Jharkhand University of Technology, Ranchi
Diploma 4th Semester Examination, 2025 (NEP)

Subject : Operations Management

Subject Code : MEC 401

Time Allowed : 3 Hours

Full Marks : 70

Answer in your own words.

Answer any five questions.

Question 1 *is compulsory and answer* any four *of the remaining questions.*

All *questions carry equal marks.*

---

1. Write the correct answer of the following questions: 2×8=16

   (i) Which of the following is a forecasting method?

       (a) Lean production   (b) Delphi method

       (c) Kaizen   (d) TQM

   (ii) ABC analysis is used in

       (a) Costing   (b) Forecasting

       (c) Inventory control   (d) Capacity planning

   (iii) Which of the following is not a quality tool?

       (a) Histogram   (b) Pareto chart

       (c) SWOT analysis   (d) Control chart

   (iv) TQM stands for

       (a) Total Quality Measurement   (b) Total Quality Management

       (c) True Quality Management   (d) Timed Quality Management

   (v) ERP stands for

       (a) Enterprise Resource Planning   (b) Engineering Resource Planning

       (c) Energy Resource Process   (d) Environmental Resource Plan

   (vi) Which of the following is a production strategy?

       (a) Push system   (b) Pull system

       (c) Both (a) and (b)   (d) None of these

   (vii) What is the main goal of quality management?

       (a) Higher profit   (b) Customer satisfaction

       (c) High production   (d) Less manpower

2. (a) Describe the main steps in the forecasting process.

   (b) Compare short-term and long-term forecasts with examples.   7+7

3. (a) Explain the types of production processes used in industries.

   (b) What do you understand by outsourcing? Give one example.   7+7

4. (a) Explain man-machine chart with one example.

   (b) Describe time study and its benefits in improving productivity.   7+7

5. (a) What is a supply chain? List major components of a supply chain.

   (b) Describe the concept of Bullwhip effect in supply chain.   7+7

6. (a) What are the key dimensions of quality from a customer's perspective?

   (b) Explain any two quality improvement tools.   7+7

7. Write short notes on *any four* :   3·5×4=14

   (a) Master Production Schedule

   (b) Statistical Quality Control

   (c) Kanban System

   (d) Break-even point

   (e) Motion study

   (f) Barcodes in SCM

———

Jharkhand University of Technology, Ranchi

Diploma 4th Semester Examination, 2025 (NEP)

Subject : Product Design and Development

Subject Code : MEC 403

Time Allowed : 3 Hours

Full Marks : 70

Answer in your own words.

Answer any five *questions.*

Question No. 1 *is compulsory, and answer* any four *of the remaining questions.*

All *questions carry equal marks.*

---

1. Write the correct answer of the following questions: 2×7=14

   (i) What is the main function of a prototype?

      (a) Cost analysis   (b) Design testing

      (c) Marketing   (d) Legal approval

   (ii) Which of the following is a general design consideration?

      (a) Price only   (b) Environmental effect

      (c) Shape only   (d) Advertisement

   (iii) Which factor relates to shape, finish, and color in product design?

      (a) Durability   (b) Aesthetics

      (c) Safety   (d) Maintenance

   (iv) What does FDM stand for in 3D printing?

      (a) Fixed Deposition Modelling   (b) Fused Deposition Modelling

      (c) Flexible Drawing Machine   (d) Fused Direct Material

   (v) Which machine element is used to connect two rods under tensile load?

      (a) Cotter joint   (b) Knuckle joint

      (c) Muff coupling   (d) Flange

   (vi) Which CAD command is used to rotate an object?

      (a) Zoom   (b) Move

      (c) Rotate   (d) Mirror

   (vii) Which property is checked during post-processing of 3D prints?

      (a) Surface roughness   (b) Weight

      (c) Color   (d) Temperature

2. (a) Explain the term product life cycle.

   (b) What is the role of patent and legal issues in product design?   7+7

3. (a) Define ergonomic design. List two examples of good ergonomic design.

   (b) Explain the relationship between man, machine and environment.   7+7

4. (a) A hollow shaft is used in a machine. How is it different from solid shaft in terms of strength and weight?

   (b) Write down the ASME code formula for torsion in shaft.   7+7

5. (a) What are the steps in designing a helical compression spring?

   (b) Write standard terminology used in spring design (*any five* terms).   7+7 .

6. (a) How is a coupling modeled and assembled in CAD?

