



**Diploma in Mechanical Engineering**

Year 2<sup>nd</sup>

Sem 4<sup>th</sup>

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
DTME401	DCS	PRODUCTION MANAGEMENT AND INFORMATION SYSTEMS	60	20	20	0	0	2	1	0	3

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

**Course Educational Objectives (CEOs):**

- (A) This subject aims at introduction of basic concepts of production management & principles of production management.
- (B) It covers the optimization of factory resources.
- (C) It also includes understand the processing of various jobs in industries.
- (D) Student will understand role of Industrial engineering department in the industry.

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. To understand the functioning of manufacturing organizations.
2. To understand optimization of factory resources.
3. To understand the processing of various jobs in industries.
4. To understand role of Industrial engineering department in the industry.
5. To understand various components of management.

**Syllabus**

**Unit - I**

**Introduction and Management Process:** Definition, objectives, functions, organization structure, Types of production, Production procedure, what is Management? Evolution various definitions Concept of management Levels of management Administration & management scientific management by F.W. Taylor Principles of Management (14 principles of Henry Fayol) Functions of Management Planning Organizing Directing Controlling, Organizational Management Organization: - Definition Steps in organization, Types of organization Line & staff Functional Project, departmentation Centralized & Decentralized Authority & Responsibility.

**Unit -II**

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**Product development & Design:** Marketing aspect, product characteristic, economic analysis- profit consideration, standardization, simplification and specialization, Production aspect, break even analysis - concept & problems, Make or Buy Decisions - Functional aspects of Make or Buy Decisions, Economic and Non-Economic Factors influencing Make or Buy Decisions.

### Unit -III

**Linear Programming:** Linear programming in multi-product system, Formulation of Linear Programming Problem (LPP), and problems on graphical solution only.

### Unit -IV

**Inventory Control:** Types of inventories, ABC analysis, concepts of Economic Order Quantity (EOQ), inventory control with deterministic demand, instantaneous and gradual replenishment, quantity discount, shortages. Problems on Simple inventory control model without shortages, Project Management: Critical path method (CPM) and Program Evaluation & Review Technique (PERT), Simple problems on PERT / CPM.

### Unit -V

**Plant Layout, Material Handling & Work Study:** Study of plant layout, flow systems, types of layout, requirements of good plant layout, different material handling equipment, Introduction Productivity, Definition, benefits, measures of effectiveness; factors affecting. Productivity improvement techniques  
**Method study:** Definition, need, method study procedures; Flow Diagrams, String Diagrams, Process charts: Outline process chart; Flow Process Chart, Multiple activity chart, Travel chart, Workplace layout design, Principles of Motion Economy, Two handed process chart, Work measurement: Work Sampling, Time study – procedures & equipments, performance rating, allowances, calculation of standard times, Predetermined Time Standards (PTS), MTM techniques

### Unit -VI

**Human Resource Management:** Personnel Management Introduction Definition Functions Staffing Introduction to HR Planning Recruitment Procedure Personnel– Training & Development Types of training Induction Skill Enhancement Leadership & Motivation Maslow's Theory of Motivation Safety Management Causes of accident Safety Precautions Introduction to – Factory Act ESI Act Workmen Compensation Act Industrial Dispute Act.

### Reference Books:

1. MartandTelsang “, “Industrial Engineering & Production Management “, “S. Chand & Co. Ltd.
2. M. S. Mahajan”, “Industrial Engineering. And Production Management”, “DhanpatRai& Co.
3. Banga& Sharma”, “Industrial Organization & Management
4. P. K. Gupta, & D. S. Hira”, “Operations Research”, S. Chand

  
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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
DTME402	DCS	THEORY OF MACHINES	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

