



## P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, M.Tech - Mechanical Engineering (MCIM)

Semester End Examination; May/June - 2018

**Flexible Manufacturing System**

Time: 3 hrs

Max. Marks: 100

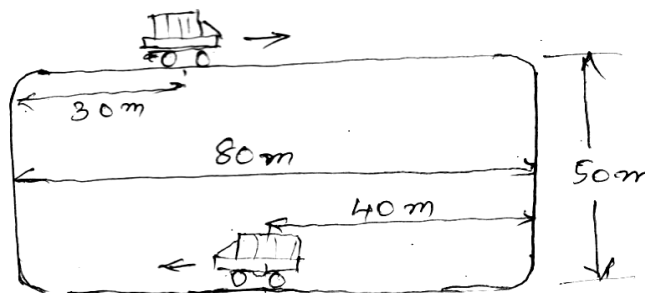
*Note: Answer FIVE full questions, selecting ONE full question from each unit.*

### UNIT - I

- 1 a. Define the following :
- |                        |                        |                          |  |
|------------------------|------------------------|--------------------------|--|
| i) Machine flexibility | ii) Mix flexibility    | iii) Routing flexibility |  |
| iv) Volume flexibility | v) Product flexibility |                          |  |
- b. Explain the typical categories of FMS according to the number of machines in the system. 10
- 2 a. With neat sketch, explain: i) Open field FMS 10  
 ii) Robot centered FMS. 10
- b. Discuss the advantages and disadvantages of FMS. 10

### UNIT - II

- 3 a. Explain the types of material handling equipment's. 10
- b. In an organization the layout for the AGV's is planned as shown in figure below.



The following data is given:

Total deliveries required = 50 deliveries / hour

Velocity of the vehicle = 50 m / min

Average loading time = 1 min

Average unloading time = 1 min

Traffic factor = 0.9

Availability = 0.96

Worker efficiency = 1.0

Determine;

- |                                       |   |
|---------------------------------------|---|
| i) Travel distance with load          | ii) Empty travel distance                       |
| iii) Ideal delivery cycle time        | iv) Number of AGV's required to meet the demand |
| v) Efficiency of the handling system. |   |

Neglect any reduced distances due to corners.

- 4 a. Explain the classes of AS/RS. 10
- b. The oval of the top driven carousel track has a length = 50 m and width = 4 m. The speed of the carousel = 75 m/min. There are 100 carriers around the carousel and each carries 5 bins suspended from it. For a single direction carousel and bidirectional carousel, compare how long it takes to retrieve 20 parts from a carrier, if each part is in different storage bin and random storage is used in the carousel? Also determine the spacing between carrier and carousel. The handling time associated with retrieval is 20 seconds. 10

**UNIT - III**

- 5 a. With a neat sketch, explain the configuration of DNC. 10
- b. Explain the strategies of a tool employed in FMS. 10
- 6 a. Explain the tool identification systems in FMS. 10
- b. With a neat sketch, explain the types of CMM. 10

**UNIT - IV**

- 7 a. With an example, explain parts classification and loading system. 10
- b. Explain the steps in production flow analysis. 10
- 8 a. Differentiate between Cellular manufacturing and FMS modeling. 10
- b. Explain the steps of grouping parts and machines by rank order clustering. 10

**UNIT - V**

- 9 a. Explain Flexible assembly systems. 10
- b. Explain features of FAS. 10
- 10 a. Explain economical justification of FMS. 10
- b. With a neat sketch, describe HNH FMS system. 10

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