 P: 0
Semester: 5	Teaching Hours: 36
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand the structure and properties of the fluid.
2	Understand the concept and solve problems related to statics, kinematics, and dynamics of fluids.
3	Use and apply dimensional analysis techniques to various physical fluid phenomena.
4	Analyze the viscous flow through pipe flow and determine head loss in pipe network.
5	Recognize basic components of turbo machines and understand related fundamental laws/ principles and apply these for calculation of various parameters like work done, force efficiency etc.
6	Understand constructional details, working and design aspects of runner/wheel and evaluate the performance of various turbines like Pelton, Francis, Kaplan, Centrifugal and Reciprocating pump.

Subject Code: MEC-307A **Subject Name: Design of Machine Elements**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 2
Semester: 5	Teaching Hours: 42
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr. Sharanjit Singh	Module Coordinator: Dr. Harish Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and use basic concepts design philosophy for engineering applications.
2	To learn fundamentals approaches to failure prevention for static and repeated loading.
3	To learn the design of riveted, welded joints, other joints, keys and couplings.
4	To learn the design of clutch and brakes.
5	To learn the design of gears.
6	To learn the design of bearings.

Subject Code: MEC-308B **Subject Name: Non-Conventional Machining Processes**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 5th	Teaching Hours: 39
Theory/Practical: Theory	Credits: 3
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and use basic concepts advanced manufacturing processes for engineering applications.
2	Selection of different processes as per the requirement of the manufacturing.
3	Recognize the features of different advanced manufacturing processes.
4	Analyze the effect of process parameters on performance of major non-conventional machining.
5	Understand the concepts related to hybridization of modern machining processes and their utilization in industry.
6	Use various additive manifesting processes according to industrial requirements.

Subject Code: MEC309B **Subject Name: Industrial Engineering**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 5	Teaching Hours: 36
Theory/Practical: Theory	Credits: 3
Name of the Faculty: Vipan Bansal	Module Coordinator: Vipan Bansal

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Know the functions and required qualities of an Industrial Engineer.
2	Adopt a system approach to design, develop, implement, and innovate integrated systems that include people, materials, information, equipment, and energy.
3	Know about conducting method study, motion study, time study, and method time measurements.
4	Learn the different aspects of value, cost, lifecycle cost, and to be able to carry out function analysis of a product or system using value analysis techniques.
5	Able to analyze, compare and execute the activities of inventory management and control.
6	Identify and analyze the effect of working environment on worker's health.

Subject Code: MEC310 Subject Name: Industrial Engineering Laboratory

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 5	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Vipan Bansal	Module Coordinator: Vipan Bansal

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Develop the understanding of basic concepts of various plant layouts and suggest improvements in existing Machine Shop Layout.
2	Analyze the requirements of a newly established industry and draw its basic organization structure.
3	Develop the basic understanding of Inventory Control Management through case study on ABC/VED analysis.
4	Develop the complete understanding of organization structure of purchase department and analyze various purchase procedure.
5	Draw a Flow Process Chart and understand its concept, importance, and applications.

Subject Code: MEC311 **Subject Name: Mechanics of Fluids Laboratory**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 5	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Analyze different form of energies in fluid flow and inter conversion.
2	Understand different concept of continuity equation and flow rate.
3	To determine critical Reynolds' numbers for flow through commercial pipes.
4	To Calculate Friction Factor of Pipes of Different Diameter.
5	To Find Coefficient of Discharge of Different Notches and venturi meter.
6	To Find Minor Losses with Sudden Expansion, Contraction, Bend, Elbow Etc.

Subject Code: MEC313 **Subject Name: Heat Transfer Laboratory**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 5	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Dr. M P Garg	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Students will be able to determine the thermal conductivity of a metallic rod and insulating powder.
2	Students will be able to calculate effectiveness of different fins through designed experimental set up.
3	Students will be able to assess and evaluate the thermal performance of systems for radiation heat transfer and its applications.
4	Students will be familiar with estimation of dimensionless numbers while working on heat flow through pipes.
5	Students will develop the capability to predict temperature distribution and heat flow in working on different heat exchangers.

Subject Code: MEC300 **Subject Name: Industrial Training**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 0
Semester: 5	Teaching Hours: 72
Theory/Practical: Theory	Credits: 2
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Participate in the projects in industries during his or her industrial training.
2	Describe use of advanced tools and techniques encountered during industrial training and visit.
3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
4	Develop awareness about general workplace behaviour and build interpersonal and team skills.
5	Prepare professional work reports and presentations.

