

R09

Code No: C8003**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****M.Tech I - Semester Examinations, March/April-2011****AUTOMATION IN MANUFACTURING****(MECHATRONICS)****Time: 3hours****Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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- 1.a) Explain various types of automation strategies and mention their effect on various parameters of automation like MLT, WIP, operation time etc. [8]
- b) Discuss about types of costs in manufacturing. [4]
- 2.a) Discuss about various material characteristics and explain how they affect the material handling system. [8]
- b) Briefly explain the basic components of an AS/RS system. [4]
- 3.a) Explain the analysis of single model assembly lines. [8]
- b) What is line balancing? Define the terms total work content, cycle time and balance delay. [4]
- 4.a) In a 10-station transfer line, the probability that a station breakdown will occur for a given work part is equal to 0.01. This probability is the same for all 10 stations. Determine the frequency of line stops per cycle on this flow line using the upper and lower-bound approaches. Also compute the production rate. [4]
- b) Discuss the analysis of automated flow lines with storage buffers. [8]
- 5.a) A 10 station in-line assembly machine has a 6 second ideal cycle time. 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 $q = 0.01$, and the probability that a defect will jam is $m = 0.5$. When a jam occurs, the average downtime is 2 minutes. Determine the average production rate, the yield of good assemblies, and the uptime efficiency of the assembly machine. [8]
- b) Discuss the analysis of a single-station assembly machine. [4]

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6. The following list defines the precedence relationships and element times for a new model toy:

Element	T (Minutes)	Immediate predecessors
1	0.5	---
2	0.3	1
3	0.8	1
4	0.2	2
5	0.1	2
6	0.6	3
7	0.4	4, 5
8	0.5	3, 5
9	0.3	7, 8
10	0.6	6, 9

Determine the assignment of work elements to stations using the largest-candidate rule. Also calculate

- (a) How many stations are required?
 (b) Compute the balance delay. [12]
7. It is desired to determine how many vehicles will be required to satisfy demand for a particular AGVS. The system must be capable of making 40 deliveries/hour. The following specifies the performance characteristics of the system: Vehicle velocity = 150 m/min, average distance traveled per delivery = 450 m, pick-up time = 45 s, drop-off time = 45 s, average distance traveling empty = 300 m, traffic factor = 0.90. Determine the number of vehicles required to satisfy the delivery demand. Also determine the handling system efficiency. [12]
8. Write short notes on the following:
 (a) Functions in Manufacturing
 (b) Kilbridge and Wester method of line balancing
 (c) Transfer Mechanisms. [3 x 4 =12]

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