

MINUTES OF 12TH MEETING
OF
BOARD OF STUDIES (BOS)

DEPARTMENT
OF
MECHANICAL ENGINEERING
UNIVERSITY POLYTECHNIC

JULY 01ST, 2023

UNIVERSITY POLYTECHNIC
Department of Mechanical Engineering

Date: 01st July 2023

AGENDA OF 12th BOS

The 12th meeting of the Board of Studies of Mechanical Engineering is scheduled on Saturday, 01st July 2023 at 10:00 a.m. in the Principal Office, University Polytechnic as per the following Agenda: -

- **Item No. 12.1** To confirm the minutes of meeting of 11th BOS meeting.
- **Item No. 12.2 Action Taken Report (ATR).**
The ATR based on the minutes of 11th BOS will be Presented.
- **Item No. 12.3** To Recommend the modification in syllabus of **Thermal Engineering** in third semester DME 3102 with the new code as **DME 3202**
- **Item No. 12.4** To Recommend the modification in syllabus of **Refrigeration and Air Conditioning** in fifth semester DME 5102 with new code as **DME 5202**.
- **Item No. 12.5** To Recommend the modification in syllabus of fifth semester subject details are given in **DME 5212 Internal Combustion Engine with new title and code Internal Combustion Engine & E-Mobility DME 5312**.
- **Item No. 12.6** To introduce **DME 4011 Industrial Management & Entrepreneurship Development** as a new subject in fourth semester instead of **Fundamentals of electrical and Electronics Engineering DEE 4109**. (shifted to first year).
- **Item No. 12.7** To introduce **DME 4092 Jigs and Fixtures lab** as a new practical subject in fourth semester instead of Basics of electrical and Electronics Engineering Lab DEE 4092. (shifted to first year).
- **Item No. 12.8** To Recommend the modification in syllabus of **CNC Machine Technology DME 6023** in sixth semester with new code **DME 6123**.
- **Item No. 12.9** To Recommend the introduce new subject in first year **Applied Mechanics DME 1021**.
- **Item No. 12.10** To Recommend the modification in syllabus of **Hydraulics and hydraulics Machine DME 4101** in sixth semester with new code and title **Pneumatics & Hydraulics and hydraulics Machine DME 4201**.

Deepak Agarwal
Programme coordinator
Mechanical Engineering

Minutes of the 12th Meeting of Board of Studies Held on July 01ST, 2023

Members Present:

1. Mr. Rajeev Sharma, Associate Vice President, JBM AUTO.
2. Dr. Shahnawaz Mohsin Associate Professor AMU, Aligarh
3. Dr. Manoj Kumar Agrawal Associate Professor ME, GLA University, Mathura
4. Mr. Ramveer (GLA Alumni) Executive Engineer Voltas Enterprises, Delhi
5. Dr. Vikas Kumar Sharma Principal, University Polytechnic.
6. Mr. Deepak Agarwal Program Coordinator, Dept of Mechanical Engg. University Polytechnic
7. Mr. Yogendra Kumar Training & Placement Advisor, Dept of Mechanical Engg. University Polytechnic
8. Mr. Hemant Gautam Sr. Lecturer Dept of Mechanical Engg. University Polytechnic

The Chairman Board of Studies welcomed all the members and started proceedings of the 12th meeting of BOS in accordance with the Agenda note circulated earlier.

Agenda Item No. 12.1 To confirm the minutes of the 11thBOS meeting.

The minutes of the meeting of 11thBoS held on May 28th, 2022 were implemented and enclosed as in Annexure - A

Agenda Item No. 12.2 Action taken report (ATR)

ATR Based on minutes of 11th BOS were presented

ATR is of 11th BOS enclosed in Annexure - A.

Agenda Item No. 12.3 To Recommend the modification in syllabus of Thermal Engineering DME 3102 with new code DME 3202.

The experts gave their opinion regarding the changes in the syllabi of above-mentioned subjects and suggested according to the needs of industry and academics.

The proposed course structure with modified syllabus and subject name is enclosed as Annexure – B.

Subject	Existing syllabus	Proposed syllabus	Annexure	Remark
Modification in Thermal Engineering DME 3202	Thermal Engineering DME 3102: - No any Removal	Thermal Engineering DME 3202: - Mode of heat Transfer(Basic Laws) to Added in Module II.	Annexure B	<i>The experts gave their opinion regarding the shifting of mode of heat transfer from RAC to Thermal engineering.</i>

Agenda Item No. 12.4 To Recommend the modification in syllabus of fifth semester subject details are given in Refrigeration and Air Conditioning DME 5102 with new code DME 5202.

The proposed course structure with modified syllabus and subject name is enclosed as Annexure – D.

Subject	Existing syllabus	Proposed syllabus	Annexure	Remark
Modification in Refrigeration and Air Conditioning DME 5102	Refrigeration and Air Conditioning DME 5102: - No any Removal	Refrigeration and Air Conditioning DME 5202: - Fins, Thermal Radiations, Latest Developments in RAC & Duct Design	Annexure D	<i>The experts gave their opinion regarding the addition of new topics as mentioned</i>

Agenda Item No. 12.5 To Recommend the modification in syllabus of fifth semester subject details are given in DME 5212 Internal Combustion Engine with new title and code Internal Combustion Engine & E-Mobility DME 5312.

The experts gave their opinion regarding the changes in the syllabus of Subject and suggested it according to the needs of industry and academics. Added new content as per requirements.

The proposed course structure with modified syllabus and subject name is enclosed as Annexure – D.

Subject	Existing syllabus	Proposed syllabus	Annexure	Remark
Modification in DME 5212 Internal Combustion Engine	DME 5212 Internal Combustion Engine: - No any Removal	Internal Combustion Engine & E-Mobility DME 5312: - All topics of IC engine has been shifted to module I and module II is covering with E-mobility topics only.	Annexure D	The experts gave their opinion regarding the subject name due to the content of subject related to e mobility.

Agenda Item No. 12.6 To introduce **Industrial Management & Entrepreneurship Development DME 4011** as a new subject in fourth semester instead of Fundamentals of Electrical and Electronics Engineering DEE 4109.

The experts gave their and syllabus was designed as per need of industry and academics.

The proposed course structure with syllabi and subject name is enclosed as Annexure – C.

Subject	Existing syllabus	Proposed syllabus	Annexure	Remark
Subject Replaced	Electrical and Electronics Engineering DEE 4109: - Subject shifted to first semester with new code.	Industrial Management & Entrepreneurship Development DME 4011: - Added as new Subject	Annexure C	The experts gave their opinion regarding the new subject IM & ED as per the need of industry and academics.

Agenda Item No. 12.7 To introduce **Jigs and Fixtures lab DME 4092** as a new practical subject in fourth semester instead of **Basics of electrical and Electronics Engineering Lab DEE 4092**.

The proposed course structure with syllabi and subject name is enclosed as Annexure – C.

Subject	Existing syllabus	Proposed syllabus	Annexure	Remark
Subject Replaced	Basics of electrical and Electronics Engineering Lab DEE 4092: - Subject shifted to first semester with new code	Jigs and Fixtures lab DME 4092: - Added as new Subject	Annexure C	The experts gave their opinion regarding the introduction and adding of new subject Jigs and Fixtures Lab to make students more employable.

Agenda Item No. 12.8 To Recommend the modification in syllabus of **CNC Machine Technology DME 6023** in sixth semester with new code **DME 6123**.

The experts gave their and syllabus was designed as per need of industry and academics.

The proposed course structure with syllabi and subject name is enclosed as Annexure – E.

Subject	Existing syllabus	Proposed syllabus	Annexure	Remark
Modification in CNC Machine Technology DME 6023	CNC Machine Technology DME 6023:- Concepts and features of NC systems, Classification of NC systems, Design considerations of NC machine tools, Functions of MCU. Manual part programming, Preparatory, Miscellaneous functions, Point-to-point and contouring systems, Adaptive control, ACO and ACC systems,	CNC Machine Technology DME 6123:- Industrial Automation: Concept and Scope Algorithm. Mechatronics: Mechanical System Interfacing, Simple Mechatronics Devices: Servo Motors, Stepping Motors, DC Motors, Analog / Digital Convertors. Robotics Technology: Joints and links, common robot configurations,	Annexure F	<i>The experts gave their opinion regarding the changes in the syllabi of above-mentioned subjects and suggested according to the needs of industry and academics.</i>

Agenda Item No. 12.9 To Recommend the introduce new subject in first year **Applied Mechanics DME 1021**.

The experts gave their and syllabus was designed as per need of industry and academics.

The proposed course structure with syllabi and subject name is enclosed as Annexure – F.

Subject	Existing syllabus	Proposed syllabus	Annexure	Remark
New Subject		Applied Mechanics DME 1021: - Added as new Subject	Annexure F	<i>The experts gave their opinion regarding the importance of basic knowledge of applied mechanics as a compulsory subject in first year in addition to the mechanics lab.</i>

Agenda Item No. 12.10 To Recommend the modification in syllabus of **Hydraulics and hydraulics Machine DME 4101** in sixth semester with new code and title **Pneumatics & Hydraulics and hydraulics Machine DME 4201**.

The experts gave their and syllabus was designed as per need of industry and academics.

The proposed course structure with syllabi and subject name is enclosed as Annexure – C.

Subject	Existing syllabus	Proposed syllabus	Annexure	Remark
Modification in Hydraulics and hydraulics Machine DME 4101	Hydraulics and hydraulics Machine DME 4101:- No any removal	Hydraulics and Pneumatic System DME 4201:- Topics related to pneumatics have been added	Annexure C	<i>.The experts gave their opinion regarding the importance of pneumatics in addition to the hydraulics in the industry and suggested the new topics.</i>

Dr. Vikash Kr. Sharma
Principal Academic
University Polytechnic

Copy to: Chairman, Academic Council
Principal , University Polytechnic, Mathura
Registrar
All the members of Bos

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ANNEXURE - A

DEPARTMENT OF MECHANICAL ENGINEERING

Minutes of the 11th Meeting of Board of Studies held on May 28th, 2022

GLAU/Poly/ME/BOS/MoM/2021-22/01

28-May-2022

Members Present:

- | | |
|---------------------------|--------------------------------|
| 1. Mr. Hitesh Parashar | 5. Prof (Dr.) Diwakar Bhardwaj |
| 2. Mr. Pushendra Kuntal | 6. Mr. Akash Deep Yadav |
| 3. Mr. Shashank Vhardwaj | 7. Mr. Yogendra Kumar |
| 4. Dr. Vikas Kumar Sharma | |

The Chairman Board of Studies welcomes all the members and started proceedings of the 11th meeting of BOS in accordance with the Agenda note circulated earlier.

Agenda Item No. 11.1 To confirm the minutes of meeting of 10th BOS meeting.

The minutes of the meeting of 10th BoS held on May 04th, 2020 were implemented and enclosed as

Agenda Item No. 11.2 Action taken report (ATR)

ATR Based on minutes of 10th BOS were presented

<i>Agenda Item</i>	<i>Description</i>	<i>Action Taken</i>
1.	To confirm the minutes of meeting of 9th BOS meeting.	<i>Suggestions incorporated. See Annexure A</i>
2.	Subject named as <i>Fundamentals of Electrical and Electronics Engineering</i> has been shifted from III semester to IV semester. (Subject code DEE 3009 replaced by DEE 4014)	<i>Suggestions were incorporated and approved Syllabi were implemented.</i>
3.	Subject named as <i>Measurement and Metrology</i> has been shifted from IV semester to III semester. (Subject code DME 4003 replaced by DME 3007)	
4.	Subject named as <i>Basics of Electrical and Electronics Engineering lab</i> has been shifted from III semester to IV semester. (Subject code DEE 3091 replaced by DEE 4090)	
5.	Subject named as <i>Measurement and Metrology LAB</i> has been shifted from IV semester to III semester. (Subject code DME 4083 replaced by DME 3092)	
6.	Subject named as <i>Major Project</i> has been renamed as Project II in VI semester. (Subject code DME 6086 replaced by DME 6286)	

Agenda Item No. 11.3 To Recommend the modification in the syllabus of Strength of Material in third DME 3101.

The experts gave their opinion regarding the changes in the syllabus of above-mentioned subject and suggested according to need of industry and academics.

The proposed changes in the syllabus of above-mentioned subject with addition of some minor sub topics in Module I and Module II is enclosed as Annexure – B.

Subject with New Code	Existing syllabus	Proposed syllabus	Remark	Annexure
DME 3101 STRENGTH OF MATERIAL	No Any Removal	Moment of inertia, parallel axis theorem, perpendicular axis theorem. Concept of moment, Reaction of statically determinant beams.	<i>The experts gave their opinion regarding the changes in the syllabi of above-mentioned subjects to strengthen the students in this subject.</i>	Annexure B.

Agenda Item No. 11.4 To Recommend the modification in the syllabus of Fundamentals of electrical and electronics engineering in forth semester DEE 4009.

The proposed changes in the syllabus of above-mentioned subject as per the need of Electric Vehicle Industry and subject code (DEE 4109) is enclosed as Annexure – C.

Subject with New Code	Existing syllabus	Proposed syllabus	Remark	Annexure
DEE 4109 FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING	Sensing and Actuation Principles: Mechanical sensor and actuation: Principle, Beam and Cantilever, Microplates, Capacitive effects, Piezoelectric Materials as sensing and actuating elements, Strain Measurement, Pressure measurement, Thermal sensor and actuation, Micro-Opto-Electro mechanical systems (MOEMS), Radio Frequency (RF) MEMS, Bio-MEMS Application case studies: Pressure Sensor, Accelerometer, Gyroscope, Digital Micromirror Devices (DMD), Optical switching, Capacitive Micromachined Ultrasonic Transducers (CMUT)	Traction Motor: Traction Motor & Controller: brief introduction of traction motor and controller, function of motor, Traction cooling system (Purpose, Main Components of TCS, Coolant circuit), fault diagnosis of TCS, Traction motor controller R&R, Safety precautions for traction motor.	<i>The experts gave their opinion regarding the changes in the syllabi of above-mentioned subjects and suggested according to need of industry and academics. To give the knowledge about EV. And Enhance their skills in electric vehicle.</i>	Annexure C.

Agenda Item No. 11.5 To Recommend the modification in the syllabus of Internal Combustion Engine in fifth semester DME 5112.

The experts gave their opinion regarding the changes in the syllabus of DME 5112 Internal Combustion Engine Subject and suggested according to need of industry and academics. Added new contain as per requirements.

The proposed changes in the syllabus and subject code (DME 5212) as per suggestions of BOS members is enclosed as Annexure – D.

