True-False & MCQ

Lecture 01 – 02

True/False Questions:

01	Robotics combines computer science with mechanical and electrical engineering to accomplish tasks.	True
02	Repeatability refers to a robot's ability to reach an exact target position.	False
03	All robots are machines, but not all machines are robots	True
04	Proprioceptive sensors measure external environmental data like distance to objects.	False
05	A key disadvantage of robotics is increased unemployment due to human labor replacement	True

Multiple Choice Questions:

1. Which sensor type is used to measure a robot's internal state (e.g., motor speed)?

a) Exteroceptive b) Proprioceptive c) Active d) Tactile

2. What is the primary difference between machines and robots?

a) Machines require human intervention; robots operate autonomously

b) Robots are reprogrammable; machines perform fixed tasks

c) Both a and b

d) Machines use sensors; robots do not

3. Which of these is NOT a typical component of robotic knowledge?

a) Dynamic system modeling b) Feedback control

c) Sensor fusion d) Financial forecasting

4. Accuracy in robotics is defined as:

a) Positional deviation from the average displacement

b) Ability to consistently return to the same position

c) Ability to reach a desired target point

d) Speed of completing repetitive tasks

5. Robots are BEST suited for:

a) Jobs dangerous for humans b) Creative art projects

c) Social interaction therapy d) Political decision-making

Lecture 03 – 04

True/False Questions:

01	Euler angles are mathematically convenient for orientation representation due to their continuous mapping.	False
02	In the Hybrid Paradigm, planning and reactive execution happen simultaneously.	False
03	Holonomic robots have fewer controllable degrees of freedom (DOF) than total DOF.	False
04	Potential field methodologies represent behaviors as vectors combined by summation.	True
05	Reactive systems require a global world model for decision-making.	False

Multiple Choice Questions:

1. Which orientation representation suffers from discontinuous mapping?

a) Rotation matrices b) Axis-angle c) Euler angles d) Quaternions

2. In subsumption architecture, how do higher-level behaviors override lower-level ones?

a) Vector summation b) Inhibition or suppression c) Priority weighting d) Neural networks

3. A car-like robot with 3 DOF (x, y, θ) but only 2 controllable inputs (steer, accelerate) is:

a) Holonomic b) non-holonomic c) Redundant d) Fully actuated

4. Which paradigm uses ONLY "Sense → Act" without planning?

a) Hierarchical b) Hybrid c) Reactive d) Deliberative

5. What is the primary advantage of programming by behavior?

a) Centralized control b) Real-time execution

c) Global world modeling d) Complex planning capabilities

Lecture 05 – 06

True/False Questions:

01	Active sensors emit their own energy and measure environmental reactions.	True
02	Bayesian updating in occupancy grids requires unconditional probabilities only.	False
03	The BUG1 algorithm guarantees finding a path if one exists but is inefficient.	True
04	In closed-loop control, the integral term (I) eliminates steady-state error.	True
05	Voronoi diagrams minimize path distance rather than maximize obstacle clearance.	False

Multiple Choice Questions:

1. Which type of sensor would a robot use to measure its own wheel rotation?

a) Exteroceptive b) Proprioceptive c) Active d) Passive

2. In Bayes' rule for occupancy grids, what does P(s | H) represent?

a) Prior probability of hypothesis b) Probability of sensor reading given hypothesis

c) Posterior probability after sensor update d) Sensor tolerance value

3. Which path planning method connects all mutually visible polygon vertices?

a) Occupancy grid b) Voronoi diagram c) Visibility graph d) Topological map

4. What is the primary function of the derivative term (D) in PID control?

a) Eliminate accumulated past errors b) Provide proportional response to current error

c) Predict future error trends d) Reduce power consumption

5. In the "Pick Up the Trash" multi-agent system, how did robots avoid collisions?

a) Centralized path planning b) Wireless communication

c) Repulsive potential fields d) Shared global map

Lecture 07 – 08

True/False Questions:

01	In teach mode programming, robot paths are recorded by physically guiding the end-effector.	False
02	Exact cell decomposition uses fixed grid boundaries regardless of environmental geometry.	False
03	Region II in sonar occupancy grids is considered "probably occupied."	False
04	The integral term (Ki) in PID control reduces overshoot and settling time.	False
05	Bayesian updating for occupancy grids requires only the current sensor reading, ignoring prior probabilities.	False

Multiple Choice Questions:

1. Which programming mode allows operators to record complex curved paths by manually guiding the robot?

a) Physical Set-up b) Teach Mode (PTP)

c) Continuous Walk-Through d) Software Mode

2. In the sonar sensor model, which region represents areas where obstacles definitely DO NOT exist?

a) Region I (Detection cone) b) Region II (Empty cone)

c) Region III (Shadow) d) Region IV (Unobserved)

3. Which path planning method maximizes clearance from obstacles?

a) Visibility graph b) BUG2 algorithm c) Exact cell decomposition d) Voronoi diagram

4. What does the term P(H) represent in Bayesian occupancy grid updating?

a) Sensor measurement accuracy b) Prior probability before sensor data

c) Likelihood of sensor reading d) Posterior probability after update

5. Which PID component responds to the RATE OF CHANGE of error?

a) Proportional (P) b) Integral (I) c) Derivative (D) d) Hybrid (H)