7.3.1

Highlight the performance of the institution in an area distinct to its priority and thrust.

Additional Information:

CONTENTS

20 Years of Excellence in CREATING ENGINEERS

All B.Tech COURSES ACCREDITED NBA

Counseling Code ADIT

Major/ Minor Offering in B.Tech

	MAJORS	MINORS
CSE	Artificial Intelligence & Machine Learning	• Data Science • Internet of Things • Electric Vehicles • Robotics • Smart Cities
CSE (AI & ML)	Data Science	• Internet of Things • Electric Vehicles • Robotics • Smart Cities
IT	Data Science	• Artificial Intelligence & Machine Learning • Internet of Things • Electric Vehicles • Robotics • Smart Cities
ECE	Internet of Things	• Artificial Intelligence & Machine Learning • Data Science • Electric Vehicles • Robotics • Smart Cities
EEE	Electric Vehicles	• Artificial Intelligence & Machine Learning • Data Science • Internet of Things • Robotics • Smart Cities
Mech	Robotics	• Artificial Intelligence & Machine Learning • Data Science • Internet of Things • Electric Vehicles • Smart Cities
Civil	Smart Cities	• Artificial Intelligence & Machine Learning • Data Science • Internet of Things • Electric Vehicles • Robotics

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B.Tech | M.Tech | MBA | Diploma

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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An Autonomous Institution
TEKKALI -532 201 Srikakulam Dist., AP
Tel: 92466 57908, 94401 95531

Introduction to IoT

(Honors /Major Degree Course)

Subject Code: 20HCTXXX	L	T	P	C
	3	1	0	4.0

Course Objectives:

- To learn fundamentals of IoT such as Components, Networking and Communication technologies.
- To discuss various network configurations and topologies.
- To differentiate sensors and actuators used in IoT.
- To study different communication protocols for IoT communication.
- To study the salient features and application scope of each connectivity protocol.
- To apply IoT data into real world applications.

Course Outcomes:

The student will be able to:

CO 1. Explain the evolution of different internet technologies and need for IoT.
CO 2. Identify different networking components in IoT with respect to OSI layer.
CO 3. Analyze the need of sensors and actuators used in IoT.
CO 4. Determine the requirements associated with each of these communication protocols in real-world solutions.
CO 5. Explain the terminologies and technologies associated with IoT connectivity.
CO 6. Understand the requirements, challenges, and advantages of implementing IoT in real world applications.

Unit –I

Introduction to IoT: Introduction, Evolution of IoT, IoT and M2M, IoT -CPS, IoT- WoT, Various enablers of IoT and Complex interdependence technologies, Networking components of IoT.

Unit – II

Networking Components in IoT: Introduction, Network types, Network reachability, OSI model, Internet Protocol suite, Data link layer addressing, Network layer addressing, TCP/IP transport layer.

Unit- III

IoT sensors and actuators: Introduction, Sensors and its characteristics, types of sensing, sensing considerations, Actuators, characteristics of actuators, types of actuators.

Unit – IV

IoT software and Protocols: Introduction, data protocols, MQTT, MQTT-SN, CoAP, XMPP, HTTP, WebSocket, Identification protocols, EPC, uCode.

Unit – V

Connectivity Technologies in IoT: Introduction, IEEE 802.15.4, Zigbee, Communication topologies in Zigbee, WirelessHART network architecture, RFID, Lora, WI-Fi, Bluetooth.

Unit – VI

IoT Applications: IoT in agriculture, Smart irrigation Management system, IoT in health care systems, Advantages and risks of health care IoT.

Text Books:

1. Misra, S., Mukherjee, A., & Roy, A. (2021). *Introduction to IoT*. Cambridge: Cambridge University Press. doi:10.1017/9781108913560.
2. Adrian McEwen, Hakim Cassimally "Designing the Internet of Things", John Wiley & Sons, 2014.

Reference Books:

1. Vijay Madisetti , Arshdeep Bahga, Adrian McEwen (Author), Hakim Cassimally "Internet of Things A Hands-on-Approach" University Press, 2014.
2. Joe Biron and Jonathan Follett "Foundational Elements of an IoT Solution: The Edge, The Cloud, and Application Development", First Edition. Cisco Press, 2017.