Subject with New Code	Existing syllabus	Proposed syllabus	Remark	Annexure
DME 5212 INTERNAL COMBUSTION ENGINE	<p>Air Standard Cycles: Internal and external combustion engines; classification of I.C. Engines, Cycles of operation in four stroke and two stroke I.C. Engines; auto cycle, diesel cycle, dual combustion cycle; air standard efficiency, specific work output, specific weight; work ratio; mean effective pressure. With basic numerical problems.</p> <p>Carburetion: Mixture requirements for various operating conditions in S.I. Engines; carburetor.</p> <p>Pollution from Engine and Its control: Air pollution from I.C. Engine, Hydrocarbons and Hydrocarbons emissions, Other emissions, Methods of emission control; alternative fuels for I.C. Engines.</p> <p>Lubrication and Cooling Systems:- Lubricating system, Types of lubrication system; properties of lubricating oil; SAE rating of lubricants, , Need of engine cooling; disadvantages of overcooling; Types of cooling systems, radiators.</p>	<p>Introduction of Electric Vehicle: Electric vehicle Architecture: Major components of electric vehicle. In vehicle Safety devices and usage of safety devices. Mandatory Safety precautions while handling Electric Vehicle. Safety measure to be taken before & while driving an electric vehicle. Instrument Cluster: Different Symbols/Icons Meaning and functions, Various gauges and meters reading Different pages of cluster display & diagnostic page reading</p> <p>Li-Ion Battery: HV Battery pack detailed explanation of Lithium Ion battery, In vehicle Removal and reinstallation of battery Safety precautions for handling a high voltage battery, Battery connections Battery management system, Battery cooling system, charging and discharging cycle</p> <p>Power steering: Brief introduction, Working of EHPS, in vehicle Circuit P/S oil replacement, Safety precautions, removal & refitting of PS Motor. location, preparations for self, Vehicle safety, safety precautions while working on EV, Repair/ replacement of HV components.</p> <p>EV Charging System: Electric Vehicle Charger: Main components of EV Charger, EV Charging Sockets, Charging of Electric Vehicle, Basic Charging system faults and rectification, safety precautions for EV charging types of cable (HV & LV), wiring harness, power distribution unit</p>	<p><i>The experts gave their opinion regarding the changes in the syllabi of above-mentioned subjects and suggested according to need of industry and academics. To give the knowledge about EV. And Enhance their skills in electric vehicle.</i></p>	Annexure D

Agenda Item No. 11.6 To Recommend the modification in the syllabus of Automobile Engineering in sixth DME 6105.

The experts gave their opinion regarding the changes in the syllabus of DME 6105 Automobile Engineering Subject and suggested according to need of industry and academics. Added new contain as per requirements of Electric Vechicle Manufacturing and their maintenance.

The proposed changes in the syllabus and subject code (DME 6205) is enclosed as Annexure – E.

Subject with New Code	Existing syllabus	Proposed syllabus	Remark	Annexure
DME 6205 AUTOMOBILE ENGINEERING	Battery; Battery Constructional details of lead and cell battery Specific gravity of electrolyte Effect of temperatures, charging and discharging on specific gravity Capacity and efficiency of battery, Battery charging Maintenance of batteries, Checking of batteries for voltage, faults and specific gravity	Lubrication and Cooling Systems: - Lubricating system, Types of lubrication system; properties of lubricating oil; SAE rating of lubricants, Need of engine cooling; disadvantages of overcooling; Types of cooling systems, radiators. Pollution from Engine and Its control: Air pollution from I.C. Engine, Hydrocarbons and Hydrocarbons emissions, Other emissions, Methods of emission control; alternative fuels for I.C. Engines	<i>The experts gave their opinion regarding the changes in the syllabi of above-mentioned subjects and suggested according to need of industry and academics.</i>	Annexure E

Agenda Item No. 11.7 Any other item with the permission of chair

To Recommend the modification in the syllabus of Thermal Engineering in sixth DME 3002.

The experts gave their opinion regarding the changes in the syllabus of DME 3002 Thermal Engineering Subject and suggested according to need of industry and academics. Added new contain as per requirements.

The proposed changes in the syllabus and subject code (DME 3102) is enclosed as Annexure – B.

Subject with New Code	Existing syllabus	Proposed syllabus	Remark	Annexure
DME 3102 THERMAL ENGINEERING	AIR COMPRESSOR: Work done during compression in single stage and two stage, Heat rejected and inter cooling in tow stage compression, compress or lubrication	Air Standard Cycles: Internal and external combustion engines; classification of I.C. Engines, Cycles of operation in four stroke and two stroke I.C. Engines; auto cycle, diesel cycle, dual combustion cycle; air standard efficiency, specific work output, specific weight; work ratio; mean effective pressure. With basic numerical problems.	<i>The experts gave their opinion regarding the changes in the syllabi of above-mentioned subjects and suggested according to need of industry and academics.</i>	Annexure B.

Principal
University Polytechnic

Copy to: Chairman, Academic Council
Principal (Academic), University Polytechnic, Mathura
Principal (Admin), University Polytechnic, Mathura
Registrar
All the members of BoS

ANNEXURE - B

GLA UNIVERSITY POLYTECHNIC
COURSE STRUCTURE, CONTACT HOURS and CREDITS

DISCIPLINE : MECHANICAL ENGINEERING.
SEMESTER : III SEM (FULL-TIME)

Sr. No.	Subject Code	Subject Name	Periods Per Week			Cr
			L	T	P/D	
1	DME 3007	Measurement and Metrology	3	0	0	3
2	DME 3201	Strength of Materials	3	0	0	3
3	DME 3202	Thermal Engineering	3	0	0	3
4	DME 3103	Workshop Technology-I	3	0	0	3
6	DME 3081	Strength of Materials Lab.	0	0	2	1
7	DME 3182	Thermal Engineering Lab.	0	0	2	1
8	DEE 3092	Measurement and Metrology lab	0	0	2	1
9	DME 3283	Workshop Technology-I Lab	0	0	8	4
10	DME 3084	Engineering Drawing Lab.	0	0	4	2
11	DME 3095	Soft Skill I	0	0	2	1
TOTAL			12	0	20	22

DME 3202: THERMAL ENGINEERING

Introduction: To study of various sources, concept of energy, work, heat & their conversion, thermodynamics and study of various thermodynamic laws with their applications.

Objective: Know various sources of energy & their applications by applying various gas laws & ideal gas processes to various thermodynamic systems and understand the properties of steam

Credits: 02

Semester III

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
I	<p>FUNDAMENTAL OF THERMODYNAMICS: Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system, thermodynamics. gas laws, definition of work. Zeroth law of thermodynamics. First law of thermodynamics for cyclic and non-cyclic processes. Idea of internal energy and enthalpy. Thermodynamic processes -constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic Process polytrophic process, their representation on P-V diagram and calculation of work done. Application of the first law of this process.</p> <p>Second law of thermodynamic, Concept of perpetual motion machine of first order and that of second order. Concept of heat engine, heat pump and refrigerator. Carnot cycle efficiency for heat engine and cop for refrigerator and heat pump. Entropy</p>	18
II	<p>PROPERTIES OF STEAM: Idea of steam generation beginning from heating of water at 0°C to its complete formation into saturated steam. Idea of dry saturated steam, wet steam and its dryness fraction, super-heated steam and its degree of super heat. Enthalpy, entropy, specific volume and saturation pressure and temperature of steam. Use of steam table</p> <p>AIR COMPRESSOR: Definition and their use, Difference between reciprocating and rotary compressor, their types and working volumetric efficiency,</p> <p>Air Standard Cycles: Internal and external combustion engines; classification of I.C. Engines, Cycles of operation in four stroke and two stroke I.C. Engines; auto cycle, diesel cycle, dual combustion cycle; air standard efficiency, specific work output, specific weight; work ratio; mean effective pressure. With basic numerical problems.</p> <p>Modes of Heat Transfer: Conduction, Convection, Radiation (Basic laws and their simple formula based numerical)</p>	18

RECOMMEND BOOKS

1. Engineering Thermodynamics by PK Nag; Tata McGraw Hill, Delhi.
2. Basic Engineering Thermodynamics by Roy Chaudhary; Tata McGraw Hill, Delhi.
3. Engineering Thermodynamics by CP Arora; Tata McGraw Hill,

Intended Outcomes:

1. describe basic concepts of Thermodynamics
2. restate definition of system, surrounding, closed and open system, extensive and intensive properties.
3. calculate absolute and gage pressure, and absolute temperature.
4. calculate changes in kinetic, potential, enthalpy and internal energy.

ANNEXURE – C

GLA UNIVERSITY POLYTECHNIC

COURSE STRUCTURE, CONTACT HOURS and CREDITS

DISCIPLINE : MECHANICAL ENGINEERING

SEMESTER : IV SEM (FULL-TIME)

Sr. No.	Subject Code	Subject Name	Periods Per Week			Cr
			L	T	P/D	
1	DME 4011	Industrial Management & Entrepreneurship Development	3	0	0	3
2	DME 4105	Machine design and Drawing	3	0	0	3
3	DME 4104	Workshop technology II	3	0	0	3
4		Elective I	3	0	0	3
5		Elective I Lab	0	0	2	1
6	DME 4092	Jigs and Fixture Lab	0	0	2	1
7	DME 4284	Workshop Technology – II Lab.	0	0	8	4
8	DME 4085	Machine Design and Drawing Lab	0	1	4	3
9	DME 4090	Soft Skill II	0	0	2	1
TOTAL			12	1	18	22

Elective I: (Any one)

1. DME 4201 –Hydraulics and Pneumatic System
2. DME 4006 – Fluid Power Systems
3. DME 4008 – **Microprocessor**

Elective I Lab

- 1.DME 4281 - Hydraulics and Pneumatic System Lab
- 2.DME 4087 – Fluid Power Systems Lab
- 3.DME 4088 – **Microprocessor lab**

DME 4011: Industrial Management & Entrepreneurship Development

Introduction: In the present-day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. It may be further added that an entrepreneurial mindset with managerial skills helps the student in the job market. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

Objective: To enable the students to gain understanding of concepts and environment of industrial management.

Credits: 03

Semester IV

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
Unit - 1	<p>Introduction: - Concept /Meaning and its need, Qualities and functions of entrepreneur and barriers in entrepreneurship, Sole proprietorship and partnership forms and other forms of business organizations. Industrial Management. Scientific approach to Industrial Management-Concept, principles and significance of scientific management. Meaning and factors determining factory location. Concept, objectives and importance of plant layout, factors influencing layout, types of layout, problems of layout.</p> <p>Total Quality Management: - Concept of TQM – Principles of TQM – Benefits of TQM. Methods of TQM – Management methods (i) Benchmarking - Meaning, Types of Benchmarking, Steps in Benchmarking Process(ii) Deming Wheel – Steps in Deming Wheel(iii) Just in time-Objectives and Characteristics of Just in Time (iv) Quality Circles-Concept and features of Quality Circles, (v) Six Sigma.</p>	18
Unit - 2	<p>ENTREPRENEURSHIP: - Concept /Meaning and its need Qualities and functions of entrepreneur and barriers in entrepreneurship, Sole proprietorship and partnership forms and other forms of business organizations Schemes of assistance by entrepreneurial support agencies at National, State, District –level, organization: NSIC, NRDC, DC, MSME.</p> <p>PROJECT REPORT PREPARATION: - Project report Preparation Project report Preparation Common errors in project report preparations Common errors in project report preparations Common errors in project report preparations.</p> <p>Material and Store Management: Introduction functions, and objectives, ABC Analysis and EOQ.</p>	18

RECOMMEND BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development and Management by J.S.Narang; Dhanpat Rai & Sons, Delhi.
3. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
4. Handbook of Small Scale Industry by PM Bhandari
5. Entrepreneurship Development and Management by MK Garg

Intended Outcomes: After undergoing this course, the students will be able to:

- Know about various schemes of assistance by entrepreneurial support agencies
- Conduct market survey
- Prepare project report
- Explain the principles of management including its functions in an organisation.
- Have insight into different types of organizations and their structures.
- Inculcate leadership qualities to motivate self and others.
- Manage human resources at the shop-floor
- Maintain and be a part of healthy work culture in an organisation.
- Use marketing skills for the benefit of the organization.
- Maintain books of accounts and take financial decisions.
- Undertake store management.
- Use modern concepts like TQM, JIT and CRM.

DME 4201: Hydraulics and Pneumatic System

Introduction: This subject will introduce students with properties of fluids, measurement of fluid properties and hydraulic machines

Objective: it is designed to make students aware about properties of fluid, discharge measurement and hydraulic machines etc.

Credits: 03

Semester IV

L-T-P: 3-1-0

Module No.	Contents	Teaching Hours
I	<p>Properties of Fluids: Fluid : Real fluid, ideal fluid., Fluid Mechanics, Hydraulics, Hydrostatics, Hydro kinematics., Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapor pressure and compressibility. Hydrostatic Pressure: Pressure, intensity of pressure, pressure head, Pascal's law and its applications. Measurement of Pressure: Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Use of simple manometer, differential manometer and mechanical gauges. Measurement of pressure by manometers and pressure gauges. Fundamental of Fluid Flow, Types of Flow, Discharge and continuity equation (flow equation) Types of hydraulic energy. Bernoulli's theorem; statement and description (without proof of theorems). Venturi meter (horizontal only) Orifice: Definition of Orifice, and types of Orifices, Hydraulic Coefficients. Large vertical orifices. Free, drowned and partially drowned orifice. Time of emptying rectangular/circular tanks with flat bottom. Flow through Pipes: Definition, laminar and turbulent flow explained through Reynold's Experiment. Reynolds Number, critical velocity and velocity distribution. Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, obstruction and change of direction (No derivation of formula). Hydraulic gradient line and total energy line.</p>	12
II	<p>Flow Measurements: Measurement of velocity by Pitot tube, Measurement of Discharge by a Notch Difference between notches and orifices. Discharge formulae for rectangular notch, triangular Notch, trapezoidal notch, and conditions for their use. (with derivation) Measurement of discharge by weirs. Difference between notch, weir Discharge formula for broad crested weir, velocity of approach.</p> <p>Pumps & Turbines: Reciprocating pumps (parts, working, discharge, work done, %slip only), Centrifugal pumps (parts, working), Reciprocating v/s Centrifugal pumps, Turbine (layout, efficiency, classification), Construction & working of (pelton turbine, reaction turbine, Kaplan turbine, Francis turbine only)</p>	12

Text Books:

1. Fluid Mechanics & Hydraulic Machines, LaxmiPublication (P) Ltd., New Delhi.
2. Vijay Gupta & Gupta S.K., Fluid Mechanics, New Age International Publishers, New Delhi.
3. Kapoor J.K., Hydraulics, Bharat Bharti Prakashan, Merrut.

4. Likhri S.K., Hydraulics Laboratory Manual, New Age International Publishers, New Delhi.

Ref Books:

1. Garde R.J., Fluid Mechanics, New Age International Publishers, New Delhi.
2. Jagdish Lal, Hydraulics & Hydraulic Machines, Metropolitan Book Depot, Delhi.
3. Modi P.N., Fluid Mechanics, New Age International Publishers, New Delhi.