Subject Code: MEC358A **Subject Name: Optimization Techniques**

Programme: B.Tech.(Mech)	L: 3 T: 1 P: 0
Semester: 6	Teaching Hours: 36
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr. Harish Kr Garg	Module Coordinator: Vipan Bansal

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Developing the mathematical modeling in solving practical problems in industry by Linear programming problems
2	Understand the mathematical tools that are needed to formulate & solve transportation, assignment, and Dynamic programming problems for optimization.
3	Design new simple models, like PERT and CPM, to improve decision making. Applying mathematical models to solve the inventory & Queuing problems
4	Applying mathematical models to solve the replacement problems and brief knowhow of constrained and unconstrained optimization.

Subject Code: MEC-359 **Subject Name: Automobile Engineering**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 6th	Teaching Hours: 36
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand different types of automobiles, construction, and their usage.
2	To aware the students about a method of ignition system and its characteristics.
3	To familiarize the students with methods of power transmission in the automobiles.
4	To familiarize students with different steering system of automobiles.
5	To familiarize students with different Braking system in the automobiles.
6	To familiarize students with different lubrication system and maintenance of the automobiles.

Subject Code: MEC306A **Subject Name: Mechanics of Fluids**

Programme: B.Tech.(ME)	L: 3 T: 1 P: 0
Semester: 5	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand the structure and properties of the fluid.
2	Understand the concept and solve problems related to statics, kinematics, and dynamics of fluids.
3	Use and apply dimensional analysis techniques to various physical fluid phenomena.
4	Analyze the viscous flow through pipe flow and determine head loss in pipe network.
5	Recognize basic components of turbo machines and understand related fundamental laws/ principles and apply these for calculation of various parameters like work done, force efficiency etc.
6	Understand constructional details, working and design aspects of runner/wheel and evaluate the performance of various turbines like Pelton, Francis, Kaplan, Centrifugal and Reciprocating pump.

Subject Code: MEC311 **Subject Name: Mechanics of Fluids Laboratory**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 5	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	**Course Outcomes (CO)**
1	Analyze different form of energies in fluid flow and inter conversion.
2	Understand different concept of continuity equation and flow rate.
3	To determine critical Reynolds' numbers for flow through commercial pipes.
4	To Calculate Friction Factor of Pipes of Different Diameter.
5	To Find Coefficient of Discharge of Different Notches and venturi meter.
6	To Find Minor Losses with Sudden Expansion, Contraction, Bend, Elbow etc.

Subject Code: MEC-363 **Subject Name: Automobile Engineering Laboratory**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 6th	Teaching Hours: 12
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand the construction and details regarding ignition systems.
2	Understand the constructional details, working principles and operation of the Engine Cooling & Lubricating Systems.
3	Understand the constructional details, working principles and operation of different Brake systems
4	Understand the constructional details, working principles and operation of different suspension system.
5	Understand the constructional details, working principles and operation of different steering systems.
6	Understand the constructional details, working principles and operation of different clutch and differential systems.

Subject Code: MEC-451 **Subject Name: Maintenance and Reliability**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 7	Teaching Hours: 36
Theory/Practical: Theory	Credits: 3
Name of the Faculty: Sumit Nijjar	Module Coordinator: Dr. M. P. Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To learn about maintenance management & planning techniques.
2	To learn various maintenance strategies & scheduling procedures.
3	To learn about Reliability Oriented Maintenance Systems.
4	To learn diagnosis techniques so that one can identify and take appropriate actions on error symptoms and causes of failures.

Subject Code: MEC-461B **Subject Name: Robotics and Automation**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 7	Teaching Hours: 36
Theory/Practical: Theory	Credits: 3
Name of the Faculty: Sumit Nijjar	Module Coordinator: Dr. M. P. Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To learn about robot terminology, classification, attached devices viz. Sensors & End-effectors.
2	To understand the concept of robot programming and its application in industry.
3	To understand the concept, need and application of various types of automation & the use of hydraulic/pneumatic valves and cylinders for their application in automation.
4	Design the pneumatic and hydraulic circuits for industrial automation applications and analyze the working of fluidic sensors for industrial applications.

Subject Code: MEC-471 Subject Name: Robotics and Automation Laboratory

Programme: B.Tech.(ME)	L: 0 T: 00 P: 2
Semester: 7	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: Sumit Nijjar	Module Coordinator: Dr. M. P. Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To learn about robotic arm, its configuration, and various attachments.
2	To learn about various types of hydraulic and pneumatic valves.
3	To learn the use of direction control valve and pressure control valves in clamping devices for jig and fixture.
4	To design and assemble meter in and meter out circuits.

