

Code No: C3301

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH I - SEMESTER EXAMINATIONS, APRIL/MAY-2012

AUTOMATION IN MANUFACTURING

(ADVANCED MANUFACTURING SYSTEMS)

Time: 3hours

Max. Marks: 60

Answer any five questions
All questions carry equal marks

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- 1.a) Discuss various types of automation strategies mentioning their importance.
- b) What is plant layout? Discuss different types of layouts mentioning their applications.
- 2.a) Mention the objectives of automated flow line and discuss about in-line and rotary type configuration lines.
- b) With neat diagrams explain the functioning of various types of Transfer Mechanisms.
3. Calculate the line efficiency for a transfer line with one storage buffer. The line has 10 workstations, each with a probability of breakdown of 0.02. The cycle time of the line is 1 min. and each time a breakdown occurs, it takes exactly 5 min. to make repairs. The line is to be divided into two stages by a storage bank so that each stage will consist of five stations. Compute the efficiency of the two-stage line for various buffer capacities.
4. A proposal has been submitted to replace a group of assembly workers, each working individually, with an assembly line. The following table gives the individual work elements

Element	T_e (min)	Immediate predecessors
1	1.0	----
2	0.5	----
3	0.8	1,2
4	0.3	2
5	1.2	3
6	0.2	3,4
7	0.5	4
8	1.5	5,6,7

The demand rate for this job is 1600 units/week (assume 40 h/week) and the current number of operators required to meet this demand is eight using the individual manual workers.

- a) Construct the precedence diagram from the data provided on work elements.
- b) Use the Kilbridge and Wester method to assign work elements to stations. What is the Balance delay for the solution?
- c) The initial cost to install the assembly line is Rs.20, 000. If the hourly rate for workers is Rs. 5 .00 /h, will the assembly line be justified using a 3-year service life? Assume 50 weeks/year. Use a rate of return = 10%.

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- 5.a) Discuss the effect of plant layout in the design of material handling systems.
- b) Explain the quantitative relationships and analysis of AGV systems.

- 6.a) Discuss about various types of costs in manufacturing.
- b) Explain the analysis of transfer lines without storage.

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.

8. Write short notes on the following:
 - (a) Analysis of multi station assembly
 - (b) Communication systems in manufacturing
 - (c) Automated Storage/ Retrieval Systems
