Paper id: 250640

Roll No: | | | | | | | | | | | | |

BTECH
(SEM VI) THEORY EXAMINATION 2024-25
INDUSTRIAL ROBOTICS

TIME: 3 HRS **M.MARKS: 100**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt *all* questions in brief. 02 x 7 = 14

Q no.	Question	CO	Level
a.	Define DOF (Degrees of Freedom) and write its significance in robotics.	CO1	K2
b.	Mention two industrial applications of robots.	CO1	K2
c.	Differentiate between internal and external sensors.	CO2	K2
d.	What is a gripper? Name two types.	CO2	K2
e.	Define actuator. Give two examples used in robotics.	CO3	K2
f.	Write the significance of SIGNAL and WAIT commands in robot programming.	CO4	K3
g.	What is the need of AI in robotics?	CO5	K2

SECTION B

2. Attempt any *three* of the following: 07 x 3 = 21

		CO	Level
a.	Classify robotic systems based on work volume and drive systems. Explain with neat sketches.	CO1	K2
b.	Classify various sensors used in robotics and explain any one with working principle and example.	CO2	K2
c.	Explain various types of actuators and compare their selection criteria for robotic applications.	CO3	K2
d.	Write a robot program using pseudo-code or any standard robot language to pick and place 5 objects.	CO4	K3
e.	Write short notes on: (i) Safety standards in robotics (ii) Socio-economic impact of robotization.	CO5	K2

SECTION C

3. Attempt any *one* part of the following: 07 x 1 = 07

		CO	Level
a.	Explain the different parameters like resolution, accuracy, repeatability with suitable examples.	CO1	K2
b.	Describe the elements of a robotic system and compare different robot anatomies.	CO1	K2

4. Attempt any *one* part of the following: 07 x 1 = 07

		CO	Level
a.	Explain with diagrams the types of grippers used in robotics. What are the design considerations?	CO2	K2
b.	A gripper needs to exert a force of 30N on a component weighing 10N. Calculate necessary friction coefficient if it is a two-finger parallel gripper (assume suitable data).	CO2	K3

5. Attempt any *one* part of the following: 07 x 1 = 07

		CO	Level
a.	Describe the different drive systems used in robots. Add a block diagram for any one drive.	CO3	K2
b.	With the help of a neat sketch, explain the working of a closed-loop robot control system.	CO3	K2

6. Attempt any *one* part of the following: 07 x 1 = 07

		CO	Level
a.	Explain the difference between VAL, AML, and Python in robot programming.	CO4	K3
b.	Illustrate the evolution of robot programming languages from WAVE to ROS.	CO4	K3

7. Attempt any *one* part of the following: 07 x 1 = 07

		CO	Level
a.	Explain various types of mobile robot locomotion systems with sketches.	CO5	K2
b.	What is Artificial Intelligence? Describe the role of AI in industrial robotics with one case study.	CO5	K2