

# 22563

**21222**

**3 Hours / 70 Marks**

Seat No. 

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15 minutes extra for each hour

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- Instructions* – (1) All Questions are *Compulsory*.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data, if necessary.
- (5) Preferably, write the answers in sequential order.
- (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

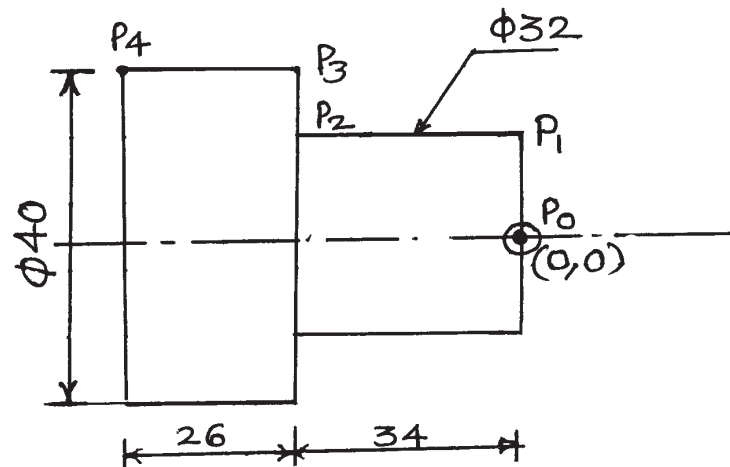
**Marks**

- 1. Attempt any FIVE of the following: **10****
- a) Enlist the different types of non-conventional machining processes.
- b) Name the various types of cutters used in milling operations.
- c) Enlist the different types of gear manufacturing methods.
- d) State the advantages of CNC machines over conventional machines.
- e) State the meaning of subroutine and canned cycles in CNC part programming.
- f) State the function of Automatic tool changer (ATC) in CNC machines.
- g) Define Robotics. State the components of Robotics manipulator.

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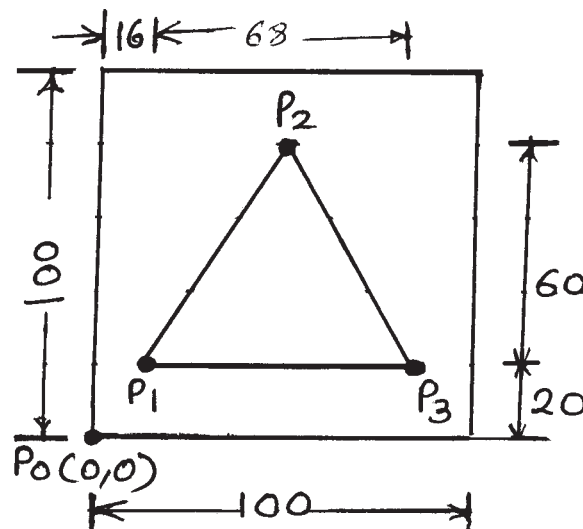
- 2. Attempt any THREE of the following:** **12**
- a) Explain working principle of Electro Discharge Machining (EDM) with sketch.
  - b) Explain Face milling and side milling operations with neat sketch.
  - c) Explain the concept of tool presetting in CNC tooling.
  - d) Explain the use of following codes in CNC part programme.
    - (i) G00
    - (ii) G03
    - (iii) M03
    - (iv) M30
- 3. Attempt any THREE of the following:** **12**
- a) Explain the working principle of gear hobbing with suitable sketch.
  - b) Explain absolute and incremental co-ordinate system in CNC machines with simple suitable example.
  - c) Explain the Do loops programming format with simple example.
  - d) Compare hard automation and soft automation stating one application of each.
- 4. Attempt any THREE of the following:** **12**
- a) Classify gear finishing methods stating one application of each.
  - b) Explain Re-circulating ball screw arrangement in CNC machines with neat sketch.

- c) Develop a part program for turning on CNC lathe for the component shown in Fig. 1 using ISO format. Use the tool path co-ordinates shown in Fig. 1. Neglect tool compensation. Assume suitable data if necessary. Speed of spindle 1000 rpm and feed 100 mm/min.



**Fig. No. 1**

- d) Develop a part program for CNC milling for the part shown in Fig. 2 using ISO format. Take spindle speed 800 rpm, feed 80 mm/min. Depth of slot 5 mm. Assume suitable data if necessary. Neglect cutter compensation.



**Fig. No. 2**

- e) Select an engineering product manufactured by applying group technology principles. Write its part classification and coding.

**5. Attempt any TWO of the following:****12**

- a) Draw Abrasive Jet Machining (AJM) setup diagram showing all the elements. State the function of each elements.
- b) Find cutting speed for milling operation to machine two parallel vertical surfaces of a workpiece simultaneously by using pair of side milling cutters, when cutter rpm is 600 rpm and diameter of cutter is 200 mm.  
Draw the cutter and work arrangement diagram for above operation.
- c) Sketch the Axes nomenclature for CNC lathe and CNC milling. Show major axes with sign conventions.

**6. Attempt any TWO of the following:****12**

- a) Draw the setup diagram of ultrasonic machining (USM). Explain the function of elements in setup. State the process parameters in it.
  - b) Compare simple indexing and compound indexing methods with suitable example.
  - c) Draw the setup of Gear shaping by pinion cutter or rotary gear cutter and explain its working.
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