CBCS SCHEME

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18ME732

Seventh Semester B.E. Degree Examination, June/July 2023
Automation and Robotics

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Example the various levels of automation with a diagram. **(08 Marks)**

b. Explain the following advanced automated functions.
i) Safety monitoring
ii) Maintenance and repair diagnostics
iii) Error detection and recovery. **(12 Marks)**

OR

2 a. Differentiate 'Process industries' and 'Discrete manufacturing industries'. **(04 Marks)**

b. Explain the following continuous process control methods with suitable examples.
i) Regulatory control ii) Feed Forward Control. **(06 Marks)**

c. What is ADC? Describe the three steps of the ADC process. **(10 Marks)**

Module-2

3 a. The ideal cycle time of an 16 station transfer line is 1.4 min. The average downtime per line will be 6 min and the probability of break downs per cycle is equal for all cycles and is equal to 0.004. Determine production rate and line efficiency by considering both upper bound and lower bound approaches. **(12 Marks)**

b. What is "Storage Buffer"? Give the reasons for using "Storage Buffers" in automated production lines. **(08 Marks)**

OR

4 a. With sketch explain types of configurations of automated assembly systems. **(10 Marks)**

b. What does "RFID" stand for? Explain the functions of 'RFID tag". **(10 Marks)**

Module-3

5 a. State Asimov's laws of robotics. **(03 Marks)**

b. Clarify "Accuracy" and "Repeatability" in industrial robots. **(07 Marks)**

c. What are the five joint types of used in robotic arms and wrists? Explain with neat sketches. **(10 Marks)**

OR

6 a. Name the common body-arm configurations of robot. Explain them with diagrams. **(10 Marks)**

b. Explain the functions of "Robot Control System". **(06 Marks)**

c. What is an "End Effectors"? Name the various types of end effectors used in robots. **(04 Marks)**

Module-4

7 a. Explain how the stepper motor is used as actuator in robots. **(10 Marks)**

b. Explain shortly about the following sensors.
i) Tactile sensors
ii) Proximity sensors. **(10 Marks)**

OR

8 a. What is 'Manipulator kinematics' in robotics? Explain with an example. **(10 Marks)**

b. Describe position, orientation and frames related to manipulator. **(10 Marks)**

Module-5

9 a. Explain the three levels of robot programming. **(10 Marks)**

b. List and explain the requirements of robot programming language. **(10 Marks)**

OR

10 a. Write short notes on 'Offline Programming (OLP) systems" in robots. **(10 Marks)**

b. Discuss the various issues to be considered is the design of OLP systems. **(10 Marks)**

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