U.S.N ☐☐☐☐☐☐☐☐☐☐

P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Third Semester, M.Tech. - Mechanical Engineering (MCIM)
Semester End Examination; Dec - 2017/Jan - 2018
Industrial Automation

Time: 3 hrs   *Max. Marks: 100*

*Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a.	Explain the different types of automation and write the examples of automated manufacturing systems.	10
b.	Discuss the types of material handling equipment associated with three layout types.	10
2.	Consider an automated cell consisting of a CNC machine tool, a parts storage unit and a robot for loading and un loading the parts between the machine and the storage unit. Possible errors that might effect this system can be divided into the following categories: i) Machine and process ii) Cutting tools iii) Work holding fixture iv) Part storage unit v) Load/unload robot. Develop a list of possible errors that might be included in each of these five categories.	12
b.	Distinguish between AS/RS and a carousel storage system.	8

UNIT - II

3 a.	Discuss the role of computer control system in automated manufacturing systems.	10
b.	What are the factors to be considered while classifying manufacturing system	10
4 a.	A machine tool builder submits a proposal for a 20-station transfer line to machine a certain components currently produced by conventional methods. The proposal states that the line will operate at production rate of 50 pieces per hour at 100% efficiency. On similar transfer lines. The probability of station break downs per cycle is equal for all stations and $P = 0.005$ breakdowns/cycle. It is also estimated that the average down time per line stop will be 8.0 min. The starting casting that is machined on the line costs Rs.300 per part. The line operates at accost of Rs.750 /hr. The cutting tools last for 50 parts each and the average cost per tool = Rs.200 per cutting edge. Based on this data, compute; i) Production rate ii) Line efficiency iii) Cost per unit piece produced on the line.	12
b.	Write the differences between continuous control and discrete control.	8

UNIT - III

5 a. An eight station automatic assembly machine has an ideal cycle time of 10 sec. Down time is caused by defective parts jamming at the individual assembly stations. The average downtime per occurrence is 3.0 min. The fraction defective part will jam at a given station is 0.6 for all stations. The cost to operate the assembly machine is Rs.90.00 per hour and the cost of components being assembled is Rs.60 per unit assembly. Ignore other costs.

Determine;

  i) Yield of good assemblies

  ii) Average production rate of good assemblies

  iii) Proportion of assemblies with at least one defective component

  iv) Unit cost of the assembled production.   12

 b. With neat sketch, explain hardware elements of the parts delivery system.   8

6 a. Explain the importance of AGVS in material handling automated industries and also explain Vehicle Guidance Technology.   11

 b. Discuss the different phases of shop floor control.   9

UNIT - IV

7.a Name and explain the different tools used in statistical process control.   13

 b. Define automated inspection. Explain the number of ways the automated inspection can be implemented.   7

8.a With a neat sketch, explain the constructional features of coordinate measuring machine.   14

b. What are the advantages of noncontract inspection over contact type inspection techniques?   6

UNIT - V

9 a. With a neat block diagram, explain the structures of an MRP system.   10

 b. Discuss the two stages of capacity planning adjustments.   10

10 a. Explain the different steps involved in retrieval type CAPP system.   15

 b. What are the benefits of CAPP system?   5

＊ ＊ ＊