

Sr. No.	Subject Code	Subject Name	Effective Teaching			Credit	Evaluation Scheme		
			L	T	P		Internal Assessment	External Assessment	Total Marks
			Hours/week						
<b>THEORY</b>									
1	MUPME 401N	Strength of Materials	4	-	-	4	30	80	110
2	MUPME 402N	Metrology, Instrumentation & Control	3	-	-	3	30	80	110
3	MUPME 403N	Production Technology	4	-	-	4	30	80	110
4	MUPME 404N	Hydraulics and Hydraulic Machines	3	-	-	3	30	80	110
5	MUPME 405N	Applied Thermal Engineering	3	-	-	3	30	80	110
6	MUPME 406N	Automobile Engineering	3	-	-	3	30	80	110
<b>PRACTICAL/PROJECT</b>									
7	MUPME 451N	Strength of Materials	-	-	2	2	20	25	45
8	MUPME 452N	Metrology, Instrumentation & Control	-	-	2	2	20	25	45
9	MUPME 453N	Production Technology	-	-	4	4	20	25	45
10	MUPME 454N	Hydraulics and Hydraulic Machines	-	-	2	2	20	45	65
11	MUPME 455N	Applied Thermal Engineering	-	-	2	2	20	25	45
12	MUPME 456N	Automobile Engineering	-	-	2	2	20	25	45
13	MUPGP 451N	General Proficiency	-	-	1	1	25	-	25
14	MUPGP 452N	Industrial Exposure (Assessment at University Level)	-	-	1	1	25	-	25
		<b>TOTAL</b>	<b>20</b>		<b>16</b>	<b>36</b>		<b>650</b>	<b>1000</b>

**NOTE: - Industrial Training of 30 days done after 4<sup>th</sup> semester would be evaluated in 5<sup>th</sup> Semester through Report and Viva Voice.**



**FOURTH SEMESTER**  
**DIPLOMA IN MECHANICAL ENGINEERING**





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Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Utrakhand, India

MUPME401N	Strength of Materials	4L:0T:2P	4 Credits
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## Course Objectives

The objectives of the course are:

- To provide the basic concepts and principles of strength of materials.
- To give an ability to calculate stresses and deformations of objects under external loadings.
- To give an ability to apply the knowledge of strength of materials on engineering applications and design problems

## Course Outcomes

At the end of the course ,students will be able to:		Blooms Level
CO1	Explain the different types of stresses, strains and elastic constants and relation among them	K2
CO2	Evaluate and Draw SFD and BMD for beams subjected to various loads.	K5
CO3	Formulate the bending and shear stresses equations and able to draw bending and shear stress diagrams.	K6
CO4	Formulate slope and Deflection equations for beams subjected to various loads.	K6
CO5	Analyze Principle planes, stresses. Evaluate buckling strength of long slender beams.	K4

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaluate, K6- Create

## RATIONALE

Diploma holders in this course are required to analyse reasons for failure of different components and select the material for different applications. For this purpose, it is essential to teach them concepts, principles, applications and practices covering stress, strain, bending moment, shearing force, shafts, columns and springs. Hence this subject has been introduced.



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## DETAILED CONTENTS

### 1. Introduction to Material Properties

Mechanical properties of materials such as elasticity, plasticity, ductility, brittleness, toughness, hardness, fatigue, malleability, stiffness.

Elastic bodies, plastic bodies and rigid bodies, deformation.

### 2. Stresses and Strains

Force, its definition and types, units, different types of loads. Definition of stress and strain, axial loading, different types of stresses and strains, tensile and compressive stress and strain, elastic limit, Hooke's law, stress-strain curve for ductile and brittle material, salient features of stress-strain curve. Young's modulus of elasticity. Factor of safety. Stress and strain in straight, stepped bars and taper bar of circular cross section, determination of stress and elongation of a bolt in a bolted joint when subjected to direct external load only. Stress and strain on composite section under axial loading, stress and strain due to temperature variations in homogeneous and composite bars. Shear load, shear stress and strain, modulus of rigidity, lateral strain, Poisson's ratio. Volumetric strain, bulk modulus. Relation between modulus of elasticity, modulus of rigidity and bulk modulus (Without Derivation).

### 3. Shear Force and Bending Moment

3.1 Types of beams. Concept of shear force and bending moment.

Shear force and bending moment diagram for cantilever and simply supported beams subjected to point load and uniformly distributed loads only. Maximum bending moment and point of contra flexure.