- (A) To familiarize students with basic types of mechanisms, joints and degrees of freedom to perform position, velocity and acceleration analysis using graphical and analytical methods.
- (B) To provide students an understanding of different types of mechanisms and to teach the basics of synthesis of simple mechanisms and also teach students the kinematic analysis of cam-follower motion.
- (C) To provide basic concept gyroscope, which allows the calculation of orientation and rotation; designers have incorporated them into modern technology. Select Suitable Drives and appropriate power Transmission Mechanisms for a particular application.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Students will be able to define systematically design and develop mechanisms to perform a specified task and demonstrate an understanding of the concepts of various mechanisms and pairs.
2. Students will be able to do the velocity and acceleration analysis of simple mechanisms.
3. Students will be able to explain effectively present written, oral, and graphical solutions to design problems & develop ability to come up with innovative ideas and design a layout of cam for specified motion.
4. Students will be able demonstrate an understanding of principle of gears.
5. Students will be able to synthesis simple gyroscopic forces and couple, and gyroscopic effect in airplanes, ship and vehicle.

Syllabus

Unit- I

**Simple Mechanism:** Introduction of theory of machines, definitions statics, dynamics, kinematics, kinetics, kinematic pair, kinematic chain, mechanism, machine inversions, relation between

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number of links, number of joints and number of pairs, Four bar chain and its inversion, Slider crank chain and its inversions.

### Unit-II

**Dynamic force analysis, Crank Effort Diagrams and Flywheel:** Dynamics of reciprocating engine mechanism, Inertia force due to reciprocating mass, piston effort crank effort, turning moment on crank shaft, Analytical and graphical methods of construction of turning moment diagrams for steam and I.C. Engines, Fluctuation of energy and speed, Coefficient of fluctuation of energy and speed, Flywheel and its function, calculation of moment of inertia. Weigh of flywheel for steam and I.C. Engines.

### Unit-III

**Brakes and Dynamometers:** Brakes-need, types, braking force, braking torque, Band brakes, block brakes, internally expanded brakes, dynamo meter-meaning, need and types, Simple numerical calculation on above items

### Unit-IV

**Power Transmission:** Drives meaning, Classification, belt, chain, rope and gear drives. Flat and 'V' belt, ratio of tensions, Slip length of belt calculation for open and cross belt drive. H.P. transmitted. Chain Drive: Classification, designation of chain drives as per B.I.S.

### Unit-V

**Governors:** Introduction Classification, Watt, porter, proell and hartnell, their construction and working, Sensitivity, stability, power and effort, hunting phenomena on and isochronism of governor

**Cams and Followers:** Need, Classification, motion of follower Displacement, velocity and acceleration diagrams uniform velocity, uniform acceleration and retardation.

### Reference Books:

1. S.S. Rattan, (2009), "Theory of Machines", Third Edition, Tata McGraw-Hill.
2. Ambekar A.G, (2007) "Mechanism and Machine Theory" Prentice Hall of India, New Delhi.
3. Thomas Bevan; Theory of Machines; Pearson Education
4. Rattan SS; Theory of machines; MC Graw Hills
5. Ambekar AG; Mechanism and Machine Theory; PHI. Eastern Economy Edition 2015
6. 2. Uicker & Shigley, Theory of machines & Mechanism Second Edition Oxford University Press
7. Dr. Jagdish Lal; Theory of Machines; Metropolitan Book Co; Delhi
8. Rao J S and Dukkupati; Mechanism and Machine Theory; New Age Delhi.

### List of Experiments

- 1.To finds out gyroscopic couple.

  
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- 2.To find out velocity ratio of various gear trains
- 3.To study various types of belt drives & find out the velocity ratio of the drive.
- 4.To draw the cam profile.
- 5.Study of working models of various popular mechanisms like quick return mechanism etc
- 6.To draw Involute profile of a gear by generating method.
- 7.Study of the mechanisms like Pantograph mechanism, Davis & Ackerman's steering mechanisms etc.

  
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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
DTME403	DCS	MANUFACTURING TECHNOLOGY	60	20	20	30	20	2	1	2	4

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

**Course Educational Objectives (CEOs):**

(A) The course is designed to give fundamental knowledge basic manufacturing processes for manufacturing different components. (B) To understand the basic, Operate & control different machines and equipment's. (C) To understand the basic concept, inspect the job for specified dimensions. (D) To understand the basic concept of selection of the specific manufacturing process for getting the desired type of output.

