



# **SEMESTER 8**

**PERIOD: Feb 2021 –June 2021**

**(2017-21 Batch)**

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### COURSE MAPPING

| Code   | Slot | Course Name                     | Faculty in charge                               |
|--------|------|---------------------------------|---|
| IT 402 | A    | Cryptography and Cyber Security | Ms.Bency Wilson                                 |
| IT404  | B    | Data Analytics                  | Dr. Sherly K .K                                 |
| IT462  | C    | Internet of Things              | Ms.Divya James                                  |
| IT462  | D    | Cloud Computing                 | Fr.Dr. Jaison paul Mulerikal/<br>Ms. Anu mariya |
| IT492  | E    | Project                         | Ms.Abey Abraham                                 |

### ASSIGNMENT SCHEDULE FOR S8 IT

| Assignment No and Submission Date  | Subject                         | Subject Teacher                                    |
|--|---------------------------------|--|
| Assignment 1 -23 <sup>th</sup> April 2021<br>Assignment 2- 23 <sup>th</sup> May 2021 | Cryptography and Cyber Security | Ms.Bency Wilson                                    |
| Assignment 1 -27 <sup>st</sup> April 2021<br>Assignment 2- 14 <sup>h</sup> June2021  | Data Analytics                  | Dr. Sherly K .K                                    |
| Assignment 1 -27 <sup>st</sup> April 2021<br>Assignment 2- 14 <sup>h</sup> June2021  | Internet of Things              | Ms. Divya James                                    |
| Assignment 1 -26 <sup>st</sup> April 2021<br>Assignment 2- 21 <sup>h</sup> may2021   | Cloud Computing                 | Fr.Dr. Jaison Paul<br>Mulerikal/<br>Ms. Anu Mariya |

Prepared By

**Ms.Nikhila T Bhuvan**

Approved By

**Dr.Neeba E A, HoD**

**Program Outcomes (PO)**

## **Information Technology Program Students will be able to:**

- PO 1.Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO 2.Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO 3.Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO 4.Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO 5.Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO 6.The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO 7.Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO 8.Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO 9.Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO 10.Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **Program Specific Outcomes (PSO)**

#### **Information Technology Program Students will be able to:**

**PSO1:** Acquire skills to design, analyse and develop algorithms and implement those using high-level programming languages.

**PSO2:** Contribute their engineering skills in computing and information engineering domains like network design and administration, database design and knowledge engineering.

**PSO3:** Develop strong skills in systematic planning, developing, testing, implementing and providing IT solutions for different domains which helps in the betterment of life.

### **Program Educational Objectives (PEO)**

Graduates of Information Technology program shall

**PEO 1:** Have strong technical foundation for successful professional careers and to evolve as key-players/ entrepreneurs in the field of information technology.

**PEO 2:** Excel in analyzing, formulating and solving engineering problems to promote life-long learning, to develop applications, resulting in the betterment of the society.

**PEO 3:** Have leadership skills and awareness on professional ethics and codes.

**IT 402:**

**Cryptography and Cyber  
Security**

**COURSE INFORMATION SHEET**

### IT402Cryptography and Cyber security

|  |                              |
|--|------------------------------|
| PROGRAMME: INFORMATION TECHNOLOGY              | DEGREE: BTECH                |
| COURSE: <b>CRYPTOGRAPHY AND CYBER SECURITY</b> | SEMESTER: Eighth CREDITS: 3  |
| COURSE CODE: IT402<br>REGULATION:2010          | COURSE TYPE: CORE            |
| COURSE AREA/DOMAIN: Security                   | CONTACT HOURS: 3 hours/Week. |
| CORRESPONDING LAB COURSE CODE (IF ANY):No      | LAB COURSE NAME:NA           |

#### SYLLABUS:

| UNIT | DETAILS  | HOURS |
|------|--|-------|
| I    | Basics of Algebra and Number Theory: Integer Arithmetic, Modular Arithmetic, Algebraic structures, $GF(2^n)$ Fields, Matrices, Prime Numbers, Fermat's and Euler's Theorem, Primality Testing, Factorization, Chinese Remainder Theorem, Linear and Quadratic Congruence, Discrete Logarithms.   | 7+3   |
| II   | Introduction to Security:-Security Goals – Security services (Confidentiality, Integrity, Authentication, Non-repudiation, Access control) – Security Mechanisms (Encipherment, Data Integrity, Digital Signature, Authentication Exchange, Traffic Padding, Routing Control, Notarization, Access control)- Security Principles. Introduction to Cryptography:-Kerckhoff's Principle -Classification of Cryptosystems- Cryptanalytic attacks- Cipher Properties (Confusion, Diffusion). | 7     |
| III  | Traditional Secret Key Ciphers:- Substitution Ciphers (mono alphabetic ciphers, poly alphabetic ciphers)-Transposition Ciphers-Stream and Block Ciphers. Modern Secret Key Ciphers:- Substitution Box-Permutation Box-Product Ciphers  | 7     |
| IV   | Data Encryption Standard (DES) (Fiestel and Non-Fiestel Ciphers, Structure of DES, DES Attacks, 2-DES, 3-DES) - Advanced Encryption Standard (AES) (Structure, Analysis)-Cryptographic Hash Functions– Properties - Secure Hash Algorithm-Message Authentication Code (MAC).   | 7     |
| V    | Public Key Cryptosystems (PKC): - Types of PKC –Trapdoor - one way functions -RSA Cryptosystem (Integer Factorisation Trapdoor, Key Generation, Encryption, Decryption) - El Gamal Cryptosystem (Discrete Logarithm Trapdoor, Key Generation, Encryption, Decryption) - Diffie-Hellman Key Exchange Protocol, Man in the Middle attack on Diffie-Hellman Protocol.   | 7     |



|             |  |         |
|-------------|--|---------|
| VI          | Digital Signature:-Signing - Verification - Digital signature forgery (Existential forgery, Selective forgery, Universal forgery) - RSA Digital Signature Scheme - ElGamal Signature Scheme - IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload- Intruders, Intrusion Detection, Distributed Denial of Service attacks | 7       |
| TOTAL HOURS |  | 42+3=45 |

**TEXT/REFERENCE BOOKS:**

| T/R | BOOK TITLE/AUTHORS/PUBLICATION  |
|-----|---|
| T   | Behrouz A. Forouzan, Dedeep Mukhopadhyay "Cryptography & Network Security", Second Edition, Tata McGraw Hill, New Delhi, 2010       |
| T   | Douglas R. Stinson, "Cryptography: Theory and Practice", Third Edition, CRC Press.  |
| T   | William Stallings, "Cryptography and Network Security - Principles and Practices", Pearson Education, Fourth Edition, 2006.         |
| T   | Atul Kahate, "Cryptography and Network Security", 2nd Edition, Tata McGraw Hill, 2003.  |
| R   | Bernard Menezes, Network Security and Cryptography-Cengage Learning India, 2011   |
| R   | Bruce Schneier, "Applied Cryptography: Protocols, Algorithms, and Source Code in C", Second Edition, John Wiley and Sons Inc, 2001. |
| R   | Thomas Mowbray, "Cybersecurity : Managing Systems Conducting Testing, and Investigating Intrusions", John Wiley, 2013               |
| R   | Wenbo Mao, "Modern Cryptography- Theory & Practice", Pearson Education, 2006.   |

**COURSE PRE-REQUISITES:**

| C.CODE | COURSE NAME                       | DESCRIPTION   | SEM   |
|--------|-----------------------------------|---|-------|
| CS201  | Discrete computational structures | To know the importance of learning theories and strategies in Mathematics | Third |

**COURSE OBJECTIVES:**

|   |   |
|---|---|
| 1 | To understand the mathematics behind Cryptography                         |
| 2 | To understand the security concerns and vulnerabilities                   |
| 3 | To familiarize with different types of cryptosystems                      |
| 4 | To create an awareness for the design of various cryptographic primitives |
| 5 | To analyze different types of attacks on various cryptosystems.           |

**COURSE OUTCOMES:**

| SINO   | DESCRIPTION   | Blooms' Taxonomy Level              |
|--------|---|-------------------------------------|
| C402.1 | Students will be able to <b>solve and relate</b> mathematic concepts behind the cryptographic algorithms.   | Understand and Apply (level2 and 3) |
| C402.2 | Students will be able to <b>explain</b> basic concepts and algorithms of cryptography, including encryption/decryption and hash functions.        | Understand (level 2)                |
| C402.3 | Students will be able to <b>describe</b> various network security practice applications   | Knowledge (level 1)                 |
| C402.4 | Students will be able <b>analyze</b> protocols for various security objectives with cryptographic tools   | Apply (level 3 )                    |
| C402.5 | Students will be able to <b>evaluate</b> the role played by various security mechanisms like passwords, access control mechanisms, firewalls etc. | Evaluate (level 5)                  |

**CO-PO AND CO-PSO MAPPING**

|        | PO 1 | PO2  | PO 3 | PO4  | PO 5 | P 6 | P 7 | PO 8 | PO 9 | P 10 | P 11 | P 12 | PSO 1 | PSO 2 | PSO 3 |
|--------|------|------|------|------|------|-----|-----|------|------|------|------|------|-------|-------|-------|
| C402.1 | 3    | 2    | -    | 1    | -    | -   | -   | -    | -    | -    | -    | -    | 2     | -     | -     |
| C402.2 | -    | 1    | -    | 1    | -    | -   | -   | -    | -    | -    | -    | -    | -     | 1     | -     |
| C402.3 | -    | -    | 1    | -    | -    | -   | -   | -    | -    | -    | -    | -    | -     | 1     | -     |
| C402.4 | -    | 2    | 2    | 1    | 3    | -   | -   | -    | -    | -    | -    | -    | -     | -     | -     |
| C402.5 | -    | -    | -    | 2    | 3    | -   | -   | -    | -    | -    | -    | -    | -     | -     | -     |
| C402   | 3    | 1.67 | 1.5  | 1.25 | 3    | -   | -   | -    | -    | -    | -    | -    | 2     | 1     | -     |

