



BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – Dip.RA-2023

Course Name – Mobile Robotics

Course Code - ECPE601B

(Semester VI)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Identify the pioneer of UAV development.
 - a) Nikola Tesla
 - b) Abraham Karem
 - c) Wright Brothers
 - d) Leonardo da Vinci
- (ii) Name the government agency that uses UAVs for disaster response.
 - a) NASA
 - b) FEMA
 - c) FDA
 - d) WHO
- (iii) Name the regulation body that oversees UAV usage in the USA
 - a) FAA
 - b) WHO
 - c) UN
 - d) NASA
- (iv) State the main power source for most UAVs.
 - a) Solar energy
 - b) Lithium-ion batteries
 - c) Diesel fuel
 - d) Nuclear power
- (v) Identify the main function of telemetry in UAVs.
 - a) Communication with satellites
 - b) Data transmission to ground station
 - c) Autonomous flight control
 - d) Payload activation
- (vi) Recognize a common UAV application in disaster response.
 - a) Precision agriculture
 - b) Infrastructure inspection
 - c) Search and rescue
 - d) Delivery services
- (vii) Illustrate how underwater robots are utilized in industrial applications.
 - a) Oil and gas inspection
 - b) Marine research
 - c) Search-and-rescue
 - d) Entertainment applications
- (viii) Determine how an underwater manipulator functions.
 - a) Grasping and cutting
 - b) Image processing
 - c) Pressure handling
 - d) Robotic arm motion
- (ix) Illustrate the importance of Doppler Velocity Logs (DVL) in AUV navigation.

- a) Velocity tracking
- b) Real-time location
- c) Remote guidance
- d) Frequency matching
- (x) Compare the capabilities of semi-autonomous and fully autonomous AUVs.
- a) Limited decision-making
- b) Full independence
- c) Combination of both
- d) Pre-programmed logic
- (xi) Explain the key technological components of an AUV.
- a) Sonar technology
- b) Power storage
- c) AI integration
- d) Cloud computing
- (xii) Identify the core factors influencing AUV maneuverability.
- a) Water currents
- b) Pressure resistance
- c) AI models
- d) Navigation efficiency
- (xiii) Explain how underwater robots support search-and-rescue missions.
- a) Thermal imaging
- b) Infrared scanning
- c) Rescue support
- d) Emergency location detection
- (xiv) Explain how AUVs contribute to deep-sea resource exploration.
- a) Mapping ocean resources
- b) Exploring seabed minerals
- c) Mining operations
- d) Tidal energy collection
- (xv) Identify a common propulsion system for AUVs.
- a) Thrusters
- b) Wings
- c) Rotors
- d) Propellers

Group-B

(Short Answer Type Questions)

3 x 5=15

- 2. Define an Unmanned Aerial Vehicle (UAV). (3)
- 3. Explain the principle of lift generation in UAVs. (3)
- 4. List three societal impacts of UAVs. (3)
- 5. Discuss the different types of payloads used in space and defense applications. (3)
- 6. Examine the challenges in integrating electro-optic payload systems in small satellites. (3)

OR

- Explain underwater manipulator. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

- 7. Explain various lift generation methods used in UAVs, including fixed-wing and rotary-wing systems. (5)
- 8. Assess the impact of payload weight on satellite launch costs and performance. (5)
- 9. How would you rate the efficiency of dispensable payloads in modern defense applications? (5)
- 10. Describe challenges faced in underwater robotics. (5)
- 11. Define sonar and its role in underwater robotics. (5)
- 12. Design a payload system for a weather monitoring satellite and justify your choices. (5)

OR

- Recognize environmental factors that affect underwater robotics. (5)
