

Reg. No.

Question Paper Code

12070

21 JUL 2023

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Fourth Semester

Mechanical and Automation Engineering

20MUPC403 - CNC MACHINES AND METROLOGY

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

- |   | <i>Marks,<br/>K-Level, CO</i> |
|---|-------------------------------|
| 1. Classify of CNC machines.  | 2,K1,CO1                      |
| 2. A CNC milling machine has to cut a slot located between the points (0, 0) and (4, 3) on the XY- plane where the dimensions are in inches. If the speed along the slot is to be 0.1 in/sec, find the cutting time and axial velocities. | 2,K2,CO1                      |
| 3. Write short note on ISO classification of carbide inserts.   | 2,K2,CO2                      |
| 4. Differentiate spindle drive and feed drive.  | 2,K2,CO2                      |
| 5. Give the advantages of digital vernier caliper.  | 2,K1,CO4                      |
| 6. What are the common types of limit gauges?   | 2,K1,CO4                      |
| 7. State the limitations of sine bar.   | 2,K1,CO5                      |
| 8. Define bevel protractors and mention its types.  | 2,K1,CO5                      |
| 9. Name the different types of interferometers.   | 2,K1,CO6                      |
| 10. List the various types of CMM.  | 2,K1,CO6                      |

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

11. a) Explain the advantages and Disadvantages of CNC Machines. Comparison of CNC and DNC with conventional system. 13,K2,CO1
- OR**
- b) Explain the turning centre, machining centre and grinding machine in detailed with neat sketches. 13,K2,CO1
12. a) Briefly describe the working principle of stepper motor and servo motor in CNC machine with neat sketches. 13,K2,CO2
- OR**
- b) Explain the tool and work holding devices in CNC machines. 13,K2,CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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13. a) Explain the following with neat sketches: 13,K2,CO4  
(i) Depth gauge micrometer,  
(ii) Inside micrometer and.  
(iii) Thread micrometer.

**OR**

- b) (i) Explain the classification of linear measuring instruments. 13,K2,CO4  
(ii) Explain the vernier height gauge with neat sketch.

14. a) Explain the working principle of sine bar with neat sketches. Also 13,K2,CO5  
explain why sine bars are not suitable for measuring angles above  $45^\circ$ .

**OR**

- b) Explain with the help of neat sketches, the construction and working 13,K2,CO5  
principle of an autocollimator.

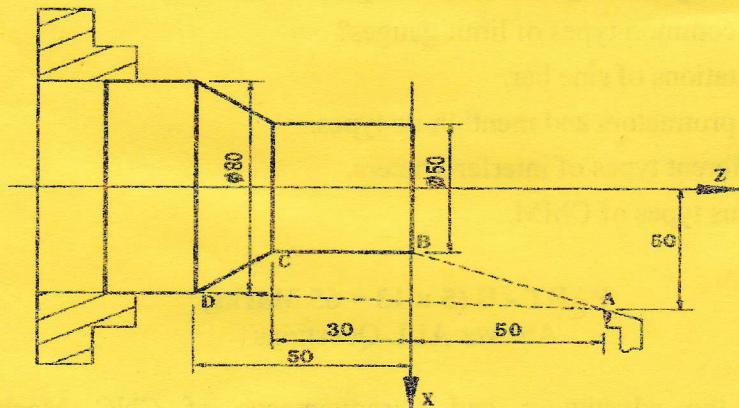
15. a) (a) List out the applications of CMM. 13,K2,CO6  
(b) Point out the advantages and disadvantages of CMM.

**OR**

- b) Explain in detail the various methods of testing accuracy of horizontal 13,K2,CO6  
milling machine and lathe using LASER Interferometer.

**PART - C (1 × 15 = 15 Marks)**

16. a) Write CNC part program for the component shown in Fig. Mention the 15,K3,CO3  
assumptions made.



**OR**

- b) Enumerate with suitable examples the following : 15,K3,CO3  
(i) Multiple turning cycle,  
(ii) Multiple grooving cycles.