Subject Code: MEC400 Subject Name: Industrial Training

Programme: B.Tech.(ME)	L: 0 T: 0 P: 0
Semester: 7	Teaching Hours: 36
Theory/Practical: Practical	Credits: 2
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Ved Raj Khullar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Participate in the projects in industries during his or her industrial training.
2	Describe use of advanced tools and techniques encountered during industrial training and visit.
3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
4	Develop awareness about general workplace behaviour and build interpersonal and team skills.
5	Prepare professional work reports and presentations.

Subject Code: MEC450A **Subject Name: Seminar**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 4
Semester: 7	Teaching Hours: 48
Theory/Practical: Practical	Credits: 2
Name of the Faculty: Vipan Bansal	Module Coordinator: Sumit Nijjar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Enhance the capability of the student to present a seminar on a technical topic
2	Understand the learning and critical thinking about a technical topic
3	Draw upon literature from different traditions to help the students appreciate the universal importance social trust, truth telling and mutual obligations.
4	Able to summarize the concept of the chosen topic systematically after considerable study of the content from primary as well as secondary sources.
5	Acquire awareness on latest technology and current trends in the field of Mechanical Engineering.

Subject Code: MEC404A **Subject Name: CAD/CAM**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 8	Teaching Hours: 36
Theory/Practical: Theory	Credits: 3
Name of the Faculty: M P Garg	Module Coordinator: M P Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Students will develop an understanding of CAD systems and graphical modeling.
2	Students will get acquainted with part coding and classification systems.
3	Students will develop an understanding of Graphics transformation and will be able to solve analytical problems with simple calculations.
4	Students will understand construction, operation, and programming of NC machines.
5	Students will have an introduction to Computer Aided Process Planning (CAPP) Systems

Subject Code: MEC462B **Subject Name: Inspection and Quality Control**

Programme: B.Tech.(ME)	L: 3 T: 0 P: 0
Semester: 8	Teaching Hours: 36
Theory/Practical: Theory	Credits: 3
Name of the Faculty: Vipan Bansal	Module Coordinator: Vipan Bansal

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Develop an understanding on quality management philosophies and frameworks.
2	Design a Single / Double / Multiple sampling plan, construct its OC curve and evaluate its effectiveness for a given process.
3	Able to perform quality circles in small groups.
4	Categorize the process in control or out of control using various types of charts (p, np, C, U charts).
5	Assess the implementation of ISO 9000/9001-2008/14000 for given manufacturing, service sector.
6	Develop analytical skills for investigating and analyzing quality management issues in the industry and suggest implementable solutions to those.

Subject Code: MEC414 **Subject Name: CAD/CAM Laboratory**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 2
Semester: 8	Teaching Hours: 24
Theory/Practical: Practical	Credits: 1
Name of the Faculty: M P Garg	Module Coordinator: M P Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Students will develop ability to customize software according to requirements in term of layout, selection of units, screen size etc.
2	Students will acquire proficiency in geometric modelling in sketcher as well as part mode.
3	Students will be able to model parts in 3 D and will have an overview to analyze these for extraction of properties.
4	Students will be acquainted with developing assemblies of surface and solid models
5	They will be able to generate drawings as per requirements from 3 D models.

Subject Code: MEC499A **Subject Name: Project**

Programme: B.Tech.(ME)	L: 0 T: 0 P: 0
Semester: 8	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Ved Raj Khullar	Module Coordinator: Sumit Nijjar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Demonstrate a sound technical knowledge of their selected project topic.
2	Undertake problem identification, formulation, and solution.
3	Design engineering solutions to complex problems utilizing a systems approach.
4	Conduct an engineering project.
5	Communicate with engineers and the community at large in written an oral form.
6	Demonstrate the knowledge, skills, and attitudes of a professional engineer.

Department Electives

Module: Design

Subject Code: MEC457 **Subject Name: Finite Element Method**

Programme: B.Tech.(Mech)	L: 4 T: 0 P: 0
Semester: 7	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr. Harish Kr Garg	Module Coordinator: Dr. Harish Kr Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To develop understanding of numerical modeling and analysis
2	Able to Formulate and solve problems in one dimensional structures and FE characteristic equations for two dimensional elements
3	Apply and characteristics of FEA elements such as bars, beams, plane and isoparametric elements.
4	Develop the element stiffness matrices using different approach and develop ability to apply suitable boundary conditions to a global structural equation and reduce it to a solvable form.