### 4. Theory of Simple Bending

Concept of pure bending, neutral axis, moment of resistance, section Modulus, bending equation, bending of simple, beams of uniform strength. Application of flexural formula for solid rectangular and circular section, Channel section, hollow rectangular and circular section.

### 5. Strain Energy

Concept of strain energy, proof resilience and modulus of resilience.

Stresses developed due to gradual, sudden and impact load.

Strain energy stored due to gradual, sudden and impact load.

Strain energy due to bending and torsion.



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## 6. Slope and Deflection

Introduction, determination of slope and deflection by Macaulay's method, moment area of method

Simple cases of slope and deflection in simply supported beam with uniformly distributed load on whole of the length and a point load at the centre

Cantilever beam with uniformly distributed load on whole length and a pointload at the end.

## 7. Torsion

Pure torsion, torsion equation (relation between twisting moment, shear stress and angle of twist), polar modulus of section

Assumptions in theory of pure torsion.

Strength of circular solid shaft and hollow shaft in pure torsion

Power transmitted by shaft

## 8. Thin Cylinder and spheres

Introduction

Thin cylinder Vessel Subjected to internal Pressure

Stresses in a Thin Cylinder Vessel Subjected to internal Pressure

Expression for circumferential stresses

Expression for longitudinal stresses

## LIST OF PRACTICALS

- Perform tensile test on bars of mild steel and aluminum.
- Perform shear test on specimen of two different metals.
- Carry out bending tests on a steel bar or wooden beam.
- Perform following impact test:
  - Izod impact test
  - Charpy test
- Perform torsion test on specimen of different metals for determination of angle of twist for a given torque.



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## **INSTRUCTIONAL STRATEGY**

1. Use computer based learning aids for effective teaching-learning
2. Expose the students to real life problems.
3. Plan assignments so as to promote problem solving abilities and develop continued learning skills.

## **RECOMMENDED BOOKS**

1. Strength of Materials by Srivastava & Gape, PHI Publication.
2. Strength of Materials by R.S. Khurmi; S. Chand and Company, Delhi.
3. Strength of Materials by S. Ramamrutham; Dhanpat Rai Publishing Co.(P)Limited
4. Mechanics of Materials by Kirpal Singh; Standard Publishers, New Delhi.
5. Elements of Strength of Materials by D.R. Malhotra and H.C, Gupta; SatyaPar Kashan, New Delhi.
6. Mechanics of Solids by VS Prasad; Golgotha Publications, New Delhi.
7. Strength of materials Dr. B.C Puniya & S. Rama Murtha; Laxmi Publication, NewDelhi.
8. Mechanics of solids by J.K. Kapoor; Bharat Bharati Prakash an, Meerut



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Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Utrakhand, India

MUPME402N	Metrology, Instrumentation & Control	3L:0T:2P	3 Credits
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## Course Objectives

The objectives of the course are:

- To develop in students, the knowledge of basics of Measurements, Metrology and Measuring devices.
- To understand the concepts of various measurement systems & standards with regards to realistic applications.
- The application of principle of metrology and measurements in industries.
- To develop competence in sensors, transducers and terminating devices with associated parameters

## Course Outcomes

At the end of the course ,students will be able to:		Blooms Level
CO1	Explain the basics knowledge of measurements, metrology and measuring devices.	K2
CO2	Understand the principle of linear and angular measuring instruments and apply the acquired knowledge for the accurate and precise measurement of a given quantity.	K2
CO3	Understand the fundamentals of various methods for the measurements of screw threads, surface roughness parameters and working of optical measuring instruments.	K2
CO4	Understand various advanced measuring devices and machine tool metrology and to describe application of principle of metrology and measurements in industries.	K2
CO5	Understand and able to use various devices for measuring torque, force, strain, stress and temperature. To develop competence in sensors, transducers and terminating devices with associated parameters.	K2

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaulate, K6- Create



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## RATIONALE

Diploma holders in these courses are required to measure and inspect for ensuring quality of product. For this purpose, knowledge and skills about standards of measurement, limit, fits and tolerances, types of inspection and various measuring instruments are required. Hence this subject is offered.

