

- Q.6 Attempt any two:
- Explain the CMM with its types. **5**
 - Explain the various machine vision elements and application of Machine vision. **5**
 - Explain the various characteristics of LASER. How it can be useful in metrology. **5**

Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....



Faculty of Engineering
End Sem Examination May-2023
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.

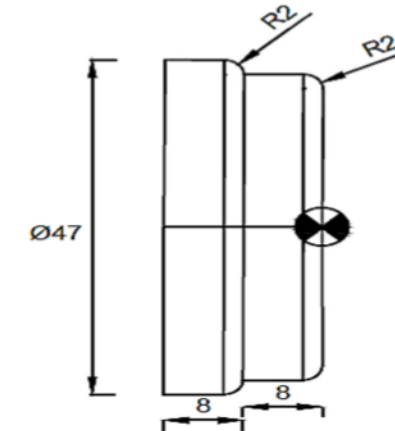
- Q.1
- Several machine tools can be controlled by a central computer in **1**
(a) NC (b) CNC (c) DNC (d) None of these
 - In the NC machine tool, the position feedback package is connected **1**
between _____.
(a) Programmer and Machine tool
(b) Control unit and Machine tool
(c) Control unit and Programmer
(d) None of these
 - The rotor of a stepper motor has no- **1**
(a) Windings (b) Commutator
(c) Brushes (d) All of these
 - A variable reluctance stepper motor is constructed of _____ material **1**
with salient poles.
(a) Paramagnetic (b) Ferromagnetic
(c) Diamagnetic (d) Non-magnetic
 - The code used to set the feed in per minute- **1**
(a) G90 (b) G91 (c) G94 (d) G21
 - Part programming can be done by- **1**
(a) Manual part programming only
(b) Computer assisted part programming only
(c) Automatic part programming through CAD/CAM software package
(d) All of these

P.T.O.

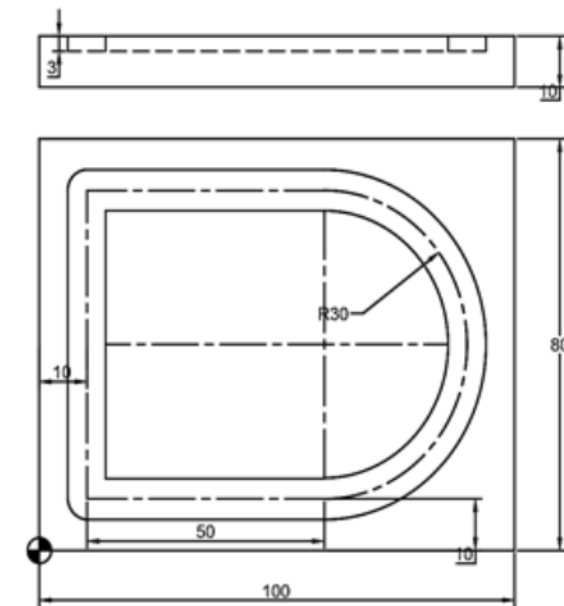
[2]

- vii. The Electrode gap in spark plug can be accurately measured by 1
 (a) A Micrometer
 (b) A Sine Bar
 (c) A feeler gauge
 (d) None of these
- viii. In a sine bar the standard length is measured from 1
 (a) Between inner circumference of two rollers
 (b) Between the centres of two rollers
 (c) Edge to edge
 (d) Between outer circumference of two rollers
- ix. Arrange the various key stages of Machine vision systems sequentially 1
 I. Decision-making
 II. Image processing
 III. Image acquisition
 (a) I - II - III (b) III - I - II (c) II - III - I (d) III - II - I
- x. Which is/are the forms of CMM probe? 1
 (a) Touch-trigger Probe (b) Displacement type probe
 (c) Proximity Probe (d) All of these
- Q.2 i. Explain the DNC. 2
 ii. Explain the advantages to be gained by using CNC compared to NC. 3
 iii. Explain the various types of guideways used in CNC machine. 5
- OR iv. Compare the manual inspection with computer aided inspection. 5
- Q.3 i. How can a stepper motor be used in a CNC machine? 2
 ii. Explain the following- 8
 (a) 3 phase AC Induction motor
 (b) DC Shunt Motor
- OR iii. Explain any four types of work holding devices used in CNC machine with diagram. 8
- Q.4 i. Differentiate between absolute and incremental coordinate systems. 3
 ii. Interpret the given data and generate a Part Program for given product 7
 as per siemens controller
 Raw material Dia 48 mm, Take Max. Depth of Cut 1 mm
 Feed 0.2 mm per rev. (All Dimension in mm)

[3]



- OR iii. Interpret the given data and generate a Part Program as per Fanuc 7
 Controller for the given slot to be generated in CNC Milling. Take, feed
 as 300 mm/minute and maximum depth of cut 1.5 mm. (All Dimension
 in mm)



