

TABLE OF CONTENTS

Chapter 1: Foundations of Green Smart Cities	01-35
1.1 Evolution of Cities: From Conventional to Smart Cities	
1.2 Concept, Characteristics and Dimensions of Green Smart Cities	
1.3 Sustainable Urban Development and the Sustainable Development Goals	
1.4 Urbanization, Resource Consumption and Environmental Challenges	
1.5 Green Smart City Architecture and Integrated Urban Systems	
1.6 Smart City Maturity Models, Indicators and Performance Assessment	
Chapter 2: Internet of Things for Smart Cities	36-70
2.1 Fundamentals of Internet of Things and Urban IoT	
2.2 IoT Architecture, Devices, Sensors and Actuators	
2.3 Wireless Sensor Networks for Urban Applications	
2.4 IoT Communication Technologies and Connectivity	
2.5 IoT Protocols, Gateways and Interoperability	
2.6 Edge, Fog and Cloud Computing for Smart Cities	
Chapter 3: Smart Urban Infrastructure	71-103
3.1 Intelligent Infrastructure and Urban Asset Management	
3.2 Smart Buildings and Energy-Efficient Infrastructure	
3.3 Smart Energy Systems, Smart Grids and Microgrids	
3.4 Smart Water Supply and Distribution Infrastructure	
3.5 Intelligent Waste Management and Resource Recovery	
3.6 Smart Transportation and Intelligent Mobility Infrastructure	
Chapter 4: Environmental Monitoring in Smart Cities	104-137
4.1 Principles of Urban Environmental Monitoring	
4.2 IoT-Based Air Quality Monitoring and Assessment	
4.3 Smart Water Quality and Groundwater Monitoring	
4.4 Urban Soil, Noise and Environmental Pollution Monitoring	
4.5 Urban Heat Islands and Microclimate Monitoring	
4.6 Environmental Sensor Networks, Calibration and Data Quality	
Chapter 5: Environmental Data Analytics and Artificial Intelligence	138-170
5.1 Urban Environmental Data Acquisition and Management	
5.2 Data Preprocessing, Cleaning and Feature Engineering	
5.3 Statistical and Time-Series Analysis of Urban Data	
5.4 Machine Learning for Environmental Prediction	
5.5 Artificial Intelligence for Pollution, Energy and Traffic Analytics	
5.6 Real-Time Environmental Analytics and Decision Support	

Chapter 6: GIS, Remote Sensing and Digital Twins	171-201
6.1 Geographic Information Systems for Smart Urban Planning	
6.2 Spatial Databases and Geospatial Data Visualization	
6.3 Remote Sensing for Urban Environmental Assessment	
6.4 Urban Land Use, Land Cover and Environmental Change Analysis	
6.5 Digital Twins for Smart Cities and Infrastructure	
6.6 Integrated GIS, IoT and Digital Twin Platforms	
 Chapter 7: Green Energy and Low-Carbon Urban Systems	 202-232
7.1 Urban Energy Demand and Energy Management	
7.2 Renewable Energy Integration in Smart Cities	
7.3 Smart Grids, Energy Storage and Demand Response	
7.4 Smart Buildings and Intelligent Energy Management	
7.5 Electric Vehicles and Smart Charging Infrastructure	
7.6 Carbon Management, Net-Zero and Climate-Neutral Cities	
 Chapter 8: Smart Water, Waste and Circular Urban Systems	 233-262
8.1 Intelligent Water Demand and Distribution Management	
8.2 Smart Wastewater Monitoring, Treatment and Reuse	
8.3 Smart Stormwater Management and Urban Flood Control	
8.4 IoT-Based Solid Waste Collection and Optimization	
8.5 Recycling, Resource Recovery and Waste-to-Energy Systems	
8.6 Circular Economy and Urban Resource Management	
 Chapter 9: Smart Mobility, Climate Resilience and Urban Safety	 263-295
9.1 Intelligent Transportation Systems and Traffic Analytics	
9.2 Smart Public Transportation and Multimodal Mobility	
9.3 Sustainable Mobility, Pedestrian and Cycling Infrastructure	
9.4 Urban Climate Risks and Environmental Vulnerability	
9.5 IoT-Based Disaster Monitoring and Early-Warning Systems	
9.6 Climate-Resilient and Adaptive Urban Infrastructure	
 Chapter 10: Smart Governance, Applications and Future Cities	 296-329
10.1 Digital Governance and Integrated Smart City Platforms	
10.2 Citizen-Centric Services, Open Data and Participatory Planning	
10.3 Cybersecurity, Privacy and Ethical Issues in Smart Cities	
10.4 Global and Indian Green Smart City Case Studies	
10.5 Emerging Technologies: 5G/6G, Robotics, Drones and Generative AI	
10.6 Future Trends in Autonomous, Sustainable and Resilient Green Smart Cities	
 References	 330-335