Intended Outcomes:

- ❖ Student would be aware about properties of fluids and measurement of various fluid properties.
- ❖ Students could measure and calculate discharge through various instruments.
- ❖ Students would aware about hydraulic machines.

DME 4092: Jigs and Fixture Lab

Introduction: The main purpose of a fixture is to locate and, in some cases, hold a workpiece during either a machining operation or some other industrial process. A jig differs from a fixture in that it guides the tool to its correct position in addition to locating and supporting the workpiece.

Objective: Primary purpose is to provide repeatability, accuracy, and interchangeability in the manufacturing of products.

Credits: 03

Semester IV

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
1	To make a welding fixture for right angle joint.	48
2	To make a plate drilling jig.	
3	To make a drilling jig for a flange.	
4	To make a box type jig.	
5	To make a dovetail fixture for milling operations.	
6	To make a jig with adjustable locating pins.	
7	To make a V block jig.	
8	To make a boring jig with suitable dimensions.	

Intended Outcomes:

1. To understand fundamental principles and applications of Jigs and fixtures in industry.
2. To study the importance of work piece location and degrees of freedom
3. To understand the requirements and types of clamping.
4. To study the guiding elements of jigs
5. To understand Jigs and its types and failure causes and remedies.

ANNEXURE – D

GLA UNIVERSITY POLYTECHNIC
COURSE STRUCTURE, CONTACT HOURS and CREDITS

DISCIPLINE : Mechanical Engineering (General)

SEMESTER : V SEM (Full Time)

Sr. No.	Subject Code	Subject Name	Periods Week			Credit
			L	T	P/D	
1	DME 5101	Theory of Machines	3	0	0	3
2	DME 5202	Refrigeration And Air Conditioning	3	0	0	3
3		Elective II	3	0	0	3
4	DME 5312	Internal Combustion Engine & E-Mobility	3	0	0	3
5	DME 5183	Workshop Technology –Lab	0	0	4	2
6	DME 5181	Theory Of Machines Lab	0	0	2	1
7	DME 5182	Refrigeration And Air Conditioning Lab.	0	0	2	1
8		Elective II lab	0	0	2	1
9	DME 5093	Automobile Technology lab	0	0	2	1
10	DME 5091	Soft Skills III	0	0	2	1
11	DME 5185	Project I	0	0	4	2
12	DME 5086	Seminar	0	0	2	1
Total			12	0	20	22

Elective II: (Any one)

1. DME 5104 – Computer Aided Manufacturing
2. DME 5010- Automation and Robotics
3. DME 5011 – Microcontroller And PLC

Elective II Lab

1. DME 5084 – CAM lab
2. DME 5087 – Automation and Robotics Lab
3. DME 5088 – Microcontroller and PLC Lab

DME 5202: REFRIGERATION AIR CONDITIONING

Introduction: To introduce about different Refrigeration Cycle and Air-Conditioning Processes and Concepts of mechanisms of heat flows, Modes of Heat transfer

Objective: Diploma Engineers should learn this subject to know the processes, equipment's, systems of Refrigeration and Air Conditioning with their functioning, maintenance, repairs and measures to meet the challenges of the near future in this area.

Credits: 03

Semester V

L-T-P: 3-1-0

Module No.	Contents	Teaching Hours
Unit – I	<p>Introduction to Heat Transfer: Thermodynamics and Heat Transfer.</p> <p>Fins: Heat transfer from extended surfaces, types of fins and its applications.</p> <p>Thermal Radiation : Basic radiation concepts; Radiation properties of surfaces, Black body radiation Planck's law, Wein's displacement law, Stefan Boltzmann law, Kirchoff's law, Gray body, Shape factor, Black-body radiation.</p> <p>Heat Exchanger : Types of heat exchangers; Fouling factors, Introduction to Mass Transfer.</p> <p>Refrigeration: Introduction to refrigeration system, Methods of refrigeration, Carnot refrigeration cycle, Unit of refrigeration, Refrigeration effect & C.O.P.</p>	18
Unit - II	<p>Air Refrigeration cycle: Open and closed air refrigeration cycles, Reversed Carnot cycle, Bell Coleman or Reversed Joule air refrigeration cycle, Aircraft refrigeration system, Classification of aircraft refrigeration system.</p> <p>Vapour Compression System: Single stage system, Analysis of vapour compression cycle, Use of T-S and P-H charts, Effect of change in suction and discharge pressures on C.O.P, Effect of sub cooling of condensate & superheating of refrigerant vapour on C.O.P of the cycle, Actual vapour compression refrigeration cycle, Multistage vapour compression system requirement, cascade system.</p> <p>Vapour absorption cycle: Working Principal of vapour absorption refrigeration system, Comparison between absorption & compression systems.</p>	18

Reference Books:

1. Refrigeration & Air Conditioning by R .S. Khurmi, S Chand Publication
2. Refrigeration and Air Conditioning – by Arora

3. Refrigeration and Air Conditioning – by Domakundavar
4. Heat Transfer, by R. Yadav, Central Publishing House, Allahabad.

Intended Outcomes:

- ❖ Understand Refrigeration Unit / Air- Conditioning Unit. (Refrigerator / Window Air-Conditioner)
- ❖ Understand Concepts of mechanisms of heat flows
- ❖ Know about Domestic refrigerators – ice plant, Water cooler, cold storages

DME 5312: Internal Combustion Engine & E-Mobility

Introduction: Introduce various types of IC Engine its functional and operational characteristics to understand the Construction features and distinguish the Combustion characteristics its study and effects on various parameters of S.I and C.I engines.

Objective: To understand the operation and design of internal combustion engines with implications of a tradeoff between performance, efficiency, emissions and assess the relation between engine powers output to the required power for vehicle propulsion.

Credits: 3

Semester V

L-T-P: 3-0-0

Module No.	Content	Teaching Hours
Unit - I	<p>Introduction to Engine Performance parameters:- mechanical efficiency, brake mean effective pressure and indicative mean effective pressure, torque, volumetric efficiency; specific fuel consumption (BSFC, ISFC), thermal efficiency; Basic engine measurements; fuel and air consumption, brake power, indicated power and friction power, heat lost to coolant and exhaust gases.</p> <p>Fuel Injection and Ignition systems:- MPFI, factors affecting air fuel mixture, injection system in diesel engine; types of inject systems, Ignition system; types of ignition systems, spark plugs, super charging, turbocharging.</p> <p>Combustion in I.C. Engines: S.I. engines:- Combustion in S.I. Engines; detonation; effects of engine variables on detonation; octane rating of fuels; pre-ignition; combustion chambers in S.I. engines. C.I. Engines :- Combustion in C.I. Engines; delay period; variables affecting delay period; knock in C.I. engines, Cetane rating; combustion chambers in C.I. engine.</p>	18
Unit - II	<p>Introduction of Electric Vehicle: Electric vehicle Architecture: Major components of electric vehicle. In vehicle Safety devices and usage of safety devices. Mandatory Safety precautions while handling Electric Vehicle. Safety measure to be taken before & while driving an electric vehicle. Instrument Cluster: Different Symbols/Icons Meaning and functions, Various gauges and meters reading Different pages of cluster display & diagnostic page reading</p> <p>LI-Ion Battery: HV Battery pack detailed explanation of Lithium Ion battery, In vehicle Removal and reinstallation of battery Safety precautions for handling a high voltage battery, Battery connections Battery management system, Battery cooling system, charging and discharging cycle</p> <p>Power steering: Brief introduction, Working of EHPS, in vehicle Circuit P/S oil replacement, Safety precautions, removal & refitting of PS Motor. location, preparations for self, Vehicle safety, safety precautions while working on EV, Repair/ replacement of HV components.</p> <p>EV Charging System: Electric Vehicle Charger: Main components of EV Charger, EV Charging Sockets, Charging of Electric Vehicle, Basic Charging system faults and rectification, safety precautions for EV charging., types of cable (HV & LV), wiring hardness, power distribution unit.</p>	18

Reference Books:

1. Internal Combustion Engines –V. Ganesan, Pub.-Tata McGraw-Hill.
2. Engineering fundamental of the I. C. Engine – Willard W. Pulkrabek Pub.-PHI, India

Intended Outcomes:

- ❖ Study of Forced Induction system on I.C Engine – Supercharging and Turbocharging
- ❖ Understand the basics of fuel supply and fuel Injection system for S.I and C.I engine
- ❖ Ability to understand and operate the battery ignition system and understand the basic principles of working
- ❖ Ability to understand and operate the cooling system and understand the basic principles of working
- ❖ Ability to understand and operate the various lubrication system and understand the basic principles of working
- ❖ Various advancement in the technology of IC engine system.

ANNEXURE – E

GLA UNIVERSITY POLYTECHNIC

COURSE STRUCTURE, CONTACT HOURS and CREDITS

DISCIPLINE : Mechanical Engineering (General)

SEMESTER : VI SEM (Full Time)

Sr. No.	Subject Code	Subject Name	Periods Per Week			Credit
			L	T	P/D	
1	DME 6201	Power Plant Engineering	3	0	0	3
2	DME 6205	Automobile Engineering	3	0	0	3
3	DME 6017	Material Science	3	0	0	3
4		Elective III	3	0	0	3
5		Elective III Lab	0	0	4	2
6	DME 6083	Advance Production Technology Lab	0	0	2	1
7	DME 6087	Material Science lab	0	0	2	1
8	DME 6081	Automobile Engineering Lab	0	0	4	2
9	DME 6186	Project II	0	0	8	4
Total			12	0	20	22

Elective III: (Any one)

1. DME 6021 –Maintenance Engineering & Safety
2. **DME 6123- CNC Machine Technology**
3. DME 6122-Jigs and Fixtures

Elective III Lab: (Any one)

1. DME 6094 –Maintenance Engineering & Safety Lab
2. DME 6025- CNC Machine Technology Lab
3. DME 6197 -Jigs and Fixtures Lab

DME 6123: CNC MACHINE TECHNOLOGY

Introduction: To study definition, classification of Automation, levels of Automation and study NC & CNC Machines, their basic structure, logic gates & PLC.

Objective: Define, Classify Automation; Levels of Automation, Purpose & Application of Different types of Automation

Credits: 3

Semester VI

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
Unit – I	<p>Introduction: - Constructional features of CNC machine tools, machining center, turning center, CNC EDM, Ball screws, Bearings, Centralized lubrication systems.</p> <p>Industrial Automation: Concept and Scope of Industrial Automation, Socio-Economic Considerations, And Pneumatic Logic Circuits: Un-Complementation Algorithm.</p> <p>Mechatronics: Mechanical System Interfacing, Simple Mechatronics Devices: Servo Motors, Stepping Motors, DC Motors, Analog / Digital Convertors. Types and Function of Controllers.</p>	18
Unit – II	<p>Suspension System; Independent Suspension System Function, Sinumeric, Fanuc controls, computed aided part programming, post processors,</p> <p>APT programming, CNC programming based on CAD Feedback devices, tooling for CNC machine, Interpolators. Maintenance of CNC Machines, Economics of manufacturing using CNC machines.</p> <p>Robotics Technology: Joints and links, common robot configurations, work volume, drive systems, types of robot control, accuracy and repeatability, applications of robots</p>	18

Reference Books:

1. The motor vehicle - Newton steeds. & Garret
2. Automotive Chassis - P.M. Heldt.
3. Mechanism of the car - A.W. Judge
4. Automotive mechanism - Joseph Heitner.
5. The Automobile – Harban singh Reyat
6. Automotive Engineering - G.B.S. Narang
7. An introduction to Automobile - N.R. Khatawate Engineering

Intended Outcomes:

- ❖ Understand to select tool and equipment for vehicle maintenance.
- ❖ Diagnose faults and suggest remedies.
- ❖ Understand tuning, backlash and detonation.

ANNEXURE – F

DME 1021: Applied Mechanics

Introduction: The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, center of gravity, laws of motion and simple machines which are required by the students for further understanding of other allied subjects. The subject enhances the analytical ability of the students

Objective: Define the various types of forces and Analyze different types of forces acting on a body and draw free body diagrams.

Credits: 3

Semester VI

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
Unit – I	<p>Introduction: - Concept of engineering mechanics definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields. Definition of Applied Mechanics.</p> <p>Rigid Body: Concept of rigid body, scalar and vector quantities</p> <p>Laws of forces Definition of force, measurement of force in SI units, its representation, types of force. characteristics of a force, Composition and resolution of coplanar concurrent forces, resultant force, method of composition of forces, laws of forces, triangle law of forces, polygon law of forces - graphically, analytically, resolution of forces, resolving a force into two rectangular components, Lami's theorem (concept only) [Simple problems on above topics]</p>	18
Unit – II	<p>Moment: - Concept of moment Moment of a force and units of moment Principle of moment and its applications (Levers – simple and compound, steel yard, safety valve, reaction at support) Parallel forces (like and unlike parallel force), calculating their resultant Concept of couple, its properties and effects,</p> <p>Friction: - Definition and concept of friction, types of friction, force of friction Laws of static friction, coefficient of friction, angle of friction, angle of repose, cone of friction Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane.</p> <p>Simple Machines: Definition of effort, velocity ratio, mechanical advantage and efficiency of a machine and their relationship, law of machine Simple and compound machine Definition of ideal machine, reversible and self-locking machine System of pulleys (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency Working principle and application of wheel and axle, Weston's Differential Pulley Block, simple screw jack, worm and worm wheel, single and double winch crab. Expression for their velocity ratio and field of their application</p>	18

Reference Books:

1. A Text Book of Applied Mechanics by S Ramamurtham, Dhanpat Rai Publishing Co. Ltd.

2. A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi; S Chand and Co. Ltd., New Delhi.
3. A Text Book of Applied Mechanics by RK Rajput; Laxmi Publications, New Delhi..
4. Text Book of Applied Mechanics by Birinder Singh, Kaption Publishing House, New Delhi.
5. Test Book of Applied Mechanics by AK Upadhya, SK Kataria & Sons, New Delhi

Intended Outcomes:

- Determine the resultant of coplanar concurrent forces.
- Calculate the co-efficient of friction for different types of surfaces.
- Calculate the least force required to maintain equilibrium on an inclined plane.
- Determine the centroid/center of gravity of plain and composite laminar and solid bodies.
- Determine velocity ratio, mechanical advantage and efficiency of simple machines.



GLA
UNIVERSITY
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Established vide U.P. Act 21 of 2010.