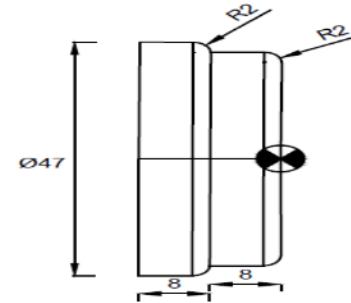
- Q.5 i. Explain the concept of interchangeability. 2
 ii. What is a limit gauge? What are types of limit gauges. 3
 iii. Draw and explain the working principle of Sine bar. Show how to take 5
 reading by it.
- OR iv. Draw and explain the working principle of Bevel Protractor. Show how 5
 to take reading by it.

P.T.O.

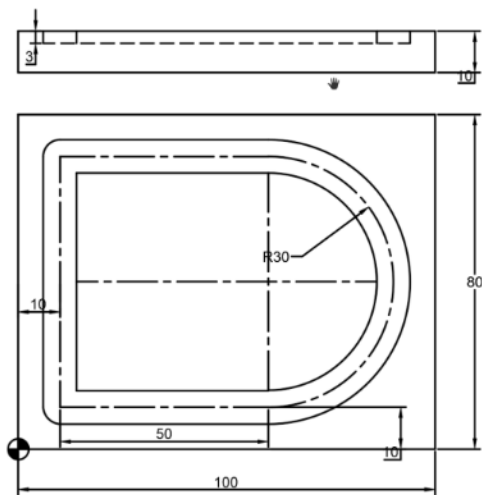
Marking Scheme

RA3CO30 (T) CNC Machine and Metrology

Q.1	Several machine tools can be controlled by a central computer in c) DNC In the NC machine tool, the position feedback package is connected between	1
	b) Control unit and Machine tool The rotor of a stepper motor has no	1
	d) All of the mentioned A variable reluctance stepper motor is constructed of _____ material with salient poles.	1
	b) Ferromagnetic The code used to set the feed in Per minute	1
	c) G94 Part programming can be done by	1
	d) All of these The Electrode gap in spark plug can be accurately measured by	1
	c) A feeler gauge In a sine bar the standard length is measured from	1
	b) Between the centres of two rollers Arrange the various key stages of Machine vision systems sequentially	1
	P) Decision-making Q) Image processing R) Image acquisition d) R -Q – P III – II - I Which is/are the forms of CMM probe	1
	d) All of these	
Q.2	Explain the DNC.	2
	Explanation- 2 marks Explain the advantages to be gained by using CNC compared to NC.	3
	3 Advantages - 3 marks Explain the various types of guideways used in CNC machine	5
OR	2.5 marks each * 2= 5 marks Compare the Manual Inspection with Computer Aided Inspection	5
	5 points - 5 marks	

Q.3	How can a stepper motor be used in a CNC machine?	2
	uses - 2 marks Explain the following- a) 3 phase AC Induction motor b) DC Shunt Motor	8
OR	4 marks each * = 8 marks Explain any four types of Work holding devices used in CNC machine with diagram	8
	2 marks each * 4= 8 marks	
Q.4	Differentiate between Absolute and Incremental coordinate systems.	3
	1.5 marks each Interpret the given data and generate a Part Program for given product as per Siemens Controller Raw material Dia 48 mm, Take Max. Depth of Cut 1 mm Feed 0.2 mm per rev. (All Dimension in mm)	7
		
	3 marks for correct starting (3 blocks) and ending (3 blocks) 4 marks for middle portion Interpret the given data and generate a Part Program as per Fanuc Controller for the given slot to be generated in CNC Milling. Take, feed as 300 mm/minute and maximum depth of cut 1.5 mm. (All Dimension in mm)	7
OR		

[2]



3 marks for correct starting (3 blocks) and ending (3 blocks)
4 marks for middle portion

Q.5 Explain the concept of interchangeability. 2

Explanation - 2 marks

3

1 -Mark Limit gauge

2-Mark Types

Draw and explain the working principle of Sine bar. show how to take reading by it. 5

1 marks for diagram

2 marks working principle

2 marks for process of taking reading

OR iv Draw and explain the working principle of Bevel Protractor. show how to take reading by it. 5

1 marks for diagram

2 marks working principle

2 marks for process of taking reading

Q.6 Attempt any two:
Explain the CMM with its types. 5

Explanation of CMM - 2 marks

types - 3 marks

[3]

Explain the various machine vision elements and application of Machine vision. 5

2.5 marks for elements

2.5 marks for application

iii. Explain the various characteristics of LASER. How it can be useful in metrology. 5

4 marks for 4 characteristics

1 mark for usefulness in metrology
