Course Title:	**Introduction to Drone Technology**	Semester	I/II
Course Code:	**BETCK105P/ BETCK205P**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3-0-0-0	Exam Hours	03
Total Hours of Pedagogy	40hours	Credits	03

Course Learning Objectives

- Understand about the goal of the Drone Technology.
- Understand the Components of Drone.
- Familiarize the students with the concepts and techniques used in design of a small drones and its applications.

Module-1: Basics of Drones(8 hours)

Basics of Drones: Definition and history of drones, Types of drones and their applications, Drone components and terminology, Regulations and Guidelines for drone usage.

Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 4 – 4.1 to 4.4
(RBTLevels:L1 and L2)

Module-2:Drone Design and Assembly(8 hours)

Drone Design and Assembly:
Design considerations for drone airframe and propulsion systems, Selecting and assembling drone components such as motors, batteries, flight controllers, and cameras, Basic wiring and soldering techniques.

Applications: code for designing of flight controllers
Textbook 1: Chapter 5 – 5.1 to 5.9
(RBTLevels:L2, L3and L4)

Module-3: Drone Motors and ESC (8 hours)

Drone Motors and ESC: Working, Types: Brush and Brushless Motors, motor sizing and identification, mounting patterns and thread size, Thrust to Weight ratio, KV ratings, advanced motor selection, Electronic Speed Controller (ESC).
Applications: mounting patterns and threads

(RBTLevels:L2, L3, L4and L5)

Module-4: Flight Mechanics and Dynamics (8 hours)

Flight Mechanics and Dynamics: Basic principles of flight mechanics, flight controller board, Selection of drone controller with example, Factors affecting drone flight performance and efficiency

Applications: designing off light controller board, Selection of drone controller.

(RBTLevels:L1, L2and L3)

Module-5: Applications of Drone (8 hours)

Self study: Energy sector, carbon capture and storage, waste management, national and local policies.

Overview of commercial and industrial drone applications, Case studies and examples of successful drone deployments, GPS based navigation system, Drone Camera Systems, Agro application, Drone Delivery, Future trends and developments in the drone industry.

Applications: GPS based navigation system, Drone Camera Systems.

(RBTLevels:L2and L4)

Course outcome

CO1. Learn about the various types of Drones and its applications.
CO2. Learn about the various components of drone design.
CO3. Design basic types of drone systems.

Course Assessment and Evaluation Details(both CIE and SEE)

Continuous Internal Evaluation: 50 marks		
Theory Assessment Tool	**Marks**	**Reduced marks**
IAT-1	25	25
IAT-2	25	
Assessment-1(activity based)	25	25
Assessment-2(activity based)	25	
Semester End Examination(SEE):50marks		
SEE	**Marks**	**Reduced marks**
Course end examination (Answer any one question from each unit – Internal choice)	100	50

Activity Based Learning/Practical Based learning

Suggested Activities are:

Activity-Based Learning (ABL) encourages students to learn through hands-on, practical experiences. In the context of drone technology, it involves engaging students with real-world applications and challenges, using drones as a learning tool to understand fundamental concepts of aerodynamics, electronics, coding, and problem-solving

Suggested Learning Resources:

Suggested Learning Resources:

Text Book:

1. M. LaFay, Building Drones for Dummies, John Wiley & Sons, Inc., n.d.
2. E. Tooley, Practical Drones: Building, Programming, and Applications, Apress, 2021.
3. D. Levy, Drone Programming: A Guide to Code Your Own Drones, Packt Publishing, n.d.
4. S. K. Kopparthy, Drone Technology: Theory and Practice, Springer, 2020.
5. P. Horowitz and W. Hill, The Art of Electronics, Cambridge University Press, 2015.
6. K. Sundar and R. V. Rajakumar, Multicopters: Principles and Applications, Springer, 2021.

Reference Books:

1. D. Saxby, Drone Aerial Photography and Video: Techniques and Stories from the Field, Cengage Learning, 2018.
2. D. McLeod, Getting Started with Drone: How to Build, Fly, and Program Your Own Drone, Apress, 2019.
3. M. A. Banks, Building and Flying Electric Model Aircraft, O'Reilly Media, Inc., 2014.
4. G. C. Camara Leal, Flying Robots: An Introduction to Autonomous Aerospace Systems, Springer, 2017.

Web and Video Lectures (e-Resources):

1.https://www.youtube.com/watch?v=yC_hFm0BX28&list=PLxApjaSnQGi6Jm7LLSxvmNQjS_rt9swsu
2.https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4_
3. https://www.youtube.com/watch?v=6wi5DI6du4&list=PL_uaeekrhGzJlB8XQBxU3z_-hDwT95xlk
4. https://www.youtube.com/watch?v=KqSqyKwVuA8

COs and POs Mapping (CO-PO mappings are only Indicative)

COs	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	3									
CO2	2	2	2			3				3		
CO3		3	3			3			3	2		

Level 3-HighlyMapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0-Not Mapped