Course Curriculum

BATCH - 2023- 2024

Three Year Diploma Course

In

Mechanical Engineering

UNIVERSITY POLYTECHNIC



GLA UNIVERSITY POLYTECHNIC
COURSE STRUCTURE, CONTACT HOURS and CREDITS

DISCIPLINE : MECHANICAL ENGINEERING.
SEMESTER : III SEM (FULL-TIME)

Sr. No.	Subject Code	Subject Name	Periods Per Week			Cr
			L	T	P/D	
1	DME 3007	Measurement and Metrology	3	0	0	3
2	DME 3201	Strength of Materials	3	0	0	3
3	DME 3202	Thermal Engineering	3	0	0	3
4	DME 3103	Workshop Technology-I	3	0	0	3
6	DME 3081	Strength of Materials Lab.	0	0	2	1
7	DME 3182	Thermal Engineering Lab.	0	0	2	1
8	DEE 3092	Measurement and Metrology lab	0	0	2	1
9	DME 3283	Workshop Technology-I Lab	0	0	8	4
10	DME 3084	Engineering Drawing Lab.	0	0	4	2
11	DME 3095	Soft Skill I	0	0	2	1
TOTAL			12	0	20	22



GLA UNIVERSITY POLYTECHNIC

COURSE STRUCTURE, CONTACT HOURS and CREDITS

DISCIPLINE : MECHANICAL ENGINEERING
SEMESTER : IV SEM (FULL-TIME)

Sr. No.	Subject Code	Subject Name	Periods Per Week			Cr
			L	T	P/D	
1	DEE 4014	Fundamentals of electrical and electronics engineering	3	0	0	3
2	DME 4105	Machine design and Drawing	3	0	0	3
4	DME 4104	Workshop technology II	3	0	0	3
5		Elective I	3	0	0	3
6		Elective I Lab	0	0	2	1
8	DEE 4090	Basics of Electrical and Electronics Engineering Lab.	0	0	2	1
9	DME 4284	Workshop Technology – II Lab.	0	0	8	4
10	DME4185	Machine Design and Drawing Lab	0	1	4	3
11	DME 4090	Soft Skill II	0	0	2	1
TOTAL			12	1	18	22

Elective I: (Any one)

1. DME 4201 –Hydraulics and Pneumatic system
2. DME 4006 – Fluid Power Systems
3. DME 4008 – **Microprocessor**

Elective I Lab

- 1.DME 4281 - Hydraulics and Pneumatic system Lab
- 2.DME 4087 – Fluid Power Systems Lab
- 3.DME 4088 – **Microprocessor lab**



GLA UNIVERSITY POLYTECHNIC
COURSE STRUCTURE, CONTACT HOURS and CREDITS

DISCIPLINE : Mechanical Engineering (General)
SEMESTER : V SEM (Full Time)

Sr. No.	Subject Code	Subject Name	Periods Per Week			Credit
			L	T	P/D	
1	DME 5201	Theory of Machines	3	0	0	3
2	DME 5202	Refrigeration And Air Conditioning	3	0	0	3
4		Elective II	3	0	0	3
5	DME 5312	Internal Combustion Engine	3	0	0	3
6	DME 5283	Workshop Technology –Lab	0	0	4	2
7	DME 5181	Theory Of Machines Lab	0	0	2	1
8	DME 5182	Refrigeration And Air Conditioning Lab.	0	0	2	1
9		Elective II lab	0	0	2	1
10	DME 5093	Automobile Technology lab	0	0	2	1
10	DME 5091	Soft Skills III	0	0	2	1
11	DME 5185	Project I	0	0	4	2
12	DME 5086	Seminar	0	0	2	1
Total			12	0	20	22

Elective II: (Any one)

1. DME 5104 – Computer Aided Manufacturing
2. DME 5010- Automation and Robotics
3. DME 5011 – Microcontroller And PLC

Elective II Lab

1. DME 5084 – CAM lab
2. DME 5087 – Automation and Robotics Lab
3. DME 5088 – Microcontroller and PLC Lab



GLA UNIVERSITY POLYTECHNIC
COURSE STRUCTURE, CONTACT HOURS and CREDITS

DISCIPLINE : Mechanical Engineering (General)
SEMESTER : VI SEM (Full Time)

Sr. No.	Subject Code	Subject Name	Periods Per Week			Credit
			L	T	P/D	
1	DME 6201	Power Plant Engineering	3	0	0	3
2	DME 6205	Automobile Engineering	3	0	0	3
3	DME 6017	Material Science	3	0	0	3
4		Elective IV	3	0	0	3
5		Elective IV Lab	0	0	4	2
6	DME 6083	Advance Production Technology Lab	0	0	2	1
7	DME 6087	Material Science lab	0	0	2	1
8	DME 6181	Automobile Engineering Lab	0	0	4	2
9	DME 6286	Project II	0	0	8	4
Total			12	0	20	22

Elective III: (Any one)

1. DME 6021 –Maintenance Engineering & Safety
2. DME 6123- CNC Machine Technology
3. DME 6122-Jigs and Fixtures

Elective III Lab: (Any one)

1. DME 6094 –Maintenance Engineering & Safety Lab
2. DME 6088- CNC Machine Technology Lab
3. DME 6197 -Jigs and Fixtures Lab



DME 3202: THERMAL ENGINEERING

Introduction: To study of various sources, concept of energy, work, heat & their conversion, thermodynamics and study of various thermodynamic laws with their applications.

Objective: Know various sources of energy & their applications by applying various gas laws & ideal gas processes to various thermodynamic systems and understand the properties of steam

Credits: 03

Semester III

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
I	FUNDAMENTAL OF THERMODYNAMICS: Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system, and thermodynamics. gas laws , definition of work. Zeroth law of thermodynamics. First law of thermodynamics for cyclic and non-cyclic processes. Idea of internal energy and enthalpy. Thermodynamic processes -constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic Process polytrophic process, their representation on P-V diagram and calculation of work done. Application of the first law of this process. Second law of thermodynamic , Concept of perpetual motion machine of first order and that of second order. Concept of heat engine, heat pump and refrigerator. Carnot cycle efficiency for heat engine and cop for refrigerator and heat pump. Entropy	12
II	PROPERTIES OF STEAM: Idea of steam generation beginning from heating of water at 0°C to its complete formation into saturated steam. Idea of dry saturated steam, wet steam and its dryness fraction, super-heated steam and its degree of super heat. Enthalpy, entropy, specific volume and saturation pressure and temperature of steam. Use of steam table AIR COMPRESSOR: Definition and their use, Difference between reciprocating and rotary compressor, their types and working work done during compression in single stage and two stage, Heat rejected and inter cooling in tow stage compression, volumetric efficiency, compress or lubrication.	12

RECOMMENDED BOOKS

1. Engineering Thermodynamics by PK Nag; Tata McGraw Hill, Delhi.
2. Basic Engineering Thermodynamics by Roy Chaudhary; Tata McGraw Hill, Delhi.
3. Engineering Thermodynamics by CP Arora; Tata McGraw Hill,



DME 3201: STRENGTH OF MATERIAL

Introduction: Introduce basic concepts of stress, strain, displacement and transformations and use energy methods to find force, stress and displacement in simple structures, torsion and bending

Objective: To provide basic knowledge to estimate strength, predict failure and incorporate design considerations so that the students can solve real engineering problems and design engineering systems

Credits: 03

Semester III

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
I	<p>Stresses and Strains: Concept of load, stresses and strain, Tensile compressive and shear stresses and strains, Concept of Elasticity, Elastic limit and limit of proportionality. Hook's Law, Young's Modulus of elasticity, shear modulus and bulk modulus, Stress strain diagram, Poisson's ratio, relation between elastic moduli</p> <p>Thin cylindrical shell: Circumferential stresses in thin walled cylindrical shells.</p> <p>Bending of beams: Concept of beam and type of loading, Concept of end supports-Roller, hinged and fixed, Concept of bending moment and shearing force, B.M. and S.F. Diagram for cantilever and simply supported beams subjected to concentrated Load only. Bending equation and its application.</p>	12
II	<p>Column and struts: Concept of column, modes of failure, Types of columns, Buckling load, crushing load, Slenderness ratio, Factors affecting strength of a column, End restraints, Effective length, Strength of column by Euler Formula without derivation.</p> <p>Torsion in circular bars: Concept of torsion, difference between torque and torsion, Use of torque equation for circular shaft, Power transmitted by shaft,</p> <p>Springs: Closed coil helical springs subjected to axial load, Stress deformation, Stiffness and angle of twist and strain energy, Proof resilience, Laminated spring (semi elliptical type only), Determination of number of plates.</p>	12

Text Books:

1. Rajput R. K., Strength of Materials, S.Chand & Co. Ltd., Delhi.



DME 3103: WORKSHOP TECHNOLOGY-I

Introduction: This course on Workshop technology-I would help the students in getting an outlook of how Manufacturing process implemented in industries for production.

Objective: Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various manufacturing processes is required to be imparted.

Credits: 03

Semester III

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
I	<p>Cutting Tools and Cutting Materials</p> <p>Types of cutting tools and their application. Properties and their materials</p> <p>Function of cutting fluid, Types of cutting fluids, Difference between cutting fluid and lubricant,</p> <p>Lathe</p> <p>Function and operations of various parts of a lathe, Classification and specification of various types of lathe, Work holding devices, Lathe tools and operations: - Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling, form turning, spinning.</p> <p>Cutting parameters</p> <p>Speed, feed and depth of cut for various materials and for various operations, machining time. Speed ratio.</p> <p>Lathe accessories</p> <p>Centers, dogs, different types of chucks, collets, faceplate, angle plate, mandrel, steady rest, follower rest, taper turning attachment, tool post grinder, milling attachment, Quick change device for tools. Introduction to capstan and turret lathe.</p> <p>Casting</p> <p>Pattern making and mould making :: Properties and types of moulding sand. Type of moulds, centrifugal and investment casting, type of</p>	12



	patterns, pattern allowances, Elements of gating system, different type of casting	
II	<p>Welding</p> <p>Welding Process-: Principle of welding, Classification of welding processes, Advantages and limitations of welding, Industrial applications of welding, symbols. 0020 Principle of operation, Types of gas welding flames and their applications, Gas welding equipment, types of gas welding</p> <p>Arc Welding-: Principle of operation, Arc welding machines and equipment, A.C. and D.C. arc welding, Effect of polarity, current regulation and voltage regulation</p> <p>Other Welding Processes-: Resistance welding, introduction to spot and seam welding, TIG, MIG</p> <p>Welding Defects-: Types of welding defects, methods of controlling welding defects.</p> <p>Metal Forming Processes</p> <p>Press Working - Types of presses, type of dies, selection of press die, die material. Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping, perforating, lancing, marking, coining</p> <p>Forging - Open die forging, closed die forging, Press forging, upset forging, swaging, up setters, roll forging, Cold and hot forging</p> <p>Rolling - Elementary theory of rolling, Types of rolling mills, Thread rolling, roll passes, Rolling defects and remedies</p> <p>Extrusion and Drawing - Type of extrusion- Hot and Cold, Direct and indirect. Pipe drawing, tube drawing, wire drawing.</p>	12

Recommended Books

1. Workshop Technology by BS Raghuvanshi : Dhanpat Rai and Sons Delhi
2. Elements of Workshop Technology by SK Choudhry and Hajra : Asia Publishing House
3. Manufacturing Technology by M Adithan and A.B. Gupta; Wiley Eastern India Ltd. New Delhi.

Intended Outcomes:



- ❖ Understand the basics concepts of manufacturing process, Metal forming processes & Machining processes.
- ❖ Develops the skills related to practical approach.
- ❖ Understand the various concepts, process and importance of production.
- ❖ Understand the working of machines.



DEE 4009: FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Introduction: Introduce basic concepts voltage, current, power and energy with Transmission and Distribution System and Electrical Safety precautions.

Objective: To provide basic knowledge to estimate advantages of electrical energy, Basic idea of semiconductors, Identification of wiring systems, staircase installation and various types of earthing, applications of MCBs and ELCBs.

Credits: 03

Semester IV

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
Unit - 1	Basic Terminology and their concepts: Introduction of basic concepts of Electrical terminologies components of electrical and electronics and their properties, Kirchoff's law, D.c. circuit analysis. Comparison of AC and DC circuit Basic Electronics Classification of materials and their energy band diagram, types of semiconductor, PN junction Diode: biasing, operation and V-I characteristics transistor: Classification, working, & application, Zener diode: Its characteristics & application. Rectifiers and their types, FET, amplifiers, filters Communication System Signals and their classifications, Elementary signals: Impulse, Sinusoidal, pulse function, exponential function, Elements of communication system, need of modulation, AM, FM, PM and their applications	12
Unit - 2	Electromagnetism: Basic Concept of magnetic circuits, Analogy between electric and magnetic circuit, B-H Curve, Hysteresis and Eddy current losses. Simple numerical Electromagnetic Induction: Faraday's law, Lenz's law, Concept of self inductance & mutual inductance (simple problems), its applications. Power: Electrical power, Types of power, Power factor, Concept of power factor improvement.	12
Unit - 3	Three phase ac circuit: Generation and advantages of 3-phase system, star-delta connections, Line and phase voltage/current relationship. Single phase transformer: Construction, Principle, Application Introduction of Auto-Transformer DC MACHINE: Principle of DC generator and Motor, Applications AC MOTORS: Basic Principle of three phase Induction Motor and Synchronous Motor its applications.	12

RECOMMENDED BOOKS

1. Basic Electrical Engineering by PS Dhogal; Tata McGraw Hill Publishers, New Delhi



2. A Text Book of Electrical Technology, Vol. I and II by BL Thareja; S Chand and Co., New Delhi
3. Basic Electricity by BR Sharma; Satya Prakashan, New Delhi
4. Basic Electrical Engineering by JB Gupta, S Kataria and Sons, Delhi
5. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi, New Age International Publishers Ltd., New Delhi
6. Basic Electronics by VK Mehta; S Chand and Co., New Delhi
7. Electrical Machines by SK Bhattacharya; Tata McGraw Hill, New Delhi



DME 3283: WORKSHOP TECHNOLOGY –I lab

Introduction: The development in materials technology, computer technology and economics, coupled with knowledge about the requirements and demands of manufacturing, are the corner stones of the activities.

Objectives: Know and identify basic manufacturing processes for manufacturing different components and Produce jobs as per specified dimensions.

Credits: 04

Semester III

L-T-P: 0-0-8

LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
I	Welding <ol style="list-style-type: none">1. Preparing gas welding joint in vertical position joining M.S. Plates2. Exercise on gas cutting of mild steel plate with oxy-acetylene gas torch.3. Exercise on gas welding of cast iron and brass part or component.4. Exercise on spot welding/seam welding5. Exercise on MIG and TIG welding6. Prepare Outdoor Bench	32
II	Pattern Making and Foundry <ol style="list-style-type: none">1. Preparation of solid/single piece pattern.2. Preparation of two piece/split pattern3. Preparation of mould with solid pattern on floor.4. Preparation of floor mould of solid pattern using copes.5. Preparation of floor mould of split pattern in cope and drag of moulding box.6. To make a pattern from wood for a hollow cylinder as per drawing.7. To prepare components using open die and closed die operations8. To prapre circular component using roll forging	32
	Machine Shop <ol style="list-style-type: none">1. A composite job involving, turning, taper turning, external thread cutting and knurling, grooving, chamfering etc.2. Grinding of single point cutting tool.3. and boring operations by lathe machine.4. To perform eccentric turning on a mild steel bar with the	32



III	help of Lathe Machine. 5. To make the square threads on mild steel rod using lathe machine 6. To prepare a component by using rolling mill	
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Intended Outcomes:

- ❖ Understand the various method of operations in lathe m/c ,drill m/c & milling m/c
- ❖ Understand the various method of forging
- ❖ Identify joining methods for fabrication
- ❖ Operate lathes & drilling machines.
- ❖ Use welding machines and equipment
- ❖ Use smithy/forging equipment's
- ❖ Set the tools, jobs and decide cutting parameters of machines
- ❖ Inspect dimensions of jobs using measuring instruments



DEE 4087: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB.