Subject Code: MEC402 **Subject Name: Mechanical Vibrations**

Programme: B.Tech.(Mech)	L: 4 T: 0 P: 0
Semester: 7	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr. Harish Kr Garg	Module Coordinator: Dr. Harish Kr Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To Formulate mathematical models of problems in vibrations and to understand the concept of undamped vibration in mechanical systems
2	To develop ability to solve damped and forced vibrations problems.
3	Learning Vibration Measuring Instruments in different cases and understanding principle modes and Normal modes of vibration in mechanical systems.
4	Ability to determine vibratory responses for Multi degree of freedom (MDOF) and continuous systems.

Subject Code: MEC427 **Subject Name: Advanced Materials**

Programme: B.Tech.(Mech)	L: 4 T: 0 P: 0
Semester: 7	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr. Harish Kr Garg	Module Coordinator: Dr. Harish Kr Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To develop understanding of advanced materials and various processing techniques of Metal matrix composites.
2	Able to understand various processing techniques of Polymer and Ceramic Matrix Composites.
3	Learning of advanced structural ceramics, WC, TiC, TaC, AI2O3, SiC, Si3N4, CBN and Diamond and smart materials
4	Learning of Modern Metallic Materials such as Dual phase steels, Metallic glass etc and their applications.

Subject Code: MEC445 **Subject Name: Mechanical Behaviour of Materials**

Programme: B.Tech.(Mech)	L: 4 T: 0 P: 0
Semester: 7	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr. Harish Kr Garg	Module Coordinator: Dr. Harish Kr Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To develop understanding engineering materials, their structure, and mechanical properties.
2	Able to understand plastic deformation techniques, and various strengthening mechanisms in materials.
3	Learning concept of ductile and brittle fracture and fatigue fracture, fatigue test (S-N curve), fatigue behaviour in iron & steel.
4	Learning Creep Behaviour through various creep mechanisms

Module: Manufacturing & CAD - CAM

Subject Code: MEC422 **Subject Name: Tool Design**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 8th	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand materials and Geometry of cutting tools.
2	To learn about the Thermal aspects in machining and use of cutting fluid in machining.
3	Evaluate the purpose and principal of tool geometry, construction, and design.
4	Enhance the knowledge regarding the manufacturing aspects of the machining.
5	Design machine tools control system which will further help in recognizing the different operational conditions on the machine.
6	Understand the importance of the tool design.

Subject Code: MEC424A **Subject Name: Flexible Manufacturing System**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 7th	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and use basic concepts of automation.
2	Understand the working of Automated assembly systems.
3	To understand the concept of group technology in manufacturing.
4	Understand the components and features of Flexible Manufacturing Systems.
5	To understand material handling and storage devices used in manufacturing.
6	To understand general notion of robotic movements and their programming.

Subject Code: MEC432 **Subject Name: Tribology**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester:7th	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr M P Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand Design of surfaces in contact for mechanical engineering applications.
2	Analyze various methods for quality checking of engineering applicable surfaces
3	Understand the theories and rigs accounting friction and Wear.
4	Analyze the variation of friction and wear in metals and non-metals.
5	Apply various lubrication systems and bearing for different working conditions
6	Analyze causes of failure of tribological components.

Subject Code: MEC456 **Subject Name: Non-Conventional Energy Resources**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 7th	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and use basic concepts energy resources for engineering applications.
2	To impart the knowledge information about the various non-conventional energy resources.
3	To provide the information about the use of solar energy to produce electricity.
4	To understand the ways to utilize wind energy for human usage.
5	To understand the issue of fuel availability.
6	To discover the pros and cons of conventional energy sources.

Subject Code: MEC452A **Subject Name: Product Design and Development**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 8th	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Dr Sharanjit Singh	Module Coordinator: Dr Sharanjit Singh

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and use basic concepts of designs in development of new products.
2	To facilitate the development of new concepts for innovative products.
3	Understand the technical and business aspects of the product development process.
4	Apply creative process techniques in synthesizing information, problem-solving and critical thinking.
5	Use basic fabrication methods to build prototype models for hard-goods and soft goods and packaging.
6	Skilled in implementation of gathering data from customers and establish technical Specification.

