Faculty of Engineering and Technology

P.K. University

Shivpuri (MP)

Evaluation Scheme & Syllabus

Diploma in Production Engineering

(VI Semester)

(Effective from session 2025-26)

EVALUATION SCHEME

DIPLOMA –PRODUCTION ENGINEERING (6th SEM)

Study And Evaluation Scheme For Diploma Production Engineering

SEMESTER-VI

SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DENVIPE601	Environmental Education and Disaster Management	4	-	-	4	30	-	30	70	-	70	100
DINDUPE602	Industrial Engineering & Safety	4	-	-	4	30	-	30	70	-	70	100
DMETRPE603	Metrology & Measuring Instrument	4	1	-	5	30	-	30	70	-	70	100
DPRODPE604	Production Technology -II	4	1	-	5	30	-	30	70		70	100
DPRODPE605	Metrology & Measuring Instrument Lab	0	0	2	1		25	25		25	25	50
DINTEPE606	Production Technology -II Lab	0	0	2	1		25	25		25	25	50
DPROJPE607	Project	0	0	12	6		100	100		100	100	200
Total		16	2	16	26	120	150	270	280	150	430	700

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DENVIPE601
ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

1. INTRODUCTION:

- Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects. - Lowering of water level , Urbanization.
- Biodegradation and Bio-degradability, composting, bio remediation, Microbes
-Use of bio pesticidies and bio fungicides.
-Global warning concerns, Ozone layer depletion, Green house effect, Acid rain ,etc.

2. POLLUTION: Sources of pollution, natural and man made, their effects on living environments and related legislation.

2.1 WATER POLLUTION: Flow Measurement: Hot Wire Anemometry, Laser Doppler Velocity meter, Rota meter Temperature Measurement: Thermometers, bimetallic thermocouples, thermostats and pyrometers. Measurements of Force, Torque: Different types of load cells, elastic transducers, pneumatic & hydraulic systems. Seismic instruments Measurements of Acceleration, and Vibration: Accelerometers vibration pickups and decibel meters, vibro-meters.

- Factors contributing water pollution and their effect.
- Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal. - Physical, Chemical and Biological Characteristics of waste water.
- Indian Standards for quality of drinking water.
- Indian Standards for quality of treated waste water.
- Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal.

2.2 AIR POLLUTION: Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, GO, CO2, NH3, F, CL, causes and its effects on the environment.

- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.

A. Settling chambers
B. Cyclones
C. Scrubbers (Dry and Wet)
D. Multi Clones

E. Electro Static Precipitations

F. Bog Fillers. - Ambient air quality measurement and their standards.

- Process and domestic emission control
- Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV.

2.3 NOISE POLLUTION: Sources of noise pollution, its effect and control.

2.4 RADISACTIVE POLLUTION: Sources and its effect on human, animal, plant and material, means to control and preventive measures.

2.5 SOLID WASTE MANAGEMENT: Municipal solid waste, biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

3. LEGISLATION:

Preliminary knowledge of the following Acts and rules made there under-

- The Water (Prevention and Control of Pollution) Act
- 1974. - The Air (Prevention and Control of Pollution) Act - 1981.
- The Environmental Protection (Prevention and Control of Pollution) Act -1986. Rules notified under EP Act - 1986 Viz.

The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000
The Hazardous Wastes (Management and Handling) Amendment Rules, 2003.
Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.
The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002.
Municipal Solid Wastes (Management and Handling) Rules, 2000.
The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA):

- Basic concepts, objective and methodology of EIA.
- Objectives and requirement of Environmental Management System (ISO-14000) (An Introduction).

5. DISASTER MANAGEMENT: Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy

- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority
- Duties and powers, Case studies of various Disaster in the country, Meaning and benefit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan. Main feature and function of National Disaster

Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication.

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DINDUPE602
INDUSTRIAL ENGINEERING AND SAFETY

1. **INSPECTION:** Inspection, Need and its planning, objective. Types of inspection, Inspection standards. Duties of inspector in inspection. Inspection needs.

2. **WORK STUDY:** Method Study-Process chart, Flow process chart, Flow diagram, Man and Machine chart, Gang process Chart. Work Measurement-Time study, Tools used in time study, Performance rating, Allowance and use of time standard, Time and Motion study. Principle of human motion economy, Micro motion study, Memo motion study, Therbligs, left hand and right hand chart.

3. **PRODUCTION, PLANNING AND CONTROL:** Methods of production-Unit, Batch, mass. Sales forecasting and its use. Planning-Products, process parts, materials, Optimum Batch quantity for production and Inventory, Theory and Analysis of M/C capacity, Batch quantity, Loading and balancing-Scheduling M/C loading. Preplanning activities, Routing, Dispatching, Follow up activities.
4. **MATERIAL HANDLING AND MATERIAL HANDLING EQUIPMENT:** Factors in material
   handling problems, Cost reduction through improved material handling, Reduction in time of material handling, Material handling equipments -Lifting lowering devices, Transporting devices, Combination devices, Maintenance of material handling equipments.