**JUSTIFICATIONS FOR CO-PO MAPPING**

| <b>MAPPING</b> | <b>LOW/MEDIUM/HIGH</b> | <b>JUSTIFICATION</b>  |
|----------------|------------------------|---|
| C402.1-PO1     | H                      | Students will get to know about the maths behind the cryptographic algorithm which can contribute to the basic engineering knowledge            |
| C402.1-PO2     | M                      | Using the knowledge in basic maths students can analyze and formulate solutions for some problems   |
| C402.1-PO4     | L                      | The knowledge in the mathematics behind the subject helps students to do research on developing new overcoming the demerits of the existing one |
| C402.1-PS01    | M                      | The knowledge in maths will help in formulating new algorithms.   |
| C402.2-PO2     | L                      | Only if students know the existing cryptographic algorithms they can formulate new one doing problem analysis                                   |
| C402.2-PO4     | L                      | Only if students know the existing cryptographic algorithms they can conduct investigations of complex problems and provide valid conclusions   |
| C402.2-PS02    | L                      | knowing the existing cryptographic algorithm will help them while they contribute to the network design   |
| C402.3-PO3     | L                      | Only if students know the existing network security applications they can develop new one understanding the problems of the existing ones       |
| C402.3-PS02    | L                      | knowing the existing network security applications will help them while they contribute to the network design                                   |
| C402.4-PO2     | M                      | Students will be able to analyze various security requirements and come up with the security protocol for each requirement                      |
| C402.4-PO3     | M                      | Students will be able to understand various security issues and design protocol to specified requirement  |
| C402.4-PO4     | L                      | Having knowledge on the existing protocols will help them in conducting further investigations on the security requirement                      |
| C402.4-PO5     | H                      | Having knowledge on the existing protocols will help them to choose the appropriate one meeting the specific security requirement               |
| C402.5-PO4     | M                      | Having knowledge on the existing security mechanisms  |

|            |   |  |
|------------|---|--|
|            |   | like access control,passwords etc will help them in conducting further investigations on the security requirement  |
| C402.5-PO4 | H | Having knowledge on the existing security mechanisms like access control,passwords etc will help them in choosing the appropriate technique in meeting the specific security requirement |

**GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:**

| SNO | DESCRIPTION                            | PROPOSED ACTIONS | RELEVANCE WITH POs | RELEVANCE WITH PSOs |
|-----|--|------------------|--------------------|---------------------|
| 1   | Topics on Web Security – SSL, TLS, SET | Assignment/NPTEL | 3,4,5              | PSO3                |

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:**

| SNO | DESCRIPTION   | RELEVANCE WITH POs | RELEVANCE WITH PSOs |
|-----|---|--------------------|---------------------|
| 1   | To familiarize students on the topic called steganography which plays an important role in information security | 3,4,5              | PSO2                |
| 2   | Familiarizing students on quantum cryptography  | 3,4,5              | PSO2                |

**WEB SOURCE REFERENCES:**

|   |   |
|---|---|
| 1 | <a href="http://www.maths.usyd.edu.au/u/afish/Math2068/index_lectures.html">http://www.maths.usyd.edu.au/u/afish/Math2068/index_lectures.html</a> |
| 2 | <a href="http://www.math.utk.edu/~finotti/papers/grad.pdf">http://www.math.utk.edu/~finotti/papers/grad.pdf</a>                                   |
| 3 | <a href="https://engineering.purdue.edu/kak/compsec/">https://engineering.purdue.edu/kak/compsec/</a>   |

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

|   |   |   |  |
|---|---|---|--|
| <input type="checkbox"/> CHALK & TALK     | <input type="checkbox"/> STUD. ASSIGNMENT | <input type="checkbox"/> WEB RESOURCES  |  |
| <input type="checkbox"/> LCD/SMART BOARDS | <input type="checkbox"/> STUD. SEMINARS   | <input type="checkbox"/> ADD-ON COURSES |  |

**ASSESSMENT METHODOLOGIES-DIRECT**

|  |   |  |  |
|--|---|--|--|
| <input type="checkbox"/> ASSIGNMENTS         | <input type="checkbox"/> STUD. SEMINARS | <input type="checkbox"/> TESTS/MODEL EXAMS   | <input type="checkbox"/> UNIV. EXAMINATION |
| <input type="checkbox"/> STUD. LAB PRACTICES | <input type="checkbox"/> STUD. VIVA     | <input type="checkbox"/> MINI/MAJOR PROJECTS | <input type="checkbox"/> CERTIFICATIONS    |
| <input type="checkbox"/> ADD-ON COURSES      | <input type="checkbox"/> OTHERS         |  |  |

**ASSESSMENT METHODOLOGIES-INDIRECT**

|  |  |
|--|--|
| <input type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE) | <input type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE) |
| <input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS | <input type="checkbox"/> OTHERS                              |

**Prepared by**  
**BENCY WILSON**

**Approved by**  
**(HOD)**

**Course Plan- Cryptography and Cyber Security**  
**Semester: S8 Branch: Information Technology**

| Si.No | Day | Topic  |
|-------|-----|--|
| 1     | 1   | Basics of Algebra and Number Theory: Integer Arithmetic  |
| 2     | 1   | Basics of Algebra and Number Theory: Integer Arithmetic  |
| 3     | 1   | Basics of Algebra and Number Theory: Integer Arithmetic  |
| 4     | 1   | Modular Arithmetic   |
| 5     | 1   | Modular Arithmetic   |
| 6     | 1   | Algebraic structures   |
| 7     | 1   | Algebraic structures   |
| 8     | 1   | Algebraic structures   |
| 9     | 1   | Prime Numbers  |
| 10    | 1   | Fermat's and Eulers's Theorem  |
| 11    | 1   | Fermat's and Eulers's Theorem  |
| 12    | 1   | Primality Testing, Factorization   |
| 13    | 1   | Primality Testing, Factorization   |
| 14    | 1   | Chinese Remainder Theorem  |
| 15    | 1   | Chinese Remainder Theorem  |
| 16    | 1   | Linear and Quadratic Congruence, Discrete Logarithms   |
| 17    | 2   | Introduction to Security:-Security Goals – Security services (Confidentiality, I                           |
| 18    | 2   | Integrity, Authentication, Non-repudiation, Access control)  |
| 19    | 2   | Security Mechanisms (Encipherment, Data Integrity,   |
| 20    | 2   | Digital Signature, Authentication Exchange, Traffic Padding,   |
| 21    | 2   | Routing Control, Notarization, Access control)   |
| 22    | 2   | Security Principles. Introduction to Cryptography:- Kerckhoff's Principle -Classification of Cryptosystems |
| 23    | 2   | Cryptanalytic attacks- Cipher Properties (Confusion, Diffusion).   |
| 24    | 3   | Traditional Secret Key Ciphers:- Substitution Ciphers (mono alphabetic ciphers)                            |
| 25    | 3   | poly alphabetic ciphers)-Transposition Ciphers-Stream and Block Ciphers.                                   |
| 26    | 3   | Modern Secret Key Ciphers:- Substitution Box-  |

|    |   |   |
|----|---|---|
| 27 | 3 | Permutation Box-Product Ciphers   |
| 28 | 4 | Data Encryption Standard (DES) (Fiestel and Non-Fiestel Ciphers,                          |
| 29 | 4 | Structure of DES, DES Attacks   |
| 30 | 4 | 2-DES, 3-DES) - Advanced Encryption Standard (AES) (Structure, Analysis)-                 |
| 31 | 4 | Cryptographic Hash Functions  |
| 32 | 4 | Properties - Secure Hash Algorithm-Message Authentication Code (MAC).                     |
| 33 | 5 | Public Key Cryptosystems (PKC): - Types of PKC  |
| 34 | 5 | Trapdoor - one way functions -RSA Cryptosystem  |
| 35 | 5 | (Integer Factorisation Trapdoor, Key Generation, Encryption, Decryption)                  |
| 36 | 5 | - El Gamal Cryptosystem (Discrete Logarithm Trapdoor                                      |
| 37 | 5 | Diffie-Hellman Key Exchange Protocol, Man in the Middle attack on Diffie-Hellman Protocol |
| 38 | 6 | Digital Signature:-Signing – Verification - Digital signature forgery                     |
| 39 | 6 | (Existential forgery, Selective forgery, Universal forgery)                               |
| 40 | 6 | RSA Digital Signature Scheme - ElGamal Signature Scheme                                   |
| 41 | 6 | IP Security Overview, IP Security Architecture,   |
| 42 | 6 | Authentication Header, Encapsulating Security Payload-                                    |
| 43 | 6 | Intruders, Intrusion Detection  |
| 44 | 6 | Distributed Denial of Service attacks   |

## **IT402:Cryptography**

### **ASSIGNMENT I**

1. What are the common primality test available.
3. Prove that the remainder of a number when divided by 3 is the same as the remainder of the sum of its digits
4. What is a permutation generator. Check if it is a field or not.

