

I SEMESTER M.TECH. (INDUSTRIAL AUTOMATION AND ROBOTICS) END SEMESTER EXAMINATIONS, DEC 2018

SUBJECT: AUTOMATED MANUFACTURING SYSTEMS [MTE 5133]

TIME: 3 HOURS

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL questions.
- Missing data may be suitable assumed.
- 1A. Write a CNC part program for machining the component as shown in Fig 1A on Vertical (05) Machining center. The radius of four corner holes is 06 mm. All dimensions are in mm.



Fig 1A: Component dimension details

- 1B. Draw a circuit diagram of point-to-point control system and discuss the working principle and the function of AND GATE in the circuit (05)
- 2A. Discuss the design considerations of guideways in a CNC machine with neat (05) diagrams.
- **2B.** Summarize the purpose of material handling systems used in industries? Discuss any (05) four-material transport equipment.
- **3A.** List the sources of variability in machining and explain the ACC system in detail. (05)
- **3B.** Write a CNC part program for machining the component shown in the Fig 3B on turning center, the diameter of the ingot is 32 mm. All dimensions are in mm.



Fig 3B: Machining Profile for turning operation

- **4A.** You are running a startup which focuses on automating the existing manufacturing (06) system. Illustrate the approach and strategies you seek for automating a manufacturing system of your choice, emphasising on the control parameters and components of automation.
- **4B.** Identify the various sources of thermal loads in CNC machine, and discuss the (04) different methods of reducing these thermal loads.
- 5A. Elaborate on absolute and incremental coordinate systems. Which system is better? (03) Justify your answer.
- **5B.** In each aisle of an AS/RS, there are 70 storage compartments in the length direction (04) and 10 storage compartments vertically. The dimensions of the unit load in inches (in) are 50 (length), 45 (width) and 50 (height) respectively. The allowances designed for each storage compartment are : x = 8 inch, y = 7 inch and z = 10 inch. Storage depth u in the number of unit load is 3. Determine the capacity per aisle and the dimensions of the single storage system.
- 5C. With the aid of a simple sketch describe the method of reproducing a machining (03) feature using the mirror image word address programming facility in one axis and two axes.