5. **PLANT LAYOUT:** General plant location factors, Influence of location on plant layout, selection of plant site, Product layout, Process layout. Advantages and disadvantage of process layout

6. **STANDARD AND CODE:** National and International code, value of standardization. Standardization program, Role of Standardization department, standardization techniques and problems.ISO-9000 - Concept and its evolution and implications

7. **QUALITY CONTROL:** Concept of quality control, Quality assurance elements of quality control, Statistical quality control, Acceptance sampling, control chart for variable and attributes, Uses of X, R, "P" and "C" chart - O.C. curve, Concept of Total Quality Management

8. **COST ESTIMATION :** Introduction and function of cost estimation, estimation procedure, elements of cost, depreciation - methods of calculating depreciation, overhead expanses, distribution of over head expanses, calculation of cost for machining and metal forming process and break even analyzer.
9. **VALUE ENGINEERING:** Concept of value engineering and technique.
10. **ACCIDENTS AND SAFETY:** Classification of accidents causes of accidents, Effects of accidents, Action to be taken in case different types of accidents, Safety - needs, consciousness, procedures, measures. General safety devices used on machines, Safe working condition and productivity.

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DMETRPE603
METROLOGY AND MEASURING INSTRUMENTS

1. INTRODUCTION: Meaning and scope of metrology in field of engineering. Standards and types of measurements (Line and Wave length, Primary, Secondary and Tertiary measurement concept only). Limits, Fits and Tolerances. Interchangeability, precision and accuracy, Sources of error.

2. PRINCIPLES AND CLASSIFICATIONS OF MEASURING INSTRUMENTS:

(A) Principle of Mechanical Measuring Instruments: Lever method, vernier method, screw and screw nut method, compound gearing and helical spring methods.
(B) Principles of Optical Instruments: Reflection, Refraction, Interference, Polarization, tical prisms, Lenses and Optical projection (Magnification)
(C) Principle of Electrical measuring instruments
(D) Principle of Hydraulic and Pneumatic Instruments.

3.TRANSDUCERS: Definition, various types of transducers such as resistive, capacitive, inductive, electromagnetic, photo electric, piezo-electric and their use in instrumentation.

4.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", read type mechanical comparator, mechanical-optical, zees' optotest, electro limit, electromechanical, electronics, pneumatic comparators, gauges, tool makers microscope.

5.SURFACE FINISH: Geometrical characteristics of surface roughness- Waviness'. Lay, flaws. 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. Qualitative and quantitative methods. Comparison of surfaces produced by common production methods.

6 VARIOUS TYPES OF INSTRUMENTS USED FOR:

(i)(a) Physical Measurements such as - Length, Depth height, Thickness, Gaps, Curvature , Angle, Taper, Area, Undulations, Surface finish, Thread and Gear measurement.
(b) Liquid Level & Viscosity - Liquid level measuring methods and devices Viscometer - Plate and Cone viscometer, Two float viscometer, Rheo viscometer.

(ii) ***Mechanical Quantities:***

(a) Displacement, velocity, acceleration, speed, torque-Use of transducers and electronic counters,

stroboscope, vibrating reeds and tachometers.

(b) Pressure and Vacuum - Idea of atmospheric pressure, Gauge pressure and vacuum - Use of instruments such as manometers and pressure gauge using elastic elements such as diaphragm, Capsule, Bellows, Bourdon tube and various transducers and thermo couple, vacuum gauges.

(c) Strain Gauge - Use of strain gauge and load cells.

7. **TEMPERATURE MEASUREMENT:** Various types of thermometers, thermocouples, pyrometers

8. SPECIAL MEASURING DEVICES: Computerized 3-D measuring machine (Working Only).

9. MEASUREMENT OF VIBRATIONS: Use of seismic Accelerometer, Potentio metric type and **L. V. D. T.** type, Piezo-electric type accelerometer.

10. **INSPECTION OF GEOMETRICAL ERRORS:** Construction and working of auto-collimator, checking of straightness, flatness, squareness and parallelism, circularity (By dial gauge and tapered).

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DPRODPE604
PRODUCTION TECHNOLOGY-II

1. PRODUCTION MACHINE TOOLS:

Machine tools used for quantity production. Semi automatic multi tools centre lathe. Auto lathes: Single spindle automatics. Sliding head types. Single spindle automatics. Multi spindle automatics, Ultra high speed machining. External centre lss grinding. Internal center less grinding. Mechanical copying systems. Hydraulic servo copying systems for lathe. Electric copying systems, special purpose machines - Brake Drum Turning Lathe

2. PRODUCTION OF PLASTICS:

Polymers. Thermo plastics. Moulding of thermoplastic. Extrusion process. Sheet forming process. Machining of thermoplastics. Thermosetting Plastics. Moulding of Thermosetting plastics. Machining of thermosetting plastics. Other processing methods for plastics. Plastic component design. Mould design.

