B.E. Eighth Semester (Mechanical Engineering) (C.B.S.)
Automation in Production

P. Pages : 3

Time : Three Hours

KNT/KW/16/7594

Max. Marks : 80

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Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) What is automation in production. Explain how product variety and production volume are related to various types of automation system. **6**

b) A manual assembly line operator with a mechanized conveyors which moves at a speed of 2m/min. The spacing between the base part put on the line is 1.5m and stations are separated from each other by 2.5m. Find the ideal minimum number of work stations and cycle time. Get the line balancing solution using largest candidate rule and find the balance delay. **7**

| Element	Time (Min)	Preceeded by	Element	Time (Min)	preceeded by
1	0.2	-	8	0.2	5
2	0.5	-	9	0.4	5
3	0.2	1	10	0.3	6,7
4	0.6	1	11	0.1	9
5	0.1	2	12	0.2	8,10
6	0.2	3,4	13	0.1	11
7	0.3	4	14	0.3	12,13

OR

2. a) What are the different methods of workpart transport for transfer line? Describe their suitability to different manufacturing situations. **6**

b) An 8 station automatic assembly line has an ideal cycle time of 40 sec. the average downtime per occurance is 4 min. The fraction defect rate is 1% and the probability that the defective part jam at a given station is 0.7 for all stations. The cost to operate the assembly machine is Rs. 800/- per hour and cost of components being assembled is Rs. 200/- per unit. Ignoring other cost Determine i) yield of good assemblies ii) Average rate of good assemblies. iii) What proportion of assemblies will have at least one defective component. iv) Determine unit cost of assembled product. **7**

3. a) What is Numerical control system? Explain various types of N.C motion control system. **6**

b) Explain various components of NC system. Also discuss the problem with conventional NC that leads to the development of DNC and CNC. **7**

OR

4. a) Explain various N.C Words and APT statements. **5**

b) Write an APT part programme for the component (drilling & milling). The spindle speed is 500 rpm. feed rate is 2 mm/rev. Thickness of the part = 20 mm. If two cuts are required (Finish cutter = 20 mm & Rough cutter = 28 mm) along with two holes of 6 mm diameter. **8**

Fig not to scale
Assume data is required
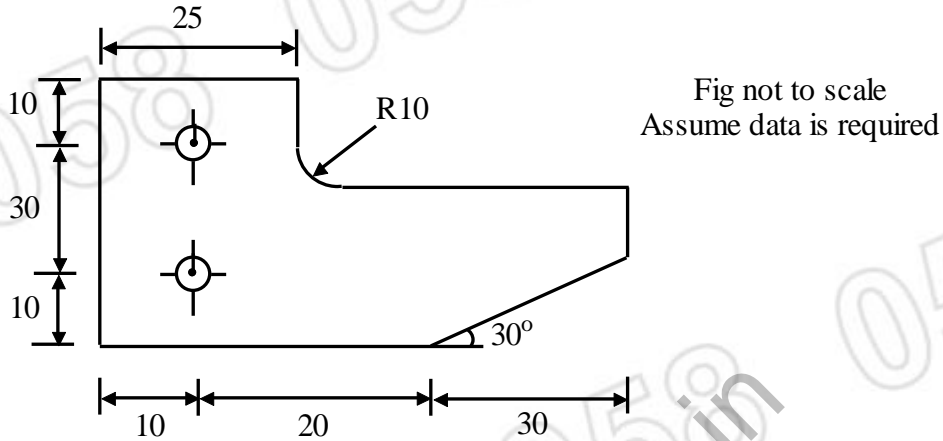
5. a) Explain 'sensors' in Robots with specific applications. **6**

b) With the help of neat sketches explain various robot configuration stating their advantages and application. **8**

OR

6. Write short notes on **any three.** **14**

   i) Robot Joints.

   ii) End effectors in Robot.

   iii) Adaptive control.

   iv) Robot programming.

   v) Robot work volume.

7. a) Explain various types of AGVS. Also discuss vehicle guidance and Routing for AGVS. **7**

b) The following specifications are given for AGVS which is capable of making 120 deliveries per hour. The Average Travel distance per delivery is 150 m. Average empty travel distance is 100 m. Load and unload time (each) is 0.75 min. speed of vehicle is 40m/min. The traffic factor is 0.80. Determine. **6**
   i) Average total time per delivery, the handling system efficiency, and the resulting No. of deliveries per hour for a vehicle.
   ii) No. of vehicles required for 120 deliveries/ hour.

8. a) What is AS/RS. What are its types. Also Explain various elements of an AS/RS. **7**

b) A mechanised storage carousel has a length of 12 m and width of 1.5 m The velocity of the carousel is 20 m /min. and the part handling time at the unload station is 50 sec. Determine the average time to retrieve a part from the system. **6**

    i) Assuming that the part revolves in single direction.

    ii) Assuming that it revolves in both directions.

9. a) Define Group Technology? Explain optiz classification and coding system with an example. **6**

b) Explain with neat sketches various configurations of Co-ordinate measuring machine. **7**

10. a) Compare offline and online Inspection. Also explain machine vision system with neat sketch. **7**

b) Explain composite part concept and production flow analysis (PFA). **6**

11. a) What do you mean by computer Integrated Manufacturing system? Explain. **7**

b) What is F.M.S? Explain different layout configurations of FMS. **7**

12. Write short notes on **any three.** **14**

    i) Flexibilities in FMS.

    ii) CAPP and its types.

    iii) Stop floor control.

    iv) C.A.Q.C.

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