### **ASSIGNMENT II**

1. Intruders, Intrusion Detection.
2. Distributed Denial of Service attacks



# **IT 404:**

# **Data Analytics**

### COURSE INFORMATION SHEET

|   |                             |
|---|-----------------------------|
| PROGRAMME: Information Technology           | DEGREE: BTECH               |
| COURSE: Data Analytics                      | SEMESTER: S8 CREDITS: 3     |
| COURSE CODE: IT404<br>REGULATION: 2016      | COURSE TYPE: ELECTIVE       |
| COURSE AREA/DOMAIN: Artificial Intelligence | CONTACT HOURS: 4hours/Week. |
| CORRESPONDING LAB COURSE CODE (IF ANY):NA   | LAB COURSE NAME: NA         |

#### SYLLABUS:

| UNIT | DETAILS   | HOURS |
|------|---|-------|
|      | Data Analysis, Analysis Vs Reporting, Different Statistical Techniques of Data Analysis, Descriptive Analytics, Regressive Models, Neural Networks. Descriptive Analytics- Association and Sequential Rules, Big Data and its characteristics, Data Analysis using R language, Data visualization techniques. |       |
| 1    | Introduction to Data Analysis - Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting - Modern data analytic tools.<br>Statistical concepts: Sampling distributions, re-sampling, statistical inference, prediction error.   | 8     |
| 2    | Predictive Analytics – Regression, Decision Tree, Neural Networks.<br>Dimensionality Reduction - Principal component analysis   | 6     |
| 3    | Descriptive Analytics - Mining Frequent itemsets - Market based model – Association and Sequential Rule Mining - Clustering Techniques – Hierarchical – K- Means  | 6     |
| 4    | Introduction to Big data framework - Fundamental concepts of Big Data management and analytics - Current challenges and trends in Big Data Acquisition.   | 7     |

|             |   |    |
|-------------|---|----|
| 5           | Data Analysis Using R - Introduction to R, R Graphical User Interfaces, Data Import and Export, Attribute and Data Types, Descriptive Statistics, Exploratory Data Analysis, Visualization Before Analysis, Dirty Data, Visualizing a Single Variable, Examining Multiple Variables, Data Exploration Versus Presentation, Statistical Methods for Evaluation | 8  |
| 6           | Popular Big Data Techniques and tools- Map Reduce paradigm and the Hadoop system- Applications Social Media Analytics- Recommender Systems- Fraud Detection.  | 7  |
| TOTAL HOURS |   | 42 |

**TEXT/REFERENCE BOOKS:**

| T/R | BOOK TITLE/AUTHORS/PUBLICATION  |
|-----|---|
| T   | EMC Education Services, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data. John Wiley & Sons, 2015.            |
| T   | Jaiwei Han, Micheline Kamber, "Data Mining Concepts and Techniques", Elsevier, 2006.  |
| T   | Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007  |
| R   | Michael Minelli, Michele Chambers, AmbigaDhiraj , "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends", John Wiley & Sons, 2013. |
| R   | Bart Baesens," Analytics in a Big Data World: The Essential Guide to Data Science and itsApplications", John Wiley & Sons, 2014.                          |
| R   | Min Chen, Shiwen Mao, Yin Zhang, Victor CM Leung ,Big Data: Related Technologies,Challenges and Future Prospects, Springer, 2014                          |

**COURSE PRE-REQUISITES:CS208 Principles of database design**

**COURSE OBJECTIVES:**

|   |   |
|---|---|
| 1 | To understand the data analysis techniques  |
| 2 | To understand the concepts behind the descriptive analytics and predictive analytics of data. |
| 3 | To familiarize with Big Data and its sources  |
| 4 | To familiarize data analysis using R programming  |
| 5 | To understand the different visualization techniques in data analysis                         |

**COURSE OUTCOMES:**

**Students will be able to:**

| SlNo. | DESCRIPTION   |
|-------|---|
| 1     | Understand the statistical concepts and inferences to analyse different types of data, and characterize it to make more intelligent predictions |
| 2     | Apply theoretical foundations of decision trees and neural networks classifier to make decision modelling process more intelligent.             |
| 3     | To understand the concepts behind the association rule mining and clustering techniques   |
| 4     | Understand the fundamental concepts of Big Data management and analytics  |
| 5     | Learn data analysis using R programming.  |
| 6     | Understand Map Reduce paradigm and the Hadoop system and identify its applicability in real life problems.                                      |

**CO MAPPING WITH PO, PSO**

| CO No. | Programme Outcomes (POs) |   |   |   |   |   |   |   |   |    |    |    | Programme-Specific Outcomes (PSOs) |   |   |
|--------|--------------------------|---|---|---|---|---|---|---|---|----|----|----|------------------------------------|---|---|
|        | 1                        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1                                  | 2 | 3 |
| 1      | 3                        | 3 | 3 | 1 |   |   |   |   | 1 |    |    | 2  | 1                                  | 2 |   |
| 2      | 3                        | 3 | 3 | 1 |   |   |   |   | 1 |    |    | 1  | 1                                  | 2 | 1 |
| 3      | 3                        | 3 | 3 | 1 |   | 1 |   |   | 1 |    |    | 1  | 2                                  | 1 | 1 |
| 4      | 3                        | 3 | 3 | 1 |   |   |   |   | 1 |    |    | 2  | 1                                  | 1 | 1 |
| 5      | 3                        |   | 3 | 2 |   |   |   |   |   |    |    |    | 1                                  | 1 | 1 |
| 6      | 3                        |   | 3 | 3 |   |   |   |   |   |    |    |    | 1                                  | 1 | 1 |
| IT40   |                          |   |   |   |   |   |   |   |   |    |    |    |                                    |   |   |

|   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

**JUSTIFICATION FOR CO-PO-PSO CORRELATION:**

**JUSTIFICATION FOR CO-PO MAPPING**

| <b>MAPPING</b> | <b>LEVEL</b> | <b>JUSTIFICATION</b>   |
|----------------|--------------|--|
| IT404.1-PO1    | 3            | Knowledge of various data analytic approaches involves solving complex engineering problems                            |
| IT404.1-PO2    | 3            | Principles of mathematics and engineering sciences are used in various aspects of data analytic approaches             |
| IT404.1-PO3    | 3            | Using the knowledge of statistical concepts, we can design and develop solutions for complex engineering problems      |
| IT404.1-PO4    | 1            | Statistical concepts and inferences can be used to design and conduct experiments to provide valid conclusions         |
| IT404.1-PO9    | 1            | Expertise developed, which will enable the student to become a productive member of a design team                      |
| IT404.1-PO12   | 2            | The student will become aware of the need for lifelong learning and the continued upgrading of technical knowledge     |
| IT404.2-PO1    | 3            | Comparative study of different dimensionality reduction techniques involves solving complex engineering problems       |
| IT404.2-PO2    | 3            | Principles of mathematics and engineering sciences are used in various aspects of dimensionality reduction techniques. |
| IT404.2-PO3    | 3            | Knowledge of neural network techniques can be used to design and develop solutions for complex engineering problems    |
| IT404.2-PO4    | 3            | Decision tree techniques knowledge can be used to design and conduct experiments to provide valid conclusions          |
| IT404.2-PO9    | 1            | Expertise developed, which will enable the student to become   |

|              |   |   |
|--------------|---|---|
|              |   | a productive member of a design team  |
| IT404.2-PO12 | 1 | The student will become aware of the need for lifelong learning and the continued upgrading of technical knowledge  |
| IT404.3-PO1  | 3 | Knowledge of theoretical foundations of association rule mining involves solving complex engineering problems   |
| IT404.3-PO2  | 3 | Principles of mathematics and engineering sciences are used in theoretical foundations of clustering techniques to label data points.   |
| IT404.3-PO3  | 3 | Knowledge of theoretical foundations of clustering techniques can be used to design and develop solutions for complex engineering problems  |
| IT404.3-PO4  | 1 | Theoretical foundations of frequent pattern mining knowledge can be used to design and conduct experiments to provide valid conclusions   |
| IT404.3-PO6  | 1 | Knowledge of theoretical foundations of association rule mining and clustering techniques will help understand issues and societal problems related to cybercrimes and computer hacking |
| IT404.3-PO9  | 1 | Expertise developed, which will enable the student to become a productive member of a design team   |
| IT404.3-PO12 | 1 | The student will become aware of the need for lifelong learning and the continued upgrading of technical knowledge  |
| IT404.4-PO1  | 3 | Knowledge of the fundamental concepts of Big Data management and analytics helps in solving complex engineering problems  |
| IT404.4-PO2  | 3 | Principles of mathematics and engineering sciences are used in various aspects of Big Data management and analytics   |
| IT404.4-PO3  | 3 | Knowledge of the fundamental concepts of Big Data management and analytics can be used to design and develop solutions for complex engineering problems                                 |

|              |   |   |
|--------------|---|---|
| IT404.4-PO4  | 1 | Various Big Data management and analytics concepts knowledge can be used to design and conduct experiments to provide valid conclusions   |
| IT404.4-PO9  | 1 | Expertise developed, which will enable the student to become a productive member of a design team   |
| IT404.4-PO12 | 2 | The student will become aware of the need for lifelong learning and the continued upgrading of technical knowledge                        |
| IT404.5-PO1  | 3 | Study of data analysis using R programming involves solving complex engineering problems  |
| IT404.5-PO3  | 3 | data analysis using R programming knowledge can be used to design and develop solutions for complex engineering problems                  |
| IT404.5-PO4  | 2 | Exploratory data analysis can be used to design and conduct experiments to provide valid conclusions                                      |
| IT404.6-PO1  | 3 | Knowledge of Map Reduce paradigm and the Hadoop system involves solving complex engineering problems                                      |
| IT404.6-PO3  | 3 | Knowledge of Map Reduce paradigm and the Hadoop system can be used to design and develop solutions for complex engineering problems       |
| IT404.6-PO4  | 3 | Map Reduce paradigm and the Hadoop system knowledge can be used to conduct experiments in real life problems to provide valid conclusions |