ADITYA INSTITUTE OF TECHNOLGY AND MANAGEMENT (AUTONOMOUS)

Approved by AICTE,
Recognized Under 2(f) & 12(b) of UGC,
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K.Kotturu, Tekkali, Srikakulam – 532201. Andhra Pradesh.

B. Tech ECE (Honors Degree in IoT)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Identified Subjects for B.Tech ECE (Honors Degree in IoT)

S. No.	Semester	Code	Theory & Lab	L	T	P	C
1	II-II	20HCTXXX	Introduction to IoT	3	1	0	4
2	III-I	20HCTXXX	Sensor Technologies in IoT	3	0	0	3
3	III-I	20HCTXXX	IoT Sensors Lab	0	0	2	1
4	III-II	20HCTXXX	IoT Web development and Applications	3	0	0	3
5	III-II	20HCTXXX	Practical Python programming for IoT Lab	0	0	2	1
6	IV-I	20HCTXXX	IoT Security and Trust	3	1	0	4

B.Tech Honors in ROBOTICS

Year/Sem.	Code	Theory/Lab	L	T	P	C
II B. Tech. (2nd Sem)	20ROT201	Introduction to Robotics and Mechatronics	4	0	0	4
III B. Tech. (1st Sem)	20ROI301	Robot Transformations, Kinematics and, Dynamics (Theory and MAT LAB)	3	0	2	4
III B. Tech. (2nd Sem)	20ROI302	Robot Programming and Applications (Theory and Programming Lab)	3	0	2	4
IV B. Tech. (1st Sem)	20ROT401	Computer Vision & System Design	4	0	0	4
IV B. Tech. (2nd Sem)		Two Moocs Course during 2-2 to 4-1				4
Total						20

INTRODUCTION TO ROBOTICS AND MECHATRONICS: (2 – 2)

Unit – I: Introduction to Robotics: Brief History, Automation and Types, Robots, Robotics and, Principles, Development of Robotics, Laws of Robotics, Specifications and Classifications, Degree of Freedom, Anatomy and Work Volume, Applications.

Unit – II: Robot Actuation Systems: Machine and Mechanism, Architecture of Robotics Systems Mechanical - Cams, Gear trains, Ratchet and Pawl, Belt and chain drives, Bearings. Electrical - Electrical systems, Solid State Switches, Solenoids, D.C. motors, A.C. motors, Stepper motors, Pneumatic and, Hydraulic Actuation System - Introduction to Hydraulic and Pneumatic Systems, Directional Control valves, Flow control valves.

Unit – III: Sensors: Robotic Sensors, Position Sensors - Optical, Non-Optical, Velocity Sensors, Accelerometers, Proximity Sensors - Contact, Non-Contact, Range Sensing, Touch and Slip Sensors, Force and Torque Sensors.

Unit – IV: Introduction to Mechatronics: Definition and Components, Applications, Mechatronics System Design, Procedure and Possible Design Solutions, Building Blocks of Mechanical, Electrical, Electro-Mechanical, Thermal and Fluid Systems, Open and Closed Loop Systems, Digital and Analogue Control Systems.

Unit – V: Signal Conditioning and Data Acquisition: Filtering, Pulse Modulation, A/D and D/A Converters, Multiplexers, Data Acquisition Systems.

Unit – VI: Basic Introduction to Microprocessor, Microcontrollers and PIC Microcontroller, 8051 Programming, Peripheral Interfacing, Microprocessor, Microcontroller in Robotics, Control Modes, PID and Digital Controllers, Velocity Control, Adaptive Control, , Programmable Logic Controllers: Fundamentals of PLCs, Mnemonics and Timers, Relays and Counters, Master and Jump Control, Data Control, Analog I/O Control

Computational Statistics and Data Analysis
(Common to all Branches)

L	T	P	C
4	0	0	4

Honours / Minor Course: *Artificial Intelligence and Machine Learning*
Subject Code: 20AIT201

Course Objective

To introduce several statistical techniques found to be serving as tools even today in the development of machine learning and artificial intelligence based computer algorithms.

