

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



**NIET**  
**Greater Noida**

**Autonomous Institute**

**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        |

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**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/<br>ACSE0858 | Capstone Project/Industrial Internship | 0       | 0 | 20 |                   |    |       | 200 |              | 300 | 500        | 10        |
| 3       |                       | MOOCs (For B.Tech. Hons. Degree)       |         |   |    |                   |    |       |     |              |     |            |           |
| 4       |                       | <b>TOTAL</b>                           |         |   |    |                   |    |       |     |              |     | <b>650</b> | <b>12</b> |

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

| S.No. | Subject Code | Course Name  | University/Industry Partner Name   | No. of Hours    | Credit |
|-------|--------------|--|------------------------------------|-----------------|--------|
| 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    |
| 3     | AMC0184      | Developing Applications with SQL, Databases, and Django            | IBM                                | 14 hours        | 1      |
| 4     | AMC0187      | Getting started with Git & Github                                  | IBM                                | 8 hours         | 0.5    |
| 5     | AMC0214      | The Complete React Developer Course                                | Infosys Springboard                | 39 hours        | 3      |
| 6     | AMC0215      | AWS IoT Case Study- Smart Parking Project                          | Infosys Springboard                | 6 hours         | 0.5    |
| 7     | AMC0216      | Programming using Java   | Infosys Springboard                | 113 hours 2 min | 4      |
| 8     | AMC0217      | React Native   | Infosys Springboard                | 19 hours        | 1.5    |
| 9     | AMC0081      | Industrial IoT Markets and Security                                | Infosys Springboard                | 21 hours        | 1.5    |

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TE: Theory End Semester Exam., PE: Practical End Semester Exam.

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**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 to 18      | =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       |
| <b>Course Objective:</b> 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.   |                                |         |         |
| <b>Pre-requisites:</b> 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<br>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<br>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.<br>Case Study: IEEE 802.15.4 LR-WPANs Standard, IEEE 802.11ax, Target detection and tracking, Field sampling.  |                                |         |         |

|  |   |    |
|--|---|----|
| <b>Course Outcomes: After completion of this course students will be able to</b>   |   |    |
| 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 |
| <b>Text books</b>  |   |    |
| 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                     |   |    |
| <b>Reference Books</b>   |   |    |
| 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.   |   |    |
| <b>Video Links</b>   |   |    |
| <b>Unit 1</b>  | <a href="https://www.youtube.com/watch?v=W1aMmCZ25fw">https://www.youtube.com/watch?v=W1aMmCZ25fw</a>   |    |
| <b>Unit 2</b>  | <a href="https://www.youtube.com/watch?v=ycaz99NogS4&amp;list=PLJ5C_6qdAvBHroAfeKCO7K4xphEF74UPc">https://www.youtube.com/watch?v=ycaz99NogS4&amp;list=PLJ5C_6qdAvBHroAfeKCO7K4xphEF74UPc</a> |    |
| <b>Unit 3</b>  | <a href="https://www.youtube.com/watch?v=sayPu0biqQk&amp;list=PLhjFbo2uE8q2FiaqRw4RO2MqNaJY4pi9O">https://www.youtube.com/watch?v=sayPu0biqQk&amp;list=PLhjFbo2uE8q2FiaqRw4RO2MqNaJY4pi9O</a> |    |
| <b>Unit 4</b>  | <a href="https://www.youtube.com/watch?v=N03Gh6GvEw4&amp;list=PLV8vIYTIdSnaoFjclogMhXiBFrHSL2Ar1">https://www.youtube.com/watch?v=N03Gh6GvEw4&amp;list=PLV8vIYTIdSnaoFjclogMhXiBFrHSL2Ar1</a> |    |
| <b>Unit 5</b>  | <a href="https://youtu.be/vnLvup1q3pk">https://youtu.be/vnLvup1q3pk</a>   |    |

