NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA, G.B. NAGAR
(AN AUTONOMOUS INSTITUTE)

NIET
Greater Noida
Autonomous Institute
Estd.2001
Get Future Ready

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, UTTAR PRADESH, LUCKNOW

Evaluation Scheme & Syllabus

For

Bachelor of Technology

Computer Science and Engineering (Internet of Things)

Fourth Year

(Effective from the Session: 2023-24)

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)

Bachelor of Technology
Computer Science And Engineering (Internet Of Things)
EVALUATION SCHEME
SEMESTER-VII

Sl. No.	Subject Codes	Subject Name	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
WEEKS COMPULSORY INDUCTION PROGRAM													
1	ACSIOT0701	Wireless Sensor Network	3	0	0	30	20	50		100		150	3
2		Departmental Elective-V	3	0	0	30	20	50		100		150	3
3		Open Elective-II	3	0	0	30	20	50		100		150	3
4		Open Elective-III	3	0	0	30	20	50		100		150	3
5	ACSIOT0751	Wireless Sensor Network Lab	0	0	2				25		25	50	1
6	ACSE0759	Internship Assessment-III	0	0	2				50			50	1
7		MOOCs (For B.Tech. Hons. Degree)											
		GRAND TOTAL										**700**	**14**

List of MOOCs (Coursera) Based Recommended Courses for Fourth Year (Semester-VII) B. Tech Students

S. No.	Subject Code	Course Name (IoT)	University / Industry Partner Name	No of HOURS	Credits
1.	AMC0162	Internet of Things: Sensing and Actuation From Devices	University of California San Diego	16 hours	1
2.	AMC0149	Architecting Smart IoT Devices	EIT Digital	33 hours	2.5

OR

S. No.	Subject Code	Course Name (Java)	University / Industry Partner Name	No of HOURS	Credits
1	AMC0105	Developing Cloud Apps with Node.js and React	IBM	16	1
2	AMC0167	Java Servlet Pages (JSPs)	LearnQuest	16	1

PLEASE NOTE:-

- **Internship (3-4 weeks) shall be conducted during summer break after semester-VI and will be assessed during Semester-VII**

Abbreviation Used: -

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

List of Departmental Electives

Departmental Electives	Subject Codes	Subject Name	Bucket Name	Branch	Semester
Elective-V	ACSE0712	RPA Implementation	CRM-RPA	IoT	7
Elective-V	ACSAI0712	Natural Language Processing	Data Analytics	IoT	7
Elective-V	ACSE0713	Web Development using MERN Stack with DevOps	Full Stack Development	IoT	7
Elective-V	ACSAI0711	IoT for Smart Cities	Smart Systems	IoT	7

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)

Bachelor of Technology
Computer Science And Engineering (Internet Of Things)
EVALUATION SCHEME
SEMESTER-VIII

Sl. No.	Subject Codes	Subject Name	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
1		Open Elective-IV	2	0	0	30	20	50		100		150	2
2	ACSE0859/ ACSE0858	Capstone Project/Industrial Internship	0	0	20				200		300	500	10
3		MOOCs (For B.Tech. Hons. Degree)											
4		**TOTAL**										**650**	**12**

List of MOOCs (Coursera) Based Recommended Courses for Fourth Year (Semester-VIII) B. Tech Students

S. No.	Subject Code	Course Name (IoT)	University / Industry Partner Name	No of HOURS	Credits
1.	AMC0182	Capstone: Autonomous Runway Detection for IoT	EIT Digital(1/4)	30 hours	2.5
2.	AMC0189	Internet of things Capstone V2: Build a mobile surveillance system	University of California San Diego	4 hours	0.5

OR

S. No.	Subject Code	Course Name (Java)	University / Industry Partner Name	No of HOURS	Credits
1	AMC0184	Developing Applications with SQL, Databases, and Django	IBM	14 Hours	1
2	AMC0187	Getting started with Git & Github	IBM	8 Hours	0.5