3. CUTTING TOOLS FOR MACHINING:

Elementary theory of metal cutting, Single point tools- Basic angles. Chip formation and their classification, basic mechanism of chip formation, geometry of chip formation, forces on chip. Effect of manipulating factors such as velocity, size of cut, effect of tool geometry, Specific power consumption. Tool material. Tool wear and Tool life. Tailor's tool life equation. Machining economics. Properties of tool materials. Tool materials. Tool steels. High speed steel. Cast cobalt alloys. Carbides or centered carbide. Ceramics. UCON. Surface treatment of cutting tools- Its advantage. Tin coated high speed steel, diamonds, Cubic boron nitrides.

4. PRESS TOOLS:

Elements of Press tools, Factors affecting press tool design. Shearing. Bending. and Drawing operation. Combination. Progression and compound die. Rubber die forming.

5. MODERN CONCEPT OF QUALITY CONTROL :

Do it right first time, Just in time **(JIT),** Process Control, ZD production **(Zero Defect Production).**

6. INTRODUCTION TO COMPUTER INTREGATED MANUFACTURING:

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.** Introduction to Rapid Prototyping (RP) definition, various RP Technologies. Advantages of RP. Reverse Engine - Definition, reverse engineering tools CMM (Co-ordinate Measuring Machine), White light scanner, Laser

scanners.,Introduction to Robotics.

List of Books-

1. Manufacturing Science by Ghosh and Malik
2. Production Engg. Science by P.C. Pandey
3. Production Technology by RK Jain
4. Manufacturing Technology by P.N. Rao., MCGRAW HILL INDIA

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DMETRPE605
METROLOGY AND MEASURING INSTRUMENTS LAB

List of practicals:

1. Measurement of angle with the help of sine bar/vernier Bevel protractor.
2. Study and sketch of various types of optical projectors.
3. Use of comparators for measurement
4. To measure the diameter of a hole with the help of precision balls.
5. Measurement of Taper by standard balls and rollers.
6. To test the squareness of a component with auto collimator.
7. To measure the pitch, angle and form of thread of a screw.
8. Measurement of gear elements by using gear tooth vernier.
9. To measure the straightness of the edge of a component with the help of autocollimator.
10. Use of linear measuring instrument such as vernior calliper and micrometer.
11. 11.Calibration of Sensors like LVDT

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DPRODME606

PRODUCTION TECHNOLOGY-II Lab

List of practical's:

1. Inspection of casting
    (a) Flange of pipe
    (b) Pulley
    (c) Gear blank
    (d) Bush
2. Turning, boring, internal threading of cost iron flange.
3. Marking and drilling holes in cost iron flange 75 mm. size pipe.
4. Boring hole in cast iron pulley and cutting key way slot.
5. Turning bottom shaft of cycle and milling cotter slot.
6. Turning hub axle of cycles.
7. Turning and internal threading of cone of cycle.
8. Turning bearing races and cups of cycle.
9. Turning plug gauge.
10. Case hardening of
    (a) Plug gauge
    (b) Bottom shaft of cycle
    (c) Gear
11. Gear milling, internal hole boring, key way slot cutting for auto (scooter/jeep/truck/gear box).
12. Milling of snap gauge plate.
13. Inspection practices
    (a) Flange after each operation.
    (b) Pulley after each operation.
    (c) Gear after each operation.
    (d) Gauges after each operation.
    (e) Cycle parts after each operation.
14. Hardness testing.
15. Packing practices.
16. Few examples as case study such as schedule for complete overhaul of centre lathe, reciprocal or

centrifugal pumps and compressor etc giving work distribution, planning repair estimate.

17. Heat treatment of small tools, coining tools and forgining dies.

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DPROJPE607:PROJECT

The project paper will be students awareness of the plans and programmes running for rural development, Ecological balance and environmental pollution control.

Four problems on design and drawing of simple machine/machine parts and preparing project report for loan to establish small scale industry to fabricate the item designed. A few examples of such items are given below. Bench Vice, Small centrifugal pump, Screw jack, Hand Shearing Machine, Hand blower, Main Switch outer casing (Cast Iron), Stepped Motor Pulley, Biogas Plant, Smoke Less Chulha, Hand Operated Grinder/Juicer, Agricultural Implements, Material Handling Equipments for small scale industry. Solar Cooker or any other simple items of general utility or industrial use.