Register No.: …………………………… Name: …………………………………………………

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)
(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)
SEVENTH SEMESTER B.TECH. DEGREE EXAMINATION (R), DECEMBER 2023
ROBOTICS AND AUTOMATION
(2020 SCHEME)

Course Code :   **20RBT491**

Course Name: **Field Robotics**

Max. Marks :   **100**   **Duration: 3 Hours**

PART A
(Answer all questions. Each question carries 3 marks)

1. List any six applications of wheeled mobile robots in domestic environments.
2. State the challenges involved in designing wheeled mobile robots.
3. Paraphrase sensor fusion.
4. Illustrate an application of ultrasonic sensor as an external world sensor.
5. What are the various steps taken in controlling payload in UAV?
6. Demonstrate evolutionary computation-based path planning algorithms.
7. Draw a block diagram showing FPV channel downlink and uplink procedure.
8. Outline the key features of georeferencing approach.
9. Justify the need for using UAV in a 3D modelling application.
10. Describe the general procedure involved with a UAV platform in agricultural applications.

PART B
(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Elaborate the various components of autonomy. (8)
    b) Summarize about Sheridan scale of autonomy. (6)

OR

12. a) Illustrate speed control using point mass and force input. (8)
    b) Summarize the procedure for continuous and smooth trajectory establishment. (6)

MODULE II

13. a) Enumerate the various steps involved in an optimal path algorithm. (8)
    b) Build a state machine model for a standard and advanced cruise control system. (6)

OR

14. a) Identify any two sensors used for internal sensing. (8)
    b) State the limitations of autonomous systems. (6)

MODULE III

15. a) Elaborate the various components of unmanned aerial vehicles. (7)
    b) Comment about the stability and control of a UAV. (7)

OR

16. a) Demonstrate the classification of UAVs. (7)
    b) Comprehend the various parameters of mission planning. (7)

MODULE IV

17. With neat diagrams explain Flying Adhoc based network architecture. (14)

OR

18. Describe about UAV communication and its types. (14)

MODULE V

19. a) Explain the need of UAV in rescue operations. (7)
    b) List the reasons for terminal failure of rescue robots. (7)

OR

20. a) Explain the protocol followed in a stressed mission. (8)
    b) What are the advantages, disadvantages and concerns for surveillance applications of UAVs? (6)

****