S.No.	Subject Code	Course Name	University/Industry Partner Name	No. of Hours	Credit
1	AMC0214	The Complete React Developer Course	Infosys Springboard	39 hours	3
2	AMC0215	AWS IoT Case Study- Smart Parking Project	Infosys Springboard	6 hours	0.5
3	AMC0216	Programming using Java	Infosys Springboard	113 hours	4
4	AMC0215	Programming Fundamentals using Python - Part 1	Infosys Springboard	43 hours	3.5
5	AMC0216	Industrial IoT Markets and Security	Infosys Springboard	21 hours	1.5
6	AMC0217	React Native	Infosys Springboard	19 hours	1.5

Abbreviation Used: -

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)

Bachelor of Technology
Computer Science And Engineering (Internet Of Things)

AICTE Guidelines in Model Curriculum:

A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

1. For 6 to 12 HOURS =0.5 Credit
2. For 13 to18 =1 Credit
3. For 19 to 24 =1.5 Credit
4. For 25 to 30 =2 Credit
5. For 31 to 35 =2.5 Credit
6. For 36 to 41 =3 Credit
7. For 42 to 47 =3.5 Credit
8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only. The students shall be awarded Honours Degree as per following criterion.

i. If he / she secures 7.50 as above CGPA.
ii. Passed each subject of that degree program in the single attempt without any grace.
iii. Successful completion of MOOCs based 20 credits.

B. TECH FOURTH YEAR			
Course Code	**ACSIOT0701**	**L T P**	**Credits**
Course Title	**WIRELESS SENSORS NETWORK**	**3 0 0**	**3**

Course Objective: Students should learn the Fundamentals of wireless communication technology and wireless sensor networks also students should be able to design sensing node with wireless sensor networks for IoT application.

Pre-requisites: Computer Networks, IoT Protocols

Course Contents / Syllabus

UNIT-I	**WIRELESS COMMUNICATION AND WSN**	**8 HOURS**

Wireless Communication: Fundamentals of wireless communication technology, the electromagnetic spectrum radio propagation, characteristics of wireless channels, Wireless Internet

Introduction to wireless sensor networks: Key definitions of sensor networks, Characteristics, advantages and challenges of wireless sensor network

UNIT-II	**WIRELESS SENSOR NODE DESIGN**	**8 HOURS**

Wireless Sensor node architecture: Wireless Single-Node Architecture Hardware Components, commercially available sensor nodes - IRIS, Mica Mote, EYES nodes, BT nodes, Energy Consumption of Sensor Nodes, Operating Systems, Network Architecture, Sensor Network Scenarios, Optimization Goals

UNIT-III	**MAC AND ROUTING PROTOCOLS**	**8 HOURS**

MAC Protocols: IEEE 802.15.4 MAC protocol, MAC protocols for sensor network, location discovery, SMAC, BMAC, Traffic-adaptive medium access protocol (TRAMA), Issues in designing MAC protocols for wireless networks

Routing Protocols: classification of routing protocols, table-driven, on-demand, hybrid and flooding routing protocols, Issues in designing a routing protocol.

UNIT-IV	**INFRASTRUCTURE AND SECURITY**	**8 HOURS**

Infrastructure Establishment: Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control Platform, Tool and Security: Programming Challenges, Node-level software platforms, Node-level Simulators. Security issues in Sensor Networks. Future Research Direction.

UNIT-V	**APPLICATIONS OF WSN**	**8 HOURS**

Applications of WSN: Home Control, Industrial Automation, Medical Applications, Reconfigurable Sensor Networks, Civil and Environmental Engineering Applications.

Case Study: IEEE 802.15.4 LR-WPANs Standard, IEEE 802.11ax, Target detection and tracking, Field sampling.