## DETAILED CONTENTS

### 1. Introduction

Definition of metrology Standard of measurement - Primary, secondary, Tertiary and working standards. Types of errors- Controllable and random error Precision, accuracy, sensitivity, hysteresis, response time, repeatability, calibration, uncertainty of measurement

### 2. Linear Measurement

Construction features and use of instruments for non-precision linear measurement: steel rule, calipers, surface plate, angle plate, V-block.

Construction features and use of instruments for precision measurements: Vernier calipers, Vernier height and depth gauges, micrometers. Slip gauges, Indian standards of slip gauges, sets of slip gauges, use of slip gauges.

Cylinder bore gauges, feeler and wire gauges. Comparators – Characteristics, uses, working principles of different types of comparators: mechanical, electrical, electronics and pneumatic comparator.

### 3. Angular Measurement

Construction and use of instruments for angular measurements: bevel Protector, sine bar, angle gauges, clinometers. Optical instruments for angular measurement, auto collimator.

### 4. Measurement of Surface Finish

Terminology of surface roughness. Concept of primary texture and secondary texture. Factors affecting surface finish. LA, RMS and RA value. Principle and operation of stylus probe instruments for measuring surface Roughness

### 5. Limits, Fits and Tolerances

Definition and terminology of limits, fits and tolerances. Interchangeability Hole basis and shaft basis systems. Type of fits. Standard and Limit gauges.





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## 6. Instrumentation

Brief description about the measurement of displacement, vibration, frequency, pressure, temperature and humidity by electro mechanical transducers LVDT, Resistance thermometer, thermocouple, Strain measurement, Opticalpyrometer

### LIST OF PRACTICALS

1. Internal and external measurement with Vernier - caliper and micrometer.
2. Measurement with height gauge and depth gauge.
3. Measurement of flatness with dial indicator.
4. Measurement with combination set and bevel protector.
5. Study and use of slip gauges.
6. Measurement of angle with side bar
7. Determination of temperature by (i) pyrometer (ii) thermocouple.
8. Measurement of surface roughness of a surface

### INSTRUCTIONAL STRATEGY

1. Demonstrate use of various measuring instruments while imparting theoretical instructions.
2. Use computer based learning aids for teaching learning

### RECOMMENDED BOOKS

1. Engineering Metrology by RK Jain; Khanna Publishers, New Delhi.
2. Text Book of Production Engineering by PC Sharma; S Chand and Company
3. Metrology Laboratory Manual by M Adithan and R Bahl; NITTTR, Chandigarh.
4. Engineering Metrology by RK Rajput; SK Kataria and Sons, Ludhiana.
5. Mechanical Measurements and Control by Kumar D.S; Metropolitan, N. Delhi
6. Mechanical Measurement by Sirohi; New Age Publishers



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Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Uttarakhand, India

<b>MUPME403N</b>	<b>Production Technology</b>	<b>4L:0T:4P</b>	<b>4 Credits</b>
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## **Course Objectives**

**The objectives of the course are:**

- To understand the concept and basic mechanics of metal cutting, working of standard machine tools such as lathe, shaping and allied machines, milling, drilling and allied machines, grinding and allied machines and broaching
- To understand the basic concepts of Cooling and Lubrication.

## **Course Outcomes**

<b>At the end of the course ,students will be able to:</b>		<b>Blooms Level</b>
<b>CO1</b>	Choose machining processing to manufacture any component	<b>K2</b>
<b>CO2</b>	Understand the basics of metal cutting and working of different types of machine tools.	<b>K2</b>
<b>CO3</b>	Explain the conventional and advanced metal forming processes and composite fabrication.	<b>K2</b>
<b>CO4</b>	Develop simplified manufacturing processes with the aim of reduction of cost and manpower	<b>K4</b>
<b>CO5</b>	Identify/control the appropriate process parameters, and possible defects of manufacturing processes so as to remove them.	<b>K3</b>

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaulate, K6- Create

## **RATIONALE**

This subject provides knowledge and develops skills on various machine operations visa capstan and turret Lathe, milling, grinding, gear manufacturing, broaching and automatic machines which is very essential for Mechanical diploma holders to work in manufacturing industries.