### JUSTIFICATION FOR CO-PSO MAPPING

| MAPPING      | LEVEL | JUSTIFICATION  |
|--------------|-------|--|
| IT404.1-PSO1 | 1     | Various data analytic approaches Acquire skills to design, analyse and develop algorithms and implement them using high-level programming languages. |

|                  |   |  |
|------------------|---|--|
| IT404.1-<br>PSO2 | 2 | Knowledge of data analytics concepts contribute skills in computing and knowledge engineering domain.  |
| IT404.2-<br>PSO1 | 1 | Knowledge of different dimensionality reduction techniques<br>Acquire skills to design, analyse and develop algorithms and implement them using high-level programming languages.                            |
| IT404.2-<br>PSO2 | 2 | Different decision trees techniques concepts contribute skills in computing and knowledge engineering domain.  |
| IT404.2-<br>PSO3 | 1 | Knowledge of different decision trees and neural networks classifier techniques contribute to develop strong skills in developing IT solutions for different domains which helps in the betterment of life.  |
| IT404.3-<br>PSO1 | 2 | Theoretical foundations of the association rule mining and clustering techniques<br>Acquire skills to design, analyse and develop algorithms and implement them using high-level programming languages       |
| IT404.3-<br>PSO2 | 1 | Theoretical foundations of the association rule mining and clustering techniques contribute skills in computing and knowledge engineering domain   |
| IT404.3-<br>PSO3 | 1 | Theoretical foundations of the association rule mining and clustering techniques contribute to develop strong skills in developing IT solutions for different domains which helps in the betterment of life. |
| IT404.4-<br>PSO1 | 1 | Study of fundamental concepts of Big Data management and analytics acquire skills to design, analyse and develop algorithms and implement them using high-level programming languages                        |
| IT404.4-<br>PSO2 | 1 | Knowledge of fundamental concepts of Big Data management and analytics contribute skills in computing and knowledge engineering domain.  |
| IT404.4-         | 1 | Fundamental concepts of Big Data management and analytics  |



|      |  |   |
|------|--|---|
| PSO3 |  | knowledge contribute to develop strong skills in developing IT solutions for different domains which helps in the betterment of life. |
|------|--|---|

**GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:**

| SNO | DESCRIPTION                           | PROPOSED ACTIONS                                      | PO MAPPING       |
|-----|---------------------------------------|---|------------------|
| 1   | Hands on sessions on Hadoop MapReduce | Conduct workshops on Hadoop and MapReduce programming | 1, 2, 3, 4, 5, 6 |
| 2   | Hands on session on R-programming     | Conduct workshops on R-programming                    | 1, 2, 3, 4, 5, 6 |

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURE/NPTEL ETC

**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:**

| S No: | DESCRIPTION      | PO MAPPING       |
|-------|------------------|------------------|
| 1     | .SPARK Framework | 1, 2, 3, 4, 5, 6 |
| 2     | Deep learning    | 1, 2, 3, 4, 5, 6 |

**DESIGN AND ANALYSIS TOPICS:**

| Sl. No. | DESCRIPTION                         | PO MAPPING           |
|---------|-------------------------------------|----------------------|
| 1       | Dimensionality Reduction techniques | 1, 2, 3, 4, 5, 9, 10 |
| 2       | Classification algorithms           | 1, 2, 3, 4, 5, 9, 10 |
| 3       | Clustering algorithms               | 1, 2, 3, 4, 5, 9, 10 |

**WEB SOURCE REFERENCES:**

|    |   |
|----|---|
| 1. | <a href="https://onlinecourses.nptel.ac.in/noc21_cs45/preview">https://onlinecourses.nptel.ac.in/noc21_cs45/preview</a>                               |
| 2. | <a href="https://www.upgrad.com/machine-learning-and-artificial-intelligence">https://www.upgrad.com/machine-learning-and-artificial-intelligence</a> |

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

|  |  |  |  |
|--|--|--|--|
| <input checked="" type="checkbox"/> CHALK & TALK     | <input checked="" type="checkbox"/> STUD. ASSIGNMENT | <input type="checkbox"/> WEB RESOURCES             | <input type="checkbox"/> STUD. LAB PRACTICES |
| <input checked="" type="checkbox"/> LCD/SMART BOARDS | <input type="checkbox"/> STUD. SEMINARS              | <input checked="" type="checkbox"/> ADD-ON COURSES |  |

**ASSESSMENT METHODOLOGIES-DIRECT**

|   |  |   |  |
|---|--|---|--|
| <input checked="" type="checkbox"/> ASSIGNMENTS | <input checked="" type="checkbox"/> STUD. SEMINARS | <input checked="" type="checkbox"/> TESTS/MODEL EXAMS | <input type="checkbox"/> UNIV. EXAMINATION |
| <input type="checkbox"/> STUD. LAB PRACTICES    | <input type="checkbox"/> STUD. VIVA                | <input type="checkbox"/> MINI/MAJOR PROJECTS          | <input type="checkbox"/> CERTIFICATIONS    |
| <input type="checkbox"/> ADD-ON COURSES         | <input type="checkbox"/> OTHERS                    |   |  |

**ASSESSMENT METHODOLOGIES-INDIRECT**

|   |   |
|---|---|
| <input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE) | <input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE) |
| <input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS            | <input type="checkbox"/> OTHERS   |

**Prepared by**

**Dr. Sherly K.K**  
**(Faculty in Charge)**

**Approved by**

**Saritha S**  
**(HoD)**

### Course Plan

| <b>Year:</b> | <b>2021</b>     |            | <b>Class: S8 IT</b>  |  |
|--------------|-----------------|------------|--|--|
|              | <b>Subject:</b> |            | <b>IT 404 Data Analytics</b>   |  |
| <b>Sl.No</b> | <b>Module</b>   | <b>Day</b> | <b>Planned</b>   |  |
| 1            | I               | Day 1      | Course objectives and expected course outcomes, Syllabus details, importance of course study |  |
| 2            | I               | Day 2      | Introduction to Data Analytics   |  |
| 3            | I               | Day 3      | Evolution of Analytic scalability, analytic processes and tools                              |  |
| 4            | I               | Day 4      | Analysis vs reporting - Modern data analytic tools.  |  |
| 5            | I               | Day 5      | Statistical concepts   |  |
| 6            | I               | Day 6      | Sampling distributions, re-sampling  |  |
| 7            | I               | Day 7      | Statistical inference  |  |
| 8            | I               | Day 8      | Prediction error   |  |
| 9            | I               | Day 9      | Revision Module-I  |  |
| 10           | II              | Day 10     | Predictive Analytics – Regression  |  |
| 11           | II              | Day 11     | Decision Tree  |  |
| 12           | II              | Day 12     | Neural Networks.   |  |
| 13           | II              | Day 13     | Dimensionality reduction   |  |
| 14           | II              | Day 14     | Principle Component Analysis   |  |
| 15           | II              | Day 15     | Revision Module-II   |  |
| 16           |                 | Day 16     | Test-1   |  |
| 17           | III             | Day 17     | Descriptive Analytics - Mining Frequent itemsets   |  |
| 18           | III             | Day 18     | Market based model   |  |
| 19           | III             | Day 19     | Association and Sequential Rule Mining   |  |
| 20           | III             | Day 20     | Clustering Techniques  |  |
| 21           | III             | Day 21     | Hierarchical Clustering  |  |
| 22           | III             | Day 22     | K- Means clustering  |  |
| 23           | IV              | Day 23     | Introduction to Big data framework   |  |
| 24           | IV              | Day 24     | Fundamental concepts of Big Data management and analytics                                    |  |

|    |    |        |  |
|----|----|--------|--|
| 25 | IV | Day 25 | Current challenges and trends in Big Data Acquisition        |
| 26 | IV | Day 26 | Revision Module-IV   |
| 27 | V  | Day 27 | Data Analysis Using R - Introduction to R,                   |
| 28 | V  | Day 28 | R Graphical User Interfaces, Data Import and Export          |
| 29 | V  | Day 29 | Attribute and Data Types                                     |
| 30 | V  | Day 30 | Descriptive Statistics                                       |
| 31 | V  | Day 31 | Exploratory Data Analysis,                                   |
| 32 | V  | Day 32 | Visualization Before Analysis, Dirty data                    |
| 33 | V  | Day 33 | Visualizing a Single Variable, Examining Multiple Variables, |
| 34 | V  | Day 34 | Data Exploration Versus Presentation,                        |
| 35 | V  | Day 35 | Statistical Methods for Evaluation                           |
| 36 | V  | Day 36 | Revision Module-V  |
| 37 | VI | Day 37 | Popular Big Data Techniques and tools                        |
| 38 | VI | Day 38 | Map Reduce paradigm  |
| 39 | VI | Day 39 | The Hadoop system  |
| 40 | VI | Day 40 | Applications Social Media Analytics- .                       |
| 41 | VI | Day 41 | Recommender Systems-   |
| 42 | VI | Day 42 | Fraud Detection  |
| 43 | VI | Day 43 | Revision Module VI   |

### Assignment Questions

Assignment-1

Submission Date: 27/4/2021

1. Describe the various attribute selection measures. Illustrate splitting decision is made in decision tree induction?
2. Describe the decision tree construction procedure (ID3 algorithm)

3. Construct decision tree using the data given in the table.

| Outlook  | Temp. | Humidity | Wind   | Decision |
|----------|-------|----------|--------|----------|
| Sunny    | Hot   | High     | Weak   | No       |
| Sunny    | Hot   | High     | Strong | No       |
| Overcast | Hot   | High     | Weak   | Yes      |
| Rain     | Mild  | High     | Weak   | Yes      |
| Rain     | Cool  | Normal   | Weak   | Yes      |
| Rain     | Cool  | Normal   | Strong | No       |
| Overcast | Cool  | Normal   | Strong | Yes      |
| Sunny    | Mild  | High     | Weak   | No       |
| Sunny    | Cool  | Normal   | Weak   | Yes      |
| Rain     | Mild  | Normal   | Weak   | Yes      |
| Sunny    | Mild  | Normal   | Strong | Yes      |
| Overcast | Mild  | High     | Strong | Yes      |
| Overcast | Hot   | Normal   | Weak   | Yes      |
| Rain     | Mild  | High     | Strong | No       |

4. Draw multilayer perceptron network and explain functionalities of each unit. Justify how can it be used in analytics?
5. Describe Neural network training process

Assignment-2

Submission Date:14/6/2021

1. Present a recommender system with suitable example? Describe the five main techniques used in recommender systems. Also specify the advantages and disadvantages of each techniques.
2. With an example, discuss the big data application in social media analytics.