| 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   | Credits |
| Course title   | RPA IMPLEMENTATION   | 3 0 0   | 3       |
| Course objective: This course is designed to give a thorough understanding and practical skills in developing and deploying software robots for Robotic Process Automation (RPA).  |  |         |         |
| Pre-requisites: Basic Knowledge of C Programming   |  |         |         |
| Course Contents / Syllabus   |  |         |         |
| UNIT-I   | DATA MANIPULATION  | 8 HOURS |         |
| Introduction to Data Manipulation, Scalar variables, collections and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data Recording and Advanced UI Interaction; Recording Introduction, Basic and Desktop Recording, Web Recording, Input/output Methods, Screen Scraping, Data Scraping, Scraping advanced techniques.                                    |  |         |         |
| UNIT-II  | SELECTORS  | 8 HOURS |         |
| Selectors, Defining and Assessing Selectors, Customization, Debugging, Dynamic Selectors, Partial Selectors, RPA Challenge, Image, Text & Advanced Citrix Automation, Introduction to Image & Text Automation, Image-based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices using tab for Images Starting Apps. |  |         |         |
| UNIT-III   | DATA TABLES AND AUTOMATION   | 8 HOURS |         |
| Excel Data Tables & PDF, Data Tables in RPA, Excel and Data Table Basics Data Manipulation in Excel, 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 HOURS |         |
| Debugging Tools, Strategies for solving issues, Catching errors.   |  |         |         |
| Orchestrator: Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.   |  |         |         |
| UNIT-V   | ROBOTIC FRAMEWORK  | 8 HOURS |         |
| Re-Framework template, Re-Framework template works, Use Re-Framework to automate your own 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 |
| <b>Textbooks:</b>   |  |    |
| 1) Vaibhav Jain, “Crisper Learning: For UiPath”, Latest Edition, Independently Published, 2018.   |  |    |
| 2) Alok Mani Tripathi, “Learning Robotics Process Automation”, Latest Edition, Packt Publishing Ltd, Birmingham. March 2018   |  |    |
| <b>Reference Books/E-Books:</b>   |  |    |
| 1) Kelly Wibbenmeyer, “The Simple Implementation Guide to Robotic Process Automation (RPA)”, Latest Edition, iUniverse Press.   |  |    |
| 2) <a href="https://www.uipath.com/hubfs/ebook-its-time-to-automate.pdf">https://www.uipath.com/hubfs/ebook-its-time-to-automate.pdf</a>  |  |    |
| <b>Links:</b>   |  |    |
| <a href="https://www.youtube.com/watch?v=6QoCG6YIPVo&amp;list=PL41Y-9S9wmyJarNN2KnB4XudpT1yE1kVd">https://www.youtube.com/watch?v=6QoCG6YIPVo&amp;list=PL41Y-9S9wmyJarNN2KnB4XudpT1yE1kVd</a> |  |    |
| <a href="https://www.youtube.com/watch?v=YOHFgrOvPTM&amp;list=PL41Y-9S9wmyLvF6Ou0oPhg6MrFWSw7sn4">https://www.youtube.com/watch?v=YOHFgrOvPTM&amp;list=PL41Y-9S9wmyLvF6Ou0oPhg6MrFWSw7sn4</a> |  |    |
| <a href="https://www.youtube.com/watch?v=QMBuyLMjOhM&amp;list=PL41Y-9S9wmyIYX6kciM8DboVYymsv2y6K">https://www.youtube.com/watch?v=QMBuyLMjOhM&amp;list=PL41Y-9S9wmyIYX6kciM8DboVYymsv2y6K</a> |  |    |
| <a href="https://www.youtube.com/watch?v=KE9raKNTkfl&amp;list=PL41Y-9S9wmyLeXL1DY9j-XepNb_vg9N8t">https://www.youtube.com/watch?v=KE9raKNTkfl&amp;list=PL41Y-9S9wmyLeXL1DY9j-XepNb_vg9N8t</a> |  |    |
| <a href="https://www.youtube.com/watch?v=2rjr8QhD9oc&amp;list=PL41Y-9S9wmyJi2zmWY77yPZrdVI7ab3Ja">https://www.youtube.com/watch?v=2rjr8QhD9oc&amp;list=PL41Y-9S9wmyJi2zmWY77yPZrdVI7ab3Ja</a> |  |    |