## DETAILED CONTENTS

### UNIT-1

Elementary theory of metal cutting, chip formation, continuous chip, discontinuous chip with BUE, discontinuous chips. Mechanism of chip formation, Geometry of chip formation, forces of chip, Merchant circle diagram. Tool life, Economics of tool life. Cutting Tools and Materials, Various types of single point cutting tools and their uses, Single point cutting tool geometry, tool signature and its effect, Heat produced during cutting and its effect, cutting speed, feed and depth of cut and their effect, Properties of cutting tool material, Study of various cutting tool materials viz. High speed steel, tungsten carbide, cobalt steel, cemented carbides, satellite, ceramics and diamond.

### UNIT-2

Lathe, Principle, Description and function of various parts of a lathe, Classification and specification of various types of lathe, Drives and transmission, Work holding devices, Lathe tools: Parameters/Nomenclature and applications, Lathe operations: -Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling. Cutting parameters –Speed, feed and depth of cut for various materials and for various operations, machining time. Speed ratio, preferred numbers of speed selection. Lathe accessories: - Centers, dogs, chucks, collets, face plate, angle plate, mandrel, steady rest, taper turning attachment, tool post grinder.

### UNIT-3

Drilling, Principle of drilling. Classification of drilling machines and their description. Various operations performed on drilling machine –drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping. Speeds and feed during drilling, machining time. Types of drills and their features, Types of reamers.

### UNIT-4

Boring Principle of boring, Classification of boring machines and their brief description. Specification of boring machines.

### UNIT-5

Shaping, Planning and Slotting, Working principle of shaper, planer and slotter. Quick return mechanism applied to shaper, slotter and planer machine. Types of tools used and their geometry. Specification of shaper, planer and slotting machine. Speeds and feeds in above processes.

### UNIT-6

Cutting fluids and Lubricants, Function of cutting fluid, Types of cutting fluids, Difference between cutting fluid and lubricant, Selection of cutting fluids for different materials and operations, Common methods of lubrication of machine tools.



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## LIST OF PRACTICALS

1. Single point cutting tool grinding.
2. A composite job involving turning, taper turning, thread cutting and knurling.
3. Marking and drilling practice using column and knee type drilling machine and radial drilling machine.
4. A job on drilling, reaming, counter boring and counter sinking.
5. Prepare a V-block on shaper machine.
6. Exercise on key way cutting.

## INSTRUCTIONAL STRATEGY

1. Teacher should lay special emphasis in making the students conversant with concept, principle, procedure and practices related to various manufacturing processes
2. Focus should be laid on preparing jobs using various machines/ equipment in the workshop
3. Aids/ Video films should be used to show operations

## RECOMMENDED BOOKS

1. Manufacturing technology by Rao; Tata McGraw hill Publishers, New Delhi
2. Manufacturing technology by M. Adithan and AB. Gupta; New Age International (P) Ltd.



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MUPME404N	Hydraulics and Hydraulic Machines	3L:0T:2P	3 Credits
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## Course Objectives

The objectives of the course are:

- To understand the basic principles of fluid mechanics
- To identify various types of flows
- To understand boundary layer concepts and flow through pipes
- To evaluate the performance of hydraulic turbine

## Course Outcomes

At the end of the course ,students will be able:		Blooms Level
CO1	To know the different types of flows and channels	K2
CO2	To know the applications of momentum principles.	K2
CO3	To make the student is expected to prepare models for prototypes of hydraulic structures	K3
CO4	Able to identify type of fluid flow patterns and describe continuity equation.	K2
CO5	To understand the performance of turbines and pumps	K2

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

## RATIONALE

Diploma holders in Mechanical Engineering are required to deal with problems of fluid flow and use of hydraulics in power generation. For this purpose, knowledge and skill about fluid mechanics, fluid flow and hydraulic machines are required to be imparted for enabling them to perform above functions. This subject aims at development of knowledge and skills about various properties of fluids, measurement of various flow parameters and about various hydraulic machines.



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## DETAILED CONTENTS

### 1. Introduction

Fluid, types of fluid; properties of fluid viz mass density, weight density (specific weight), specific volume, capillarity, specific gravity, viscosity, compressibility. Concept of Pressure (Atmospheric Pressure, gauge pressure, absolute pressure) Pressure measuring devices: piezometer tube, manometers - simple U-tube, differential single column, inverted U- tube Manometer Bourdon tube pressure gauge Simple problems

### 2. Flow of Fluids

Types of fluid flow- steady and unsteady, uniform and non- uniform, laminar and turbulent; rate of flow and their units; continuity equation of flow; Bernoulli's theorem (without proof) and its applications, Discharge measurement with the help of venturimeter, orifice meter and pitot tube, simple problems

### 3. Notches and Weirs

Different type of notches, Measurement of discharge over rectangular notch. Francis and Brazin's formula for rectangular weirs, submerged weirs, broad crested weirs.