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Student will Know and identify basic manufacturing processes for manufacturing different components.
2. Student will be Know About Operate & control different machines and equipment's.
3. Student will be able inspect the job for specified dimensions.
4. Student will know about basic concept of produce jobs as per specified dimensions.
5. Student will be known selection of the specific manufacturing process for getting the desired type of output.

**Syllabus**

**Unit- I**

**Lathes:** Introduction of lathes, Basic parts and functions, Types of Lathe, Concept of ram or capstan type and turret or saddle type machine, Principal parts of capstan and turret lathes.

Tool holding devices, slide tool holder, knee tool holder, knurling tool holder, recessing tool holder, form tool holder, Tap and Die holder, V-steady box tool holder, roller steady box tool holder.

**Unit- II**

**Drilling, Reaming & Boring Machine:** Classification, Basic parts and their functions - Radial drilling machine, Types of operations, Specifications of drilling machine, Types of drills and

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reamers, Twist drill nomenclature, cutting parameters, machining time calculation, Work and Tool Holding, Classification, Horizontal Boring Machines, Vertical Boring Machines, Jig Boring Machine, Size of Boring Machines.

### Unit-III

**Milling Machine:** Classification, Basic parts and their functions – column and knee Type, Types of operations, Types of milling cutters, cutting parameters, machining time calculation, milling operations – plain milling, side and face milling, form milling, gang milling, end milling, face milling, T- slot milling, slitting, Work and Tool Holding Devices, Dividing Heads.

### Unit-IV

**Grinding Machine & Broaching Machine & Gear Manufacturing:** Classification of machines, Grinding wheel composition, types and shapes, Designation. Types of grinding operations, Types of Broaching machine, Advantages, Limitation and applications broaching, Broach, Size of broaching.

Materials, Methods of manufacture Gear cutting by (i) milling, (ii) single point cutting tool on planer/shaper, (iii) Shear speed process (iv) Gear planning, (v) Gear Shapers & Gear hobbling,

### Unit -V

**Nontraditional machining processes:** Electrical discharge Machining, Principle of working, Setup of EDM, Dielectric fluid, tools (electrodes), Process parameters, Applications, Laser Beam Machining, Physical principle of Laser, Laser action in ruby rod, Types of Lasers. Set-up for LBM, Characteristics, controlling Parameters, Application of Laser Beam for Welding (LBW) Other nontraditional machines such as EBM, ECM, CHM, Principle of working, Applications, Introduction to NC, CNC and DNC Semi-Automatic and Automatic Machines.

### Reference Books:

1. *Production Technology- P.C. Sharma, S. Chand,*
2. *Manufacturing Technology R.K. Rajput Laxmi Publication*
3. *Basic Manufacturing Processes & workshop Technology- S.K. Garg*


### List of Experiments

1. Demonstration of formation of chips on a lathe, continuous, discontinuous and fractured by changing variables like rake angle.
2. Measuring of angles of a single point tool with reference to main plane with the aid of tin templates.
3. Grinding of single point (H.S.S.) tools.
4. Practice of taper turning and screw cutting on a center lathe.
5. Practice of making the pins or rivets of any size on a capstan lathe.

  
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6. Practice of drilling, boring and reaming on a lathe.
7. Practice of mounting cutters on the milling m/c and setting of m/s.
8. Practice of up milling and down milling operation.
9. Practice of cutting the spur gear on milling machine.
10. Practice on a shaper square block on a shaper and milling machine (Comparison of surface produced).

  
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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
DTME404	DCS	FLUID MECHANICS	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

- (A) The course is designed to give fundamental knowledge of fluid, its properties and behavior under various conditions.
- (B) To understand the basic concept of fluid mechanics.
- (C) To understand the basic concept of Impact of Jet & Hydraulic Turbines.
- (D) To understand the basic concept and principal of pump.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Student will be able to understand statics, dynamics and various approaches to fluid mechanics.
2. Student will be able to understand fundamentals of flow through pipes.
3. Student will be able to understand basics of compressible flow.
4. Student will be able to correlate fundamentals of fluid mechanics with various mechanical systems.
5. Student will be able to understand basic principal of pump.