- To imbibe strong foundation of statistics in students for implementation in computation.
- To understand modern computational methods used in statistics.
- To get detailed approach of simulation, estimation and visualization of statistical data.
- To understand the role of computation as a tool of discovery in data analysis.
- To be able to appropriately apply computational methodologies to real world statistical problems.
- To learn the data processing techniques required to get applied on machine learning algorithms.

Course Outcome

On completion of the course, learner will be able to–

1. Identify the suitable method of statistics on the given data to solve the problem of any heuristic approach of prediction.
2. Apply appropriate statistical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
3. Design and analyze real world engineering problems by applying various statistical modeling techniques.
4. Formulate suitable statistical method required as pre-processing technique for finding the solution of machine learning algorithm.
5. Model and solve computing problem using correlation, and resampling using appropriate statistics algorithms.
6. To introduce students to the basic concepts and techniques of Machine Learning for solving practical problems.

Unit – I

Introduction to Statistics : What is statistics, Statistical Data-Categorical, Numerical (Continuous), Univariate and Bivariate Analysis, Mean, Median, Mode, Standard Deviation, Harmonic Mean, Data Visualization-Line, Scatter, Box plots, Histogram, Descriptive statistics: qualitative and quantitative Variable, discrete variable, population, sample, random sample. **(8 hours)**

Unit – II

Probability and Distribution: Probability, Random Variable, Joint and Conditional Probability, Baye's Theorem, Monte Carlo Method, Probability Distributions, Characterizing a Distribution,

Discrete Distributions, Normal Distributions, Continuous Distributions Derived from the Normal Distribution, Poisson Distribution, Other Continuous distributions: Lognormal, Weighbull, Exponential, Uniform. **(8 hours)**

Unit – III

Hypothesis and Statistical Tests: Null hypothesis, Alternative hypothesis, Typical Analysis procedures, Hypothesis Concept, Errors, p-Value, z-value, Crucial value, Test on Numerical Data-Distribution of a Sample Mean, Comparison of Two Groups, Comparison of Multiple Groups, degree of freedom, T-test, Z-test, ANOVA analysis. **(8 hours)**

Unit – IV

Data Pre-processing and Performance Analysis

Data Pre-processing steps: data cleaning-missing data, noisy data, binning method, regression, clustering, data transformation - attribute selection, data reduction-feature selection, dimensionality reduction. Normalization- Decimal Scaling, Min-Max scaling, Z-score

Performance metrics: Confusion matrix, sensitivity, specificity, F1 score, Recall, Precision, ROC-AUC Curve, Cross validation technique – K-fold

Model evaluation: Residual error, Bias, Variance, Mean square error, RMSE, Loss.

(8 hours)

Unit – V

Statistical Methods: Dimensionality Reduction Techniques- Principal Component Analysis, Discriminant Analysis, Feature Selection- Chi2 square method, Variance Threshold, Recursive Feature Elimination, Outliers detection methods, Resampling-Random, under-sampling and over re-sampling. **(8 hours)**

Unit – VI

Machine Learning: Introduction to Machine Learning: Supervised and unsupervised ML, Regression (Linear regression, Logistic regression) Classification (Naïve-Bayes classifier), Clustering (K-means, K-mediod). **(8 hours)**

Text Books:

1. Thomas Haslwanter, "An Introduction to Statistics with Python with Applications in the Life Sciences", Springer International Publishing Switzerland 2016, ISBN 978-3-319-28315-9, ISBN 978-3-319-28316-6 (eBook)
2. Allen B. Downey, "Think Stats", Second Edition, O'Reilly Media, ISBN: 978-1-491-90733-7
3. Foundations of Machine Learning, Mehryar Mohri, Afshin Rostamizadeh, and Ameet Talwalkar, MIT Press, Second Edition, 2018.

