Code No. : 16649 H

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (Honours) VI-Semester Main Examinations, May/June-2023

Autonomous Navigation Systems

(I.T.)

Time: **3 hours**

Max. Marks: **60**

Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B**

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	What is UAS? List the different levels of autonomy in UAS.	2	1	1	1
2.	Compare Multi Rotor and VTOL Drone.	2	3	1	2
3.	What is Angle of Attack? What is its significance?	2	2	2	1
4.	Illustrate the importance of Mach number?	2	2	2	1
5.	Explain the categories of UAVs as per DGCA Classification.	2	1	3	1
6.	What is BLDC? Specify its significance for the applications of UAVs.	2	3	3	2
7.	Explain GNSS and various GNSS system models in detail.	2	3	4	1
8.	Illustrate the Trilateration technique used in GPS.	2	2	4	1
9.	What are the characteristics of Non-Autonomous and Autonomous Systems?	2	2	1	1
10.	What is Aerofoil structures, Specify its purpose in detail.	2	3	2	2

Part-B (5 × 8 = 40 Marks)

Q. No.	Stem of the question	M	L	CO	PO
11. a)	Explain in detail five major characteristics of Unmanned Autonomous systems?	4	2	1	1
b)	What is the current level of autonomy? And specify the technologies used to achieve highest level of Autonomy.	4	1	1	1
12. a)	Explain in detail Aerodynamic Characteristics of Multi rotor copter?	4	2	2	1
b)	Illustrate various forces acting on Air plane, with neat diagrams.	4	2	2	1
13. a)	Explain various types of Flight Controller software and supported hardware used in UAV designs.	4	2	3	5
b)	What is Dronekit and MAVProxy ? Specify its advantages and disadvantages?	4	1	3	5

14.	a)	What is Data Link System in UAV? Discuss its significance in detail.	4	3	4	3
	b)	What is LiDAR? Explain in detail various types of LiDARs available and its significance?	4	1	4	1
15.	a)	Illustrate various technologies used in Navigation and communication of UAS?	4	3	5	1
	b)	BLDC Motor used for UAV design has a Kv rating of 980Kv. The battery used is a 3 cell Lithium Polymer with each cell range from 3.7 to 4.2 V. Calculate the RPM for the motor during its peak and nominal voltage, while no load is connected.	4	4	2	2
16.	a)	Specify the MAVLINK version 2 payload formats in detail.	4	3	5	5
	b)	Describe the various sensors and the techniques used in obstacle avoidance of UAV.	4	3	5	3
17.		Answer any *two* of the following:				
	a)	Illustrate the role of Flight Controller in ANS along with the various sensors used in it.	4	3	1	1
	b)	Explain physical properties and structure of Atmosphere.	4	2	2	1
	c)	Specify various characteristics of Robotics OS.	4	2	3	3

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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