Reference: Chapter 8

Bart Baesens," Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", John Wiley & Sons, 2014



# IT 462:

# Internet of Things

## COURSE INFORMATION SHEET

|  |   |
|--|---|
| PROGRAMME: <b>INFORMATION TECHNOLOGY</b> | DEGREE: <b>BTECH (March 2021- June2021)</b> |
| COURSE: <b>INTERNET OF THINGS</b>        | SEMESTER: <b>VIII</b>                       |
| COURSE CODE: IT 462                      | COURSE TYPE: <b>CORE</b>                    |

|  |                                     |
|--|-------------------------------------|
| COURSE AREA/DOMAIN: <b>IoT,Cloud and Bigdata</b> | CONTACT HOURS: <b>4 hours/Week.</b> |
| CORRESPONDING LAB COURSE CODE (IF ANY):          | LAB COURSE NAME: <b>NIL</b>         |

**SYLLABUS:**

| UNIT | DETAILS   | HOURS |
|------|---|-------|
| I    | Internet: An Overview: Introduction, History of Internet, Internet Technology, Basics of Internet, Classification of Internet, Topologies, Applications, Internet of Things and Related Future Internet Technologies, Internet of Things Vision, Towards the IoT Universe(s), The Internet of Things Today  | 5     |
| II   | Internet Communication Technologies, Networks and Communication , Processes , Data Management , IoT Related Standardization , Protocol, Communication protocols, Types of communication protocols, Addressing Schemes, M2M Service Layer Standardisation, OGC Sensor Web for IoT, IEEE and IETF, ITU-T, Current trends in Internet: Internet of everything, Internet of everything, Internet of things, Storage, Databases  | 8     |
| III  | Cloud Technology: Introduction, Overview, Why cloud ? , How to implement cloud ?, Usage of cloud, Scalable Computing, Cloud computing, Characteristics of cloud computing, Classifications, Virtual machines, Virtualization technology, Models of distributed and cloud computing, Distributed computing, Clustering, Grid computing, Service oriented Architecture. Performance and Security, Performance analysis, Security, Implementations of Cloud computing. | 8     |
| IV   | Internet of Things: IoT : An overview, Introduction, Characteristics, IoT technology, IoT as a Network of Networks, IoT architecture, IoT developments, Smart Technology, Brief introduction of smart technology, Smart devices, Smart environment. IoT Components, Basic Principles, Embedded technology Vs IoT, Sensors, Wireless sensor networks, Aurdino, Raspberry Pi  | 7     |



|                    |  |           |
|--------------------|--|-----------|
| V                  | Prototyping in IoT, Basics of prototypes, Prototyping in IoT, Communication in IoT, Prototyping model, Data handling in IoT, fabryq, Bluetooth Low Energy, µfabryq, Operating Systems for Low-End IoT Devices, Open Source Oss, Contiki, RIOT, FreeRTOS, TinyOS, OpenWSN, nuttX, eCos, mbedOS, L4 microkernel family, uClinux, Android and Brillo, Other open source OS, Closed Source Oss, ThreadX, QNX, VxWorks, Wind River Rocket, PikeOS, emboss, Nucleus RTOS, Sciopta, µC/OS-II and µC/OS-III. | 7         |
| VI                 | Big Data, BigData versus IoT, BigData influence in IoT, A cyclic model of BigData, Cloud and Internet of Things, Data Storage, Analysis and Communication, Classifications, Characteristics of BigData, Types of BigData, Analysing of Data, Applications, Real time situations, BigData tools, A combined application of IoT , Cloud and BigData in IoT   | 7         |
|                    |  |           |
| <b>TOTAL HOURS</b> |  | <b>42</b> |

**TEXT/REFERENCE BOOKS:**

| T/R | BOOK TITLE/AUTHORS/PUBLICATION   |
|-----|--|
| 1   | Anthony Townsend., Smart cities: big data, civic hackers, and the quest for a new utopia, WW Norton & Company, 2013  |
| 2   | Arshdeep Bahga, Vijay Madiseti, , Internet of things: a hands-on approach, CreateSpace Independent Publishing Platform, 2013                               |
| 3   | Dieter Uckelmann, Mark Harrison, Michahelles Florian (Ed.), Architecting the internet of things, Springer, 2011  |
| 4   | Dr. Ovidiu Vermesan, Dr Peter Friess, Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, River Publishers, 2013 |
| 5   | Olivier Hersent, David Boswarthick, Omar Elloumi The internet of things: key applications and protocols, Wiley, 2012.                                      |
| 6   | Adrian McEwen, Hakim Cassimally, Designing internet of things, John Wiley & Sons, 2013 .   |

**COURSE PRE-REQUISITES:**

| C.CODE | COURSE NAME       | DESCRIPTION   | SEM |
|--------|-------------------|---|-----|
| IT 307 | COMPUTER NETWORKS | Basic awareness of network communication                | V   |
| IT 401 | EMBEDDED SYSTEMS  | Basic awareness of embedded systems,ArduinoRaspberry pi | VII |

**COURSE OBJECTIVES:**

|   |  |
|---|--|
| 1 | To explore the world of current technologies.                          |
| 2 | To understand with the concepts of internet of things                  |
| 3 | To get a knowledge basics in the history and developments of internet. |
| 4 | To be familiar with the big data and cloud in the IoT basis            |

**COURSE OUTCOMES:**

| SI No | DESCRIPTION  | Blooms' Taxonomy Level |
|-------|--|------------------------|
| C01   | Graduate will be able to <b>discuss</b> the world of current technologies.           | Understand (Level 2)   |
| C02   | Graduate will be able to <b>describe</b> the fundamentals of IoT                     | Understand (Level 2)   |
| C03   | Graduates will be able to <b>interpret</b> models of distributed and cloud computing | Apply (Level 3)        |
| C04   | Graduates will be able to <b>examine</b> protoypes for Internet of Things            | Analyze (Level 4)      |
| C05   | Graduates will be able to <b>judge</b> the applications of IoT,BigData and cloud     | Evaluate               |

|  |           |
|--|-----------|
|  | (Level 5) |
|--|-----------|

### CO-PO AND CO-PSO MAPPING

|                       | P01 | P02 | P03  | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P011 | P012 | PS01 | PS02 | PS03 |
|-----------------------|-----|-----|------|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| C01                   | 2   | -   | -    | -   | -   | -   | -   | -   | -   | -    | -    | -    | 2    | -    | -    |
| C02                   | -   | 2   | 3    | 2   | -   | -   | -   | -   | -   | -    | -    | -    | -    | -    | 3    |
| C03                   | -   | 2   | 2    | -   | -   | -   | -   | -   | -   | -    | -    | -    | 1    | -    | 2    |
| C04                   | 1   | 2   | 3    | -   | -   | -   | -   | -   | -   | -    | -    | -    | 2    | 2    | -    |
| C05                   | -   | -   | 3    | -   | -   | -   | -   | -   | -   | -    | -    | -    | 3    | -    | -    |
| CO overall Attainment | 1.5 | 2   | 2.75 | 2   |     |     |     |     |     |      |      |      | 2    | 2    | 2.5  |

### JUSTIFICATIONS FOR CO-PO MAPPING

| MAPPING  | LOW/MEDIUM/HIGH | JUSTIFICATION  |
|----------|-----------------|--|
| C01-P01  | M               | Graduate attains a basic knowledge about current technologies.   |
| C01-PS01 | M               | Graduate is made able to identify the core principles of basic technologies in IoT                       |
| C02-P02  | M               | Graduate is made capable of identifying the basic suitable technologies to design IoT based applications |
| C02-P03  | H               | Graduate is able to design simple and creative IoT projects.   |
| C02-P04  | M               | Graduate is able to apply the concept of cloud and bigdata in developing IoT based applications.         |

|          |   |  |
|----------|---|--|
| C02-PS03 | H | Graduate is able to use the basic prototypes of IoT for developing innovative applications                         |
| C03-P02  | M | Graduate will be able to use cloud models to store and maintain data.  |
| C03-P03  | M | Graduates are able to design and develop solutions based on IoT based distributed models.                          |
| C03-PS01 | L | Graduate attains a basic knowledge on prototypes and their need in building IoT                                    |
| C03-PS03 | M | Graduate attains information on basics of developing IoT related projects which can be contributed to the society. |
| C04-P01  | L | Graduate achieves a basic insight on prototypes and operating system for IoT.                                      |
| C04-P02  | M | Graduate is able to analyze a problem and write solutions using arduino programming.                               |
| C04-P03  | H | Graduate is able to develop solutions to complex problems using the given programming languages.                   |
| C04-PS01 | M | Graduates achieves knowledge on writing programs using arduino.  |
| C04-PS02 | M | Graduates achieves knowledge on interoperability in IoT.   |
| C05-P03  | H | Graduate is made able to develop applications using arduino programming  |
| C05-PS01 | H | Graduate is made able to develop applications by integrating sensors and actuators using arduino.                  |

**WEB SOURCE REFERENCES:**

|    |   |
|----|---|
| 1. | <a href="https://iotbusinessnews.com/white-papers/">https://iotbusinessnews.com/white-papers/</a> |
|----|---|

