Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-802 (A)	UAVs and Drone Technology	PEC	3	2	1	0	50	100	50

Course Outcomes:

At the end of the course the students will be able to	
CO1	Articulate the basic principles, components, and applications of drone technology.
CO2	Demonstrate knowledge of drone hardware components and their functionality.
CO3	Appreciate drone flight dynamics, control systems, and navigation techniques.
CO4	Develop knowledge of drone navigation and synchronization techniques.
CO5	Formulate algorithms for drone operations, control, and intelligence.

Detailed Syllabus

Section-A

UNIT 1: Introduction to Drones: Basics of drone technology and its historical background, Types of drones and their applications in different industries, Current trends, and prospects of drone technology. Drone applications in industries such as agriculture, construction, cinematography. **(6 Hrs.)**

UNIT 2: Drone Components and Systems: Understanding drone hardware components: frame, motors, propellers, and batteries, Introduction to drone sensors like GPS, accelerometers, gyroscopes, and camera. **(9 Hrs.)**

UNIT 3: Overview of drone software and control: Drone Flight Dynamics and Control, Principles of flight including aerodynamics, lift, drag, and thrust, Drone stabilization and control mechanisms, Introduction to flight modes and maneuvers. **(11 Hrs.)**

Section-B

UNIT 4: Drone Navigation and Synchronization: Global Positioning System (GPS) and its role in drone navigation, Autonomous flight and obstacle avoidance systems, Sensor technologies for mapping, imaging, and data collection, Drone Operation and Flight Planning, Practical Implementation of application-based Drone Model. **(9 Hrs.)**

UNIT 5: Algorithms: Flight Control Algorithms, Navigation Algorithms, Path Planning Algorithms, Obstacle Detection and Avoidance, Target Tracking Algorithms, Swarm Algorithms, Image, and Video Processing. **(8 Hrs.)**

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Introduction to UAV Systems	Paul Fahlstrom and Thomas Gleason	Wiley Publication	4th (2012)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Drone Technology: Future Trends and Practical Applications	Sachi Nandan Mohanty	Wiley Publication	1st (2023)
2	Drone Technology in Architecture, Engineering and Construction	Daniel Tal, John Altschuld	Wiley Publication	1st (2021)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-802(B)	Smart City Technologies	PEC	3	3	0	0	50	100	150

Course Outcomes:

At the end of the course the students will be able to	
CO1	Build a deep understanding of the Smart City concept and the supporting policy framework.
CO2	Evaluate the use of Data Analytics and AI in diverse aspects of smart city management.
CO3	Describe smart transportation systems for smart cities; their design and operational framework.
CO4	Develop competence in applying the IoT Framework to Smart City operations.
CO5	Explain the importance of sustainability w.r.t waste management, green buildings, and water management systems.

Detailed Syllabus

Section-A

Unit 1: Introduction to the Smart Cities: Definition, characteristics and importance of Smart Cities, Overview of Urban Development and challenges in India, Role of Technology in transforming urban spaces, India 100 smart cities policy and mission, Government initiatives and policies for smart city development, Public-private partnerships for implementing smart city projects. **(9 Hrs.)**

Unit 2 Data Analytics and AI for Smart Cities: Big data analytics for urban planning and management, AI applications in smart cities for decision-making, Machine learning algorithms for urban data analysis. **(11 Hrs.)**

Unit 3: Smart Transportation and Mobility: Intelligent transportation systems (ITS) for congestion management, Smart public transportation and mobility solutions, Electric vehicles and sustainable transportation options. **(8 Hrs.)**

Section B

Unit 4: IoT and Sensor Networks: Introduction to IoT and its applications in smart cities, Smart sensors and data collection techniques and Integration of IoT in urban systems and services. **(9 Hrs.)**

Unit 5: Environmental Sustainability in Smart Cities: Waste Management and recycling strategies, green buildings and sustainable urban development, water management and conservation practices, Renewable energy sources and their integration into urban settings, Smart grids and energy management systems, Building automation and energy-efficient technologies. **(8 Hrs.)**

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Introduction to Smart Cities	Anil Kumar	Pearson	1st (2019)
2	Smart Cities: Foundations, Principles, and Applications	Houbing Song, Ravi Srinivasan, Tamim Sookoor, Sabina Jeschke	Wiley	1st (2017)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	The Smart City Transformations: The Revolution of the 21st Century	Amitabh Satyam & Igor Clazada	Bloomsbury Academic	1st (2020)

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-802(C)	Foundations of Internet of things and Industry 4.0	PEC	3	3	0	0	50	100	150

COURSE OUTCOMES

At the end of the course the student will be able to: -	
CO1	Describe the importance of Industry 4.0 for meeting future societal needs.
CO2	Develop critical understanding on cyber-physical systems amalgamating sensors, AI, Big Data analytics and cybersecurity and their applications.
CO3	Explain the architecture of Industrial Internet-of-Things.
CO4	Evaluate the structure operations of Industrial Internet-of-Things through supporting technologies such as SDNs and Big Data Analytics.
CO5	Appraise the diverse application of Industry 4.0 and related management concepts.

Detailed Syllabus
Section-A

Unit 1: Introduction: Sensing & actuation, Industry 4.0: Globalization and Emerging Issues, The Fourth Revolution, LEAN Production Systems, Smart and Connected Business Perspective, Smart Factories. **(9 Hrs.)**

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Unit 2: Industry 4.0: Cyber Physical Systems and Next Generation Sensors, Collaborative Platform and Product Lifecycle Management, Augmented Reality and Virtual Reality, Artificial Intelligence, Big Data and Advanced Analysis. Cybersecurity in Industry 4.0, Basics of Industrial IoT: Industrial Processes, Industrial Sensing & Actuation, Industrial Internet Systems.

(9 Hrs.)

Unit 3: Industrial IoT: Business Model and Reference Architecture: IIoT-Business Models, IIoT Reference Architecture, Industrial IoT- Layers: IIoT Sensing, IIoT Processing, IIoT Communication, Industrial IoT- Layers: IIoT Communication, IIoT Networking. **(9 Hrs.)**

Section B

Unit 4: Industrial IoT: Big Data Analytics and Software Defined Networks: IIoT Analytics - Introduction, Machine Learning and Data Science, Data Management with Hadoop, Industrial IoT: Big Data Analytics, Software Defined Networks: SDN in IIoT, Data Center Networks, Industrial IoT: Security and Fog Computing: Cloud Computing, Security in IIoT, Industrial IoT- Application Domains: Factories and Assembly Line, Food Industry. **(9 Hrs.)**

Unit 5: Industrial IoT- Application Domains: Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications), Facility Management, Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries, Real case studies like Milk Processing and Packaging Industries, Manufacturing Industries. **(9 Hrs.)**

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Introduction to Industrial Internet of Things and Industry 4.0	S. Misra, C. Roy, and A. Mukherjee	CRC Press	1st (2020)
2	Industry 4.0: The Industrial Internet of Things	Alasdair Gilchrist	Apress	1st (2019)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Introduction to IoT	S. Misra, A. Mukherjee, and A. Roy	Cambridge University Press	1st (2020)