Syllabus

Unit -I

Properties of fluid: Density, Specific gravity, Specific Weight, Specific Volume, Dynamic Viscosity, Kinematic Viscosity, Surface tension, Capillary Tube, Vapour Pressure, Compressibility.

Unit-II

Fluid Pressure & Pressure Measurement: Fluid pressure, Pressure head, Pressure intensity, Concept of absolute vacuum, gauge pressure, atmospheric pressure, absolute pressure, Simple and differential manometers, Burden pressure gauge, Concept of Total pressure on immersed bodies, center of pressure, Numerical on Manometers, Total Pressure & Centre of pressure.

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### Unit- III

**Fluid Flow & Flow through Pipes:** Types of fluid flows, Continuity equation, Bernoulli's theorem, Venturimeter Construction, principle of working, Coefficient of discharge, Derivation for discharge through venturimeter, Orifice meter – Construction, Principle of working, hydraulic coefficients, Derivation for discharge through Orifice meter, Pitot tube – Construction, Principle of Working, Numerical on Venturimeter, orifice meter, pitot tube, Laws of fluid friction (Laminar and turbulent), Darcy's equation and Chery's equation for frictional losses, Minor losses in pipes, Hydraulic gradient and total gradient line, Hydraulic power transmission through pipe Numerical to estimate major and minor losses.

### Unit- IV

**Impact of Jet & Hydraulic Turbines:** Impact of jet on fixed vertical, moving vertical flat plates, Impact of jet on curved vanes with special reference to turbines & pumps, Layout of hydroelectric power plant, Features of Hydroelectric power plant, Classification of hydraulic turbines, Selection of turbine on the basis of head and discharge available, Construction and working principle of Pelton wheel, Francis and Kaplan turbine.

Draft tubes – types and construction, Concept of cavitation's in turbines, Calculation of Work done, Power, efficiency of turbine.

### Unit – V

**Pumps:** Construction, principle of working and applications, Types of casings and impellers, Concept of multistage, Priming and its methods, Cavitation, Monomeric head, Work done, Monomeric efficiency, Overall efficiency, NPSH, Performance Characteristics of Centrifugal pumps, Trouble Shooting, Construction, working and applications of submersible, jet pump, Numerical on calculations of overall efficiency and power required to drive pumps.

### Reference Books

1. *Fluid Mechanics and Hydraulic Machines* by Dr. R.K. Bansal
2. *Engineering Fluid Mechanics* by K. L. Kumar.
3. *Fluid Mechanics* by Victor L. Streeter, Benjamin Wylie Ninth
4. *Fluid Mechanics* by Frank M. White
5. *Fluid Mechanics* by Robert Fox, Alan McDonald
6. *Fluid Mechanics* by Yunus A. Cengel, John M. Cimbala

### List of Experiments

1. Verifying the Bernoulli's Theorem
2. Determination of co-efficient of discharge of a mouth piece and orifice by variable head method.

  
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3. Determination of co-efficient of discharge of a venturimeter and orifice meter.
4. Determination of the Friction Factor in a pipe.
5. Performance test on reciprocating pump and to draw the characteristics curves.
6. Performance test on centrifugal pump and to draw the characteristics curves.
7. Performance test on impulse turbine and to find out the Efficiency.
8. Performance test on reaction turbine and to find out the Efficiency.