Introduction: Introduce basic concepts voltage, current, power and energy with Transmission and Distribution System and Electrical Safety precautions.

Objective: To provide basic knowledge to estimate advantages of electrical energy, Basic idea of semiconductors, Identification of wiring systems, staircase installation and various types of earthing, applications of MCBs and ELCBs.

Credits: 01

Semester IV

L-T-P: 0-0-2

LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
1	To change the speed and direction of rotation of d.c. shunt motor by (a) Armature control method. (b) Field control method.	
2	To change the speed and direction of rotation of d.c. compound motor by (a) Armature control method. (b) Field control method.	
3	To measure the terminal voltage with variation of load current of (a) D.C. shunt generator. (b) D.C. compound generator.	
4	To perform load test on a single phase transformer and determine its efficiency.	
5	To start and run a induction motor by (a) Star Delta Starter. (b) Auto Transformer Starter.	
6	To measure slip of an induction motor by direct loading. To start and change the direction of rotation of an induction motor.	



7	To measure transformation ratio of a single phase transformer.	
8	To measure power and P.F. in a single phase circuit by Ammeter, Voltmeter and Wattmeter.	
9	To measure power and P.F. in a 3 phase/A.C. circuit by two wattmeter method.	
10	To calibrate a single phase energy meter at different P.F.'s and different loads.	
11	To locate the faults in an electrical machine by a megger.	
	To connect a fluorescent tube and note its starting and running current.	
12	To draw characteristics of Silicon Controlled Rectifier (SCR).	
13	Testing of electrical devices - Zener, Diode, Transistor, FET, UJT, SCR.	
14	Use of operational amplifier as adder, subtractor, comparator, differentiator and integrators.	
15	Repair and maintenance of inverters and generators.	
16		



DME 3182: THERMAL ENGINEERING LAB.

Introduction: These practicals would help the students for study of Boilers and application in different process industries. Steam turbines and condensers are the major component of any steam power plant. Mechanical engineer must have knowledge of working and application of these devices.

Objective: Know various sources of energy & their applications and apply fundamental concepts of thermodynamics to thermodynamic systems. Understand various laws of thermodynamics.

Credits: 01

Semester III

L-T-P: 0-0-2

LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
1	Determination of temperature by a. Thermo couple b. Pyrometer	24
2	Study of constructional details and specification of high pressure boiler and sketch	
3	Demonstration of mounting on a boiler for study and sketch (field visit).	
4	Performance testing of steam boiler.	
5	Study of compressor through models.	
6	Determination of dryness fraction of wet steam sample.	
7	Study and understanding of various types of furnace and their use through available Furnaces / visits.	
8	Study and sketching of various hand tools, Lifting tacks, Gadgets used in plant.	
9	To study various types of compressors with the help of their models.	
10	Demonstration of accessories on a boiler for study and sketch (field visit).	
	Determination of valve timing and Port timing diagram	



11	Conducting Performance test on 4 Stroke diesel Engine	
12	Conducting heat balance test on 4 Stroke diesel Engine	
13		

Intended Outcomes:

- ❖ Understand different sources of energy and their applications.
- ❖ Understand various concepts and fundamentals of thermodynamics.



DME 3084: ENGINEERING DRAWING LAB.

Introduction: “Drawing Is the Language of Engineers ”goes the maximum. So it is indispensable for engineers. It is the most precise, accurate and concise way of communicating about objects forms and their dimensions.

Objective: Students will learn to apply principles of technical drawing and acquire skills in the use of appropriate computer aids for effective preparation of 3D models in Machine Drawing.

Credits: 02

Semester III

L-T-P: 0-0-4

LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
1	Drawing of the following with complete dimensions, tolerances, materials and surface finish marks.	
	Universal coupling (Assembly) and Oldham coupling (02 Sheets)	
1.1	Bearings (04 sheets)	
1.2	Bushed Bearing (Assembled Drawing)	
1.2.1	Ball Bearing and Roller Bearing (Assembled Drawing)	
1.2.1	Plummer Block (Assembled Drawing)	
1.2.3	Foot step Bearing (Assembled Drawing)	
1.2.4	Pulleys (01 sheet)	
1.3	Fast and loose pulley (Assembled Drawing) (02 sheets)	
	Pipe Joints	
1.4	Expansion pipe joint (Assembly drawing)	
1.4.1	Flanged pipe and right angled bend joint (Assembly Drawing)	48



1.4.2	Lathe Tool Holder (Assembly Drawing)	(01 sheets)	
1.5	Reading of mechanical components drawings	(01 sheets)	
1.6	Sketching practice of bearing, bracket and pulley.	(02 sheets)	
1.7	Drilling Jig (Assembly)	(01 sheet)	
2	Machine Vice (Assembly)	(01 sheet)	
3	IC Engine Parts	(03 sheets)	
4	Piston and ring (assembly drawing)		
5.1	Connecting rod (assembly drawing)		
5.2	Crank shaft and flywheel (assembly drawing)		
5.3	Mechanical Screw Jack (assembly drawing)	(01 sheet)	
6			

Intended Outcomes:

- ❖ Understand dimensions and related terms such as limits, fits, & tolerance.
- ❖ Understand Assembly-related aspects such as mechanical joints.
- ❖ Understand the concept of machine parts assembly & design.
- ❖ Students have fundamental knowledge of drawing of different machine parts such as sectional views, bolts, nuts, couplings, bearings, jigs and screw jack.



DME 3081: STRENGTH OF MATERIALS LAB.

Introduction: To understand & analyze the practical knowledge of various types of stresses & strains along with main causes of failure of machine parts and study the effect of combined stress on different machine parts

Objective: Impart the knowledge about destructive testing for checking the quality of product and Understand & analyze different parameters of closed coil helical spring.

Credits: 01

Semester III

L-T-P: 0-0-2

LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
1	To study the mechanical properties of the material and demonstrate the different types of ferrous and non-ferrous materials.	
2	To conduct the tensile test and determine the ultimate tensile stress/strength and percentage of elongation and plot the stress-strain graph of the given mild steel specimen.	
3	To conduct the Compressive test and determine the ultimate compressive stress/strength of the given specimen.	
4	To conduct the Bending test and determine the ultimate bending stress/strength of the given bar/specimen	
5	Determination of hardness of a metal plate by Rockwell hardness testing machine.	
6	Determination of hardness of a metal plate by Brinell hardness testing machine.	
7	To perform impact test on Izod Impact testing machine.	
8	To perform impact test on Charpy Impact testing machine.	
9	To determine the angle of twist for a given torque by Torsion apparatus and to plot a graph between torque and angle of twist	
10	Determination of modulus of rigidity of material by Torsion testing machine.	
11	To determine the various parameters of helical coil spring by the spring testing machine.	
12	To demonstrate the creep and plot the graph between the time and elongation of the different material.	
13	Determination of shear force at different sections on a simply supported beam under points loads.	
14	Determination of bending moment at different sections on a simply supported beam under different types of loading.	
15	Determination of the Young's Modulus of elasticity by deflection	



	apparatus.	24
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Ref. Books:-

2. Rajput R. K., Strength of Materials, S.Chand& Co. Ltd., Delhi.
3. Kapoor J.K., Strength of Materials, Asian Publication, Muzaffarnagar.

Intended outcomes:

- ❖ Understand the tensile and compressive strength of mild steel and brick respectively
- ❖ Understand the moment equation with estimation of all values



DME 3007: MEASUREMENT AND METROLOGY

Introduction: Introduce the principle of operation of an instrument, Identify different functional elements of measuring system and appreciate the concept of calibration of an instrument.

Objective: To make student familiar with the principles of instrumentation, transducers & measurement of non-electrical parameters like temperature, pressure, flow, speed, force and stress.

Credits: 03

Semester-III

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
I	<p>INTRODUCTION: Meaning and scope of metrology in field of engineering. Standard, Primary, secondary, tertiary and working standards (Line and Wave length, Primary, Secondary and Tertiary measurement concept only). Limits, Fits and Tolerances. Allowance and types of allowances Interchangeability, precision and accuracy, Sources of error.</p> <p>TRANSDUCERS Definition, various types of transducers such as resistive, strain gauges capacitive, inductive, electromagnetic, photo electric, piezo electric and their use in instrumentation.</p> <p>TEMPERATURE MEASUREMENT Various types of thermometers, expansion thermometers thermocouples, Bimetallic thermometer pyrometers (Radiation and optical type both).</p>	12
II	<p>COMPARATORS General principles of constructions, balancing and graduation of measuring instruments, characteristics of comparators, use of comparators, difference between comparators, limit gauges and measuring instruments. Classification of comparators, construction and working of dial indicator, Johansson "Mikrokator", Sigma comparator and its magnification, mechanical-optical, optical lever principle zees opt test, electro limit, electromechanical, electronics, pneumatic comparators, gauges, tool makers microscope.</p> <p>SURFACE FINISH Geometrical characteristics of surface roughness- Waviness. Lay, flaws. orders of irregularities Effect of surface quality on its functional properties. Factor affecting the surface finish. Drafting symbols for surface roughness. Evaluation of surface finish. RMS and CLA values. Methods of measuring surface roughness. Tomlinson surface roughness tester Comparison of surfaces produced by common production methods.</p> <p>VARIOUS TYPES OF INSTRUMENTS USED FOR Physical Measurements such as -Length, Depth height, Thickness, Gaps, Curvature, Angle, Taper, Area, Undulations, Surface finish, Thread and Gear measurement., measuring element of screw thread, Liquid Level & Viscosity - Liquid level measuring methods and devices Viscometer - Plate and Cone viscometer, Two float viscometer</p> <p>Strain Gauge Use of strain gauge and load cells.</p>	12



Text Books:

1. Bhatnagar S., Metrology & measuring Instrument, Nav Bharat Prakshan, Meerut.
2. Vikram Sharma, Measurement, Metrology and Control, S.K. Kataria& Sons, New Delhi.

Ref. Books:

1. Rajput R.K., Mechanical Measurement and Instrument, S.K. Kataria& Sons, New Delhi.

Intended Outcomes:

- ❖ Student Select Suitable measuring device for a particular application.
- ❖ Measure different mechanical measuring quantity
- ❖ Know the working principle of transducers.



DME 4104: WORKSHOP TECHNOLOGY-II

Introduction: Study of cutting tools, lathe, shaper & Planner machine & Identify different parts, drives, clapper box, crank & slotted mechanism, feed mechanism, adjustment of length & position of stroke, work holding devices and Study attachment & accessories

Objective: Aware students about now significance of various methods of taper turning, milling & gear cutting and Calculate machining time for different operations.

Credits: 03

Semester-IV

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
I	<p>Drilling</p> <p>Principle, Classification of drilling machines and their description. Drilling machine operations – drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping. Speeds and feeds during drilling, impact of these parameters on drilling, machining time. Types of drills and their features, nomenclature of a drill, Drill holding devices.</p> <p>Boring</p> <p>Principle, Classification and their brief description. Boring tools, boring bars and boring heads.</p> <p>Milling machine-Introduction of milling machine and its parts,milling method umilling and down milling,deviding head indexing and indexing plate</p> <p>Gear Manufacturing and Finishing Processes</p> <p>Gear hobbing, Gear shaping, Gear shaving, Gear burnishing</p> <p>Grinding process- Definition of grinding process and its applications, types of abrasive materials and their properties, specification of grinding wheel.</p>	10



II	<p>Manufacturing processes and operations- Perforating, Piercing, Slitting operation, lancing operation, Planishingoperation ,Embossing process coining operation, marking operations.</p> <p>Metallic Coating Process</p> <p>Metal Spraying, Wire process, powder process, applications, Electro plating, anodizing and galvanizing, Organic Coatings, oil base paint, rubber base coating</p> <p>Finishing Processes</p> <p>Purpose of finishing surfaces, Surface roughness, definition & units, Honing process and its applications, Description of hones, Brief idea of honing machines, Lapping process, its applications, Description of lapping compounds & tools, Brief idea of lapping machines, Super finishing process and its applications, Use of super finishing attachment on center lathe, Polishing, Buffing.</p>	14
III	<p>Shaping, Planing and Slotting</p> <p>Working principle of shaper, planer and slotter. Type of shapers, Type of planers, Types of tools used and their geometry, Speeds and feeds in above processes.</p> <p>Broaching, Hobbing</p> <p>Introduction, Types of broaching machines – Single ram and duplex ram horizontal type, vertical type pull up, pull down, push down. Elements of broach tool, broach tooth details – nomenclature, types, and tool material.</p> <p>Modern Machining Processes</p> <p>Mechanical Process: Ultrasonic machining (USM): Introduction, principle process, advantages and limitations, applications, Electro chemical machining (ECM), Fundamental principle, process, applications, Electrical Discharge Machining (EDM): Introduction, principle parts of EDM machine, EDM terminology. Principal, metal removing rate, dielectric fluid and properties of electric fluid, applications, Wire cut EDM, Extrusion process & Plasma Arc machining</p>	12

LIST OF RECOMMENDED BOOKS

1. Workshop Technology by BS Raghuvanshi : Dhanpat Rai and Sons Delhi
2. Elements of Workshop Technology by SK Choudhry and Hajra : Asia Publishing House
3. Manufacturing Technology by M Adithan and A.B. Gupta; Wiley Eastern India Ltd. New Delhi.
4. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
5. Foundry Technology by KP Sinha and DB Goel; RoorkeePublishng House, Roorkee.



Intended Outcomes:

- ❖ Know the various methods of taper turning, milling & gear cutting.
- ❖ Calculate machining time for different operations.
- ❖ Identify cutting tool nomenclature / marking systems.
- ❖ Know the significance of various super finishing methods.
- ❖ Understand the different processes of gear cutting.
- ❖ Understand various plastic molding methods



DME 4105: MACHINE DESIGN AND DRAWING

Introduction: This course on Design and drawing would help the students in getting an outlook of how draw and design the mechanical parts.

Objective: To enable the students in terms of understanding the various concepts related to design and drawing of machine parts.

