

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name: Industrial Automation

Subject Code: 5TE02INA1

Branch: M.Tech Mechanical (CAD/CAM)

Semester: 2

Date: 02/05/2019

Time: 02:30 To 05:30

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.
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SECTION – I

Q-1

Attempt the Following questions.

- (a) Identify the five levels of automation in a production plant. (01)
- (b) What is the USA Principle? (02)
- (c) Explain the benefits of Automated production lines. (02)
- (d) What are the typical hardware components of a workstation parts delivery system? (02)

Q-2

Attempt all questions

- (a) Describe about Lean Production. (07)
- (b) Explain the four automated assembly system configurations. (07)

OR

Q-2

Attempt all questions

- (a) Write the applications of single station manned and automated cells. (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)

Q-3

Attempt all questions

- (a) Write a short note on Storage Buffers (07)
- (b) A total of 800 shafts must be produced on lathe machines during a particular week. Each shaft requires a total machine cycle time, $T_c = 11.5\text{min}$. How many lathes must be devoted for this work, If there is 40 hours of available time on each lathe? (07)

OR

Q-3

Attempt all questions

- (a) Explain in brief different work transfer mechanisms. (07)
- (b) Define and explain manufacturing lead time and work in process. (07)



SECTION – II

- Q-4 Attempt the Following questions.**
- (a) Name three categories of Automated Guided Vehicles. (01)
 - (b) What are the main objectives of Total Quality Management? (02)
 - (c) What are the functions of timer and counter in ladder logic diagram? (02)
 - (d) What is the difference between off-line inspection and on-line inspection? (02)
- Q-5 Attempt all questions**
- (a) Explain design consideration for Material Handling System. (07)
 - (b) Explain construction and operation of CMM. (07)
- OR**
- Q-5 Attempt all questions**
- (a) Explain Noncontact Nonoptical Inspection Techniques. (07)
 - (b) The oval rail of a carousel storage system has length = 12 m and width = 1m. (07)
There are 75 carriers equally spaced around the oval. Suspended from each carrier are six bins. Each bin has volumetric capacity = 0.026 m³. Carousel speed= 20 m/min. Average pickup and deposit time for a retrieval = 20 sec. Determine (a) volumetric capacity of the storage system and (b) hourly retrieval rate of the storage system.
- Q-6 Attempt all questions**
- (a) Write a short note on Vehicle Guidance Technology. (07)
 - (b) Describe the basic components of PLC. (07)
- OR**
- Q-6 Attempt all Questions**
- (a) Explain Ladder logic diagram with common logic and sequence elements. (07)
 - (b) Explain the operation of a Machine Vision System. (07)

