C U SHAH UNIVERSITY

Subject Code: 5TE02INA1   Date: 29/05/2015
Subject Name: Industrial Automation   Total Marks: 70

Instructions:
1. Make suitable assumptions whenever necessary.
2. Figures to the right indicate full marks.
3. All questions are compulsory.

Section - I

Q-1 (a) How can plant capacity be increased or decreased in the short term? 04

(b) Identify three situations in which manual labor is preferred over automation. 03

Q-2 (a) A production machine operates 80hr/week (two shifts, 5 days) at full capacity. Its 07
production rate is 20 units/hr. During a certain week; the machine produced 1000 parts
and was idle the remaining time. I) Determine the production capacity of the machine ii)
What was the utilization of the machine during the week under consideration.

(b) Give the complete analysis of transfer lines with no internal storage. 07

OR

Q-2 (a) A total of 7000 stampings must be produced in the press department during the next three 07
days. Manually operated presses will be used to complete the job and the cycle time is 27
sec. Each press must be setup before production starts. Setup time for this job is 2.0 hr.
How many presses and operators must be devoted to this production during the three
days, if there are 7.5 hrs of available time per day?

(b) Write a short note on machine cluster. 07

Q-3 (a) Give the complete analysis of Single direction conveyors. 07

(b) Consider the AGVS layout shown in figure 01. Following performance parameters are 07
given: Loading time = 0.75 min; Unloading time = 0.50 min; velocity = 50m/min;
availability = 0.95; traffic factor = 0.90; Operator efficiency = 1.0; Determine, if a total of
40 del/hr must be completed by the AGVS, i) travel distances loaded and empty ii) ideal
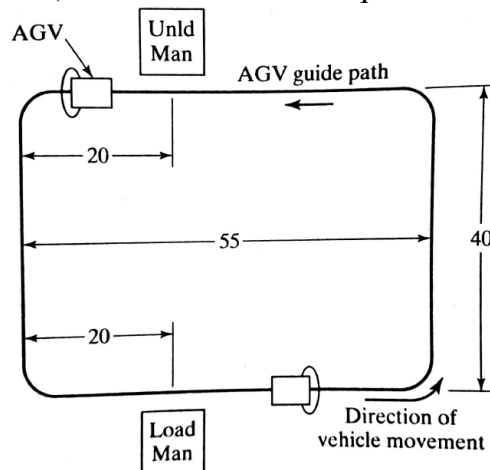delivery cycle time and iii) number of vehicles required to satisfy the delivery demand.

Fig.01

OR

Q-3 (a) A manual assembly line has 17 workstations with one operator per station. Work content 07
time to assemble the product = 28.0 min. Production rate of the line = 30 units per hour.
The proportion uptime = 0.94, and repositioning time = 6 sec. Determine the balance
delay.

| | (b) | Give the complete analysis of Vehicle based material transport systems. | 07 |

<div align="center">Section -II</div>

Q-4	(a)	Define the term accuracy and precision in measurement.	04
	(b)	Write a short note on Carousel storage system.	03
Q-5	(a)	A human worker has inspected a batch of 100 parts, reporting a total of 12 defects in the batch. On careful examination, it was found that four of these reported defects were in fact good pieces (four false alarms), whereas a total of six defective units in the batch were undetected by the inspector (six misses). What is the inspector's accuracy in this instance? Find the values of i) p1 ii) p2 & iii) A.	07
	(b)	Write principles that can be applied in product design to facilitate automated assembly.	07

<div align="center">OR</div>

Q-5	(a)	An inspector reported a total of 18 defects out of a total batch size of 250 parts. On closer examination, it was determined that five of these reported defects were in fact good pieces, while a total of nine defective units were undetected by the inspector. What is the inspectors accuracy in this instance? Specifically what are the values of p1 and p2? What was the true fraction defect rate q?	07
	(b)	What are the two basic categories of automated storage systems?	07
Q-6	(a)	Which are the considerations in material handling system design?	07
	(b)	What is an AND gate? How does it operate on two binary inputs?	07

<div align="center">OR</div>

| Q-6 | (a) | Describe what an operating characteristic curve is in acceptance sampling. | 07 |
| | (b) | Construct the Ladder logic diagrams for the following Boolean logic equations i) Y = (X1+X2)X3; ii) Y = (X1+X2)(X3+X4); iii) Y = (X1X2)+X3;   iv) Y = X1X2 | 07 |