### 4. Flow through orifices

$C_c$ ,  $C_v$ ,  $C_d$ , flow through drowned, partially drowned orifices, time for emptying a tank through a circular orifice. Simple problems

### 5. Flow through pipes

Definition of pipe flow, wetted perimeter, hydraulic mean depth, hydraulic gradient; loss of head due to friction; Chezy's equation and Darcy's equation of head loss. Loss of head in pipes due to sudden enlargement, sudden contraction, obstruction on flowpath, change of direction and pipe fittings, Simple problem

### 6. Hydraulic Devices

Description, operation and application of hydraulic machines –hydraulic ram, hydraulic jack, hydraulic brake, hydraulic accumulator, hydraulic door closer, hydraulic press,

### 7. Water Turbines and Pumps

Concept of a turbine, types of turbines – impulse and reaction. Construction and working of Pelton wheel, Francis turbine and Kaplan turbine. Concept of hydraulic pump. Construction, working and operation of reciprocating pump and centrifugal pump.



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## LIST OF PRACTICALS

1. Measurement of pressure head by employing
  - ◆ Piezometer tube
  - ◆ Single and double column manometer
  - ◆ Pressure gauge
2. To find out the value of coefficient of discharge for a venturimeter
3. Measurement of flow by using venturimeter
4. Verification of Bernoulli's theorem
5. To determine the coefficient of friction of pipe using Darcy's equation.
6. Study the working of a Pelton wheel and Francis turbine
7. Dismantling and assembly of a single stage centrifugal pump to study its constructional details, operation including fault diagnosis.
8. To demonstrate the working of a Kaplan Turbine.
9. To demonstrate the working of a single acting and double acting Reciprocating pump.
10. To determine Cd, Cv and Cc for an orifice.

## RECOMMENDED BOOKS

1. Fluid Mechanics & Hydraulics Machines by Dr. R.K. Bansal
2. Fluid Mechanics & Hydraulics Machines by Modi and Seth
3. Fluid Mechanics & Hydraulics Machines by Jadish Lal
4. Fluid Mechanics & Hydraulics Machines by A.K. Jain
5. Refrigeration's & Air conditioning by R.S. Khurmi
6. Fluid power and troubleshooting by Hohn A.H.



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MUPME405N	Applied Thermal Engineering	3L:0T:2P	3 Credits
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## Course Objectives

The objectives of the course are:

- To make the students familiar with the fundamentals of thermodynamics and to apply the principles to various thermal systems.
- To impart knowledge on statistical/micro approach to thermodynamics using real gas behavior.
- To impart knowledge on different thermodynamic property relations and their applications towards constructing thermodynamic systems.

## Course Outcomes

At the end of the course ,students will be able to:		Blooms Level
CO1	Understand the concept of entropy and apply principles of thermodynamics to analyze advanced power cycles.	K2
CO2	Analyze energy systems with Energy and irreversibility concepts.	K4
CO3	Apply thermodynamic relations for studying the behavior of ideal and real gasses	K3
CO4	Apply first and second laws of thermodynamics to analyses chemical reactions.	K3
CO5	Evaluate means of delaying equilibrium and obtaining desired combustion products	K5

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5-Evaulate, K6 Create

## RATIONALE

Thermal energy is still a major means of power in the world. Knowledge of thermal contrivances and related principle is very essential for mechanical diploma holders. The subject presents an introduction to sources of heat, thermodynamics principles and their applications to thermal contrivances.