Credits: 03

Semester-IV

L-T-P: 3-1-0

Module No.	Contents	Teaching Hours
I	Introduction Definition, Design requirements of machine elements, Fundamental unit & derived unit , Design procedure, Standards in design, Selection of preferred sizes, Indian Standards designation of carbon & alloy steels, Selection of materials for static and fatigue loads. Design against Static Load Modes of failure, Factor of safety, Principal stresses, Stresses due to bending and torsion, Theory of failure. Design against Fluctuating Loads Cyclic stresses, Fatigue and endurance limit, Stress concentration factor, Stress concentration factor for various machine parts, Notch sensitivity, Design for finite and infinite life, Soderberg, Goodman & Gerber criteria	12
II	Shafts Introduction , Cause of failure in shafts, Materials for shaft, Stresses in shafts, Design of shafts subjected to twisting moment, bending moment and combined twisting and bending moments, Shafts subjected to fatigue loads, Design for rigidity Keys and Couplings Introduction , Types of Keys, Sunk Keys, Saddle Keys, Tangent Keys, Round Keys. Splines, Forces acting on a Sunk Key , Strength of a Sunk Key, Selection of square & flat keys , Couplings- Design of rigid and flexible couplings.	12
III	Gears Introduction, Advantages and Disadvantages of Gear Drives, Classification of Gears , Nomenclature of gears and conventional representation, Drawing the actual profile of involute teeth gear by different methods. Power Screws Introduction , Types of Screw Threads used for Power Screws, Multiple Threads, Torque Required to Raise Load by Square Threaded Screws, Torque Required to Lower Load by Square Threaded Screws, Efficiency of Square Threaded Screws , Maximum Efficiency of Square Threaded Screws, Efficiency vs. Helix Angle, Overhauling and Self-locking Screws, Efficiency of Self Locking Screws , Stresses in Power Screws, Design of Screw Jack.	12

RECOMMENDED BOOKS

1. Machine Design by R.S. Khurmi and JK Gupta, Eurasia Publishing House (Pvt.) Ltd, New Delhi.
2. Machine Design by V.B.Bhandari, Tata McGraw Hill, New Delhi.
3. Engineering Design by George Dieter; Tata McGraw Hill Publishers, New Delhi.
4. Mechanical Engineering Design by Joseph Edward Shigley; McGraw Hill, Delhi.
5. Machine Design by Sharma and Agrawal; Katson Publishing House, Ludhiana.
6. Design Data Handbook by D.P. Mandali, SK Kataria and Sons, Delhi.



Intended Outcomes:

- ❖ Understand Mechanical concepts.
- ❖ Understand day-to-day designing and drawing set-up.
- ❖ Understand the basic concepts in designing, trade and industry.



DME 4201: HYDRAULICS & PNEUMATIC SYSTEM

Introduction: This subject will introduce students with properties of fluids, measurement of fluid properties and hydraulic machines

Objective: it is designed to make students aware about properties of fluid, discharge measurement and hydraulic machines etc.

Credits: 03

Semester IV

L-T-P: 3-1-0

Module No.	Contents	Teaching Hours
I	<p>Properties of Fluids:</p> <p>Fluid : Real fluid, ideal fluid., Fluid Mechanics, Hydraulics, Hydrostatics, Hydro kinematics., Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapor pressure and compressibility. Hydrostatic Pressure: Pressure, intensity of pressure, pressure head, Pascal's law and its applications.</p> <p>Measurement of Pressure: Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Use of simple manometer, differential manometer and mechanical gauges. Measurement of pressure by manometers and pressure gauges. Fundamental of Fluid Flow, Types of Flow, Steady and unsteady flow, Laminar and turbulent flow Uniform and nonuniform flow. Discharge and continuity equation (flow equation) Types of hydraulic energy.</p> <p>Potential energy, Kinetic energy, Pressure energy Bernoulli's theorem; statement and description (without proof of theorems). Venturimeter (horizontal and inclined)</p>	12
II	<p>Orifice: Definition of Orifice, and types of Orifices, Hydraulic Coefficients. Large vertical orifices. Free, drowned and partially drowned orifice. Time of emptying rectangular/circular tanks with flat bottom.</p> <p>Flow through Pipes: Definition, laminar and turbulent flow explained through Reynold's Experiment. Reynolds Number, critical velocity and velocity distribution. Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, obstruction and change of direction (No derivation of formula). Hydraulic gradient line and total energy line.</p> <p>Hydraulics and Pneumatics:</p> <p>Hydraulic Control Valves- Valve configurations, general valve analysis, critical center, open center, three way spool valve analysis and flapper valve analysis, pressure control valves, single and two stage pressure control valves, flow control valves, introduction to electro hydraulic to electro hydraulic valves. Characteristics of Pneumatic, Applications of Pneumatics, Basics Pneumatic elements, Pneumatic servo mechanisms</p>	12



III	<p>Flow Measurements: Measurement of velocity by Pitot tube , Measurement of Discharge by a Notch Difference between notches and orifices. Discharge formulae for rectangular notch, triangular Notch, trapezoidal notch, and conditions for their use. (with derivation) Measurement of discharge by weirs. Difference between notch, weir Discharge formula for broad crested weir, velocity of approach.</p> <p>Pumps & Turbines: Reciprocating pumps (parts, working, discharge, work done, %slip only), Centrifugal pumps (parts, working), Reciprocating v/s Centrifugal pumps, Turbine (layout, efficiency, classification), Construction & working of (pelton turbine, reaction turbine, Kaplan turbine, Francis turbine only)</p>	12
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Text Books:

1. Fluid Mechanics & Hydraulic Machines, LaxmiPublication (P) Ltd., New Delhi.
2. Vijay Gupta & Gupta S.K., Fluid Mechanics, New Age International Publishers, New Delhi.
3. Kapoor J.K., Hydraulics, Bharat Bharti Prakashan, Merrut.
4. Likhi S.K., Hydraulics Laboratory Manual, New Age International Publishers, New Delhi.

Ref Books:

1. Garde R.J., Fluid Mechanics, New Age International Publishers, New Delhi.
2. Jagdish Lal, Hydraulics & Hydraulic Machines, Metropolitan Book Depot, Delhi.
3. Modi P.N., Fluid Mechanics, New Age International Publishers, New Delhi.

Intended Outcomes:

- ❖ Student would be aware about properties of fluids and measurement of various fluid properties.
- ❖ Students could measure and calculate discharge through various instruments.
- ❖ Students would aware about hydraulic machines.



DME 4281: HYDRAULICS & PNEUMATIC SYSTEM LAB.

Introduction: it gives practical understanding of concepts of hydraulics and hydraulic machines.

Objective: it is designed to give practical exposure and understanding of fluid parameters and machines

Credits: 01

Semester-IV

L-T-P: 0-0-2

LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
1	To verify Bernoulli's Theorem.	24
2	<i>To find out the value of coefficient of discharge of venturimeter.</i>	
3	<i>To determine coefficient of velocity (Cv), coefficient of discharge (Cd) coefficient of contraction (Cc) for an orifice and verify the relation between them.</i>	
4	<i>To determine the critical velocity by Reynolds's Experiment.</i>	
5	To verify the loss of head due to: I - Sudden expansion. II - Sudden Contraction. III- <i>Sudden bend.</i>	
6	<i>To determine the coefficient of discharge of a rectangular and triangular notch.</i>	
7	<i>Demonstration of use of current meter and pitot tube.</i>	
8	<i>To determine Darcy friction coefficient and to investigate the relationship between the hydraulic gradient h/f and velocity v.</i>	
9	Study of a model of a Centrifugal Pump.	
10	Study of a model of a Reciprocating Pump.	
11	<i>Determine the Manning's constant or Chezy's for given rectangular channel section.</i>	

Intended Outcomes:

- ❖ Practical exposure and prove of hydraulic laws and properties
- ❖ Students will be aware about hydraulic machinery.



DME 4082: MATERIALS AND METALLURGY LAB.

Introduction: In material science lab we study the material structure for understanding the materials property so we select the proper materials for our use.

Objective: To make students understand materials structure. To make students understand process of improving materials properties.

Credits: 01

Semester-IV

L-T-P 0-0-2

LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
1	Study of Metallurgical Microscope	24
2	Study of diamond polishing apparatus.	
3	To prepare specimen for micro structural examination-cutting, grinding, polishing and etching.	
4	To study Bravais Lattice with the help of models.	
5	To know composition of alloy steel by stereoscope.	
6	To know carbon in steel by carbon steel estimation apparatus.	
7	Preparation of specimens and study of microstructure of four given metals and alloys on metallurgical microscope. a) - Brass. b) - Bronze. c) - Grey Cast Iron. d) - Malleable Cast Iron.	
8	Preparation of specimens and study of microstructure of four given metals and alloys on metallurgical microscope. e)- Low Carbon Steel. f)-High Carbon Steel. g)- High Speed Steel. h)- Bearing Steel.	
9	To perform heat treatment process on materials of known carbon percentage: a)- Normalizing b)- Case Hardening	
10	To perform heat treatment process such as annealing and comparison of hardness before and after.	
11	Identification of materials on the basis of chips during machining.	
12	Mini project- collect sample of heat insulating materials	
13	Mini project- collect sample of various steel and cast iron	
14	Mini project- collect sample of non – ferrous alloys	
15	Mini project- collect sample of non- metallic engineering materials	

Intended Outcomes:

- ❖ Understand the materials structure
- ❖ Understand the material properties
- ❖ Understand the process of improving materials properties.



DME 3092: MEASUREMENT & METROLOGY LAB.

Introduction: Introduce students to analyse the result of calibration of thermistor, Interpret calibration curve of a rotameter and Evaluate the stress induces in a strain gauge.

Objective: Aware Students about measurement techniques have also taken rapid changes, with many types of instrumentation devices, innovations, refinements.

Credits: 01

Semester-IV

L-T-P: 0-0-2

LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
1	To study the vernier caliper and measure the dimension of the given specimen.	24
2	Measurement of angle with the help of sine bar and slip gauges.	
3	To Study the height gauge and read out the dimension of given specimen.	
4	To study the types of comparators and study dial indicator in detail.	
5	To Study the micrometer and and measure the dimension of given specimen.	
6	To study the fit, limit of size and tolerance in detail.	
7	To study the depth gauge and find out its least count.	
8	To study the Go and No Go gauge.	
9	To measure the thickness of gear teeth at the pitch line and the distance from the top of a tooth the chord i.e. addendum using gear tooth caliper.	
10	To study the filler gauge in detail.	
11	To study the digital micrometer and read out the reading of given specimen.	
12	To study the screw pitch gauge and its uses.	
13	To study the bevel protector and measure the angle of given specimen.	
14	To study the radius gauge and its uses in industry.	
15	To make gear profile by profile projector.	
16	To study the snap gauge in detail and its uses in engineering.	

Intended Outcomes:

- ❖ Test and calibration of a thermocouple.
- ❖ Handle various instruments.
- ❖ Draw the calibration curves of rotameter and thermister.
- ❖ Measure various parameters using instruments.



DME 4284: WORKSHOP TECHNOLOGY – II LAB.

Introduction: To provide education at diploma level in aspects of production process technology which are of relevance to scientists, engineers and other professions who operate in the manufacturing and automobile industry and related sectors, particularly in the production, process and development areas

Objective: To study various types of basic production processes. To select, operate and control the appropriate processes for specific applications and production processes, surface finishing processes and plastic processes.

Credits: 04

Semester-IV

L-T-P: 0-0-8

LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
	<p>ADVANCE WELDING SHOP:</p> <p>1. To do</p> <p>(a) Study of various Gas cutting and welding equipments: Welding transformer, Generator/rectifier, Gas cylinder, Gas cutting machines, Cutting torches etc., Various electrodes and filler metals and fluxes. Practice of welding and cutting of different metals by making suitable jobs by different methods:</p> <ol style="list-style-type: none">1. Arc Welding practice of mild steel (M.S.) and Spot welding on stainless steel jobs.2. TIG Welding practice of Non-Ferrous metals, like Copper, Brass and Aluminum.3. Practice of Gas cutting by cutting machine.4. Study of Welding defects.5. Inspection and Tests of welded joints.6. Practice of Spot and Seam welding.7. Practice of Welding pipe joints, Pipes and Pressure vessels.8. TO prepare welding join on MIG machine <p>Advanced Machine Shop</p> <ol style="list-style-type: none">1. Grinding of single point cutting tool.2. Prepare a V-Block accuracy on shaper machine.3. Exercise on key way cutting and spline cutting on shaper machine.4. Manufacturing of spur gear on horizontal milling machine.5. To perform drilling and boring operations by lathe machine.6. To perform eccentric turning on a mild steel bar with the help of Lathe Machine.7. To make the square threads on mild steel rod using lathe machine. <p>Advance Fitting Shop</p> <ol style="list-style-type: none">1. Exercise on drilling, reaming, counter boring, counter sinking and tapping	48



	<ol style="list-style-type: none">2. Dove tail fitting in mild steel3. Radius fitting in mild steel4. Pipe threading with die5. Prepare Water Supply Channel through Pipes by using Elbows and Joints	
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Intended Outcomes:

- ❖ Use the basic machine tools like lathe, drilling and milling, shaper machine.
- ❖ Understand and select plastic molding processes
- ❖ Understand the importance of surface finish and related surface finishing methods



DME 4185: MACHINE DESIGN AND DRAWING LAB.

Introduction: Represent different kinds of materials and Mechanical components conventionally and identify the elements of a detailed drawing.

Objective: Students will learn to apply principles of technical drawing and acquire skills in the use of appropriate computer aids for effective preparation of 3D models in Machine Drawing.

Credits: 2

Semester-IV

L-T-P: 0-0-4

LIST OF PRACTICALS

ModuleNo.	Contents	Teaching Hours
1	Design & drawing of Sunk Key.	48
2	Design & drawing of SaddleKey.	
3	Design & drawing of Shaft with keyways.	
5	Design and drawing of Butt-Muff coupling & Half lap muff coupling.	
6	Design and drawing of Non protective type flange coupling.	
7	Design and drawing of Bushed Pin type flange coupling.	
8	Design and drawing the meshingspur gear.	
9	Design and drawing of spur gears by Simplified method.	
10	Design and drawing of spur gears by Prof. Unwin's method.	
11	Design and drawing of spur gears by Tracing Paper method.	
12	Draw the Front View, Side View & Top view of petrol engine piston.	
13	Draw the Front View, Half sectional side View &Half sectional top view of C.I piston for a two stroke diesel engine.	
14	Draw the all components of connecting rod for a petrol engine.	
15	Design and drawing of screw jack.	

Intended Outcomes:

- ❖ Draw the isometric view of a given three dimensional object/part.
- ❖ Draw the orthogonal projection of a solid body.
- ❖ Understand the shape and structure of different types of screws, keys and Couplings.
- ❖ Produce the assembly drawing using part drawings



DME 5201: THEORY OF MACHINES

Introduction: As the name implies the subject deals with the principles related the working of machine so for the successful design of machines and mechanism a thorough understanding of this subject is essential.

