TABLE OF CONTENTS

Chapter No.	Title	Page No.
1	**Foundations of Intelligent Drones and Autonomous Robots**	**1-35**
	1.1 Evolution of Autonomous Drones and Robots	
	1.2 Fundamentals of Robotic Autonomy	
	1.3 Intelligent Robotic System Architectures	
	1.4 Types and Configurations of Autonomous Platforms	
	1.5 Levels of Autonomy and Intelligent Behaviour	
	1.6 Challenges in Autonomous System Design	
2	**Kinematics, Dynamics and Autonomous System Modeling**	**36-70**
	2.1 Coordinate Frames and Spatial Transformations	
	2.2 Forward and Inverse Kinematics	
	2.3 Mobile Robot Kinematic Models	
	2.4 Robot Dynamics and Actuator Modeling	
	2.5 Multirotor Kinematics and Flight Dynamics	
	2.6 State-Space Modeling of Autonomous Systems	
3	**Sensing and Intelligent Perception**	**71-104**
	3.1 Sensors for Autonomous Drones and Robots	
	3.2 Inertial, GNSS and Proximity Sensors	
	3.3 Computer Vision and Visual Perception	
	3.4 LiDAR, Radar and Depth Perception	
	3.5 Object Detection, Recognition and Tracking	
	3.6 Multimodal Sensor Fusion	
4	**Localization, Mapping and SLAM**	**105-136**
	4.1 Localization and State Estimation	
	4.2 Odometry and Inertial Navigation	
	4.3 Bayesian Estimation and Kalman Filtering	
	4.4 Simultaneous Localization and Mapping	
	4.5 Visual and LiDAR-Based SLAM	
	4.6 Semantic Mapping and Spatial Intelligence	

5 **Autonomous Navigation and Motion Planning** **137-167**
5.1 Autonomous Navigation Architectures
5.2 Environment Representation and Mapping
5.3 Global Path Planning Techniques
5.4 Local Motion Planning and Trajectory Generation
5.5 Obstacle Avoidance and Collision Prevention
5.6 Navigation in Dynamic Environments

6 **Guidance, Control and Decision-Making** **168-194**
6.1 Feedback and State-Space Control
6.2 PID and Nonlinear Control
6.3 Adaptive and Robust Control
6.4 Model Predictive and Optimal Control
6.5 Autonomous Drone Guidance and Flight Control
6.6 Behaviour Planning and Decision-Making

7 **Artificial Intelligence and Learning-Based Autonomy** **195-218**
7.1 Artificial Intelligence for Autonomous Systems
7.2 Machine Learning for Robotic Perception
7.3 Deep Learning for Autonomous Navigation
7.4 Reinforcement Learning for Robotics
7.5 Imitation Learning and Learning-Based Planning
7.6 Generative AI and Foundation Models for Robotics

8 **Multi-Robot Systems and Intelligent Drone Swarms** **219-241**
8.1 Multi-Robot System Architectures
8.2 Multi-Agent Coordination and Cooperation
8.3 Swarm Intelligence and Collective Behaviour
8.4 Formation Control and Cooperative Navigation
8.5 Distributed Task Allocation and Planning
8.6 Decentralized Communication and Decision-Making

9 **Autonomous Robotics Software and Human–Robot Interaction** **242-270**
9.1 Robotic Middleware and Software Architectures
9.2 ROS and ROS2 for Autonomous Systems
9.3 Embedded Computing and Edge AI
9.4 Simulation, Digital Twins and Hardware-in-the-Loop
9.5 Human–Robot and Human–Drone Interaction
9.6 Shared Autonomy and Human-in-the-Loop Systems

10 **Safety, Security and Emerging Applications** **271-298**
10.1 Safety and Reliability of Autonomous Systems
10.2 Fault Detection, Diagnosis and Recovery
10.3 Cybersecurity of Intelligent Drones and Robots
10.4 Ethical, Legal and Regulatory Considerations
10.5 Applications in Agriculture, Healthcare, Industry and Smart Cities
10.6 Future Trends in Autonomous Robotics and Drone Technology

Reference **299-300**