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## DETAILED CONTENTS

### 1. IC Engines

Introduction and classification of IC engine Working principle of two stroke and four stroke cycle, SI engines and CI engines, Otto cycle, Diesel cycle and dual cycle Location and functions of various parts of IC engines and materials used for them Concept of IC engine terms: bore, stroke, dead centre, crank throw, compression ratio, clearance volume, piston displacement and piston speed, working of carburetor, mixture requirements, carburetor types

### 2. Cooling and Lubrication

Function of cooling system in IC engine Air cooling and water cooling system, use of thermostat, radiator and forced circulation in water cooling (description with line diagram)

### 3. Testing of IC Engines

Engine power - indicated and brake power Efficiency - mechanical, thermal, relative and volumetric Methods of finding indicated and brake power, Morse test. Morse test for petrol engine Heat balance sheet Concept of pollutants in SI and CI engines, pollution control, norms for two or four wheelers

- EURO standards, methods of reducing pollution in IC engines, alternative fuels like CNG, LPG (Simple numerical problems)

### 4. Steam condensers

- Function of a steam condenser, elements of condensing plant
- Classification-Jet condenser, surface condenser
- Cooling pond and cooling towers

### 5. Air compressors

Function of air compressor, type of air compressor - single stage, multi stage reciprocating compressors, inter-cooling of compressors, rotary compressor, Construction and working.

### LIST OF PRACTICALS

1. Study of working principle of two/ four stroke petrol engines.
2. Study of simple/ compound carburetor.
3. To determine brake horse power by dynamometer.
4. To determine indicated horse power of a multi cylinder petrol/diesel engine.
5. Study of condensers.
6. Study of cooling system of I.C. engines.



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## **INSTRUCTIONAL STRATEGY**

1. Models of various components/ parts should be demonstrated to develop comprehension amongst students
2. Industrial visit to thermal power plant and roadways/ private automobile workshop should be arranged
3. Video films for demonstration of working of IC engines, jet propulsion and gasturbine should be shown.

## **RECOMMENDED BOOKS**

1. Elements of heat engines by Pandey and Shah; Charotar Publishing house
2. Thermal Engineering by PL. Ballaney; Khanna Publishers, New Delhi.
3. Engineering Thermodynamics by Francis F Huang; McMillan Publishing company
4. Engineering Thermodynamics by C P Arora; Tata Mc Graw Hill Publishers



# MOTHERHOOD UNIVERSITY

Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Uttarakhand, India

MUPME406N	Automobile Engineering	3L:0T:2P	3 Credits
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## Course Objectives

The objectives of the course are:

- To study basics of principles of actual automobile systems.
- To study importance and features of different systems like axle, differential, brakes, Steering, suspension, and balancing etc.
- To study working of various Automobile Systems.
- To know some modern trends in Automotive Vehicles.

## Course Outcomes

At the end of the course ,students will be able to:		Blooms Level
CO1	Understand the Construction, working and other details about Internal Combustion Engines used in automobiles	K2
CO2	Identify Construction, working, preventive maintenance, trouble shooting and diagnosis of various Automobile Systems.	K2
CO3	Understand importance and features of different systems like axle, differential, brakes, steering, suspension, and balancing etc.	K2
CO4	Understand the construction, features and working of automotive electrical and electronics system of an automobile and their different parts, namely battery, alternator, starter, ignition systems, electric wiring, head lamps and electric horn	K2
CO5	Identify Modern technology and safety measures used in Automotive Vehicles	L2



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## RATIONALE

The development of automobile industry direct and indirect dependence of the present day society on the services of its products has made the knowledge of the technology imperative, this subject deals with automotive needs.

## DETAILED CONTENTS

### 1. INTRODUCTION

Definitions and specifying an automobile Automobile development and scope  
Components of an automobile Classification of automobiles Layout of chassis  
Types of drives-front wheel, rear wheel, four wheel left hand, right hand Body or super structure

### 2. TRANSMISSION SYSTEM

Clutch, Function, Constructional details of single plate and multi plate friction clutch  
Centrifugal and semi centrifugal clutch, Hydraulic operation of single plate clutch  
Clutch troubles, Gear Box, 4-speed gear box, Gear ratios, Working of sliding mesh, constant mesh and synchromesh 4-speed gearbox, Torque converter and overdrive, Transfer box, Propeller Shaft And Rear, Axle, Function, Universal joint, Final drive and differential assembly, Front driving axles, Rear axle drives and different types of rear axles, Wheels And Tyres, Types of wheels- disc wheel, wire wheel and alloy cast wheel, Types of Tyres used in Indian vehicles, Toe in, Toe out, camber, caster, kingpin inclination, Tubeless Tyres

### 3. STEERING SYSTEM

Function and principle, Ackerman and Davis steering gears types of steering gears – worm and ball nut, worm and wheel, worm and roller, rack and pinion type, Power steering, Wheel balancing, Wheel alignment

