PAPER ID-310954

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

BTECH
(SEM V) THEORY EXAMINATION 2024-25
INTELLIGENT SYSTEMS AND ROBOTICS

TIME: 3 HRS **M.MARKS: 70**

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

SECTION A

1. Attempt *all* questions in brief. **2 x 07 = 14**

Q no.	Question	CO	Level
a.	Differentiate between mobile ground robots and uninhabited air vehicles.	1	K2
b.	Define stability in the context of control systems.	1	K1
c.	Define fuzzy logic in the context of robotics.	2	K1
d.	Define Bayesian belief networks and their application.	3	K1
e.	Differentiate between genetic algorithms and simulated annealing.	3	K2
f.	Define a feed-forward network and its application.	4	K1
g.	Explain decision tree.	5	K2

SECTION B

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

a.	Compare and contrast mobile ground robots with uninhabited air vehicles, discussing their design and control challenges.	1	K2
b.	Explain probabilistic path planning. Explain its process and advantages in robot navigation.	2	K4
c.	Explain the role of probability and error models in measurement systems? Explain with examples.	3	K4
d.	Explain decision trees structure and use in classification problems with examples.	4	K4
e.	Compare genetic algorithms, simulated annealing, and particle swarm optimization in terms of their methodologies and applications.	5	K2

SECTION C

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

a.	Discuss the biological and cognitive paradigms used in robot design.	1	K2
b.	Explain the Denavit-Hartenberg transformation in detail with an example for a two-joint robotic arm.	1	K2

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

a.	Explain the principles of open-loop and closed-loop control systems with examples from robotics.	2	K4
b.	Explain the significance of stability and performance analysis in control systems.	2	K4

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

a.	Explain the Extended Kalman Filter and Particle Filter techniques with applications in robotics.	3	K4
b.	Explain the role of sensors in robotics. Explain the different types of sensors and their integration in sensor-based estimation.	3	K4

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

a.	Discuss Bayesian belief networks and their application in robot decision-making.	4	K2
b.	Explain the process of task planning for individual and multiple agents in robotics. Provide examples.	4	K2

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

a.	Explain forward chaining and backward chaining with examples of their use in robotics.	5	K2
b.	Discuss the implementation of deep-learning algorithms in robotics with specific examples of applications.	5	K2