Enrollment No...................................

Faculty of Engineering

End Sem Examination May-2024

RA3CO30 CNC Machine & Metrology

Programme: B.Tech.   Branch/Specialisation: RA

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. What is the full form of CNC? **1**
     (a) Computer numerical control   (b) Computer number control
     (c) Computer network control   (d) Computer numbers count

   ii. What does CNC machine use to control motion and speed? **1**
     (a) Numerical
     (b) Programs, as well as computer keyboard, Graphical user interface
     (c) Feedback system
     (d) GUI

   iii. Which of the following operation, we can't perform on drilling **1**
     machine?
     (a) Reaming   (b) Tapping   (c) Lapping   (d) None of these

   iv. Floating holder is included in_____ method of tool holding devices. **1**
     (a) By directly fitting in the spindle   (b) By special attachments
     (c) By a socket   (d) None of these

   v. Which of the following code is used to give input of cutter offset data? **1**
     (a) G30   (b) G20   (c) G10   (d) G04

   vi. Part-programming mistakes can be avoided in- **1**
     (a) NC (Numerical Control) machine tool
     (b) CNC (Computer Numerical Control) machine tool
     (c) Both (a) and (b)
     (d) None of these

   vii. What is the maximum permissible error for class I micrometres? **1**
     (a) 0.002 mm   (b) 0.004 mm
     (c) 0.008 mm   (d) 0.016 mm

viii. Up to which angle sine bars can measure the angles?   **1**
(a) 45 degrees   (b) 60 degrees
(c) 90 degrees   (d) 120 degrees

ix. What precise movement does CMM have?   **1**
(a) Precise movement in x coordinate
(b) Precise movement in x and y coordinates
(c) Precise movement in y and z coordinates
(d) Precise movement in x, y and z coordinates

x. What is the accuracy of present-day co-ordinate measuring machine?   **1**
(a) 10 microns   (b) 5 microns
(c) 2 microns   (d) 1 micron

Q.2 i.   Explain the principle of CNC machine.   **2**
    ii. How does the structure of CNC machine tools differ from conventional **3**
machine tools?
    iii. Classify CNC machines tools based on-   **5**
(a) Types of motion control
(b) According to programming method
(c) According to types of controllers

OR iv. Explain types of guide ways used in CNC machine tool with example.   **5**

Q.3 i.   Explain the servo principle.   **2**
    ii. Explain the following terms: **8**
(a) Spindle drives
(b) Feed drives
(c) Stepper motor
(d) Synchro-resolver

OR iii. List various feedback devices used in CNC machine. Explain working **8**
principle of rotary encoder with neat sketch.

Q.4 i.   Which are formats used for part programming?   **3**
    ii. What is the difference between canned cycle and subroutine?   **7**

OR iii. Write a CNC program using appropriate G and M code to turn **7**
component as shown in Figure 1 cutting speed V = 40 m/min and
feed = 0.1, assume suitable data for depth of cut.
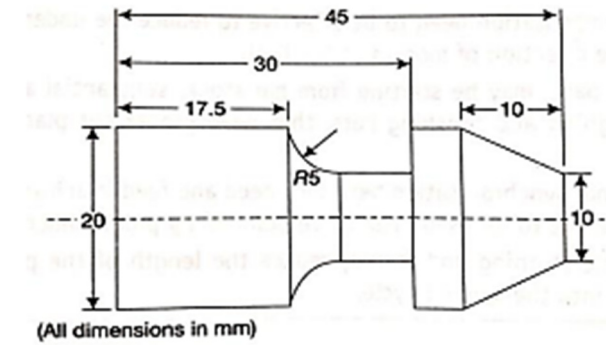
(All dimensions in mm)

Figure 1

Q.5 i.   Explain the concept of inter-changeability.   **4**
    ii. Sketch and working of autocollimator with applications.   **6**

OR iii. What is sine bar? Discuss working of sine bar when component is of **6**
large size.

Q.6   Attempt any two:
    i.   Explain laser interferometer. State it's application.   **5**
    ii. Explain the basic concept of coordinate measuring mechanism.   **5**
    iii. Define the basic concepts of machine vision system.   **5**

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Scheme of Marking

RA3CO30 (T) CNC Machine and Metrology

Q.1	i)	A	1
	ii)	B	1
	iii)	D	1
	iv)	B	1
	v)	C	1
	vi)	B	1
	vii)	B	1
	viii)	A	1
	ix)	D	1
	x)	A	1

Q.2	i.	Components – 1 mark, Working-1 mark	2
	ii.	Description-of both	3
	iii.	Classification description – 1 mark Types – 4 Marks	5
OR	iv.	Two types of Guideways	5

Q.3	i.	Principle – 2 marks	2
	ii.	(a) 2 Marks (b) 2 Marks (c) 2 Marks (d) 2 Marks	8
OR	iii.	List of devices – 4 working of encoding.	8

Q.4	i.	Format- 2 marks, Sequence – 1 mark	3
	ii.	Difference 5 marks, Description- 2 marks	7
OR	iii.	Programme- 6 mark, Figure- 1 mark	7

Q.5	i.	Description 3 marks, Example 1 mark	4
	ii.	Sketch 2 marks, Description 6 marks	6
OR	iii.	Figure-2 marks, working – 4 marks	6

Q.6			
	i.	Figure-2 marks, Description – 2 marks, Application – 1 mark	5
	ii.	Figure-2 marks, Description – 3 marks	5
	iii.	Definition 2 marks, components- 2 marks, Description- 1 mark	5

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