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

|                    |                    |                  |  |
|--------------------|--------------------|------------------|--|
| ✓ CHALK & TALK     | ✓ STUD. ASSIGNMENT | ✓ WEB RESOURCES  |  |
| ✓ LCD/SMART BOARDS | STUD. SEMINARS     | ✓ ADD-ON COURSES |  |

**ASSESSMENT METHODOLOGIES-DIRECT**

|                     |                |                     |                     |
|---------------------|----------------|---------------------|---------------------|
| ✓ ASSIGNMENTS       | STUD. SEMINARS | ✓ TESTS/MODEL EXAMS | ✓ UNIV. EXAMINATION |
| STUD. LAB PRACTICES | STUD. VIVA     | MINI/MAJOR PROJECTS | CERTIFICATIONS      |
| ADD-ON COURSES      | OTHERS         |                     |                     |

**ASSESSMENT METHODOLOGIES-INDIRECT**

|   |                                       |
|---|---------------------------------------|
| ✓ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE) | ✓ STUDENT FEEDBACK ON FACULTY (TWICE) |
| ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS   | OTHERS                                |

**Prepared by**  
**Ms. Divya James**  
**(Faculty)**

**Approved by**  
**Dr.Neeba EA**  
**(H.O.D)**

## Course Plan

March- June 2021

| Day | Topic  |
|-----|--|
| 1.  | Introduction to Internet, History of Internet, Internet Technology |
| 2.  | Basics of Internet, Classification of Internet                     |
| 3.  | Topologies, Applications   |
| 4.  | Internet of Things and Related Future Internet Technologies        |
| 5.  | Internet of things Vision, Towards the IoT universe, IoT today     |
| 6.  | Internet Communication Technologies                                |
| 7.  | Networks and Communication, Processes, Data Management             |
| 8.  | IoT related Standardization  |
| 9.  | Protocol, Communication protocols                                  |
| 10. | Types of Communication protocols                                   |
| 11. | Addressing Schemes   |
| 12. | M2M Service layer Standardization, OGC SensorWeb for IoT           |
| 13. | IEEE and IETF, ITU-T   |
| 14. | Current trends in Internet: Internet of Everything                 |
| 15. | Storages, Databases  |
| 16. | Cloud Technology: Introduction, How to implement                   |

|            |   |
|------------|---|
|            | cloud?,Usage of cloud   |
| <b>17.</b> | Scalable computing,Characteristics of cloud computing,Classifications |
| <b>18.</b> | Virtual machines,Virtualization technology                            |
| <b>19.</b> | Models of distributed and cloud computing                             |
| <b>20.</b> | Distributed computing   |
| <b>21.</b> | Clustering,Grid Computing   |
| <b>22.</b> | Service Oriented Architecture,Performance and Security                |
| <b>23.</b> | Implementations of cloud computing                                    |
| <b>24.</b> | IoT ,Characteristics,IoT Technology                                   |
| <b>25.</b> | IoT as a Network of Networks  |
| <b>26.</b> | IoT architecture  |
| <b>27.</b> | IoT developments,Smart technology                                     |
| <b>28.</b> | Smart devices   |
| <b>29.</b> | Smart environment   |
| <b>30.</b> | IoT components  |
| <b>31.</b> | Embedded Technology Vs IoT  |
| <b>32.</b> | Wireless Sensor Networks  |
| <b>33.</b> | Aurdino,Rasberry pi   |
| <b>34.</b> | Prototyping in IoT  |
| <b>35.</b> | Communication in IoT  |

|     |   |
|-----|---|
| 36. | Data handling in IoT                        |
| 37. | Bluetooth low energy                        |
| 38. | Operating Systems for Low-End IoT Devices   |
| 39. | Operating Systems for Low-End IoT Devices   |
| 40. | Operating Systems for Low-End IoT Devices   |
| 41. | Operating Systems for Low-End IoT Devices   |
| 42. | Bigdata versus IoT                          |
| 43. | A cyclic model of Bigdata                   |
| 44. | Cloud and IoT                               |
| 45. | Data storage,Analysis and communication     |
| 46. | Classifications                             |
| 47. | Characteristics of BigData,Types of Bigdata |
| 48. | Real time situations,Bigdata tools          |
| 49. | A combined application of IoT               |
| 50. | Cloud and Bigdata in IoT                    |
| 51. | Revision                                    |
| 52. | Revision                                    |

### **Assignment 1**



1. Explain in detail:
  - a) Classification of Internet
  - b) Topologies, history & basics of Internet
  
2. Discuss briefly about the applications of Internet

### **Assignment 2**

1. Write notes on BLE and its features.
2. Compare fabryq and  $\mu$ fabryq.
3. Define prototyping in IoT. Explain anyone prototyping kit/model used in IoT. List the problems of prototyping.
4. Differentiate Open source and Closed source OS

# **CS 468:**

# **Cloud Computing**

## COURSE INFORMATION SHEET

|   |                                      |
|---|--------------------------------------|
| PROGRAMME: <b>INFORMATION TECHNOLOGY</b>          | DEGREE: <b>B TECH</b>                |
| COURSE: <b>CLOUD COMPUTING</b>                    | SEMESTER: <b>8</b> CREDITS: <b>3</b> |
| COURSE CODE: <b>CS468</b> REGULATION: <b>2016</b> | COURSE TYPE: <b>ELECTIVE</b>         |
| COURSE AREA/DOMAIN: <b>CLOUD COMPUTING</b>        | CONTACT HOURS: <b>3</b>              |
| CORRESPONDING LAB COURSE CODE (IF ANY): <b>NA</b> | LAB COURSE NAME: <b>NA</b>           |

### SYLLABUS:

| UNI T | DETAILS  | HOURS |
|-------|--|-------|
| I     | <p><b>INTRODUCTION TO VIRTUALIZATION</b></p> <p>Virtual Machines and Virtualization Middleware – Data Center Virtualization for Cloud Computing – Implementation Levels of Virtualization – Virtualization Structures/Tools and Mechanisms– Virtualization of CPU – Memory – I/O Devices</p>   | 7     |
| II    | <p><b>INTRODUCTION TO CLOUD COMPUTING</b></p> <p>System Models for Distributed and Cloud Computing – Software Environments for Distributed Systems and Clouds – Cloud Computing and Service Models – Public – Private – Hybrid Clouds – Infrastructure-as-a-Service (IaaS) – Platform-as-a-Service (PaaS) - Software-as-a-Service (SaaS)-Different Service Providers</p> | 8     |
| III   | <p><b>CLOUD ARCHITECTURE AND RESOURCE MANAGEMENT</b></p> <p>Architectural Design of Compute and Storage Clouds – Public Cloud Platforms: GAE – AWS – Azure-Emerging Cloud Software Environments – Eucalyptus- Nimbus – Open Stack – Extended Cloud Computing Services – Resource Provisioning and Platform Deployment – Virtual Machine</p>                              | 8     |

|                    |  |           |
|--------------------|--|-----------|
|                    | Creation and Management.   |           |
| IV                 | <b>CLOUD PROGRAMMING</b><br>Parallel Computing and Programming Paradigms – Map Reduce –Twister – Iterative Map Reduce – Hadoop Library from Apache –Pig Latin High Level Languages- Mapping Applications to Parallel and Distributed Systems – Programming the Google App Engine – Google File System (GFS) – Big Table – Google’s NOSQL System                                    | 7         |
| V                  | <b>SECURITY IN THE CLOUD</b><br>Security Overview – Cloud Security Challenges – Security -as-a-Service – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security –Application Security – Virtual Machine Security.  | 6         |
| VI                 | <b>USING CLOUD SERVICES</b><br>Email Communications – Collaborating on To-Do Lists –Contact Lists – Cloud Computing for the Community- Collaborating on Calendars – Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Project Management -Word Processing – Databases | 6         |
| <b>TOTAL HOURS</b> |  | <b>42</b> |

**TEXT/REFERENCE BOOKS:**

| T/R | BOOK TITLE/AUTHORS/PUBLICATION   |
|-----|--|
| T1  | Kai Hwang, Geoffrey C Fox, Jack J Dongarra: Distributed and Cloud Computing – From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers – 2012. |
| R1  | Alex Amies, Harm Sluiman, Qiang Guo Tong and Guo Ning Liu: Developing and Hosting Applications on the cloud, IBM Press, 2012.  |
| R2  | George Reese: Cloud Application Architectures: Building Applications and Infrastructure in the Cloud (Theory in Practice), O’Reilly Publications, 2009.              |

|    |  |
|----|--|
| R3 | Haley Beard: Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing – applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008 |
| R4 | James E. Smith and Ravi Nair: Virtual Machines: Versatile Platforms for Systems and Processes, Morgan Kaufmann, ELSEVIER Publication, 2006.  |
| R5 | John W Rittinghouse and James F Ransome: Cloud Computing: Implementation – Management – and Security, CRC Press, 2010.   |
| R6 | Michael Miller: Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Pearson Education, 2009.  |
| R7 | Richard N. Katz: The Tower and The Cloud, Higher Education in the Age of Cloud Computing, 2008.  |
| R8 | Toby Velte, Anthony Velte and Robert Elsenpeter: Cloud Computing – A Practical Approach, TMH, 2009.  |

**COURSE OBJECTIVES:**

|   |   |
|---|---|
| 1 | To impart the fundamentals of virtualization techniques.                      |
| 2 | To introduce concepts and security issues of cloud paradigm.                  |
| 3 | To introduce cloud computing-based programming techniques and cloud services. |