Reference books:

1. José Unpingco, "Python for Probability, Statistics, and Machine Learning", Springer International Publishing Switzerland, ISBN 978-3-319-30715-2, DOI 10.1007/978-3-319-30717-6, ISBN 978-3-319-30717-6 (eBook)

2. Claus Weihs, Olaf Mersmann, Uwe Ligges, "Foundations of Statistical Algorithms", CRC Press, ISBN-978-1-4398-7887-3 (eBook - PDF)

e-Books:

- http://file.allitebooks.com/20151204/Foundations%20of%20Statistical%20Algorithms.pdf
- http://onlinestatbook.com/Online_Statistics_Education.pdf
- https://upload.wikimedia.org/wikipedia/commons/8/82/Statistics.pdf
- http://cnx.org/content/col10522/1.38/pdf
- http://www.greenteapress.com/thinkstats/thinkstats.pdf

MOOC/ Video Lectures available at:

- https://www.udemy.com/course/introduction-to-bayesian-statistics/ (Free Course)
- https://www.youtube.com/watch?v=xxpc-HPKN28
- https://www.udacity.com/course/intro-to-statistics--st101# (Free Course)
- https://nptel.ac.in/courses/111/105/111105090/
- https://nptel.ac.in/courses/111/105/111105077/

B.Tech (Honors)

Electric Vehicle Domain

S.No	Name of The Subject	L	T	P	C	Semester
1.	Introduction to Electrical Vehicle Technology	3	1	0	4	2-2
2.	Special Electrical Machines	3	1	0	4	3-1
3.	Energy storage and Management Systems	0	3	1	4	3-2
4.	Design of Electric Vehicles	2	0	2	4	4-1
5.	Project			4	4	4-2
	TOTAL				**20**	

INTRODUCTION TO ELECTRICAL VEHICLE TECHNOLOGY

(Honors Course)

Subject Code: 20EVT201

L	T	P	C
3	1	0	4

Course Objectives:

1. To describe the different types of electrical and hybrid vehicles
2. To discuss the basic components of Electric vehicle power train.
3. To discuss the basics of different Motor Principles
4. To describe the concepts of Hybrid Electric Drive Trains
5. To describe and analyze different types of batteries and energy storage systems
6. To describe different controllers and converters in Electric Vehicles

Course Outcomes:

At the end of the course the student will able to

1. Understand basics of Electric vehicle & Hybrid Electric Vehicle.
2. Understand about power train drives and control in Electric Vehicles.
3. Understand basics of different Motor Principles
4. Understand concepts in different Electrical Drive trains
5. Analyze different types of batteries and energy storage requirements.
6. Understand different controllers and converters in Electric Vehicles

Unit-I- Introduction to Electric vehicle

Comparison of Conventional Vehicle vs Electric Vehicle, Introduction to Electric Vehicles: Types of EVs, Hybrid Electric Vehicles, Introduction to EV Technology, History of Electric Vehicle, Benefits Of Electric Vehicles, Types of Electric vehicle and Hybrid Vehicles. Norms and Standards.

Unit-II- Power Train in Electric vehicle

Working of an Electric Vehicle, Major Components in an Electric Vehicle Power train, Energy Source of an EV, Transmission configuration, Components – Motor, gears, differential, clutch, brakes regenerative braking, Battery pack, Controller. Hybrid Electric Drive-train

Unit-III- Motor-Principles of Electrical Machines

Motor-Principles of Electrical Machines, EM Fundamentals, Classification of Motors, Selection of Motor, Motor Specifications Calculations, Gear ratio Calculations.

Unit-IV- Electrical Drive trains

Concept of Hybrid Electric Drive Trains, Electric Propulsion unit, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, switched reluctance motor

Unit-V- Energy Storage systems

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles:- Battery based energy , storage , Types of Batteries and Classification, different energy storage devices. Battery Selection Criteria, Major Components of a Battery pack, Applications

Unit-VI- Controllers & Converters

Controller & Converters, EV Controllers, DC-DC Converter, DC-AC Converter

Text Books:

1. Iqbal Husain, "Electric and Hybrid Vehicles Design Fundamentals", CRC Press, 2010
2. James Larminie, John Lowry, "Electric Vehicle Technology Explained", Wiley 2012.
3. Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric,

Statistical Analysis and Programming for Data Science
(Common to all Branches)

L	T	P	C
3	0	2	4

Subject Code: 20DST201

Course Objectives

After the completion of the course, students would:

- Be prepared with a varied range of expertise in different aspects of data science such as data collection, visualization, processing and modeling of data sets.