## B. TECH FOURTH YEAR

|  |  |         |         |
|--|--|---------|---------|
| Course code  | ACSAI0712  | L T P   | Credits |
| Course title   | NATURAL LANGUAGE PROCESSING  | 3 0 0   | 3       |
| <b>Course objective:</b> The course aims to provide an understanding of the foundational concepts and techniques in NLP. The focus is on providing application-based knowledge.                      |  |         |         |
| <b>Pre-requisites:</b> Programming Skills, Data Structures, Algorithms, Probability and Statistics, Machine Learning.  |  |         |         |
| Course Contents / Syllabus   |  |         |         |
| UNIT-I   | OVERVIEW OF NATURAL LANGUAGE PROCESSING  | 8 HOURS |         |
| Definition, Applications and emerging trends in NLP, Challenges. Ambiguity.  |  |         |         |
| NLP tasks using NLTK: Tokenization, stemming, lemmatization, stop-word removal, POS tagging, Parsing, Named Entity Recognition, coreference resolution.  |  |         |         |
| UNIT-II  | REGULAR EXPRESSIONS  | 8 HOURS |         |
| Data Preprocessing: Using Python - Convert to lower case, handle email-id, HTML tags, URLs, emojis, repeat characters, normalization of data (contractions, standardize) etc.                        |  |         |         |
| Vocabulary, corpora, and linguistic resources, Linguistic foundations: Morphology, syntax, semantics and pragmatics, Language models: Unigram, Bigram, N-grams.                                      |  |         |         |
| UNIT-III   | TEXT ANALYSIS AND SIMILARITY   | 8 HOURS |         |
| Text Vectorization: Bag-of-Words model and vector space models, Term Presence, Term Frequency, TF-IDF  |  |         |         |
| Textual Similarity: Cosine similarity, Word Mover’s distance, Word embeddings: Word2Vec, GloVe.  |  |         |         |
| UNIT-IV  | TEXT CLASSIFICATION & NLP APPLICATIONS   | 8 HOURS |         |
| Text classification: Implement of applications of NLP using text classification- Sentiment Analysis, Topic modelling, Spam detection.  |  |         |         |
| High Level NLP applications: Machine translation: Rule-based and statistical approaches, Text summarization Dialog systems, conversational agents and chatbots.                                      |  |         |         |
| UNIT-V   | ADVANCED NLP TECHNIQUES  | 8 HOURS |         |
| Sequential data, Introduction to sequence models - RNN and LSTM, Attention Mechanism, Transformer, Transformer-based models: BERT, GPT, T5, Introduction to Hugging Face Transformers, Case studies. |  |         |         |
| <b>Course outcome:</b> 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 Education, 2009 ISBN 0131873210.
- 2) James Allen, Natural Language Understanding, 2nd edition, 1995 Pearson Education ISBN 13: 9780805303346.
- 3) Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, NLP: A Paninian Perspective, 1st edition 1995, Prentice ISBN 9788120309210

### **Reference Books:**

- 1) Christopher D. Manning and Hinrich Schutze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999 Second Edition, ISBN No. 0-262-13360-1.
- 2) T. Winograd, Language as a Cognitive Process, 1st edition, 1983 Addison- Wesley ISBN 020108-571-2
- 3) L.M. Iivansca, S. C. Shapiro, Natural Language Processing and Knowledge Representation, 2nd edition, 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>B.TECH FOURTHYEAR</b>   |   |                              |
|--|---|------------------------------|
| <b>Subject Code: ACSE0713</b>  |   | <b>L T P</b><br><b>3 0 0</b> |
| <b>Subject Name: Web Development using MERN Stack with DevOps</b>  |   | <b>Credits</b><br><b>3</b>   |
| <b>Course Objective:</b> 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. |   |                              |
| <b>Pre- requisites:</b> Student should have the knowledge of HTML, CSS and ES6   |   |                              |
| <b>Course Contents/Syllabus</b>  |   |                              |
| <b>Unit-1</b>  | <b>Introduction to React JS:</b><br>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,  | <b>8 Hours</b>               |
| <b>Unit-2</b>  | <b>Connecting React with MongoDB:</b><br>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.            | <b>8 Hours</b>               |
| <b>Unit-3</b>  | <b>Node js &amp; Express Framework:</b><br>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   | <b>8 Hours</b>               |
| <b>Unit-4</b>  | <b>Evolution of DevOps:</b><br>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. | <b>8 Hours</b>               |
| <b>Unit-5</b>  | <b>CI/CD concepts (GitHub, Jenkins, Sonar):</b><br>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.                           | <b>8 Hours</b>               |
| <b>Course Outcomes –</b>   |   |                              |
| <b>CO1</b>   | Apply the knowledge of ES6 that are vital to implement react application over the web.  | <b>K3</b>                    |
| <b>CO2</b>   | Implement and understand the impact of web designing by database connectivity with MongoDB .  | <b>K3</b>                    |
| <b>CO3</b>   | Explain, analyze and apply the role of server-side scripting language like Nodejs and Express js framework  | <b>K4</b>                    |
| <b>CO4</b>   | Identify the benefits of DevOps over other software development processes to Gain insights into the DevOps environment.   | <b>K2</b>                    |
| <b>CO5</b>   | Demonstrate popular open-source tools with features and associated terminology used to perform Continuous Integration and Continuous Delivery. [OBJ]  | <b>K3</b>                    |
| <b>Textbooks:</b>  |   |                              |
| 1. Kirupa Chinnathambi, “Learning React”, 2 <sup>nd</sup> Edition 2016, Addison Wesley Publication.  |   |                              |