**COURSE OUTCOMES:**

| SNO   | DESCRIPTION   | Bloom's Taxonomy Level |
|-------|---|------------------------|
| 468.1 | The students will be able to identify the significance of implementing virtualization techniques. | Identify (Level 2)     |

|       |  |                      |
|-------|--|----------------------|
| 468.2 | The students will be able to interpret the various cloud computing models and services.              | Interpret (Level 3)  |
| 468.3 | The students will be able to compare the various public cloud platforms and software environments.   | Compare (Level 2)    |
| 468.4 | The students will be able to apply appropriate cloud programming methods to solve big data problems. | Apply (Level 3)      |
| 468.5 | The students will be able to appreciate the need of security mechanisms in cloud.                    | Appreciate (Level 4) |
| 468.6 | The students will be able to illustrate the use of various cloud services available online.          | Illustrate (Level 2) |

### CO-PO AND CO-PSO MAPPING

|         | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| CS468.1 | -    | 2    | -    | -    | 2    | -    | -    | -    | -    | -     | -     | -     | -     | -     | 2     |
| CS468.2 | 1    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | -     | -     | 2     |
| CS468.3 | -    | 2    | -    | -    | 2    | -    | -    | -    | -    | -     | -     | -     | -     | -     | 1     |
| CS468.4 | -    | 2    | 2    | -    | 2    | -    | -    | -    | -    | -     | -     | -     | 3     | -     | 2     |
| CS468.5 | -    | 2    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | -     | 2     | 2     |
| CS468.6 | -    | 2    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | 1     | -     | 3     |
| CS468   | 1    | 2    | 2    | -    | 2    | -    | -    | -    | -    | -     | -     | -     | 2     | 2     | 2     |

LOW/MEDIUM/HIGH → 1/2/3

### JUSTIFICATIONS FOR CO-PO MAPPING

| Mapping | LOW/MEDIU | Justification |
|---------|-----------|---------------|
|---------|-----------|---------------|

|              |               |  |
|--------------|---------------|--|
|              | <b>M/HIGH</b> |  |
| CS468.1-PO2  | M             | Using basic concepts of computer engineering students can identify the concept of virtualization                                     |
| CS468.1-PO5  | M             | Students can use the concept of virtualization to model various engineering activities   |
| CS468.2-PO1  | L             | Students can understand the various cloud computing models   |
| CS468.3-PO2  | M             | Can compare and understand the various public cloud platforms available and also their corresponding software environment            |
| CS468.3-PO5  | M             | The knowledge of various cloud platforms and software environments can be used for developing modern IT solutions                    |
| CS468.4-PO2  | M             | Can analyze Big Data problems for developing potential solutions   |
| CS468.4-PO3  | M             | Solutions can be developed for complex Big Data problems.  |
| CS468.4-PO5  | M             | Cloud programming methods can be used in engineering activities  |
| CS468.5-PO2  | M             | Appraise, correlate and conclude the need for Cloud Security mechanisms  |
| CS468.6-PO2  | M             | Students can use the knowledge gained to work on various cloud applications  |
| CS468.1-PSO3 | M             | By implementing virtualization techniques innovative IT solutions can be developed   |
| CS468.2-PSO3 | M             | The understanding of various cloud computing models and services enable the students to develop solutions for the betterment of life |
| CS468.3-PSO3 | L             | Comparative knowledge of cloud platforms can be used for the planning, developing of solutions                                       |

|              |   |   |
|--------------|---|---|
| CS468.4-PSO1 | H | Students are acquiring cloud programming knowledge  |
| CS468.4-PSO3 | M | Cloud programming methods learnt can be used for providing better solutions                                     |
| CS468.5-PSO2 | M | Understanding of cloud security concepts can be used in the network design domain                               |
| CS468.5-PSO3 | M | Appreciating and understanding the security need in cloud will help the students while providing IT solutions   |
| CS468.6-PSO1 | L | Using the knowledge of various cloud services, new algorithms can be designed, analyzed and developed           |
| CS468.6-PSO3 | H | Understanding of cloud based services enable the students to plan, develop, test and implement better solutions |

**GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:**

| S. NO | DESCRIPTION                 | PROPOSED ACTIONS | PO MAPPING |
|-------|-----------------------------|------------------|------------|
| 1     | Hands on workshop on Hadoop | Workshop         | 1,3,5      |
| 2     | Cloud Implementation        | Workshop         | 1,3,5      |

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:**

| S. NO | TOPIC                 | PO MAPPING |
|-------|-----------------------|------------|
| 1     | Performance of Cloud  | 1,2,3      |
| 2     | Cloud for HPC and HTC | 1,3,5      |



**WEB SOURCE REFERENCES:**

|   |   |
|---|---|
| 1 | <a href="https://csrc.nist.gov/publications/detail/sp/800-145/final">https://csrc.nist.gov/publications/detail/sp/800-145/final</a>         |
| 2 | <a href="https://docs.aws.amazon.com/index.html?nc2=h ql doc#lang/en us">https://docs.aws.amazon.com/index.html?nc2=h ql doc#lang/en us</a> |
| 3 | <a href="https://docs.microsoft.com/en-in/azure/">https://docs.microsoft.com/en-in/azure/</a>   |
| 4 | <a href="https://cloud.google.com/docs/">https://cloud.google.com/docs/</a>   |

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

|  |  |  |  |
|--|--|--|--|
| <input checked="" type="checkbox"/> CHALK & TALK | <input checked="" type="checkbox"/> STUD. ASSIGNMENT | <input checked="" type="checkbox"/> WEB RESOURCES  |  |
| <input type="checkbox"/> LCD/SMART BOARDS        | <input checked="" type="checkbox"/> STUD. SEMINARS   | <input checked="" type="checkbox"/> ADD-ON COURSES |  |

**ASSESSMENT METHODOLOGIES-DIRECT**

|   |   |   |   |
|---|---|---|---|
| <input checked="" type="checkbox"/> ASSIGNMENTS | <input type="checkbox"/> STUD. SEMINARS | <input checked="" type="checkbox"/> TESTS/MODEL EXAMS | <input checked="" type="checkbox"/> UNIV. EXAMINATION |
| <input type="checkbox"/> STUD. LAB PRACTICES    | <input type="checkbox"/> STUD. VIVA     | <input type="checkbox"/> MINI/MAJOR PROJECTS          | <input type="checkbox"/> CERTIFICATIONS               |
| <input type="checkbox"/> ADD-ON COURSES         | <input type="checkbox"/> OTHERS         |   |   |

### ASSESSMENT METHODOLOGIES-INDIRECT

|   |  |
|---|--|
| <input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE) | <input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (ONCE) |
| <input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS            | <input type="checkbox"/> OTHERS  |

**Prepared by**

**Approved by**

**ANU MARIA JOYKUTTY**

**Dr. NEEBA E A ,HOD, DIT**

### COURSE PLAN

| Sl.No | Module | Planned Date | Planned   |
|-------|--------|--------------|---|
| 1     | 1      | 22-Mar-21    | Introduction                                      |
| 2     | 1      | 24-Mar-21    | Virtual Machines and Virtualization Middleware    |
| 3     | 1      | 25-Mar-21    | Data Center Virtualization for Cloud Computing    |
| 4     | 1      | 26-Mar-21    | Implementation Levels of Virtualization           |
| 5     | 1      | 29-Mar-21    | Virtualization Structures/Tools and Mechanisms    |
| 6     | 1      | 31-Mar-21    | Virtualization of CPU                             |
| 7     | 1      | 05-Apr-21    | Virtualization of Memory, I/O Devices             |
| 8     | 2      | 07-Apr-21    | System Models for Distributed and Cloud Computing |

|    |   |           |   |
|----|---|-----------|---|
| 9  | 2 | 08-Apr-21 | Software Environments for Distributed Systems and Clouds  |
| 10 | 2 | 09-Apr-21 | Cloud Computing and Service Models  |
| 11 | 2 | 12-Apr-21 | Public Cloud  |
| 12 | 2 | 15-Apr-21 | Private Cloud   |
| 13 | 2 | 16-Apr-21 | Hybrid Clouds   |
| 14 | 2 | 19-Apr-21 | Infrastructure as a Service (IaaS) Platform as a Service (PaaS)<br>Software as a Service (SaaS) |
| 15 | 2 | 21-Apr-21 | Different Service Providers   |
| 16 | 3 | 22-Apr-21 | Architectural Design of Compute and Storage Clouds  |
| 17 | 3 | 23-Apr-21 | Public Cloud Platforms: GAE   |
| 18 | 3 | 26-Apr-21 | AWS , Azure   |
| 19 | 3 | 28-Apr-21 | Emerging Cloud Software Environments – Eucalyptus   |
| 20 | 3 | 29-Apr-21 | Nimbus, Open Stack  |
| 21 | 3 | 30-Apr-21 | Extended Cloud Computing Services   |
| 22 | 3 | 03-May-21 | Resource Provisioning and Platform Deployment   |
| 23 | 3 | 05-May-21 | Virtual Machine Creation and Management.  |
| 24 | 4 | 06-May-21 | Parallel Computing and Programming Paradigms - Map Reduce                                       |
| 25 | 4 | 07-May-21 | Twister, Iterative Map Reduce   |
| 26 | 4 | 10-May-21 | Hadoop Library from Apache, Pig Latin High Level Languages                                      |
| 27 | 4 | 12-May-21 | Mapping Applications to Parallel and Distributed Systems  |
| 28 | 4 | 13-May-21 | Programming the Google App Engine   |
| 29 | 4 | 14-May-21 | Google File System (GFS), Big Table   |
| 30 | 4 | 17-May-21 | Google's NOSQL System   |
| 31 | 5 | 19-May-21 | Security Overview, Cloud Security Challenges  |
| 32 | 5 | 20-May-21 | Security as a Service, Security Governance  |

|    |   |           |   |
|----|---|-----------|---|
| 33 | 5 | 21-May-21 | Risk Management, Security Monitoring  |
| 34 | 5 | 24-May-21 | Security Architecture Design  |
| 35 | 5 | 26-May-21 | Virtual Machine Security  |
| 36 | 6 | 27-May-21 | Email Communications, Collaborating on To-Do Lists                                      |
| 37 | 6 | 28-May-21 | Contact Lists, Cloud Computing for the Community  |
| 38 | 6 | 31-May-21 | Collaborating on Calendars, Schedules and Task Management                               |
| 39 | 6 | 02-Jun-21 | Exploring Online Scheduling Applications, Exploring Online Planning and Task Management |
| 40 | 6 | 03-Jun-21 | Collaborating on Event Management, Project Management                                   |
| 41 | 6 | 04-Jun-21 | Word Processing – Databases   |

## ASSIGNMENTS

### Assignment 1: Date of Submission: 26-Apr-2021

Perform a comparative study on the following Public Cloud Platforms: GAE, AWS, Azure, IBM Cloud.

