



CBCS SCHEME

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18ME732

Seventh Semester B.E. Degree Examination, Jan./Feb. 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. What is automation? Explain basic elements of an automated system. (10 Marks)
b. Briefly explain advanced automation functions. (10 Marks)

OR

- 2 a. Explain with a neat sketch, feed forward control. (06 Marks)
b. What is ADC? Explain three phases in ADC. (06 Marks)
c. Discuss the input/output devices for discrete data. (08 Marks)

Module-2

- 3 a. What is an automated production line? Explain general configuration of an automated production line and its system configuration. (10 Marks)
b. Explain storage buffer in automated production line. (04 Marks)
c. A 20 station transfer line has an ideal cycle time $T_c = 1.2$ mins. The probability of station breakdown/cycle is equal for all stations and $P = 0.05$. Down time $T_d = 0.8$ mins. For each of the upper bound and lower bound, determine
(i) Frequency of line stops / cycle.
(ii) Average actual production rate.
(iii) Line efficiency. (06 Marks)

OR

- 4 a. Discuss the problem areas in analysis and design of automated production lines. (08 Marks)
b. Write short notes on the following:
(i) Bar code technology.
(ii) RFID technology. (12 Marks)

Module-3

- 5 a. Define a robot. Explain with neat sketches any two robot configurations. (10 Marks)
b. With suitable examples, explain industrial applications of robots. (10 Marks)

OR

- 6 a. Write a note on generations of robots. (08 Marks)
b. Write short notes on,
(i) End effectors.
(ii) Robot sensors.
(iii) Robot accuracy and repeatability (12 Marks)

Module-4

- 7 a. What are actuators? Explain with sketches, hydraulic and pneumatic actuators. (10 Marks)
b. With neat sketch, explain the working of,
(i) Velocity sensor.
(ii) Touch and tactile sensor. (10 Marks)

OR

- 8 a. Write an explanatory note on actuator space and joint space. (08 Marks)
b. Derive the direct kinematic equation for PUMA 560 robot. (12 Marks)

Module-5

- 9 a. Explain the levels of robot programming. (10 Marks)
b. List and explain the requirements of robot programming language. (10 Marks)

OR

- 10 Write short notes on :
a. Offline programming system.
b. Problems in robot programming languages.
c. Issues in OLP systems.
d. Sub tasks in OLP systems. (20 Marks)