Subject Code: MEC455A **Subject Name: Non-Destructive Testing**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 4	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: M P Garg	Module Coordinator: M P Garg

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Students will be familiar with the basic terminology and the fundamental concepts of visual inspection.
2	Students will Understand the operation of radiographic and liquid penetration testing.
3	Students will be familiar with the magnetic particle and ultrasonic testing.
4	Students will understand concepts of Thermography and Eddy current testing

Module: Industrial Engineering

Subject Code: MEC421A **Subject Name: Total Quality Management**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 6 (DE-I)	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Vipan Bansal	Module Coordinator: Vipan Bansal

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Get the knowledge about different quality standards and their applications.
2	Develop an understanding on quality management philosophies and frameworks.
3	Human Aspects in Management of Quality, Employee Involvement, team, and teamwork, zero defects, quality circles, recognition and Adopt TQM methodologies for continuous process improvement.
4	Understand & analyze advance Quality concepts of 6-sigma.
5	Apply benchmarking, QFD, FMEA and business process reengineering to improve management processes.
6	Determine the set of indicators to evaluate performance excellence of an organization like ISO 9000, ISO 9001, ISO 14001.
7	Develop an understanding on internal audit, second party, third party audit

Subject Code: MEC425 Subject Name: Entrepreneurship Development &Management

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 7 (DE-II)	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Vipan Bansal	Module Coordinator: Vipan Bansal

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To be able to know about entrepreneurship, types of business and market opportunities and appraise the importance of entrepreneurship in economic growth.
2	Appraise the steps involved in setting up a business and business project reports
3	Identify different sources of finance for new enterprises and assess the role of financial institutions and various government schemes in entrepreneurial development.
4	To be able to understand economic environment supply and demand characteristic, product specification, market survey and analysis and selecting a product for small industries and apply process flow chart quality standard and apply process flow chart quality standard and control for small business product.
5	To be able to know about Industrial legislations, labour, and wage schemes and about Intellectual Property Rights

Subject Code: MEC-453A **Subject Name: Industrial Safety**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 7	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Sumit Nijjar	Module Coordinator: Sumit Nijjar

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	To learn about the need of safety, safety management techniques and accident prevention.
2	To learn about general safety considerations in various material handling, machining, and manufacturing operations.
3	To learn in detail about Occupational Health and Hygiene.
4	To learn about safety in fire engineering and explosion control.

Subject Code: MEC446 **Subject Name: Ergonomics and Workplace Design**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 8 (DE-IV)	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Vipan Bansal	Module Coordinator: Vipan Bansal

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Students should understand human factors in work and efficiency
2	Students should understand various type of psychological tests and its benefits in Industry.
3	Students should understand human relations & work Environment.
4	Students should understand Mental health factor in mal-adjustments, absenteeism and accident and importance of personal counselling
5	Students should learn anthropometric data for kinesiological applications and mechanical work capacity evaluation.
6	Students should learn and understand classification and evaluation of manual work, work analysis system, job analysis, and risk factors.

Module: Thermal Engineering

Subject Code: MEC356 Subject Name: Refrigeration and Air Conditioning

Programme: B.Tech.(ME)	L: 4 T: 1 P: 0
Semester: 5	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Ved Raj Khullar	Module Coordinator:

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand and identify method/type of refrigeration and air conditioning systems.
2	Analyze and evaluate air refrigeration cycles and systems especially for aircraft air conditioning.
3	Analyze and evaluate vapour compression refrigeration cycle and system and Students will able to solve the load calculation problem.
4	Identify the different refrigerants from their nomenclature and select them from environmental aspects and field of application
5	Design air conditioning and refrigeration systems for various applications and select their components.
6	Understand and determine psychrometric properties, evaluate various psychometric processes, and calculate cooling and heating loads for different domestic, commercial and industrial conditions.

Subject Code: MEC434 **Subject Name: Gas Dynamics**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 7	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Ved Raj Khullar	Module Coordinator:

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand basic concept and importance of gas dynamics
2	Analyze the fundamental equations of one-dimensional flow of compressible fluid and isentropic flow of an ideal gas.
3	Analyze the steady one-dimensional is entropic flow; frictional flow and isothermal flow and express the concepts of steady one-dimensional flow with heat transfer.
4	Evaluate the effect of heat transfer on flow parameters.
5	Compare the jet propulsion engines.
6	Design basic structure of rocket propulsion.

Subject Code: MEC447 **Subject Name: Power Plant Engineering**

Programme: B.Tech.(ME)	L: 4 T: 0 P: 0
Semester: 7	Teaching Hours: 48
Theory/Practical: Theory	Credits: 4
Name of the Faculty: Ved Raj Khullar	Module Coordinator:

On completion of the course, the student will have the ability to:

CO#	Course Outcomes (CO)
1	Understand energy sources for power generation and principle types of power plants.
2	Compare essential features and types of hydro-electric and nuclear power plant.
3	Understand about essential features of steam power plant and have knowledge about coal and ash handling systems.
4	Compare I.C engines and its performance with other plants.
5	Evaluate of load factor, capacity factor, average load and peak load on power plant
6	Analyze and give suggestion for direct energy conversion systems