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Code No. : 13165 N (D)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. III-Semester Main Examinations, Jan./Feb.-2024

Fundamentals of Unmanned Aerial Vehicles (OE-I)

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 does DGCA stand for, and what is its role in UAV regulation?	2	1	1	1
2.	How can drones be utilized in civil applications?	2	1	1	1
3.	What are the major components of an airplane? What is the primary function of the fuselage in an airplane?	2	2	2	1
4.	List the layers of the Earth's atmosphere. Where does weather phenomena occur in the atmosphere?	2	2	2	1
5.	What does an Electronic Speed Controller (ESC) do in a UAV?	2	1	3	1
6.	What does LADAR stand for, and how is it used in UAVs?	2	1	3	1
7.	What does CAE stand for in the analysis of unmanned aerial vehicles?	2	1	4	1
8.	What does CAD stand for? How does CAD software facilitate the design process?	2	1	4	1
9.	Name three types of drones based on their design.	2	1	1	1
10.	What is the purpose of the ailerons on an aircraft's wings?	2	1	2	1
Part-B (5 × 8 = 40 Marks)					
11. a)	Compare and contrast fixed-wing, multi-rotor, and flapping wing drones. What are the specific characteristics of each type, and how do they cater to different applications?	8	2	1	1
12. a)	Provide a detailed illustration and explanation of aerofoil nomenclature. Discuss the key characteristics of aerofoils and their significance in aerodynamic design.	4	3	2	3


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b)	Illustrate and explore in detail the auxiliary components of tail of aircraft. Discuss the functions of each component and their role in the overall operation of an aircraft.	4	3	2	2
13. a)	Discuss different types of guidance systems and their applications.	4	3	3	1
b)	What is the role of data links in UAV communication? Discuss the importance of reliable data links for real-time control and information exchange between the UAV and ground control stations.	4	3	3	12
14. a)	Explore the methodology of Computational Fluid Dynamics (CFD) in the aerodynamic analysis of UAVs.	8	3	4	5
15. a)	How do UAVs contribute to the defense field, and what are the potential benefits and challenges?	4	2	1	1
b)	Discuss the significance of the Mach number in aerodynamics and its role in determining airflow characteristics around an aircraft.	4	2	2	1
16. a)	Provide an in-depth analysis of various types of imaging cameras. Discuss their individual functions.	4	3	3	1
b)	Provide a detailed exploration of the steps in designing UAV components.	4	2	4	12
17.	Answer any <i>two</i> of the following:				
a)	Delve into the diverse applications of drones in the environmental monitoring sector.	4	2	1	12
b)	Illustrate and discuss various types of sources of drag during flight.	4	2	2	1
c)	Explore advanced sensors used in UAVs, including LADAR, SAR, and thermal cameras. Discuss the specialized applications and benefits of each sensor in UAV missions.	4	3	3	1

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%