Course Outcomes: After completion of this course students will be able to

CO 1	Understand concept of wireless communication and challenges in wireless sensor networks	K2
CO 2	Interpret sensor node architecture, design issues and optimization goals.	K3
CO 3	Implement MAC and different routing protocol based on Wireless sensor network	K3
CO 4	Discuss Infrastructure and security issues in wireless node sensor networks	K2
CO 5	Design Wireless sensor network for different applications	K6

Text books

1. Kazem Sohraby, Daniel Minoli and Taieb Znati, "Wireless Sensor Networks Technology, Protocols, and Applications ", John Wiley & Sons, 2007.
2. Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks," John Wiley & Sons, Ltd, 2005.
3. Thomas L. Marzetta, Erik G. Larsson, Hong Yang, Hien Quoc Ngo, Fundamentals of Massive MIMO, Cambridge University Press

Reference Books

1. C. Siva Ram Murthy, and B. S. Manoj, "AdHoc Wireless networks ", Pearson Education - 2008.
2. William Stallings, "Wireless Communications and Networks ", Pearson Education - 2004.

Video Links

Unit 1	https://www.youtube.com/watch?v=W1aMmCZ25fw
Unit 2	https://www.youtube.com/watch?v=ycaz99NogS4&list=PLJ5C_6qdAvBHroAfekCO7K4xphEF74UPc
Unit 3	https://www.youtube.com/watch?v=sayPu0biqQk&list=PLhjFbo2uE8q2FiaqRw4RO2MqNaJY4pi9O
Unit 4	https://www.youtube.com/watch?v=N03Gh6GvEw4&list=PLV8vIYTIdSnaoFjclogMhXiBFrHSL2Ar1
Unit 5	https://youtu.be/vnLvup1q3pk

B. TECH. FOURTH YEAR			
Course Code	**ACSIOT0751**	**L T P**	**Credit**
Course Title	**Wireless Sensor Network Lab**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Create a sample wireless topology using MATLAB Simulation Tool.	CO1
2	Implement a Transmission Control Protocol and its variants using MATLAB Simulation Tool.	CO1
3	Implement a User Datagram Protocol using MATLAB Simulation Tool.	CO1
4	Implement a Power Efficient Gathering in Sensor Information System using MATLAB Simulation Tool.	CO1
5	Interface DHT Sensors with NodeMCU and publish the sensing information on could using MQTT.	CO2
6	Communicate between two raspberry-pi nodes using MQTT protocol. Publish from one node and subscribe the data on second node.	CO2
7	Create WSN network with three raspberry-pi nodes and interface the sensors information among those. Use AMQP protocol for data exchange.	CO2
8	Five source nodes sensing temperature values are deployed in the ground floor of a building and these nodes send the values to a sink node deployed in the same floor of the building. A hierarchichal network having 2 cluster nodes and three source nodes under each cluster is implemented in the first floor of a building for sensing light intensities. The sink nodes of both networks average the received values and send it to a gateway node located in the second floor. write a program for implementing this scenario	CO2

Lab Course Outcome: After successful completion of this Lab students will be able to

CO 1	Create different topologies of Wireless networks and implement protocols using MATLAB Simulation tool.	K6
CO 2	Design Wireless sensor network using Raspberry-pi, sensors and messaging protocols.	K6

B. TECH FOURTH YEAR

Course code	ACSE0712	L T P	Cred
Course title	RPA IMPLEMENTATION	3 0 0	3

Course objective: This course is designed to give a thorough understanding and practical skills in develop and deploying software robots for Robotic Process Automation (RPA).

Pre-requisites: Basic Knowledge of C Programming

Course Contents / Syllabus

UNIT-I	DATA MANIPULATION	8 HOU

Introduction to Data Manipulation, Scalar variables, collections and Tables, Text Manipulation, I Manipulation, Gathering and Assembling Data Recording and Advanced UI Interaction; Record Introduction, Basic and Desktop Recording, Web Recording, Input/output Methods, Screen Scraping, I Scraping, Scraping advanced techniques.

UNIT-II	SELECTORS	8 HOU

Selectors, Defining and Assessing Selectors, Customization, Debugging, Dynamic Selectors, Partial Select RPA Challenge, Image, Text & Advanced Citrix Automation, Introduction to Image & Text Automat Image-based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automa challenges, Best Practices using tab for Images Starting Apps.

UNIT-III	DATA TABLES AND AUTOMATION	8 HOU

Excel Data Tables & PDF, Data Tables in RPA, Excel and Data Table Basics Data Manipulation in Ex Extracting Data from PDF, extracting a single piece of data, Anchors, Using anchors in PDF.