Objective: To impart students with the knowledge about motion, masses and forces in machines, fundamental of mechanics to machines which include engines, linkages etc.,

Credits: 03

Semester V

L-T-P: 3-1-0

Module No.	Contents	Teaching Hours
Unit - I	Simple Mechanisms Definition of statics, kinetics, kinematics and dynamics , Rigid body and resistant body ,Links ,Kinematics pairs and their types , Degree of freedom ,Kinematics chain and their types ,Constrained motion and mechanisms ,Classification of mechanisms , Equivalent mechanism , Laws of inversion of mechanisms , <i>Four bar chain and its inversions</i> , slider crank chain and its inversions, pantograph. Friction & Clutches Definition and its necessity Screw jack, Calculation of power required for raising a load and lowering a load Clutches Introduction of clutches and its working principle, single plate, multi-plate clutch, cone clutches and centrifugal clutches construction and working only. (Without numerical).	12
Unit - II	Cams Definition of cam , Classification of cams , Followers and their classification ,Brief description of different types of cams and followers with simple line diagram , Power Transmission Devices (Belt, Rope and Chain Drive) Introduction ,Belt and rope drives, open and crossed belt drives, actions of belt on pulleys, velocity ratio , Slip in belts & ropes ,Types of V Belt and Flat belt , Laws of belting and length of belt (open & cross belt) , Ratio of tensions , Power transmitted and max power transmitted by belt , lifted Gear Drive Functions of gear , Classification of gears , Gear nomenclature , Forms of teeth, , Gear Trains and its classification , Simple problems on gear trains	12
Unit - III	Balancing Need of balancing, Concept of static and dynamic balancing, Balancing of rotating mass by another mass in the same plane Fly Wheel Functions of fly wheel & Types, Kinetic Energy of rotating masses, turning moment diagram, Co-efficient of energy & speed, Simple problems, Energy stored in a flywheel (With Derivation) Governor Definition & Functions of governor; comparison between a fly wheel and governor. Types of governor – Principle, construction and working of Watt governor & Porter governor , Simple problems on watt Governor, Terminology used in Governors: Height, Hunting, isochronism, stability, sensitiveness (numerical problem).	12

Reference Books:

1. JS Rao and Dukkupati; Mechanism and Machine Theory; Wiley Eastern, New Delhi
2. A Ghosh and AK Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi
3. MF Spotts: Design of Machine Elements; Prentice Hall of India Ltd., New Delhi
4. R.C Jindal; Theory of Machines & Mechanisms; Ishan Publications, Ambala City
5. S.S Rattan: Theory of Machines; Tata McGrawHill , New Delhi

Intended Outcomes:

- ❖ The students will be able to determine velocities & accelerations of various planar mechanisms.
- ❖ Students will have an understanding of static force relationships and inertia forces and their effect that exist in machines
- ❖ Students will demonstrate the dynamics of flywheel and their motion
- ❖ Students will be able to perform balancing, vibration and critical speeds with respect to machine dynamics

DME 5312: INTERNAL COMBUSTION ENGINE

Introduction: Introduce various types of IC Engine its functional and operational characteristics to understand the Construction features and distinguish the Combustion characteristics its study and effects on various parameters of S.I and C.I engines.

Objective: To understand the operation and design of internal combustion engines with implications of a tradeoff between performance, efficiency, emissions and assess the relation between engine powers output to the required power for vehicle propulsion.

Credits: 3

Semester V

L-T-P: 3-0-0

Module No.	Content	Teaching Hours
Unit – I	<p>Air Standard Cycles: Internal and external combustion engines; classification of I.C. Engines, Cycles of operation in four stroke and two stroke I.C. Engines; auto cycle, diesel cycle, dual combustion cycle; air standard efficiency, specific work output, specific weight; work ratio; mean effective pressure. With basic numerical problems.</p> <p>Introduction to Engine Performance parameters:- mechanical efficiency, brake mean effective pressure and indicative mean effective pressure, torque, volumetric efficiency; specific fuel consumption (BSFC, ISFC), thermal efficiency; Basic engine measurements; fuel and air consumption, brake power, indicated power and friction power, heat lost to coolant and exhaust gases.</p>	12
Unit – II	<p>Carburetion, fuel Injection and Ignition systems:- Mixture requirements for various operating conditions in S.I. Engines; carburetor MPFI, factors affecting air fuel mixture, injection system in diesel engine; types of inject systems, Ignition system; types of ignition systems, spark plugs, super charging, turbocharging.</p> <p>Pollution from Engine and Its control:- Air pollution from I.C. Engine, Hydrocarbons and Hydrocarbons emissions, Other emissions, Methods of emission control; alternative fuels for I.C. Engines.</p>	12
Unit - III	<p>Combustion in I.C. Engines: S.I. engines:- Combustion in S.I. Engines; detonation; effects of engine variables on detonation; octane rating of fuels; pre-ignition; combustion chambers in S.I. engines.</p> <p>C.I. Engines :- Combustion in C.I. Engines; delay period; variables affecting delay period; knock in C.I. engines, Cetane rating; combustion chambers in C.I. engine.</p> <p>Lubrication and Cooling Systems:- Lubricating system, Types of lubrication system; properties of lubricating oil; SAE rating of lubricants, , Need of engine cooling; disadvantages of overcooling; Types of cooling systems, radiators.</p>	12

Reference Books:

1. Internal Combustion Engines –V. Ganesan, Pub.-Tata McGraw-Hill.
2. Engineering fundamental of the I. C. Engine – Willard W. Pulkrabek Pub.-PHI, India

Intended Outcomes:

- ❖ Study of Forced Induction system on I.C Engine – Supercharging and Turbocharging
- ❖ Understand the basics of fuel supply and fuel Injection system for S.I and C.I engine
- ❖ Ability to understand and operate the battery ignition system and understand the basic principles of working



- ❖ Ability to understand and operate the cooling system and understand the basic principles of working
- ❖ Ability to understand and operate the various lubrication system and understand the basic principles of working
- ❖ Various advancement in the technology of IC engine system.



DME 5202: REFRIGERATION AIR CONDITIONING

Introduction: To introduce about different Refrigeration Cycle and Air-Conditioning Processes and Concepts of mechanisms of heat flows, Modes of Heat transfer

Objective: Diploma Engineers should learn this subject to know the processes, equipment's, systems of Refrigeration and Air Conditioning with their functioning, maintenance, repairs and measures to meet the challenges of the near future in this area.

Credits: 03

Semester V

L-T-P: 3-1-0

Module No.	Contents	Teaching Hours
Unit - I	Heat & Mass Transfer (HMT) <i>Concepts of mechanisms of heat flows, Modes of Heat transfer, Fins & their types, Planck's law, Wein's displacement law, Stefan Boltzmann law, Heat Exchanger & their Types, Fouling factors, Fick's law of diffusion</i> Introduction Fundamentals of Refrigeration and Air Refrigeration Introduction, methods of refrigeration, Unit of refrigeration, COP, Carnot refrigeration cycle, Air refrigeration cycle, Refrigeration principles, COP, power calculations, refrigerants, Refrigeration Systems	12
Unit - II	Refrigerants, Refrigeration Equipment and applications Refrigeration devices- Compressors, Evaporators, Condenser, Cooling towers-function, types & capacity; Effective temperature, comfort condition, psychrometry, psychrometer, psychrometric process Domestic refrigerators - ice plant, Water cooler, cold storages Introduction to Expansion Devices <i>Types of expansion devices: variable restriction type (AXV and TXV) and constant restriction type</i>	12
Unit - III	Air Conditioning Air Conditioning cycles-Design-Duct design and selection of fan or blower, Fluidized bed drying system, Filters & Dust collectors, Types of Air Conditioners: window, split, central, A.C. plant- Installation practice & servicing, Requirement of power Cooling and Heating load estimation <i>Introduction, heating versus cooling load calculations, method of estimating cooling and heating load</i>	12

Reference Books:

1. Refrigeration & Air Conditioning by R.S. Khurmi, S Chand Publication
2. Refrigeration and Air Conditioning – by Arora
3. Refrigeration and Air Conditioning – by Domakundavar
4. Heat Transfer, by R. Yadav, Central Publishing House, Allahabad.

Intended Outcomes:

- ❖ Understand Refrigeration Unit / Air- Conditioning Unit. (Refrigerator / Window Air-Conditioner)
- ❖ Understand Concepts of mechanisms of heat flows
- ❖ Know about Domestic refrigerators – ice plant, Water cooler, cold storages



DME 5104: COMPUTER AIDED MANUFACTURING

Introduction: This course on industry would help the students in getting an outlook of how Computer can be used in manufacturing field.

Objective: To enable the students about Fundamental of manufacturing, CAD-CAM meaning, Activities of a CAD/CAM system, manufacturing components of CAD/CAM integration system approach in manufacturing, Introduction of Automation and Computer Integrated Manufacturing, Concept of CIM and FMS.

Credits: 03

Semester V

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
Unit - I	Automation Introduction to CAM, Automated Manufacturing System, Need of Automation, Basic elements of Automation, Levels of Automation, Advantages and Disadvantages of Automation and Application of Automation Numerical Control Machine Fundamental of NC machine, features of NC machine, Elements of NC Machine Tools, Classification of NC machine Tools, Advantages, suitability and limitations of NC machine, Application of NC system, Method for improving accuracy considering the factors such as tool deflection, chatter and productivity.	12
Unit - II	CNC and DNC machines Problems with conventional NC, Computer Numerical Control (CNC), Direct Numerical Control (DNC), Combined DNC/CNC system. Adaptive Control System Introduction & Types of Adaptive control system, Advantages and Disadvantages of Adaptive Control System.. Computer Integrated Manufacturing (CIM) Introduction, Layout of CIM, Advantages and limitations of CIM, applications of CIM Flexible Manufacturing System (FMS) Introduction to FMS, Types of FMS, Advantages and Disadvantages of FMS, Application of FMS.	12
Unit - III	Computer Aided Process Planning (CAPP) Introduction to Computer Aided Process Planning (CAPP), Retrieval & Generative type CAPP, Detailed introduction to Group Technology, Types of formats, Definition and Importance of various positions like Machine Zero, Home Position, Work Piece Zero, Program Zero, Cutter Radius Compensation (G40, G41, G42). NC Part Programming Introduction to NC Part Programming, Prepare NC Part program by using applicable codes like G and M, Programming on lathe for various operations like Turning, Facing, Drilling and Canned cycle.	12



Reference Books:

1. Groover Mikell P., "Automation, Production Systems and Computer Integrated Manufacturing", Prentice Hall Publisher.
2. Kundra and Rao, "Computer Aided Manufacturing", TMH, New Delhi.
3. Koren, "Computer control of Manufacturing systems", TMH, New Delhi.
4. S.J. Martin, "NC Machine Tools", TMH, New Delhi.
5. Koren, "NC Machines", TMH, New Delhi.

Intended Outcomes:

- ❖ Understand Computer Aided manufacturing concept.
- ❖ Understand modern manufacturing techniques set-up.
- ❖ Understand the basic concepts in mechanical and industry.



DME 5181: THEORY OF MACHINE LAB.

Introduction: Introduce various experiments with governors, gyroscopes, balancing machines and universal vibration facilities are available to understand machine dynamics.

Objective: Impart practical knowledge on design and analysis of mechanisms for the specified type of motion in a machine. With the study of rigid bodies motions and forces for the transmission systems, machine kinematics and dynamics can be well understood.

Credits: 1

Semester V
LIST OF PRACTICALS

L-T-P: 0-0-2

Module No.	Contents	Teaching Hours
1	To study various types of kinematics links, pairs, chains & Mechanisms.	24
2	To plot slider displacement, velocity & acceleration against crank rotation for single slider crank mechanisms.	
3	To study the working of screw jack and determine its efficiency.	
4	To study different types of clutches.	
5	To find coefficient of friction between belt and pulley.	
6	To study various types of dynamometer.	
7	To study various types of gears.	
8	To study various types of gear trains – Simple, Compound, reverted, Epicyclic and Differential.	
9	To perform the experiment for static balancing on static balancing machine.	
10	To perform gyroscopic couple on Motorized Gyroscope.	
11	To study gyroscopic effects through models.	

Intended Outcomes:

- ❖ Understand various types of kinematics links, pairs, chains & Mechanisms.
- ❖ Understand various types of gear trains – Simple, Compound, reverted, Epicyclic and Differential.
- ❖ Know to operate gyroscopic couple and dynamometer.



DME 5182: REFRIGERATION AIR CONDITIONING LAB.

Introduction: Describe types, working principles and construction of Refrigeration and Air Conditioning systems by Use various charts and tables.

Objective: it is designed to make students aware about to conduct trial on Refrigeration Test Rig for calculation of COP, power required and refrigeration effect.

Credits: 1

Semester V
LIST OF PRACTICALS

L-T-P: 0-0-2

Module No.	Contents	Teaching Hours
1	Study of basic tools used in RAC equipment	24
2	Study of Vapour compression refrigeration system.	
3	To evaluate the C O P of a given Vapour Compression system	
4	To find out the coefficient of performance (COP) of an ice plant	
5	Study and use of equipment used in Vapour compression system.	
6	To study Domestic Refrigerator, Electrolux Refrigerator, Water Cooler, Ice Plant.	
7	Study of air conditioning system (window type Air conditioner and split type unit)	
8	To evaluate the performance of an AC system	
9	Study of servicing and maintenance of RAC equipment	
10	To identify the various components of a Vapour Compression system and to draw the refrigerant Circuit and the electrical circuit	
11	To determine the properties of air by using SlingPsychrometer, Hygrometer and steam table.	
12	Cooling load estimation of a given space	
13	Study of chilling plant (direct & indirect evaporation plant)	
14	To Study the Car air conditioner and find out its coefficient of performance	
15	To study central air conditioning system.	
16	To Study Vapour Absorption Refrigeration System.	
17	To Study Various Psychometric Processes	

Intended Outcomes:

- ❖ Identify various components and controls used in refrigeration and air conditioning.
- ❖ Describe various air conditioning systems and their applications.
- ❖ Estimate cooling and heating loads.
- ❖ Identify and describe different components of air distribution system



DME 5283: WORKSHOP TECHNOLOGIES - III LAB.

Introduction: To know about the advancements in the area of manufacturing and production processes and get familiarized with working principles and operations performed on non-traditional machines, machining center, and maintenance of machine tools.

Objective: The student will able to know different machines Operation and control of different advanced machine tools and equipment by adopting safety practices while working on various machines.