Course Outcomes:
The student will be able to:

1. Identify the need for data science and solve basic problems using Python built-in data types and their methods.
2. Design an application with user-defined modules and packages using OOP concept.
3. Employ efficient storage and data operations using NumPy arrays.
4. Apply powerful data manipulations using Pandas.
5. Develop data pre-processing and visualization using Pandas.
6. Produce visualization of data with Matplotlib

Unit – I

Descriptive Statistics and Probability Distributions: Statistical Data-Categorical, Numerical (Continuous), Univariate and Bivariate Analysis, Mean, Median, Mode, Standard Deviation, Descriptive statistics: qualitative and quantitative Variable, discrete variable, population, sample, random sample. Probability Distributions: Binomial Distribution, Poisson Distribution, Uniform Distribution, Normal Distribution, Exponential Distribution.

Unit – II

Introduction to Data Science and Python Programming:

Introduction to Data Science - Why Python? - Essential Python libraries - Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set - Type Conversion- Operators.
Decision Making- Looping- Loop Control statement- Math and Random number functions. User defined functions - function arguments & its types.

File, Exception Handling and OOP: User defined Modules and Packages in Python- Files: File manipulations, File and Directory related methods- Python Exception Handling.
OOPs Concepts -Class and Objects, Constructors – Data hiding- Data Abstraction- Inheritance.

Practical Component:

1. Implement basic Python programs for reading input from console.
2. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data types: Strings, List, Tuples, Dictionary, Set

3. Solve problems using decision and looping statements.
4. Apply Python built-in data types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem
5. Handle numerical operations using math and random number functions
6. Create user-defined functions with different types of function arguments.
7. Create packages and import modules from packages.
8. Perform File manipulations- open, close, read, write, append and copy from one file to another.
9. Handle Exceptions using Python Built-in Exceptions
10. Solve problems using Class declaration and Object creation.
11. Implement OOP concepts like Data hiding and Data Abstraction.
12. Solve any real-time problem using inheritance concept.

Unit – III
Introduction to Numpy

NumPy Basics: Arrays and Vectorized Computation- The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes.

Universal Functions: Fast Element-Wise Array Functions- Mathematical and Statistical Methods- Sorting-Unique and Other Set Logic.

Practical Component:

1. Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects and Random Functions.
2. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.
3. Computation on NumPy arrays using Universal Functions and Mathematical methods.
4. Import a CSV file and perform various Statistical and Comparison operations on rows/columns.
5. Load an image file and do crop and flip operation using NumPy Indexing.

Unit – IV
Data Manipulation with Pandas
Introduction to pandas Data Structures: Series, DataFrame, Essential Functionality: Dropping Entries- Indexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking.

Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.

Practical Component:

1. Create Pandas Series and DataFrame from various inputs.
2. Import any CSV file to Pandas DataFrame and perform the following:
   a) Visualize the first and last 10 records
   b) Get the shape, index and column details
   c) Select/Delete the records(rows)/columns based on conditions.
   d) Perform ranking and sorting operations.
   e) Do required statistical operations on the given columns.
   f) Find the count and uniqueness of the given categorical values.
   g) Rename single/multiple columns.

Unit – V

Data Cleaning and Preparation

Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers- String Manipulation: Vectorized String Functions in pandas.

Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

Practical Component:

1. Import any CSV file to Pandas Data Frame and perform the following:
   a) Handle missing data by detecting and dropping/ filling missing values.
   b) Transform data using apply() and map() method.
   c) Detect and filter outliers.
   d) Perform Vectorized String operations on Pandas Series.

Unit – VI

Data Visualization

A brief Matplotlib API primer, Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

Practical Component:

1. Visualize data for the following:
   a) Line Plots
   b) Bar Plots
   c) Histograms
   d) Density Plots
   e) Scatter Plots.

Text Books

1. Y. Daniel Liang, "Introduction to Programming using Python", Pearson,2012.
2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition,2018.
3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.

Reference Books

1. Wesley J. Chun, “Core Python Programming”, Prentice Hall,2006.
2. Mark Lutz, “Learning Python”, O’Reilly, 4th Edition, 2009.