  
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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
DML301	DCS	ENVIRONMENTAL ENGINEERING & SAFETY	60	20	20	0	0	3	1	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

- (A) To familiarize students with introduction to environment/air pollution sources and effects.
- (B) To provide students an understanding of Meteorological parameters influencing air pollution.
- (C) To provide basic concept Water Pollution Sources and Waste Water Treatment Method.
- (D) To familiarize students with Solid Waste Management.
- (E) To familiarize students with Safety Practices.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Students will be able to environment/air pollution sources and effects.
2. Students will be able understanding of Meteorological parameters influencing air pollution.
3. Students will be able understand basic concept Water Pollution Sources and Waste Water Treatment Method.
4. Students will be able understand Solid Waste Management
5. Students will be able understand Safety important.

Syllabus

Unit-I

**Introduction to Environment/Air Pollution Sources And Effects:** The bio-sphere, biotic and abiotic, an aquatic eco-system, types of pollution, Impact of human being on environment, Impact of environment of human being, basic approach to improve environmental qualities, roll of an environmental engineer, Standard definition of air pollution, composition of natural air, names of air pollutants, classification of air pollutants, primary and secondary pollutants, classification of sources of air pollutant on different bases.

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### Unit-II

**Meteorological Aspects of Air Pollutant Dispersion:** Meteorological parameters influencing air pollution, environmental lapse rate, temperature inversion, atmospheric stability and adiabatic loss rate, air pollution control methods and equipment's, Natural purification processes of air, artificial purification methods of air, brief description of following control equipment's along with sketch e.g., gravitation settling chamber, cyclone, scrubber, bag house filter, electrostatic precipitator.

### Unit-III

**Water Pollution Sources and Classification:** Water resources, uses of water, classification of water, origin, composition and characteristics of domestic waste water as well as industrial waste water, Biochemical oxygen demand, water pollution and standards.

**Waste Water Treatment Method:** Basic processes of water treatment, Meaning of primary, secondary and tertiary treatment, flow chart of a simple effluent treatment plant, theory of industrial waste treatment.

### Unit- IV

**Solid Waste Management:** Sources and classification of solid waste, public health aspects, disposal methods, open dumping, sanitary, potential methods of disposal, recovery and recycling of paper, glass, metal and plastic.

### Unit-V

**Safety Practices:** Responsibility of employees and employers regarding health and safety, fire hazards, prevention and precautions. Industrial hazards prevention and protection, protection from air and noise pollution

### Reference Books

1. *Environmental pollution control Engineering by C. S. Rao*
2. *Air pollution and control by Seth*
3. *Air pollution by M. Nao*
4. *Industrial waste and its treatment by Seth*
5. *Paryavaran Yantriki Hindi granth akadami*

### List of Experiments

1. Air Pollution
  - i. Air monitoring and determination of SPM, CO, Nox, SO<sub>2</sub> with high volume sampler.
  - ii. Monitoring of stack gases and determination of SPM, CO, Nox, SO<sub>2</sub> with slack monitoring kit.
  - iii. Determination of CO, HC, in exhaust gases from petrol vehicle
2. Noise Pollution (select any three situations)

  
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Determination of sound pollution in

(a) Auditorium (b) Factories (c) Busy roads (d) Theatre (e) TV rooms

**3. Industrial Waste Water**

- a. Determination of BOD/COD ratio in industrial waste water.
- b. Determination of Ph and alkalinity/ acidity in industrial waste water.
- c. Determination of solids in industrial waste water.
- d. Determination of turbidity, color, and temperature of industrial waste water.

**4. POLLUTION STANDARDS**

- a. Study of drinking water standards

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
DTME405	DCS	WORKSHOP PRACTICES	0	0	0	60	40	0	0	6	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

- (A) To acquaint students with the basic concepts of various machining processing.
- (B) To impart a fundamental knowledge of casting processing.
- (C) Selection and application of different metal forming processing.
- (D) To understand the basic concepts and principal of Welding.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Student will be able to understand of various machining processing.
2. Student will be able to understand of various casting processing.
3. Student will be able to understand of different metal forming processing.
4. Student will be able to understand of various Welding process and their application in machining processing.

Syllabus

Unit - I

**Lathe Operations:** Any one job on Lathe Machine consisting of Different Operations. Any one job on Drilling Machine consisting of any of the following two operations like drilling, reaming, tapping, boring, spot facing, counter boring, counter sinking etc.