### 4. BRAKING SYSTEM

Constructional details and working of mechanical, hydraulic and vacuum brake, Details of master cylinder, wheel cylinder Concept of brake drum, brake lining and brake adjustment Air brake, Emergency and Parking brake  
Anti-lock braking system

### 5. SUSPENSION SYSTEM

Function Types Working of coil spring, leaf spring, rubber springs Shock absorber- telescopic type Air Suspension Strut suspension



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## 6. BATTERY

Principles of battery operation Constructional details of lead acid cell battery

Specific gravity of electrolyte – effect of temperature on specific gravity

Capacity and efficiency of battery Battery charging, chemical reactions during charge and discharge Maintenance of Batteries

## 7. DYNAMO and ALTERNATOR

DYNAMO

Function and details, Regulator – voltage current and compensated type

Cutout – construction, working and their adjustment

ALTERNATOR

Construction and working

Charging of battery from alternator

## 8. LIGHTING SYSTEM and ACCESSORIES

Lighting system, wiring circuit, Headlight, aiming of headlights

Lighting switches, Direction indicators, Windscreen wiper, Horn, Speedometer,

Heater

## LIST OF PRACTICALS

1. Wheel Balancing
2. Wheel Alignment
3. Suspension System Servicing
4. Retreading and Recapping of Tyres
5. Automotive Brake Service
6. A/C System Service
7. Clutch Troubles and Clutch Service.
8. Servicing of Fuel Injection Pump.
9. Study of MPFI System.
10. Study of steering system.

## **INSTRUCTIONAL STRATEGY**

1. Models of various components/ parts should be demonstrated to develop comprehension amongst students.
2. Industrial visit to roadways/ private automobile workshop should be arranged.
3. Video films for demonstration of working of IC engines, jet propulsion and gas turbine should be shown.



# **MOTHERHOOD UNIVERSITY**

Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Uttarakhand, India

## **RECOMMENDED BOOKS**

1. Heldt.P.M.- “Automotive Chassis”- Chilton Co., New York
2. K.K. Ram lingam - “Automobile Engineering” – SciTech Publication, Chennai
3. Steed W - “Mechanics of Road Vehicles”- Wildlife Books Ltd., London
4. Newton Steeds and Garrote- “Motor Vehicles”- Butterworth’s, London
5. Judge A.W- “Mechanism of the Car”- Chapman and Halls Ltd., London
6. Giles.J.G. G- “Steering, Suspension and Tyres”- Iiiffe Book Co., London
7. Automobile Engineering by P.S. GILL
8. Automobile Engineering Vol. 1 & 2 by Dr. Kraal Singh; Standard PublishersDistributors
9. Automobile Engineering by R.B. Gupta; Satya Prakash an, New Delhi.
10. Automobile Engineering by K.M. Gupta, Umesh Prakash an, Delhi.



# MOTHERHOOD UNIVERSITY

Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Uttrakhand, India

MUPGP 451N	General Proficiency	L:0T:1P	3 Credits
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## Course Objectives

The objectives of the course are:

- To enhance the general proficiency including human values and ethics

A qualitative Assessment Remark for General Proficiency as detailed in the table below will be given in the transcript on the basis of cumulative percentages of marks scored by the student during each semester through various components. Distribution / Weightage for award of marks in each component is prescribed in the subsequent table.

S.N.	Assessment	Weightage of Marks	Marks
1.	Discipline/Behavior of Students Inside/Outside Institute campus by Principal	40%	20
2.	Games/Sports/Cultural/Literary/PFAC/Hobby Events by DSW	40%	20
3.	Academic Activities/Special Lecture/ Industrial Visits by HOD	20%	10

S.N.	Marks Secured	Remark
1.	80-100%	Excellent
2.	60-79%	Very Good
3.	40-59%	Good
4.	20-39%	Satisfactory
5.	<20%	Poor



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Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Uttarakhand, India

<b>MUPGP452N</b>	<b>INDUSTRIAL EXPOSURE</b>	<b>L:0T:1P</b>	<b>1 Credits</b>
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Internal assessment and external assessment have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weight age to performance in testing, general behavior, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry, if any. The components of evaluation will include the following.

- i. Punctuality and regularity 15%
- ii. Initiative in learning new things 15%
- iii. Relationship with workers 15%