Printed Page:-03 **Subject Code:- AMTME0201**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M. Tech

SEM: II - THEORY EXAMINATION (2024- 2025)

Subject: Digital Manufacturing and Automation

Time: 3 Hours **Max. Marks: 70**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 15

1. Attempt all parts:-

1-a. The development of first NC machine tool project was awarded to [CO1, K1] 1

(a) Harvard Lab

(b) USAF

(c) MIT

(d) No of these

1-b. What type of motor is used to drive a CNC machining centers axis? [CO2, , K1] 1

(a) Servo

(b) Sling

(c) Derive

(d) Pusher

1-c. In CNC systems multiple microprocessors and programmable logic controllers work _____ [CO3, K1] 1

(a) one after the other

(b) for 80% of the total machining time

(c) in series

(d) in parallel

1-d. For a robot unit to be considered a functional industrial robot, typically, how many degrees of freedom would the robot have? [CO4, K1] 1

(a) 4

(b) 5

(c) 6

(d) 7

1-e. In a simple and visual method of Cell design, the priorities in classifying may be in the order [CO5, K1] 1

(a) Rotational or non rotational – Material – Size – Shape

(b) Material – Rotational or non rotational – Size – Shape

(c) Size – Rotational or non rotational – Material – Shape

(d) Shape – Rotational or non rotational – Material – Size

2. Attempt all parts:-

2.a. State the advantages and limitations of CNC machine tools. [CO1, K1] 2

2.b. Distinguish between the Canned cycle and parametric subroutines. [CO2, K2] 2

2.c. Identify the material properties needed for continuous machining. [CO3, K1] 2

2.d. list the three basic modes of material handling operation. [CO4, K1] 2

2.e. list the the benefits of CIM. [CO5, K1] 2

SECTION-B 20

3. Answer any five of the following:-

3-a. Explain open loop and closed loop control system of CNC machines. [CO1, K2] 4

3-b. With help of block diagram Explain the major components of NC Machines? [CO1, K2] 4

3-c. What are canned cycles? Discuss how a canned cycle is useful in writing a part program? [CO2, K2] 4

3-d. Explain how the various modes of operation are chosen during part programming, and what factors influence their selection? [CO2, K2] 4

3.e. List and comment on the advantages of coating high-speed steel tools. [CO3, K1] 4

3.f. Explain the functions of work cell controller. [CO4, K2] 4

3.g. What is CIM? Explain Components of CIM. [CO5, K2] 4

SECTION-C 35

4. Answer any one of the following:-

4-a. Explain part origin, machine origin and program origin for CNC programming. [CO1, K2] 7

4-b. Explain NC, CNC and DNC machines. [CO1, , K2] 7

5. Answer any one of the following:-

5-a. Describe with sketch the working and construction of recirculating ball screw used in CNC machine tools. [CO2, K2] 7

5-b. Write down simple CNC programs for turning, a Aluminum block of initial diameter of 40 mm to 10 mm using parametric subroutine. take spindle speed as 1200 RPM, depth of cut 2mm assume suitably missing data if any . [CO2, K3] 7

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6. Answer any one of the following:-

6-a.	Describe the principle of working of an automatic pallet changer and automatic tool changer. [CO3, K3]	7
6-b.	List and explain the considerations involved in the decision to recondition, recycle, or discard a cutting tool. [CO3, K2]	7

7. Answer any one of the following:-

7-a.	What is the purpose of a gripper, and how is the selection of a gripper determined?[CO4, , K3]	7
7-b.	Discuss any four common robot configurations in detail. [CO4, K3]	7

8. Answer any one of the following:-

8-a.	Explain the steps required to determine machine cell and part families with an example using rank order clustering algorithm and cluster identification algorithm [CO5, K3]	7
8-b.	Describe a Flexible Manufacturing System and explain the function of its main components. [CO5, K3]	7

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