**Turning & Grinding:** One job consisting of operations such as plain turning, step turning, Chamfering, taper turning. 50 % of available time should be used.

**Milling & Shaping:** Any one job on Milling & Shaping consisting of Different Operations.

Unit - II

**Machining:** Basic principles of lathe machine & operations performed on it. Basic description of machines & operations of shaper planer, drilling, milling, grinding Unconventional machining processes, Machine tools. NC machines, CNC machines, DNC machines.

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Department of Mechanical Engineering

*[Signature]*

*[Signature]*

Director  
Shri Vaishnav Institute of  
Technology & Science  
Indore-453 111 (M.P.)

*[Signature]*

Vice Chancellor  
Shri Vaishnav Vidyapeeth  
Vishwavidyalaya, Indore



## Diploma in Mechanical Engineering

Year 2<sup>nd</sup>

Sem 4<sup>th</sup>

### Unit - III

**Casting processes:** Pattern & allowances, Moulding sands & its desirable properties. Mould making with the use of a core, Gating system, Casting defects & remedies, Cupola furnace, Die-casting & its uses.

**Forging:** Hand forging Hand tools: Anvil, swage block, Hand hammers - types; sledge hammers, specifications and uses. Tongs, types of specifications & uses, Chisel-Hot & cold - Specifications & uses. Swages - types and sizes. Fullers, flatters, set hammer, punch and drift sizes and uses.

**Equipment:** Open and closed hearth heating furnaces, hand and power driven blowers, open and stock fire fuels-charcoal, coal, oil gaseous fuels.

### Unit - IV

**Metal forming:** Basic metal forming operations & uses of such as-forging, rolling, wire& tube drawing/making & extrusion, & its products/applications, press work & die & punch assembly, cutting & forming, its application, Hot working Vs Cold working, Powder metallurgy: powder metallurgy process & its applications, plastic-products manufacturing, galvanizing & electroplating.

### Unit - V

**Welding:** Importance & basics concepts of welding, classification of welding processes, Gas welding, types of flames, Electric arc welding, Resistance welding, Soldering & brazing and its uses, Modern trends in manufacturing, Automation, Introduction to NC/CNC/DNC, FMS, CAD/CAM, CIM and factory of future.

### Reference Books:

1. "Workshop Technology; vol. I, II&III" Viva Low Priced Student Edition, Chapman A J & Arnold, E.
2. "Workshop Technology; vol. I&II" Dhanpat Rai & Sons
3. Chaudhary, Hajra "Elements of Workshop Technology; vol. I&II" Media Promoters & Publishers, Raghuvanshi S.
4. Manufacturing Process by Raghuvanshi. (Dhanpat Rai and Co.)
5. Manufacturing Technology by M. N Rao (TMH publications)

### List of Experiments:

1. Machining
  - A. Basic operations on lathe, shaper, milling, drilling and grinding machines.
  - B. To perform step turning, knurling and threading operations on lathe.
  - C. To prepare a simple job on shaper.
2. Foundry  
Moulding and casting of
  - A. Solid bearing
  - B. Flange coupling

  
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- C. Split bearing
- D. Connecting rod
- E. V – Pulley
- F. Gear pulley
- 3. Forging Shop
  - A. Conversion of Round to square.
  - B. Conversion of Round to Hexagon.
  - C. Preparation of Chisel from round rod.
  - D. Preparation of ring and hook from M.S. Round.
  - E. Preparation of a hexagonal bolt and nut.
- 4. Sheet Metal Work
  - A. Practice on cutting of sheet
  - B. Formation of joints like grooved joints, locked groove joint
  - C. Preparation of a rectangular open type tray
  - D. Preparation of hollow cylinder
- 5. Welding
  - A. Practice on MIG Welding Machine
  - B. Practice on Spot Welding Machine
  - C. Practice on Electric Arc Welding Machine
  - D. Practice on Gas Welding Machine
  - E. Practice on TIG Welding Machine

  
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