Credits: 2

Semester V

L-T-P: 0-0-4

LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
I	Turning Shop Thread cutting operation Grinding of turning tool Threaded assembly operation of male and female fit Operation of Eccentric turning	12
II	Welding Shop Introduction of tools & equipment used in welding shop. Preparation of T – Joint. Preparation of H – Joints .Preparation of Angular joints. Preparation of combined joint of H Joint and T Joint. Practice of TIG welding on pipes.	12
III	Foundry Shop Introduction of tools used in foundry shop Making of Connecting rod in foundry shop Core making in foundry shop Making of Pulleys in foundry shop Study of Cupola furnace in foundry shop	12
IV	Machine Shop Perform various operation (turning, facing, knurling and taper turning) on a single job. Cutting operation of v-block with shaper machine. Spur gear cutting operation with milling machine.	12

Intended Outcomes:

- ❖ Select an appropriate machining process for required component.
- ❖ Specify the requirement for special purpose machines .
- ❖ Select the maintenance procedure for given machine tool.
- ❖ Repair and maintain machine tools and sub systems.
- ❖ Use and operate different hand tools required for repair and maintenance.



DME 5084: CAM LAB.

Introduction: This lab titled, 'Practical on Designing and Manufacturing by Computer Applications' would ensure that the students get real-time insights into the practical usages of computers and its various applications.

Objective: To make students acquainted with handling of the computers in designing, manufacturing and its tools. Also, it would enhance their learning of CNC Machine.

Credits: 01

Semester V
LIST OF PRACTICALS

L-T-P: 0-0-4

Module No.	Contents	Teaching Hours
1	Draw the 2 D front view of given drawing of component of UTM machine on Auto- CAD	24
2	Draw the 2 D front view of given drawing of Impeller head on Auto-CAD	
3	Draw the 2 D front view of given drawing of part of engine on Auto-CAD	
4	Draw the 2 D top view of given drawing of Piston cylinder on Auto-CAD	
5	Draw the 2 D front view of given drawing of bearing stand on Auto-CAD	
6	Draw the front view of given drawings of plate and housing on Auto-CAD in 2D	
7	Draw the front view of given drawings of part of Diesel engine assembly on Auto-CAD in 2D	
8	Draw the front view of given drawings of housing and bracket on Auto-CAD in 2D	
9	Draw the front view of given drawings of cover and quadrant of Diesel engine assembly on Auto-CAD in 2D	
10	Draw the front view of given drawings on Auto-CAD in 2D	
11	Prepare a NC program of step turning for following drawing	
12	Prepare a NC program for fillet for following drawing	
13	Prepare a NC program of taper turning for following drawing	
14	Prepare a NC program of grooving for following drawing using mastercam	
15	Prepare a NC program for drilling of following drawing	

Intended Outcomes:

- ❖ Understand computers and tools such as Auto Cad/Creo.
- ❖ Understand Designing software commands.
- ❖ Use Mastercam for NC part programming.
- ❖ Prepare reports, database and presentations on computers



DME 6201: POWER PLANT ENGINEERING

Introduction: To study working of various power plants and understand constructional features and working of devices used in non-conventional energy sources.

Objective: Give Knowledge to students about economical and operational aspects of power plants and Develop awareness for effective utilization of alternative energy sources.

Credits: 03

Semester VI

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
Unit – I	Thermal Power Plants Introduction- power and energy, sources of energy Basic thermodynamic cycles, various components of steam power plant layout pulverized coal burners- Fluidized bed combustion-coal handling system sash handling systems- Forced draft and induced draft fans- Boilers-feed pumps super heater regenerator-condenser- de-aerators-cooling tower	14
Unit – II	Hydro Electric Power Plants Layout-dams-selection of water turbines-types-pumped storage hydro plants Gas and Diesel Power Plants Types, open and closed cycle gas turbine, work output & thermal efficiency, methods to improve performance-reheating, inter-cooling, regeneration advantage and disadvantages- Diesel engine power plant-component and layout	18
Unit - III	Non-Conventional Power Generation Solar energy collectors, OTEC, wind power plants, tidal power plants and geothermal resources, fuel cell, MHD power generation-principle, thermoelectric power generation, thermionic power generation Nuclear Power Plants Principles of nuclear energy- Fission reactions-nuclear reactor-nuclear power plants	16

Reference Books:

1. A Course in Power Plant Engineering by Arora and Domkundwar, Dhanpat Rai and Co. Pvt. Ltd., New Delhi.
2. Power Plant Engineering by P.K. Nag, Tata McGraw Hill, Second Edition, Fourth reprint 2003.
3. Power station Engineering and Economy by Bernhardt G.A. Skrotzki and William A. Vopat Tata McGraw Hill Publishing Company Ltd., New Delhi, 20th reprint 2002.
4. Power Plant Technology, M.M. El-Wakil McGraw Hill 1984.

Intended Outcomes:

- ❖ Identify different components of solar energy and wind energy devices. 3
- ❖ Identify and analyze biomass plant.
- ❖ Identify and apply energy conservation techniques for commonly used power absorbing and generating devices.
- ❖ Apply principles of energy conservation and energy management techniques.
- ❖ Draw layouts of different power plants
- ❖ Operate devices using solar energy inputs



DME 6205: AUTOMOBILE ENGINEERING

Introduction: Introduction to Components of an automobile, Classification of automobiles, Layout of Chassis, Types of drives, Steering System Function and principle and Dynamo and Alternator

Objective: The development of automobile industry and direct or indirect dependence of the present day society on the services of its products has made the knowledge of this technology imperative. The paper deals with power unit part of automotive need.

Credits: 3

Semester VI

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
Unit - I	Transmission System; Clutch Function, Constructional details of single plate and multiple friction clutches, Centrifugal and semi centrifugal clutch, Gear Box Function, Working of slide mesh, constant mesh and synchromesh gear box, Torque convertor, Overdrive Propeller shaft and rear axle Function, Universal joint, Wheels & Tyres, Types of wheels, disc wheels and wire wheel, Types of tyre used in Indian vehicles, Causes of Tyre wear, Tube less tyres	12
Unit - II	Braking system; Constructional detail and working of mechanical, hydraulic and vacuum brake details of master cylinder, wheel cylinder Concept of brake drum, brake lining and brake equipment, Bleeding of brake, Brake efficiency, air brake, ABS Suspension System; Independent Suspension System Function, (Suspension system and types of suspension system and its functions) Types Working of coil spring, leaf spring Shock absorber Battery; Battery Constructional details of lead and cell battery Specific gravity of electrolyte Effect of temperatures, charging and discharging on specific gravity Capacity and efficiency of battery, Battery charging Maintenance of batteries, Checking of batteries for voltage, faults and specific gravity	12
Unit - III	A.C. & D.C. Generators; Dynamo and Alternator, Dynamo Function and details Regulators voltage, current and compensated type Cutout Construction, working and their adjustment, Alternator Construction and working, Charging of battery from alternator, Diagram of a Typical Wiring system, Illumination of Automobiles; Lighting System and Accessories, Lighting system, Wiring circuit, Head light aiming of headlights lighting switches, Direction indicator, Windscreen Wipers, Horn Speedometer, Heater Air conditioning, Wiring harness, panel lights, fog light, fuel gauge, pressure gauge, temperature gauge, types of horn, traffic rules, transport management	12

Reference Books:

1. The motor vehicle - Newton Steeds. & Garret
2. Automotive Chassis - P.M. Heldt.
3. Mechanism of the car - A.W. Judge
4. Automotive mechanism - Joseph Heitner.
5. The Automobile - Harbansigh Reyat
6. Automotive Engineering - G.B.S. Narang
7. An introduction to Automobile - N.R. Khatawate Engineering



Intended Outcomes:

- ❖ Understand to select tool and equipment for vehicle maintenance.
- ❖ Diagnose faults and suggest remedies.
- ❖ Understand tuning, backlash and detonation.



DME 6181: AUTOMOBILE ENGINEERING LAB.

Introduction: To impart knowledge on basic concepts of Automotive Engines and knowledge on various sub components & essential systems of engine

Objective: To understand the construction and working of petrol and diesel engines and its components. to acquire the knowledge about the lubrication and cooling systems, analyze engine performance by testing.

Credits:02

Semester VI

L-T-P: 0-0-4

Module No.	Contents	Teaching Hours
1.	To Study the working of ignition system.	24
2.	To Study of hydraulic braking system.	
3.	To Study working principle and operation of Gear box.	
4.	To Study and experiment of construction details and working operations of suspension systems.	
5.	To Study and constructional details, working principle and operation of the rack and pinion type steering system.	
6.	Four stroke single cylinder Diesel engine test Rig.	
7.	Four stroke four cylinder Petrol engine test Rig.	
8.	To Study of solex carburetor.	
9.	Study on model of four stroke single cylinder Diesel engine. Flywheel (b) Crank shaft (c) Piston (d) Fuel tank (e) Fuel pump (f) Valve	
10.	To Study and experiment of single plate clutch.	

Intended Outcomes:

- ❖ Sketch engine components and engine system components.
- ❖ Measure performance parameters with the help of – engine test rig.
- ❖ Adopt proper way to dismantle / assemble the engine.
- ❖ Understand working principle of S.I. / C.I. engine
- ❖ Select special tools used for engine disassembly / assembly.



DME 6083: ADVANCE PRODUCTION TECHNOLOGY LAB.

Introduction: Introduce students to prepare / modify layout of production system and study the Mechanism of Tapping attachment on drilling machine and Lathe Chuck also Practice of making rivets of any size on capstan lathe

Objective: To Operate the production tools and machines for improvement in productivity of the people and equipment.

Credits: 1

Semester VI

L-T-P: 0-0-2

Module No.	Contents	Teaching Hours
1	Two jobs on milling having following operations – facemilling, slotting, Contour machining. (Group of two students, each group must use different program for different job dimensions)	24
2	One assignment on machine tool installation procedure.	
3	Dismantling and Assembly of any one – a) Tailstock on lathe b) Apron	
4	Mechanism. c) Tapping attachment on drilling machine. d) Lathe Chuck	
5	Report on mounting and dismounting procedure of following (any two) – a) Milling machine arbor. b) Vertical milling head. c) Tool post	
6	One assignment on USM, CHM, EBM, AJM, WJM, PAM.	
7	Practice of making rivets of any size on capstan lathe	
8	Practice of angular machining on shaper	
9	Machining of hexagon on shaping machining.	

Intended Outcomes:

- ❖ Operate Auto lathes- Single spindle automatics.
- ❖ Operate Shaper and Planer
- ❖ Learn to work on press tools, cutting tools
- ❖ Know the extrusion process and injection moulding



DME 6123: CNC MACHINE TECHNOLOGY

Introduction: To study definition, classification of Automation, levels of Automation and study NC & CNC Machines, their basic structure, logic gates & PLC.

Objective: Define, Classify Automation; Levels of Automation, Purpose & Application of Different types of Automation

Credits: 3

Semester VI

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
Unit - I	Concepts and features of NC systems, Classification of NC systems, Design considerations of NC machine tools, Constructional features of CNC machine tools, Functions of MCU	16
Unit - II	Machining center, turning center, CNC EDM, Ball screws, Bearings, Centralized lubrication systems. Manual part programming, Preparatory, Miscellaneous functions, Sinumeric, FANUC controls, Computed aided part programming, Post processors, APT programming, CNC programming based on CAD	16
Unit - III	Feedback devices, tooling for CNC machine, Interpolators. Point-to-point and contouring systems, Adaptive control, ACO and ACC systems, Maintenance of CNC Machines, Economics of manufacturing using CNC machines	16

Reference Books:

1. Koren, Y. "Computer Control of Manufacturing Systems", McGraw Hill Book co. New Delhi, 1986
2. Radhakrishnan P., "Computer Numerical Control Machines", New Central Book Agency, Calcutta, 1992
3. Kundra T. K., Rao P. N., and Tiwari N. K., "CNC and Computer Aided Manufacturing", Tata McGraw Hill, New Delhi, 1991. 3.Fitzpatric,M. " Machining And CNC Technology", McGraw-Hill College, 2004

Intended Outcomes:

- ❖ Understand transfer machines & transfer line.
- ❖ Understand tooling for CNC machine, Interpolators.
- ❖ Explain NC & CNC machines and their operation.
- ❖ Write part programme for manufacturing different machine parts



DME 6017: MATERIAL SCIENCE

Introduction: All industrial products but services and power are material forms. They achieve their final form by going through series of operations in the industries. Efficient use of materials in today's industries and progress in the development of new materials of the desired properties.

Objective: To make students understand materials property, uses and economy. So they select proper materials in industries.

Credits: 3

Semester-IV

L-T-P: 3-0-0

Module No.	Contents	Teaching Hours
I	<p>Introduction Material, History of Material Origin, Scope of Material Science, Overview of different engineering materials and applications, Classification of materials, Thermal, Chemical, Electrical, Mechanical properties of various materials, Present and future needs of materials, Overview of Biomaterials and semi-conducting materials, Various issues of Material Usage-Economical, Environment and Social.</p> <p>Crystallography Fundamentals Crystal, Unit Cell, Space Lattice, Arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals, Number of atoms per unit Cell, Atomic Packing Factor. Metals And Alloys</p> <p>Introduction History and development of iron and steel, Different iron ores, Raw Materials in Production of Iron and Steel, Basic Process of iron-making and steel-making, Classification of iron and steel,</p> <p>Cast Iron Different types of Cast Iron, manufacture and their usage.</p>	18
II	<p>Steels Steels and alloy steel, Classification of plain carbon steels, Availability, Properties and usage of different types of Plain Carbon Steels, Effect of various alloys on properties of steel, Uses of alloy steels (high speed steel, stainless steel, spring steel, silicon steel) Spring materials Iron -carbon diagram, TTT Diagram.</p> <p>Concepts and effects of Heat Treatment Purpose of heat treatment, Cooling Curves various heat treatment processes hardening, tempering, annealing, normalizing, Case hardening and surface hardening.</p> <p>Non Ferrous Materials: Properties and uses of Light Metals and their alloys, properties and uses of White Metals and their alloys.</p> <p>Engineering Plastics Important sources of plastics, Classification-thermoplastic and</p>	18



	<p>thermo set and their uses, Various Trade names of engg. Plastics, Plastic Coatings</p> <p>Ceramics Classification, properties, applications Heat insulating materials Miscellaneous Materials Properties and uses of Asbestos, Glass wool, thermocole, cork, mica. Overview of tool and die materials, Materials for bearing metals, , Materials for Nuclear Energy, Refractory materials.</p> <p>Composites Classification, properties, applications</p>	
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Text Books:-

1. Hajra Choudhury S.K., Materials Science & Processes, Indian Book Distributing Company, Kolkata.
2. Bhatnagar S.K., Material & Materials Science, Nav Bharat Prakashan, Meerut.
3. Gupta K.M., Book of Materials Science.

Ref. Books

1. Kashyap K.T., Materials Science for Engineers, I.K. International Publishing House Pvt. Ltd., New Delhi.
2. Purohit R.K., Materials Science & Processes, Standard Publishers Distributors, Delhi.

Intended Outcomes:

- ❖ Understand the material properties
- ❖ Understand the uses of materials
- ❖ Understand the structure of materials
- ❖ Understand the selection criteria of materials