Email Automation: Email Automation, Incoming Email automation, Sending Email automation.

UNIT-IV	DEBUGGING AND EXCEPTION HANDLING	8 HOU

Debugging Tools, Strategies for solving issues, Catching errors.

Orchestrator: Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedu

UNIT-V	ROBOTIC FRAMEWORK	8 HOU

Re-Framework template, Re-Framework template works, Use Re-Framework to automate your processes. .NET Classes and Objects.

Course outcome: After completion of this course students will be able to:

CO 1	Apply basic concepts and methods from design engineering to explore creative solutions of real-world problems.	K3
CO 2	Learn Robotic Process Automation, and massive career opportunity in this field.	K2
CO 3	Implement the knowledge of RPA tools, functions in various industries and perform, control various tasks using RPA bots.	K3
CO4	Gain expertise in Desktop, Web & Citrix Automation and use RE-Framework to build a structured business automation process.	K2

CO 5	Develop a real-world workflow automation project and will be able to debug a workflow.	K6

Textbooks:

1) Vaibhav Jain, "Crisper Learning: For UiPath", Latest Edition, Independently Published, 2018.
2) Alok Mani Tripathi, "Learning Robotics Process Automation", Latest Edition, Packt Publishing Birmingham. March 2018

Reference Books/E-Books:

1) Kelly Wibbenmeyer, "The Simple Implementation Guide to Robotic Process Automation (RP Latest Edition, iUniverse Press.
2) https://www.uipath.com/hubfs/ebook-its-time-to-automate.pdf

Links:

https://www.youtube.com/watch?v=6QoCG6YIPVo&list=PL41Y-9S9wmyJarNN2KnB4XudpT1yE1kVd

https://www.youtube.com/watch?v=YOHFgrOvPTM&list=PL41Y-9S9wmyLvF6Ou0oPhg6MrFWSw7sn4

https://www.youtube.com/watch?v=QMBuyLMjOhM&list=PL41Y-9S9wmyIYX6kciM8DboVYymsv2y6

https://www.youtube.com/watch?v=KE9raKNTkfI&list=PL41Y-9S9wmyLeXL1DY9j-XepNb_vg9N8t

https://www.youtube.com/watch?v=2rjr8QhD9oc&list=PL41Y-9S9wmyJi2zmWY77yPZrdVI7ab3Ja

B. TECH FOURTH YEAR

Course code	ACSAI0712	L T P	Credits
Course title	NATURAL LANGUAGE PROCESSING	3 0 0	3

Course objective: The course aims to provide an understanding of the foundational concepts and technique in NLP. The focus is on providing application-based knowledge.

Pre-requisites: Programming Skills, Data Structures, Algorithms, Probability and Statistics, Mach Learning.

Course Contents / Syllabus

UNIT-I	OVERVIEW OF NATURAL LANGUAGE PROCESSING	8 HOU

Definition, Applications and emerging trends in NLP, Challenges. Ambiguity.

NLP tasks using NLTK: Tokenization, stemming, lemmatization, stop-word removal, POS tagging, Parsi Named Entity Recognition, coreference resolution.

UNIT-II	REGULAR EXPRESSIONS	8 HOU

Data Preprocessing: Using Python - Convert to lower case, handle email-id, HTML tags, URLs, emojis, rep characters, normalization of data (contractions, standardize) etc.

Vocabulary, corpora, and linguistic resources, Linguistic foundations: Morphology, syntax, semantics pragmatics, Language models: Unigram, Bigram, N-grams.

UNIT-III	TEXT ANALYSIS AND SIMILARITY	8 HOU

Text Vectorization: Bag-of-Words model and vector space models, Term Presence, Term Frequency, TF-ID

Textual Similarity: Cosine similarity, Word Mover's distance, Word embeddings: Word2Vec, GloVe.

UNIT-IV	TEXT CLASSIFICATION & NLP APPLICATIONS	8 HOU

Text classification: Implement of applications of NLP using text classification- Sentiment Analysis, To modelling, Spam detection.