   (b) What is the importance of surface texture and sectional views?   7+7

7. Write short notes on *any four*:   3·5×4=14

   (a) Stages of Additive Manufacturing

   (b) CAD commands used in 3D modelling

   (c) Safety and Reliability in Design

   (d) Design of shaft under bending

   (e) Knuckle Joint

   (f) Standardization

———

Jharkhand University of Technology, Ranchi

Diploma 4th Semester Examination, 2025 (NEP)

Subject : Elements of Industrial Automation

Subject Code : MEC 404

Time Allowed : 3 Hours

Full Marks : 70

Answer in your own words.
Answer any five questions. Question No. 1 is compulsory.
The figures in the margin indicate full marks.
All questions carry equal marks.

---

1. Write correct answer of the following questions: 2×7=14

   (i) Which of the following is an output device in industrial automation?

       (a) Proximity sensor   (b) Relay

       (c) Thermocouple   (d) Strain gauge

   (ii) Which programming language is commonly used for PLCs?

       (a) Assembly   (b) C++

       (c) Ladder Logic   (d) Java

   (iii) What is the main function of a SCADA system?

       (a) Programming   (b) Monitoring & Control

       (c) Heating   (d) Compressing

   (iv) An example of a process control sensor is

       (a) Toggle switch   (b) Induction motor

       (c) Float sensor   (d) MCB

   (v) Which device is used to convert analog signals to digital?

       (a) DAC   (b) ADC

       (c) Relay   (d) Counter

   (vi) In automation, HMI stands for

       (a) Hardware Machine Interface   (b) Human Machine Interface

       (c) Human Motor Interface   (d) High Machine Interface

   (vii) Which actuator provides linear motion?

       (a) Stepper motor   (b) Induction motor

       (c) Servo motor   (d) Pneumatic cylinder

Scanned with OKEN Scanner

2. (a) Explain the types and benefits of industrial automation.

   (b) Describe the basic components of an automation system with block diagrams.   7+7

3. (a) Compare Relay Logic Control with PLC Control.

   (b) Explain working and applications of photoelectric sensors and encoders.   7+7

4. (a) Describe ADC and DAC with block diagrams.

   (b) Explain the working of servo motor and stepper motor in automation.   7+7

5. (a) Write ladder diagrams for basic logic gates AND, OR, NOT.

   (b) Explain PLC timers and counters with applications in process control.   7+7

6. (a) Explain typical SCADA architecture with block diagram.

   (b) Describe the working of HMI in automation with an example.   7+7

7. Write short notes on *any four* of the following :   3·5×4=14

   (a) Distributed Control System (DCS)

   (b) Proximity sensors — types and uses

   (c) Applications of embedded systems in automation

   (d) Traffic light control using PLC

   (e) PLC ladder diagram for water level control

———

Jharkhand University of Technology, Ranchi

Diploma 4th Semester Examination, 2025 (NEP)

Subject : CNC Programming and Machining   Subject Code : MEC 402

Time Allowed : 3 Hours   Full Marks : 70

Answer in your own words.

Answer any five *questions.*

Question 1 *is compulsory and answer* any four *of the remaining questions.*

All *questions carry equal marks.*

---

1. Write the correct answer of the following questions: 2×7=14

    (i) Which interpolation is used for drawing arcs?
        (a) Linear   (b) Circular
        (c) Elliptical   (d) Radial

    (ii) Which component holds the workpiece in CNC lathe?
        (a) Tool test   (b) Chuck
        (c) Tailstock   (d) Slide

    (iii) M06 in CNC programming is used for
        (a) stop program   (b) tool change
        (c) start spindle   (d) end program

    (iv) What is a CNC simulator?
        (a) Hardware tool   (b) Virtual software to test programs
        (c) Coolant system   (d) Tool holder

    (v) G28 is used to
        (a) move to home position   (b) set tool offset
        (c) rotate workpiece   (d) stop coolant

    (vi) What is tool offset?
        (a) Workpiece dimension   (b) Tool wear compensation
        (c) Derive setting   (d) Part shape

    (vii) Which of the following is a turning operation?
        (a) Pocket milling   (b) Facing
        (c) Tapping   (d) Boring

39755   **Please Turn Over**

2. (a) What is CNC turning? List its common operations.

   (b) Explain the axis system used in CNC machines.   7+7

3. (a) Write a part program for taper turning of 30 mm shaft.

   (b) What are the precautions to be taken before running a CNC program?   7+7

4. (a) Explain the working of automatic tool changer (ATC).

   (b) Define machine zero and work zone with a diagram.   7+7

5. (a) What is CAM? List any two CAM software used in industries.

   (b) Describe the steps for generating CNC code using CAM.   7+7

6. (a) Explain the process of creating tool path for CNC milling.

   (b) What is mirroring in CNC programming? Give one example.   7+7

7. Write short notes on *any four*.   3·5×4=14

   (a) Job setting

   (b) Tool length measurement

   (c) Manual Data Input (MDI)

   (d) CNC milling operations

   (e) Thread cutting cycle

   (f) Machine safety practices

———