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VTU B.E/B.TECH QUESTION PAPER SET

CBCS
SEMESTER V

AUTOMATION AND ROBOTICS

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CBCS Scheme

USN ☐☐☐☐☐☐☐☐☐☐

15ME563

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Automation and Robotics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1	a. Define automation. Explain the types of automation.	(10 Marks)
	b. List and explain the automation strategies.	(06 Marks)

OR

2	a. List and explain the reasons for automation.	(10 Marks)
	b. What is FMS? List the benefits of FMS.	(06 Marks)

Module-2

3	a. Define Robot. Explain the robot anatomy.	(06 Marks)
	b. List the configurations of a robot. Explain any two with sketches.	(10 Marks)

OR

4	a. With a suitable sketches, briefly explain any two end effectors.	(08 Marks)
	b. Explain with sketches the types of joints used in robots.	(08 Marks)

Module-3

5	a. Explain the basic concepts of control systems.	(04 Marks)
	b. What is block diagram? Explain its basic elements.	(04 Marks)
	c. List the types of controllers. Explain ON-OFF controller.	(08 Marks)

OR

6	a. Explain different position sensors used in robots.	(08 Marks)
	b. Explain hydraulic and pneumatic actuators.	(08 Marks)

Module-4

7	a. What are tactile sensors? Explain any two type of tactile sensors.	(10 Marks)
	b. Explain proximity and range sensors.	(06 Marks)

OR

8	a. Explain sensing and digitizing image data related to machine vision system.	(08 Marks)
	b. Explain image processing and analysis.	(08 Marks)

Module-5

9	Explain : (i) Mechanical design features.	
	(ii) Telepresence and related technologies.	(16 Marks)

OR

10	a. What is artificial intelligence? Explain the goals of artificial intelligence.	(06 Marks)
	b. Explain artificial intelligence techniques.	(10 Marks)

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CBCS SCHEME

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15ME563

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Automation and Robotics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1 a. List the reasons used to undertake projects in manufacturing automation and computer – integrated manufacturing. **(06 Marks)**
   b. What is FMS? Discuss in detail the components of an FMS. **(10 Marks)**

OR

2 a. Compare the salient features of automation types. **(06 Marks)**
   b. Discuss the benefits of an FMS in brief. **(04 Marks)**
   c. List the capabilities that make a manufacturing system flexible and tests of flexibility in an automated manufacturing system. **(06 Marks)**

Module-2

3 a. Briefly explain the manipulator joints of robot with respect to input and output link. **(10 Marks)**
   b. Explain with neat sketch, indicating degrees of freedom , wrist assembly of robot. **(06 Marks)**

OR

4 a. Explain with neat sketches, indicating joint notation scheme for
      i) Cylindrical and ii) Jointed – arm configuration of a robot. **(08 Marks)**
   b. Explain the following terms with sketches :
      i) Spatial resolution   ii) Accuracy   iii) Repeatability. **(08 Marks)**

Module-3

5 a. For the Spring – mass – damper system shown in fig.Q5(a), derive the transfer function.

Fig.Q5(a)
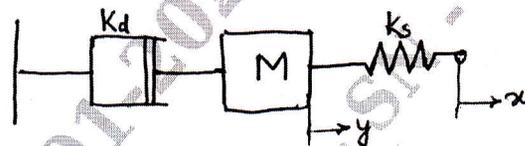
(08 Marks)
   b. Briefly explain the use of encoders for position measurement in robotics. **(08 Marks)**

OR

6 a. Explain with sketches, the response curves in a second order linear system. **(10 Marks)**
   b. Explain with sketch, how a stepper motors is used in robots. **(06 Marks)**

Module-4

7 a. Briefly explain the types of tactile sensors in robotics. **(08 Marks)**
   b. With block diagram representation, explain the functions of a machine vision system. **(08 Marks)**

OR

8 a. Explain the major uses of sensor in industrial robotics and other automated manufacturing systems. (04 Marks)

   b. Explain in brief, the steps involved in image processing and analysis as applied to robotic vision. (12 Marks)

Module-5

9 a. List the characteristic features and capabilities of the future robot. (08 Marks)

   b. Discuss any two AI techniques for representing knowledge. (08 Marks)

OR

10 a. Explain telepresence and related technologies in the field of robotics. (08 Marks)

   b. Discuss any three search techniques in problem solving. (08 Marks)

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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)

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