High Level NLP applications: Machine translation: Rule-based and statistical approaches, Text summarizat Dialog systems, conversational agents and chatbots.

UNIT-V	ADVANCED NLP TECHNIQUES	8 HOU

Sequential data, Introduction to sequence models - RNN and LSTM, Attention Mechanism, Transform Transformer-based models: BERT, GPT, T5, Introduction to Hugging Face Transformers, Case studies.

Course outcome: After completion of this course students will be able to:

CO 1	Appreciate the emerging trends and challenges in NLP and perform the basic NLP tasks using some NLP library.	K2
CO 2	Apply regular expressions for data cleaning and understand the fundamental concepts and theories underlying NLP.	K3
CO 3	Extract features and find similarity in text data.	K3

CO4	Implement NLP techniques to design real-world NLP applications	K3
CO 5	Apply advanced techniques like sequential modelling and attention mechanism to develop NLP applications	K4

Textbooks:

1)Daniel Jurafsky, James H. Martin, "Speech and Language Processing", Second Edition, Pearson Educati 2009 ISBN 0131873210.

2)James Allen, Natural Language Understanding, 2nd edition, 1995 Pearson Education ISBN 9780805303346.

3)Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, NLP: A Paninian Perspective,1st edition1995, Pren ISSBN 9788120309210

Reference Books:

1)Christopher D.Manning and Hinrich Schutze,, "Foundations of Statistical Natural Language Processing MIT Press, 1999 Second Edition, ISBN No. 0-262-13360-l.

2)T. Winograd, Language as a Cognitive Process, 1st edition, 1983 Addison- Wesley ISBN 020108-571-2

3)L.M. Ivansca, S. C. Shapiro, Natural Language Processing and Knowledge Representation, 2nd editi 2000 AAAI Press ISBN-13: 978-0262590211

Links:

1) https://realpython.com/nltk-nlp-python/
2) https://www.coursera.org/lecture/python-text-mining/basic-nlp-tasks-with-nltk-KD8uN
3) https://www.coursera.org/lecture/nlp-sequence-models/learning-word-embeddings-APM5s
4) https://www.coursera.org/projects/regular-expressions-in-python
5) https://www.coursera.org/learn/python-text-mining/lecture/sVe8B/regular-expressions

B.TECH FOURTHYEAR		
Subject Code: ACSE0713		**L T P 3 0 0**
Subject Name:Web Development using MERN Stack with DevOps		**Credits 3**
Course Objective: This course focuses on how to design and build static as well as dynamic web pages and interactive web applications. Students can understand how to put them together to create a MERN stack application.		
Pre- requisites: Student should have the knowledge of HTML, CSS and ES6		
Course Contents/Syllabus		
Unit-1	**Introduction to React JS:** Overview of frameworks, NPM commands, React App, Project Directory Structure, React Component Basic, Understanding JSX, Props and State, Stateless and Stateful Components, Component life cycle, Hooks, react-router vs react-router-dom,	**8 Hours**
Unit-2	**Connecting React with mongodB:** Google Material UI, AppBar, Material UI's Toolbar, NavBar, Material UI Buttons, SQL and Complex Transactions, Dynamic Schema, create Index (), get Indexes () & drop Index (), Replication, Statement-based vs. Binary Replication, Auto-Sharding and Integrated Caching, Load balancing, Aggregation, scalability.	**8 Hours**
Unit-3	**Node js & Express Framework:** Introduction, Environment Setup, serving static resources, template engine with vash and jade, Connecting Node.js to Database, Mongoose Module, Creating Rest APIs, Express Framework, MVC Pattern, Routing, Cookies and Sessions, HTTP Interaction, User Authentication	**8 Hours**
Unit-4	**Evolution of DevOps:** DevOps Principles, DevOps Lifecycle, DevOps Tools, and Benefits of DevOps, SDLC (Software Development Life Cycle) models, Lean, ITIL and Agile Methodology, Agile vs DevOps, Process flow of Scrum Methodologies, Project planning, scrum testing, sprint Planning and Release management, Continuous Integration and Delivery pipeline.	**8 Hours**
Unit-5	**CI/CD concepts (GitHub, Jenkins, Sonar):** GitHub, Introduction to Git, Version control system, Jenkins Introduction, Creating Job in Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sonar, Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction to Kubernetes.	**8 Hours**
Course Outcomes –		
CO1	Apply the knowledge of ES6 that are vital to implement react application over the web.	K3
CO2	Implement and understand the impact of web designing by database connectivity with Mongodb .	K3
CO3	Explain, analyze and apply the role of server-side scripting language like Nodejs and Express js framework	K4
CO4	Identify the benefits of DevOps over other software development processes	K2

