Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Industrial Automation

Subject Code: 5TE02INA1 **Branch: M.Tech Mechanical (CAD/CAM)**

Semester: 2 **Date: 07/05/2018** **Time: 10:30 To 01:30** **Marks: 70**

Instructions:

(1) Use of Programmable calculator and any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

SECTION – I

Q-1 **Attempt the Following questions.**

a. Give the types of Automation relative to production quantity and product variety. **01**

b. What is a pallet fixture in work transport in a manufacturing system? **02**

c. What is a manual assembly line? **02**

d. What is a storage buffer as the term used for an automated production line? **02**

Q-2 **Attempt all questions**

(a) Explain part storage subsystem and automatic parts transfer. **07**

(b) A production machine operates 80hr/week (two shifts, 5 days) at full capacity. Its production rate is 20units/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. **07**

OR

Q-2 **Attempt all questions**

(a) Write short notes on i) The USA Principle Ii) Automation Migration Strategy. **07**

(b) Write the applications of single station manned and automated cells. **07**

Q-3 **Attempt all questions**

(a) Derive a mathematical model for Production Rate of a manufacturing facility. **07**

(b) The hourly production rate and work content time for two models to be produced on a mixed model assembly line are given in the following table. **07**

Model j	R_{pj}	T_{wcj}
A	4/hr	27.0 min
B	6/hr	25.0 min

Also given is that line efficiency E = 0.96 and manning level M = 1. Determine (a) the theoretical minimum number of workers required on the assembly line and (b) the actual number of workers if it is known that repositioning efficiency E_r = 0.974 and line balancing efficiency E_b = 0.921.

OR

Q-3 **Attempt all questions**

(a) Explain two basic types of work transport systems. **07**

(b) A rotary work table is driven by a Geneva mechanism with six slots. The driver rotates at 30rev/min. Determine the cycle time, available processing time and the lost time each cycle to index the table. **07**

SECTION – II

Q-4 **Attempt the Following questions.**

a. Name the four major categories of material handling equipment. **01**

b. What are the functions of timer and counter in ladder logic diagram? **02**

c. What is the difference between off-line inspection and on-line inspection? **02**

d. What is machine vision? **02**

Q-5 **Attempt all questions**

(a) Which are the considerations in material handling system design? **07**

(b) 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) p_1 and ii) p_2. **07**

OR

Q-5 **(a)** Describe in brief noncontact nonoptical inspection techniques. **07**

(b) The over rail of a carousel storage system has length = 12 m and width = 1 m. There are 75 carriers equally spaced around the oval. Suspended from each carrier are six bins. Each bin has volumetric capacity = 0.026 m^3. Carousel speed = 20 m/ min. Average P&D time for a retrieval = 20 s. Determine (a) Volumetric capacity of the storage system and (b) hourly retrieval rate of the storage system. **07**

Q-6 **Attempt all questions**

(a) Define and explain different types of conveyors used in material transport systems. **07**

(b) Explain Ladder logic diagram with common logic and sequence elements. **07**

OR

Q-6 **Attempt all Questions**

(a) Explain Coordinate measuring machine with its applications. **07**

(b) Describe the basic components of PLC. **07**