Perform a comparative study on the Cloud Software Environments: Eucalyptus, Nimbus, Open Stack and Aneka

### Assignment 2: Date of Submission: 17-May-2021

Identify the best practices for Cloud Security. Also list out how security is being ensured by public cloud platforms like AWS, GAE and Azure.

Prepare a case study on any one popular application using cloud service.

# **IT 492: Project**

**COURSE INFORMATION SHEET  
IT492 - PROJECT**

|   |   |
|---|---|
| PROGRAMME: Information Technology               | DEGREE: B.Tech                            |
| COURSE: Project                                 | SEMESTER: S8 CREDITS: 6                   |
| COURSE CODE: IT492 REGULATION:<br>2016          | COURSE TYPE: Core                         |
| COURSEAREA/DOMAIN: Engineering<br>(AllBranches) | CONTACT HOURS: 18(Practical) Hours / Week |
| CORRESPONDING LAB COURSE CODE (IF<br>ANY):NA    | LAB COURSE NAME:NA                        |

### SYLLABUS:

| PHASE              | DETAILS   | HOURS         |
|--------------------|---|---------------|
| Course Plan        | <p>In depth study of the topic assigned in the light of the preliminary report prepared in the seventh semester</p> <p>Review and finalization of the approach to the problem relating to the assigned topic.</p> <p>Preparing a detailed action plan for conducting the investigation, including team work.</p> <p>Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed.</p> <p>Final development of product/process, testing, results, conclusions and future directions.</p> <p>Preparing a paper for Conference presentation/Publication in Journals, if possible.</p> <p>Preparing a report in the standard format for being evaluated by the dept. assessment board.</p> <p>Final project presentation and viva voce by the assessment board including external expert.</p> | 18 (10 Weeks) |
| Evaluation         | <p><b>Maximum Marks : 100</b></p> <p>(i) Two progress assessments      20% by the faculty supervisor(s)</p> <p>(ii) Final project report              30% by the assessment board</p> <p>(iii) Project presentation and viva voce      50% by the assessment board</p>  | 1 week        |
| <b>TOTAL HOURS</b> |   | 216           |



**COURSE PRE-REQUISITES: NIL****COURSE OBJECTIVES:**

|   |  |
|---|--|
| 1 | To apply engineering knowledge in practical problem solving.                     |
| 2 | To foster innovation in design of products, processes or systems                 |
| 3 | To develop creative thinking in finding viable solutions to engineering problems |

**COURSE OUTCOMES:**

| Ref. No. | DESCRIPTION  | Blooms Taxonomy Level |
|----------|--|-----------------------|
| IT451.1  | The students will be able to think innovatively on the development of components, products, processes or | Analyze (Level4)      |
| IT451.   | The student will be able to apply knowledge gained in solving real life engineering problems.            | Analyze & Create      |

**CO-PO AND CO-PSO MAPPING**

|         | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
|---------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| IT451.1 | 3    |      | 3    |      | 3    | 2    | 2    | -    | 3    | 3    | 3    | -    | 2     | 1     | 3     |
| IT451.2 | 3    | 3    | 3    | 3    | 3    | -    | -    | -    | 3    | 3    | 3    | -    | 2     |       | 3     |



## JUSTIFICATIONS FOR CO-PO MAPPING

| MAPPING      | LOW/MEDIUM/HIGH | JUSTIFICATION   |
|--------------|-----------------|---|
| IT451.1-PO1  | H               | Students will apply the engineering knowledge to analyze a current topic of professional interest in the Information Technology field.  |
| IT451.1-PO3  | H               | Students will design and develop solutions for complex engineering problems by developing innovative components, products, processes and technology.  |
| IT451.1-PO5  | H               | Students shall learn the use of tools for innovation & creative thinking and modern modeling tools etc. for innovation and development of components, products and processes.                                     |
| IT451.1-PO6  | M               | Students shall also consider societal aspects like health, safety, legal and cultural in addition to functional aspects while innovating and developing components, products and processes.                       |
| IT451.1-PO7  | M               | Students shall also consider environmental issues and the need for sustainable development while innovating and developing components, products and processes.  |
| IT451.1-PO9  | H               | Students shall develop individual skills as well as team & leadership skills while working in student groups.   |
| IT451.1-PO10 | H               | Students shall develop communication skills while presenting seminar before an audience.  |
| IT451.1-PO11 | H               | Students shall develop project management skills while working in groups and managing the development of components, products and processes.  |
| IT451.1-PS01 | M               | Students shall also apply IT specific skills while developing components, products and processes.   |
| IT451.1-PS02 | L               | Students shall develop software prototypes to prove their design as part of developing innovative products and solutions, though the full software development life cycle is not intended as part of this course. |
| IT451.1-PS03 | H               | Students shall also develop professional skills like research and entrepreneurship skills while working as a team to develop innovative products and solutions.   |
| IT451.2-PO1  | H               | Students will apply the engineering knowledge while analyzing the problem requirements and arriving at workable design solutions.   |

|              |   |   |
|--------------|---|---|
| IT451.2-P02  | H | Students shall develop strong problem analysis skills while identifying and analyzing problems and arriving at innovative solutions for problems.                                 |
| IT451.2-P03  | H | Students shall design and develop innovative solutions after identifying and analyzing problems.  |
| IT451.2-P04  | H | Students shall conduct user surveys & research and analyze complex data to arrive at conclusions as part of analyzing complex engineering problems.                               |
| IT451.2-P05  | H | Students shall use modern tools for problem identification and analysis.  |
| IT451.2-P09  | H | Students shall develop individual skills as well as team & leadership skills while working in student groups.   |
| IT451.2-P010 | H | Students shall develop communication skills while working in student groups.  |
| IT451.2-P011 | H | Students shall develop project management skills while working in groups and managing the development of components, products and processes.                                      |
| IT451.2-PS01 | M | Students shall also apply IT specific skills while analyzing problems and arriving at workable design solutions.  |
| IT451.2-PS03 | H | Students shall also develop professional skills like research and entrepreneurship skills while working as a team to analyze problems and to arrive at workable design solutions. |

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

|  |  |  |
|--|--|--|
| <input type="checkbox"/> CHALK & TALK√     | <input type="checkbox"/> STUD. ASSIGNMENT√ | <input type="checkbox"/> WEB RESOURCES√        |
| <input type="checkbox"/> LCD/SMART BOARDS√ | <input type="checkbox"/> STUD. SEMINARS    | <input type="checkbox"/> DISCUSSIONS/ DEBATES√ |

**ASSESSMENT METHODOLOGIES-DIRECT:**

|   |   |  |  |
|---|---|--|--|
| <input type="checkbox"/> ASSIGNMENTS          | <input type="checkbox"/> STUD. PRESENTATIONS√ | <input type="checkbox"/> TESTS/MODEL EXAMS | <input type="checkbox"/> UNIV. EXAMINATION |
| <input type="checkbox"/> STUD. LAB PRACTICES√ | <input type="checkbox"/> STUD. VIVA√          | <input type="checkbox"/> PROJECT/SEMINAR   | <input type="checkbox"/> CERTIFICATIONS√   |

|   |                                   |           |  |
|---|-----------------------------------|-----------|--|
|   |                                   | REPORTS ✓ |  |
| <input type="checkbox"/> ADD-ON COURSES | <input type="checkbox"/> OTHERS ✓ |           |  |

**ASSESSMENT METHODOLOGIES-INDIRECT:**

|  |   |
|--|---|
| <input type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE) ✓ | <input type="checkbox"/> STUDENT FEEDBACK ON FACULTY (ONCE) ✓ |
| <input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXPERTS ✓      | <input type="checkbox"/> OTHERS                               |

**Prepared by**

**Approved by**

**Abey Abraham**

**Dr.Neeba E A  
(HOD)**

**IT 492 PROJECT SCHEDULE - JANUARY - APRIL 2020**

| <b>Sl. No.</b> | <b>Period</b> | <b>Activity</b>  |
|----------------|---------------|--|
| 1              | WEEK 1        | Finalization of software and hardware requirements                   |
| 2              | WEEK 3        | 30% of Progress evaluation by guide+ panel members                   |
| 3              | WEEK 4        | 30% of Progress evaluation by guide+ panel members                   |
| 4              | WEEK 5        | Preparation of Conferences/Journal Papers-weekly evaluation by guide |
| 5              | WEEK 6        | Weekly evaluation by guide   |
| 6              | WEEK 9        | 70% of Progress evaluation by guide+ panel members                   |
| 7              | WEEK 11       | Weekly evaluation by guide   |
| 8              | WEEK 12       | Final Internal Evaluation  |

|   |         |                   |
|---|---------|-------------------|
| 9 | WEEK 13 | Report Submission |
|---|---------|-------------------|