

Enroll No

Q.P. Code
UT3123

Unit Test -II (2025-26)
 T.Y. B.Tech.-Electronics & Telecommunication Engineering
Course Code: OE359 **Course Name: OE-I Drone Technology**

Day & Date: Friday & 19/09/2025

Time: 10:30 am to 11:30 am

Max Marks- 25

- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures in rounded () brackets within the question, indicate the scheme of marking for respective part of the question, whereas, figures in the first right column indicate total marks for that whole question.
 - 3) CO is the index number of the Course Outcome statement.
 - 4) The Bloom's taxonomy level (BL) for 1,2,3,4,5 and 6 is remember, understand, apply, analyze, evaluate and create respectively.
 - 5) Assume suitable data if necessary.
 - 6) Use of non-programmable calculators is allowed

			Marks	BT Level	Cos
Q.1	A	Articulate Objectives and Mission Requirements of Design and Development of UAV with mission profile.(2) Describe the UAV Design procedure on the basis of following i) Initial Sizing along with graph Weight versus cruise speed.(2) ii) Airfoil Selection along with graph of Angle of attack versus lift-to-drag ratio.(2) iii) Engine selection along with graph of Velocity versus Thrust. (2)	8	2	2
	B	Describe Payload design procedure in accordance with following points i) Payload Mission Requirements.(1) ii) Payload design considerations. (2) iii) Trade – offs for small UAV Design.(2) Illustrate payload hardware design with neat diagram and describe Power Budget, Weight Budget, Volume allocation.(3)	8	2	2
		OR			
	B	Describe design procedure for Micro Aerial Quadrotor Vehicles on the basis of i) Single Quadrotor Arm and SolidWorks.(3) ii) Hardware Design: Motor and propeller, Control CPU, Motor Speed Controller.(3) iii) Draw the structure of Quadrotor. (2)	8	2	2
Q.2	A	To Develop small UAV derive the equation for Kinematics of moving frames associated with coordinate frame transformation(2), Direct Cosine matrix(2), Rotation Matrix(2), Prove derivatives of the Euler angles in terms of the angles themselves and the angular velocity(3);	9	3	4

$$\begin{bmatrix} \dot{\phi} \\ \dot{\theta} \\ \dot{\psi} \end{bmatrix} = \begin{bmatrix} 1 & \sin \phi \frac{\sin \theta}{\cos \theta} & \cos \phi \frac{\sin \theta}{\cos \theta} \\ 0 & \cos \phi & -\sin \phi \\ 0 & \sin \phi \frac{1}{\cos \theta} & \cos \phi \frac{1}{\cos \theta} \end{bmatrix} \begin{bmatrix} \omega_x \\ \omega_y \\ \omega_z \end{bmatrix}$$