	to Gain insights into the DevOps environment.	
CO5	Demonstrate popular open-source tools with features and associated terminology used to perform Continuous Integration and Continuous Delivery.	K3

Textbooks:

1. Kirupa Chinnathambi, "Learning React", 2nd Edition 2016, Addison Wesley Publication.
2. Mohan Mehul, "Advanced Web Development with React", 2nd Edition 2020, BPB Publications.
3. Dhruti Shah, "Comprehensive guide to learn Node.js", 1st Edition, 2018 BPB Publications.
4. Jennifer Davis, Ryn Daniels, "Effective DevOps: Building, Collaboration, Affinity, and Tooling at Scale",1st Edition, 2016, O'Reilly Media Publication.
5. John Edward Cooper Berg, "DevOps. Building CI/CD Pipelines with Jenkins, Docker Container, AWS (Amazon Web Services) ECS, JDK 11, Git and Maven 3, Sonar, Nexus", Kindle Edition,2019, O'Reilly Media Edition.

Reference Books:

1. Anthony Accomazzo, Ari Lerner, and Nate Murray, "Fullstack React: The Complete Guide to ReactJS and Friends", 4th edition, 2020 International Publishing.
2. David Cho, "Full-Stack React, Type Script, and Node: Build cloud-ready web applications using React 17 with Hooks and GraphQL", 2nd edition, 2017 Packt Publishing Limited.
3. Richard Haltman & Shubham Vernekar, "Complete node.js: The fast guide: Learn complete backend development with node.js"5th edition, 2017 SMV publication.
4. Glenn Geenen, Sandro Pasquali, Kevin Faaborg, "Mastering Node.js: Build robust and scalable real-time server-side web applications efficiently" 2nd edition Packt,2017 Publishing Limited.
5. Greg Lim," Beginning Node.js, Express & MongoDB Development, kindle edition,2019 international publishing.
6. Daniel Perkins, "ReactJS Master React.js with simple steps, guide and instructions" 3rd edition, 2015 SMV publication.
7. Peter Membrey, David Hows, Eelco Plugge, "MongoDB Basics", 2nd edition ,2018 International Publication.

Links: NPTEL/You Tube/Web Link:

https://youtu.be/QFaFIcGhPoM?list=PLC3y8-rFHvwgg3vaYJgHGnModB54rxOk3
https://youtu.be/pKd0Rpw7O48
https://youtu.be/TlB_eWDSMt4
https://youtu.be/QFaFIcGhPoM

https://youtu.be/Kvb0cHWFkdc
https://youtu.be/pQcV5CMara8
https://youtu.be/c3Hz1qUUIyQ
https://youtu.be/Mfp94RjugWQ
https://youtu.be/SyEQLbbSTWg

https://youtu.be/BLl32FvcdVM
https://youtu.be/fCACk9ziarQ
https://youtu.be/YSyFSnisip0
https://youtu.be/7H_QH9nipNs
https://youtu.be/AX1AP83CuK4

https://youtu.be/2N-59wUIPVI

https://youtu.be/hQcFE0RD0cQ https://youtu.be/UV16BbPcMQk https://youtu.be/fqMOX6JJhGo
https://youtu.be/m0a2CzgLNsc https://youtu.be/1ji_9scA2C4 https://youtu.be/tuIZok81iLk https://youtu.be/IluhOk86prA https://youtu.be/13FpCxCClLY

B. TECH FOURTH YEAR

Course Code	ACSAI0711	L T P	Credits
Course Title	IoT for Smart Cities	3 0 0	3

Course Objective: Students should understand Fundamentals of Smart cities and its urban planning structure and should be able to architect process of smart cities using IoT application. Student should be able to analyze changes in sustainable growth of smart cities.

