MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University, Manipal – 576 104

I SEMESTER M.TECH (INDUSTRIAL ROBOTICS AND AUTOMATION)
END SEMESTER EXAMINATIONS, DEC 2015/JAN 2016

SUBJECT: Automated Manufacturing Systems (MTE 507)

Time: 3 Hours   MAX. MARKS: 50

Instructions to Candidates:
- ❖ Answer **ANY FIVE FULL** questions.
- ❖ Missing data may be suitable assumed.

1A. Explain the following terms in context of design considerations of NC machine tools   **4.**

    (i)   Repeatability

    (ii)   Accuracy

    (iii)   Resolution

1B. In an NC drive the pitch of the lead screw is 10 mm, and an encoder of 1000 pulse **3** per revolution is mounted on its end. The backlash between the lead screw and the nut is 3.6 degrees. Calculate the backlash in terms of linear slide movement and BLU?

1C. What are the advantages of incremental system over absolute system in CNC?   **3**

2A. A CNC milling machine has to cut a slot located between the points (0,0) and (7.1, **4** 7.1) on XY plane. The recommended federate along the slot is 6in/min. Find cutting time and axial velocities?

If velocity in Y-axis is off by -10 %, what is the position error along y axis at the end of the path?

2B. Enumerate the advantages and disadvantages of cellular layouts.   **3**

2C. Define Shop floor control. Discuss the importance of order scheduling.   **3**

3A. Explain the various types of co-ordinate measurement machines.   **5**

3B. What do you understand by computer aided process planning?   **2**

3C. What are the various advantages of CNC over conventional NC machines?   **3**

4A. When do you suggest variant CAPP over generative CAPP? Discuss variant CAPP with suitable flow diagram taking appropriate example.   **4**

4B. A ten-station in-line assembly machine has an ideal cycle time is 6 sec. The base part is automatically loaded prior to the first station, and components are added at each of the stations. The fraction defect rate at each of the 10 stations is q is 0.01, and the probability that a defect will jam is m is 0.5. When jam occurs the average downtime is 2 min. Cost to operate the assembly machine is \$42.00/hr. Other costs are ignored. Determine: (a) Average production rate of all assemblies (assemblies/hr}, (b) Yield of good assemblies, (c) Average production rate of good product. (d) Uptime efficiency of the assembly machine.   **6**

5A. The outline of the part is to be profile milled, using a 20·mm diameter face mill and 10mm dia drill. The part is 10 mm thick. Spindle speed is 2500RPM and feed = 10 IPM for drill as well as contour. Use the Lower left comer of the part as the origin in the x-y axis system. Write the part program.   **8**
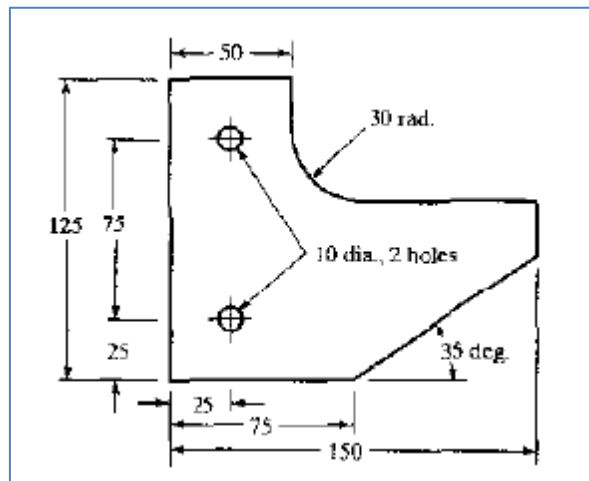
5B. What is the significance of canned cycle in drilling multiple holes? Write single block for canned cycle command used in drilling.   **2**

6A. Discuss the various objectives of automating a company's storage operations.   **2**

6B. In context of automated identification methods, explain   **3**

    (i)   Encoded data

    (ii)   Machine reader or scanner

    (iii)   Decoder

6C. The AGVs includes load station 1 where raw parts enter the system for delivery to **5** any of three production stations 2, 3, and 4. Unload station 5 receives finished parts from the production stations. Load and unload times at stations 1 and 5 are each 0.5 min. One Material flow loop completes, when vehicle completes the flow of 1-3-4-5-1 followed by 1-2-5-1. It is desired to determine how many vehicles are required to satisfy demand if a total of 40 del/hr must be completed by the AGVs. The following performance parameters are given: onward vehicle velocity= 50m/min, downward vehicle velocity = 60m/min, availability = 0.95, traffic factor = 0.90, and operator efficiency does not apply, so E = 1.0. Determine total cycle time per delivery as well as the number of vehicles required.
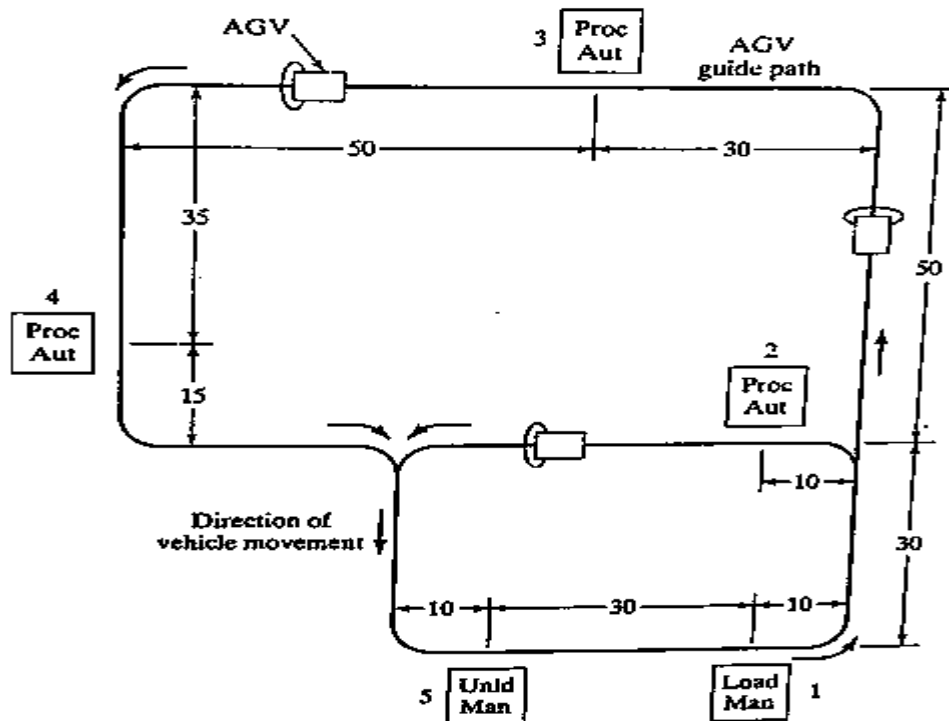
From-To Chart Showing Flow Rates, loads/hr (Value Before the Slash Mark) and Travel Distances, m (Value After the Slash Mark) Between Stations in a Layout

	To	1	2	3	4	5
From	1	0	9/50	5/120	6/205	0
	2	0	0	0	0	9/80
	3	0	0	0	2/85	3/170
	4	0	0	0	0	8/85
	5	0	0	0	0	0