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| 2. Mohan Mehul, “Advanced Web Development with React”, 2 <sup>nd</sup> Edition 2020, BPB Publications.   |
| 3. Dhruti Shah, “Comprehensive guide to learn Node.js”, 1 <sup>st</sup> Edition, 2018 BPB Publications.  |
| 4. Jennifer Davis, Ryn Daniels, “Effective DevOps: Building, Collaboration, Affinity, and Tooling at Scale”, 1 <sup>st</sup> 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:

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| 1. Anthony Accomazzo, Ari Lerner, and Nate Murray, “Fullstack React: The Complete Guide to ReactJS and Friends”, 4th edition, 2020 International Publishing. [OBJ]                             |
| 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/TIB\\_eWDSMt4](https://youtu.be/TIB_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/BLI32FvcdVM>

<https://youtu.be/fCACk9ziarQ>

<https://youtu.be/YSyFSnisip0>

[https://youtu.be/7H\\_QH9nipNs](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/fqMOX6JhGo>

<https://youtu.be/m0a2CzgLNsc>

[https://youtu.be/1ji\\_9scA2C4](https://youtu.be/1ji_9scA2C4)

<https://youtu.be/tuIZok81iLk>

<https://youtu.be/IluhOk86prA>

<https://youtu.be/13FpCxCCILY>

## B. TECH FOURTH YEAR

|   |   |          |         |
|---|---|----------|---------|
| Course Code   | ACSAI0711   | L T P    | Credits |
| Course Title  | IoT for Smart Cities  | 3 0 0    | 3       |
| <b>Course Objective:</b> 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.   |   |          |         |
| <b>Pre-requisites:</b> 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<br>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       |         |

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|---|--|
| <b>Text books</b>   |  |
| 4. Introduction To Smart Cities 1St Edition 2019 Edition by ANIL KUMAR, PEARSON   |  |
| 5. Smart Cities by Claude ROCHET, Wiley-ISTE 2018   |  |
| <b>Reference Books</b>  |  |
| 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 href="#">A smart city case study of Singapore—Is Singapore truly smart? - ScienceDirect</a>   |  |
| 6. <a href="#">(PDF) Case study of Dubai as a Smart City (researchgate.net)</a>   |  |
| <b>7. Open-Source Web Repositories</b><br><br>Smart city government of India. <a href="http://smartcities.gov.in">http://smartcities.gov.in</a><br><br>Reconceptualising Smart Cities: A Reference Framework for India<br><a href="https://www.niti.gov.in/writereaddata/files/document_publication/CSTEP%20Report%20Smart%20Cities%20Framework.pdf">https://www.niti.gov.in/writereaddata/files/document_publication/CSTEP%20Report%20Smart%20Cities%20Framework.pdf</a><br><br>Draft Concept Note on Smart City Scheme". Government of India - Ministry of Urban Development - <a href="http://martcitiesoftomorrow.com/wp-content/uploads/2014/09/CONCEPT_NOTE_3.12.2014__REVISED_AND_LATEST_.pdf">martcitiesoftomorrow.com/wp-content/uploads/2014/09/CONCEPT_NOTE_3.12.2014__REVISED_AND_LATEST_.pdf</a> |  |
| <b>Video Links</b>  |  |
| <b>Unit 1</b>   | <a href="#">Nokia Technology Vision 2030 - YouTube</a>                                 |
| <b>Unit 2</b>   | <a href="#">What is Zigbee and How it Works   Zigbee Network Explained - YouTube</a>   |
| <b>Unit 3</b>   | <a href="#">How to Make Remote Control Door Lock at Home - YouTube</a>                 |
| <b>Unit 4</b>   | <a href="#">IoT - Smart Green Building - YouTube</a>                                   |
| <b>Unit 5</b>   | <a href="#">Smart waste management using IOT - real benefits of Sensoneo - YouTube</a> |