INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

DRONE TECHNOLOGY								
VI Semester: AERO								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AAED38	**Open Elective**	3	-	-	3	40	60	100
Contact Classes: 48	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 48**		
Prerequisite:								

I. COURSE OVERVIEW:

Drones have rapidly emerged as transformative technologies with applications spanning various industries, including photography, videography, agriculture, environmental monitoring, surveillance, and emergency response. As drones become increasingly accessible and versatile, understanding their operation, capabilities, and regulations is essential for both enthusiasts and professionals. This course explores the basic principles of drone technology, including aerodynamics, propulsion systems, navigation, and communication.

II. COURSES OBJECTIVES:

The students will try to learn

I. The key components and subsystems of drones, such as airframes, motors, batteries, sensors, and onboard electronics.
II. The fundamentals of safe and efficient drone flight operations, including pre-flight checks, flight planning, takeoff, navigation, and landing procedures.
III. The regulatory environment governing drone operations, including airspace regulations, registration requirements, and compliance with local and international laws.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

CO 1 Understand the functions and importance of major aircraft components.
CO 2 Identify the types of flight vehicles and control systems used for the drone systems.
CO 3 Illustrate the basic concepts of flight mechanics related to the UAVs.
CO 4 Understand the working principle of various aircraft propulsion system.
CO 5 Acquire the knowledge about various materials used for aircraft construction.
CO 6 Make use of DGCA and FAA regulations for the operations and maintenance of the UAV systems

IV. COURSE CONTENT:

MODULE-I: INTRODUCTION (10)

History of UAV, Classifications, UAV System composition, UAS, Drones, Evolution of drones, Concepts of flight: Aerodynamics, flight performance, stability and control.

MODULE –II: UNMANNED AERIAL SYSTEM COMPONENTS (10)

UAS, Platforms, Payload, installation and utilization, propulsion, on-board flight control, communications, Telemetry, tracking, launch / recovery systems, ground control stations, Trouble shooting.

MODULE–III: DRONE ANATOMY AND ASSEMBLY (10)

Multi rotor introduction, Drone Anatomy: Motor, Propeller, ESC, Flight controller.

Transmitter, Receiver Sensors, Assembly, Autonomous system, Emergency identification and handling.

MODULE-IV: APPLICATIONS AND INNOVATIONS OF DRONES (09)

Military – Civil: Health care, public safety, Disaster Management, Wild life monitoring, Railways, Data collection, Environmental Science, Product delivery, Surveying, Traffic Management, Agriculture, Construction Entertainment, Innovations.

MODULE –V: OPERATIONAL CONSIDERATIONS AND FUTURE SCOPE (09)

DGCA regulations, CAR, NPNT, fly zones, Digital sky platform, Federal Aircraft Regulations, Future Prospects and Challenges, Case Studies, Mini and Micro UAVs. Sensors, actuators, AI and IoT in drones.

V. TEXT BOOKS:

1. Paul G Fahlstrom, Thomas J Gleason, “Introduction to UAV Systems”, UAV Systems, Inc, 1998
2. Reg Austin “Unmanned Aircraft Systems UAV design, development and deployment”, Wiley, 2010.

VI. REFERENCE BOOKS:

1. Armand J. Chaput, “Design of Unmanned Air Vehicle Systems”, Lockheed Martin Aeronautics Company, 2001
2. Kimon P. Valavanis, “Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy”, Springer, 2007
3. Robert C. Nelson, Flight Stability and Automatic Control, McGraw-Hill, Inc, 1998

VII. ELECTRONICS RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc19_ae02/preview
2. https://www.mooc-list.com/search/node/civil%20aviation

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech talk topics
4. Open end experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper - II
9. Lecture notes
10. E-learning readiness videos (ELRV)
11. Power point presentation