MOOC:

1. https://www.edx.org/course/python-basics-for-data-science
2. https://www.edx.org/course/analyzing-data-with-python
3. https://www.coursera.org/learn/python-plotting?specialization=data-science-python

DEPARTMENT OF CIVIL ENGINEERING

B.Tech. honours in SMART CITIES

Sr .No	Course	Course Code	Teaching Scheme (Hours per Week)			Credits
			L	T	P	
1	Urban Planning and Essentials of smart cities	20SCT201	4	0	0	**4**
2	Smart Energy &Transportation Systems	20SCT301	4	0	0	**4**
3	Smart water & waste management systems	20SCT302	4	0	0	**4**
4	ICT for smart cities	20SCT401	4	0	0	**4**
5	Urban governance &Development Management (UGDM)	NPTEL	8 Weeks Course			**2**
6	Machine Learning for Engineering & Science Applications	NPTEL	8 Weeks Course			**2**

Urban Planning and Essentials of Smart Cities

Course Code: 20SCT201

L	T	P	C
4	0	0	4

COURSE OBJECTIVES

Students will have

- To interpret and illustrate trends of urbanisation.
- To explain various urban development plans.
- To illustrate design and development of urban development projects.
- To comprehend essential aspects of smart and sustainable cities.
- To infer policy planning and development of smart cities.
- To recognize the role of Governance in addressing the urban challenges and key issues

COURSE OUTCOME

- Interpret and illustrate trends of urbanisation.
- Explain various urban development plans.
- Illustrate design and development of urban development projects.
- Comprehend essential aspects of smart and sustainable cities.
- Infer policy planning and development of smart cities.
- Recognize the role of Governance in addressing the urban challenges and key issues

UNIT I

Basics of Urbanisation:

Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl, Peri - urban areas, Central Business District (CBD), Classification of urban areas, Trends of Urbanisation at International, National, Regional and State level.

UNIT II

Urban Plan Formulation:

Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights, Special Economic Zones- Development of small town and smart cities-case studies

UNIT III

Planning And Design Of Urban Development Projects:

Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects

UNIT IV

Overview of Smart Cities:

Defining smart cities, Dimension, components and categories of smart cities. Global Standards and performance benchmarks, Practice codes.

UNIT V

Planning of Smart Cities:

General prerequisites of smart cities, Policy frame work for smart cities. India 100 smart cities policy and mission, planning and development.

UNIT VI

Smart Governance:

Definitions, functions, objectives and benefits of smart Governance. Infrastructure for smart governance. Initiatives and implementation stages of smart governance.

Text Books:

1. Allen G.Noble, (Eds), 'Regional Development and Planning for the 21st Century: New Priorities and New Philosophies', Aldershot, USA, 1988.
2. Andy Pike, Andres Rodriguez-Pose, John Tomaney, 'Handbook of Local and Regional Development', Taylor & Francis, 2010
3. Andreas Faludi and Sheryl Goldberg, 'Fifty years of Dutch National Physical Planning, Alexandrine Press, Oxford, 1991.
4. Daniel G. Parolek, AIA, Karen Parolek, Paul C. Crawford, FAICP, Form Based Codes: A Guide for Planners, Urban Designers, Municipalities, and Developers, John Wiley & Sons, 2008
5.Smart Cities: Big Data and the Quest for a New Utopia, Anthony M. Townsend, ISBN: 978-0-393-08287-6

References:

1. A.B. Gillion and Simon Eisner, "The Urban Pattern", CBS Publishers and Distributors, Delhi. 2. Ward S (2002), "Planning the 20th Century City" John Wiler & Sons.
3. R. Ramachandran, "Urbanisation and Urban Systems in India", Oxford Publications.
4. FAIR, G.M., GAYER, J.C. AND OKUN, D.A., "Elements of water supply and Waste water Disposal", John Wiley & Sons, New York.
5. TCPO AND MINISTRY OF WORKS AND HOUSING, "Norms and Standards for Urban Water Supply and Sewerage Services", New Delhi.
6. National Institute of Urban Affairs, "status of water supply, sanitation and solid waste management in urban area" 2005,
7. Transforming City Governments for Successful Smart Cities, Editor: Manuel Pedro Rodriguez-Bolivar ISBN: 978-3-319-03166-8