Reg. No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

B.E / B.TECH. DEGREE EXAMINATIONS, MAY 2023
Sixth Semester
ME18014 – DIGITAL MANUFACTURING
(Mechanical Engineering)
(Regulation 2018)

TIME: 3 HOURS   MAX. MARKS: 100

CO 1	The students will be able to learn basic concepts of NC, CNC machines and adaptive control system.
CO 2	The students will be exposed to different Mechatronics and Mechanical elements in CNC machines.
CO 3	The students will be able study different CNC measuring system and tooling.
CO 4	The students will be able to practice CNC programming.
CO 5	The students will be able to study the maintenance of different CNC machine elements.

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

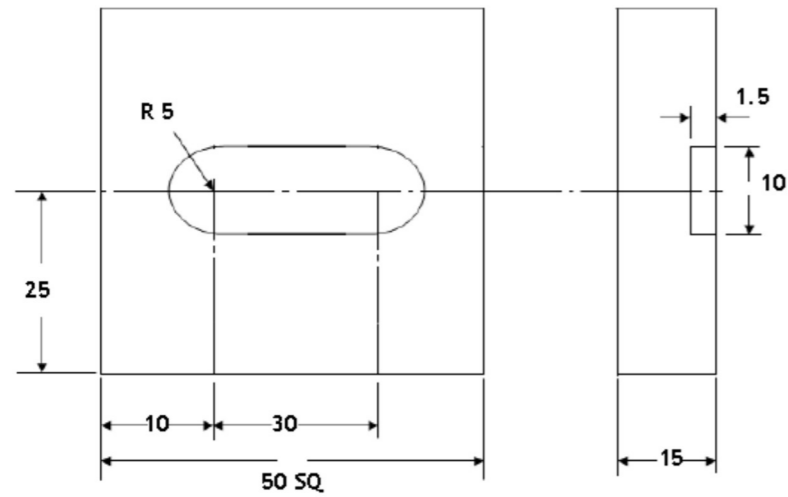|		CO	RBT LEVEL
1	Differentiate closed loop system and open loop system.	1	2
2	List out any four electrical elements of a CNC system.	1	3
3	Name any two advantages of using a PLC rather than conventional relays, timers, counters and other hard-wired control components.	2	3
4	State the usage of sensor and actuator in digital manufacturing.	2	1
5	How does the modular fixture differ from unified fixture in CNC machine?	3	4
6	Differentiate resolver and encoder.	3	3
7	What do you mean by tool offset and tool compensation?	4	2
8	Differentiate ATC and APC.	4	2
9	What is meant by dry run in CNC?	5	1
10	State any four commonly encountered issues in the set-up and maintenance of CNC machine.	5	2

PART- B (5 x 14 = 70 Marks)

				Marks	CO	RBT LEVEL
11(a)	(i)	Identify a mechatronics system that is used in our day-to-day life and explain its application.		(6)	1	4
	(ii)	Analyse its mechanical, electrical, electronic elements in the functioning of the above system.		(8)	1	4
		(OR)				
11(b)	(i)	Illustrate the three functions of an adaptive control system, being used in digital manufacturing perspective.		(6)	1	4
	(ii)	Analyse the evolution of CNC with respect to NC and DNC.		(8)	1	4
12(a)	(i)	Explain the general configuration of a CNC system with a neat sketch		(7)	2	3
	(ii)	Explain the hardware component that are used in machine tool for converting electrical energy into mechanical energy.		(7)	2	3
		(OR)				
12(b)	(i)	List out the five basic components of a PLC.		(4)	2	3
	(ii)	Explain the five PLC programming methods identified in the International Standard for Programmable Controllers (IEC 1131-3).		(10)	2	3
13(a)	(i)	With a block diagram, explain the three stages of a digital measurement system.		(6)	3	3
	(ii)	Classify the CNC cutting tools on the basis of setting up of tools.		(8)	3	3
		(OR)				
13(b)	(i)	What are the six basic principles of work holding devices?		(6)	3	3
	(ii)	Explain most commonly employed and simplest method of location, 3-2-1 principle of location.		(8)	3	3
14(a)		Write a part programme using G – codes and M – codes to perform CNC Lathe operations such as facing, turning, taper turning, etc.		(14)	4	3
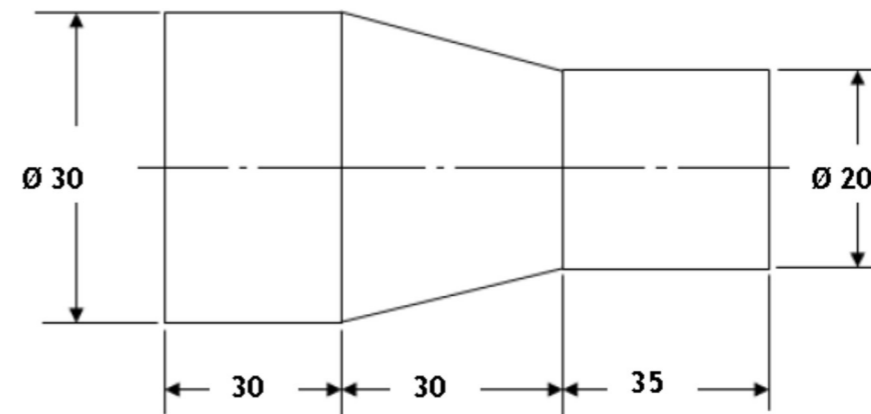
(OR)

14(b) Write a part programme using G-codes and M-codes to perform machining operations in CNC Milling machine.   **(14)**   **4**   **3**

15(a) Explain the procedure to be followed for installation and maintenance of CNC machine.   **(14)**   **5**   **2**

(OR)

15(b) Describe the technical specifications of a 5 axis CNC milling machine.   **(14)**   **5**   **2**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

			Marks	CO	RBT LEVEL
16	**(i)**	Why the tool condition monitoring system is so important?	**(2)**	**3**	**4**
	(ii)	Explain any four types of tool condition monitoring system.	**(8)**	**3**	**4**

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