Pre-requisites: Computer Networks, IoT Protocols

Course Contents / Syllabus

UNIT-I	Introduction to Smart Cities	8 HOURS

Structures of city systems, Urban and Regional Planning, Informatics and Smart Cities, Smart Environment, Smart Streetlight, Smart Hospital Management System, Smart Automations, Smart Vehicles, Programming environment for IDE sensor and actuators used in the Development of smart city, Issues and Challenges in design of smart cities

UNIT-II	Technology and Infrastructure used for Smart Cities	8 HOURS

Wireless sensor networks, Wi-Fi, ZigBee, 6lowpan Networks, Bluetooth, Ethernet Terahertz Communications, Intelligent personal edge computing, Hologram Technology, Inter-User Inter-Operator Knowledge Sharing, User-Centric Network Architecture, Full-Duplex Communication Stack

UNIT-III	Security in Smart Cites	8 HOURS

Flexible and Intelligent Materials, Smart Meter Deployment, Automated door locks, Finger print Door Systems, Surveillance Cameras, RFID security systems, Library books anti-theft systems, Fog computing paradigms, Data Encryption Standard (DES) Techniques and its types, Blockchain for Decentralized Security,

UNIT-IV	Understanding Sustainability and Urban Mobility	10 HOURS

Green 6G network, Green IoT, Visible light communication, WPT and Energy Harvesting, B2C (MAKER SCENE), Smart Agriculture, Reduction of CO2, Smart Chemical Technology, Energy Consumption Monitoring, Smart Waste Management, Waste generation geo-specific data analysis, Smart bin sensors, Container Tracking, smart water management, Smart irrigation, Rain and storm water management

UNIT-V	Smart Cities Case Studies	6 HOURS

International Case Studies of Dubai, Singapore with reference technologies (Communication technologies, Sensing technologies, Database technologies, architecture etc.) applications implementation and challenges
India's Ecosystem for smart cities, Case Study on Smart City Projects in India: An analysis of Nagpur, Allahabad and Dehradun, Ideation of smart city implementation project.

Course Outcomes: After completion of this course students will be able to

CO 1	Understand the structure, issues and challenges in designing smart cities	K2
CO 2	Communicate and visualize IoT data with communication techniques and Hologram	K2
CO 3	Implement the concept of automated doors and security systems for different IoT applications	K3
CO 4	Analyze the concept of sustainable green energy and architect smart waste and water management like systems	K4
CO 5	Implement smart city use cases with respect to Indian smart city plans	K3

Text books

4. Introduction To Smart Cities 1St Ediion 2019 Edition by ANIL KUMAR, PEARSON
5. Smart Cities by Claude ROCHET, Wiley-ISTE 2018

Reference Books

3. Smart City on Future Life - Scientific Planning and Construction by Xianyi Li 2012
4. Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia by Anthony Townsend 2013
5. A smart city case study of Singapore—Is Singapore truly smart? - ScienceDirect
6. (PDF) Case study of Dubai as a Smart City (researchgate.net)
7. **Open-Source Web Repositories**

   Smart city government of India. http://smartcities.gov.in

   Reconceptualising Smart Cities: A Reference Framework for India https://www.niti.gov.in/writereaddata/files/document_publication/CSTEP%20Report%20Smart%20Cities%20Framework.pdf

   Draft Concept Note on Smart City Scheme". Government of India - Ministry of Urban Development - martcitiesoftomorrow.com/wp-content/uploads/2014/09/CONCEPT_NOTE_3.12.2014__REVISED_AND_LATEST_.pdf

Video Links

Unit 1	Nokia Technology Vision 2030 - YouTube
Unit 2	What is Zigbee and How it Works | Zigbee Network Explained - YouTube
Unit 3	How to Make Remote Control Door Lock at Home - YouTube
Unit 4	IoT - Smart Green Building - YouTube
Unit 5	Smart waste management using IOT - real benefits of Sensoneo - YouTube