

# 22563

**12223**

**3 Hours / 70 Marks**

Seat No. 

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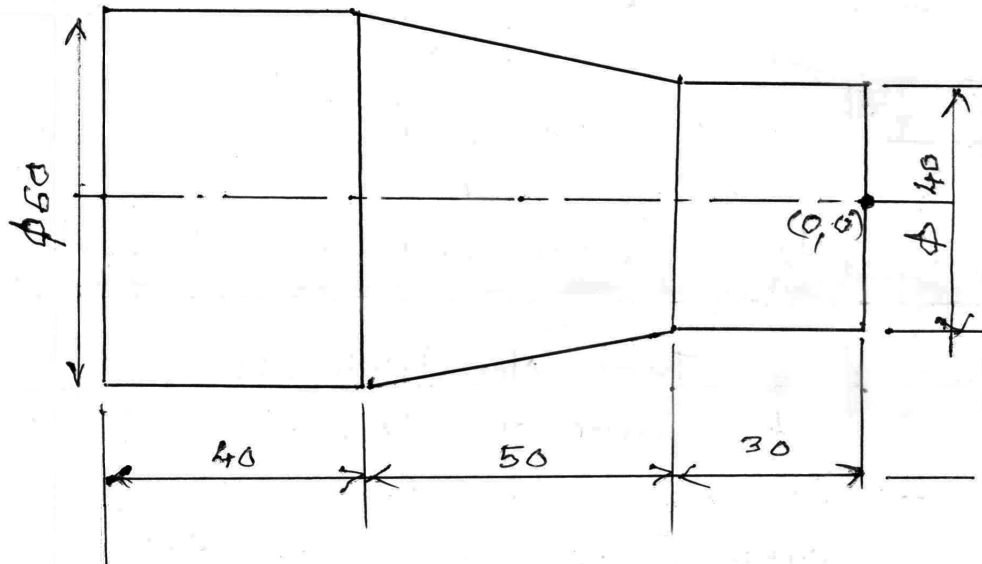
- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Mobile Phone, Pager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

**Marks**

- 1. Attempt any FIVE of the following: **10****
- a) Write advantages of EDM process. (Any two)
  - b) State different types of milling machines.
  - c) Enlist any two gear manufacturing methods.
  - d) State the functions of any two important elements of CNC machine.
  - e) State the meaning of Code M03 and M06 in CNC part programming.
  - f) Define home position and programme zero in CNC part programming.
  - g) Define Automation. Give any one example of hard automation.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Explain with the neat sketch working principle of Abrasive Jet Machining.
  - b) Draw the neat sketch of Column and Knee type of milling machine. State the function of each part of the machine.
  - c) Describe the concept of cutter radius compensation for CNC machine with suitable example.
  - d) Justify the need of virtual simulation of CNC machine.
- 3. Attempt any THREE of the following:** **12**
- a) Explain with the neat sketch any one type of gear hobbing process.
  - b) Compare CNC (Computerized Numerical Control) machine with DNC (Direct Numerical Control) machine.
  - c) Explain the term preparatory function and miscellaneous function in the context of CNC part programming.
  - d) "Pneumatic actuators are widely used in Robotics." Justify.
- 4. Attempt any THREE of the following:** **12**
- a) Compare gear hobbing process with gear shaping process (Atleast four points)
  - b) Explain working and importance of re-circulating ball screw used in CNC machine.
  - c) Prepare process sheet and calculate cutting parameters for the component shown in Figure 1. All dimensions are in mm.  
Given: Raw material stock size -  $\phi$  60 x 120 length.  
Stock material - Aluminium  
Feed  $f = 0.2$  mm / rev.  
Cutting velocity ( $V_c$ ) = 90 m / min.  
Assume suitable data if required.



**Fig. No. 1**

- d) Develop full G and M code manual part program of CNC lathe for component given in Figure 1 in word address format (WAF).
- e) Justify use of cellular manufacturing in today's manufacturing situation.

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

**12**

- a) Draw set up diagram of Ultrasonic Machining (USM) process, showing all the elements. State the function of each element.
- b) A milling cutter of diameter  $\phi = 10$  mm and rotating at 1000 rpm is used to cut 'L' shape slot. Find cutting velocity in m/min. Show cutter and work piece relative arrangement with neat sketch.
- c) Describe Axes nomenclature for CNC turning centre and CNC milling centre.

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

- a) Draw setup diagram and give details of following process control parameters of Electro Discharge Machining (EDM).
- i. Discharge current range.
  - ii. Voltage range
  - iii. Type of dielectric
  - iv. Type of electrode material
- b) Apply simple (plain) indexing method for indexing 30 divisions use number of holes on plate 1, or plate 2 or plate 3 as given below. Reduction ratio of worm gear is 40:1.
- Plate 1 → 15, 16, 17, 18, 19, 20  
Plate 2 → 21, 23, 27, 29, 31, 33  
Plate 3 → 37, 39, 41, 43, 47, 49
- c) Justify the need of gear finishing. Demonstrate any one gear finishing process with important process parameters.
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