USN | | | | | | | | | | |

17ME563

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. What is the difference between a continuous variable and discrete variable?   (05 Marks)
    b. Define sensor. Explain common measuring sensors used in automation system.   (08 Marks)
    c. Briefly describe the three steps of the Analog-to-digital conversion process.   (07 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 of $T_c = 1.2$ mins. The probability of station breakdown per cycle is equal for all stations and $P = 0.05$ break downs/cycle. Down time $T_d = 0.8$ min. For each of the upper bound and lower bound, determine:
    (i)   Frequency of line stops per cycle
    (ii) Average actual production rate
    (iii) Line efficiency   (06 Marks)

OR

4   a. What are the four automated assembly system configurations? Explain.   (10 Marks)
    b. Define automatic identification and data capture. Explain briefly bar code and RFID.   (10 Marks)

Module-3

5   a. What is an Industrial Robot? Explain common Robot configurations with a neat diagram.   (12 Marks)
    b. Define the following:
    (i)   Work volume
    (ii) Resolution
    (iii) Accuracy
    (iv) Repeatability   (08 Marks)

OR

6   a. Explain different sensors used in Robot.   (08 Marks)
    b. Identify the Robotics application.   (08 Marks)
    c. Write a note on end effecter.   (04 Marks)

Module-4

7 a. Describe positions, orientation and frames as related to manipulator. **(10 Marks)**

   b. Illustrate the interpretation used to map points between frames as operators using Translation and Rotation. **(10 Marks)**

OR

8 a. Write notes on :
    (i)   Link description
    (ii) Link connection description **(10 Marks)**

   b. Explain Actuator space, joint space and Cartesian space using the example of PUMA-560. **(10 Marks)**

Module-5

9 a. Define Robot Programming Language and explain the levels of Robot Programming. **(10 Marks)**

   b. List and explain requirements of a Robot Programming Language. **(10 Marks)**

OR

10 a. What are the problems peculiar to Robot Programming? Explain. **(10 Marks)**

    b. Explain Central issues in OLP Systems. **(10 Marks)**

* * * * *