R09

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
- - -

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%.

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

****