## 1.1.2 Details of Courses where syllabus revision was carried out

## B.Tech - Artificial Intelligence and Data Science

## R-17 Curriculum

| Course Code | Course Name | % of Change |
|---|---|---|
| 17CSC14 | Cloud Computing | 100 |
| 17AIC11 | Information Retrieval Techniques | 100 |
| 17AIC12 | Design thinking | 100 |
| | Average | 100 |

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| SEMESTER: VII | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | PRERQUISITE | CONTACT PERIODS | L | T | P | C |
| **THEORY** | | | | | | | | | |
| 1. | 17CSC14 | Cloud Computing | PC | - | 3 | 3 | 0 | 0 | 3 |
| 2. | 17AIC11 | Information Retrieval Techniques | PC | - | 3 | 3 | 0 | 0 | 3 |
| 3. | 17AIC12 | Design thinking | PC | - | 3 | 3 | 0 | 0 | 3 |
| 4. | E6 | Elective (PSE) | PSE | - | 3 | 3 | 0 | 0 | 3 |
| 5. | E7 | Elective (OE) | OE | - | 3 | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | | | | |
| 6. | 17AID01 | Project Work - I | EEC | - | 8 | 0 | 0 | 8 | 4 |
| | | | | **TOTAL** | **23** | **15** | **0** | **8** | **19** |

| SEMESTER: VIII | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | PRERQUISITE | CONTACT PERIODS | L | T | P | C |
| **THEORY** | | | | | | | | | |
| 1. | E8 | Elective (OE) | OE | - | 3 | 3 | 0 | 0 | 3 |
| 2. | E9 | Elective (PSE) | PSE | - | 3 | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | | | | |
| 3. | 17AID02 | Project Work-II | EEC | - | 16 | 0 | 0 | 16 | 8 |
| | | | | **TOTAL** | **22** | **6** | **0** | **16** | **14** |

| 17CSC14   CLOUD COMPUTING | | | | | |
|---|---|---|---|---|---|
| | | | L | T | P | C |
| | | | 3 | 0 | 0 | 3 |

| PREREQUISITE : NIL | QUESTION PATTERN: TYPE – 1 |
|---|---|

**COURSE OBJECTIVES AND OUTCOMES:**

| Course Objectives | | Course Outcomes | | Related Program outcomes |
|---|---|---|---|---|
| 1.0 | To learn the basic concepts of the cloud. | 1.1 | The students will be able to recall and describe cloud Platform and Technology. | a,j,l |
| 2.0 | To be familiar with the architecture and virtualization of cloud. | 2.1 | The students will be able to describe and Implement Virtualization Technologies. | a,e,j,l |
| 3.0 | To be familiar with the architecture and virtualization of cloud. | 3.1 | The students will be able to develop and manage cloud applications using Aneka. | a,b,c,e,j,l |
| 4.0 | To explore the concepts of Map Reduce Programming. | 4.1 | The students will be able to create a Hadoop Environment and Generate a Map- Reduce Programming. | a,b,c,e,j,l |
| 5.0 | To design intelligent Cloud services and Applications. | 5.1 | The students will be able to design Web Based Applications for various Corporate. | a,b,c,d,e,i,j,k,l |

| UNIT I - INTRODUCTION | (9) |
|---|---|

Introduction: Cloud computing at a Glance – Historical Development – Building Cloud Computing Environments – Computing Platform and Technologies – Principles of Parallel and Distributed Computing: Elements of parallel Computing – Distributed Computing –Technologies of Distributed Computing.

| UNIT II - VIRTUALIZATION AND CLOUD COMPUTING ARCHITECTURE | (9) |
|---|---|

Virtualization: Introduction – Characteristics of Virtualized Environments – Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization – Technology Examples – Cloud Computing Architecture: Cloud reference model – Types of the Clouds – Open Challenges.

| UNIT III - HADOOP AND MAP REDUCE | (9) |
|---|---|

Apache Hadoop – Hadoop Map Reduce – Hadoop Distributed File System- Hadoop I/O - Developing a Map Reduce Application - Map Reduce Types and Formats - Map Reduce Features– Hadoop Cluster Setup – Administering Hadoop.

| UNIT IV – SECURITY IN THE CLOUD | (9) |
|---|---|

Basic Terms and Concepts – Threat Agents – Cloud Security Threats – Cloud Security Mechanism: Encryption, Hashing, Digital Signature, Public Key Infrastructure, Identity and Access Management, Single Sign-on, Cloud Based Security Groups, Hardened Virtual Server Images.

| UNIT V - CLOUD PLATFORMS AND APPLICATIONS | (9) |
|---|---|

Cloud Platforms in Industry: Amazon Web Services – Google AppEngine – Microsoft Azure – Cloud Application: Scientific Applications – Business and consumer Applications – Case Study – Cloud Deployment Tools: Eucalyptus, Open Nebula.

**TOTAL (L: 45) = 45 PERIODS**

| |
|---|
| **TEXT BOOK:** |
| 1. Rajkumar Buyya, Christian Vecchiola and Thamari Selvi S, "Mastering in Cloud Computing", McGraw Hill Education (India) Private Limited, 2013.<br>2. Thomas Erl, Zaigham Mahood, Ricardo Puttini, "Cloud Computing, Concept, Technology and Architecture", Prentice Hall, 2013. |
| **REFERENCES:** |
| 1. Anthony T Velte, "Cloud Computing: A Practical Approach", Tata McGraw Hill, 2009.<br>2. Halper Fern, Kaufman Marcia, Bloor Robin, Hurwit Judith, "Cloud Computing for Dummies", Wiley India, 2009.<br>3. RajkumarBuyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing Principles Books and Paradigms", Wiley, 2014.<br>4. Michael Miller , "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing ,2009<br>5. Dr. Kumar Saurabh, "Cloud Computing – Unleashing Next Gen Infrastructure to Application", Willey, 2014. |

| 17AIC11  INFORMATION RETRIEVAL TECHNIQUES | | | | | | |
|---|---|---|---|---|---|---|
| | | | | L | T | P | C |
| | | | | 3 | 0 | 0 | 3 |

| PREREQUISITE : 17CSC07 | QUESTION PATTERN: TYPE – 1 |
|---|---|

**COURSE OBJECTIVES AND OUTCOMES:**

| Course Objectives | | Course Outcomes | | Related Program outcomes |
|---|---|---|---|---|
| 1.0 | To learn the basics of information retrieval system. | 1.1 | The students will be able build an information retrieval system using the available tools. | **a,b,c,d,e,l** |
| 2.0 | To perceive knowledge on information retrieval components. | 2.1 | The students will be to identify and design the various components of an Information Retrieval system. | **a,b,c,d,e,i,l** |
| 3.0 | To gain exposure about text operations and user interface. | 3.1 | The students will be able to apply machine learning techniques to text classification and clustering which is used for efficient information retrieval. | **a,b,c,d,e,i,l** |
| 4.0 | To explore different multimedia information retrieval techniques. | 4.1 | The students will be able to analyze the web content structure. | **a,b,c,d,e,i,l** |
| 5.0 | To design search engines and interpret its applications. | 5.1 | The students will be able to design an efficient search engine. | **a,b,c,d,e,f,g,h,i,j,k,l** |

| UNIT I - INTRODUCTION | (9) |
|---|---|

Basic Concepts – Retrieval Process – Modeling – Classic Information Retrieval – Set Theoretic, Algebraic and Probabilistic Models – Structured Text Retrieval Models – Retrieval Evaluation –Word Sense Disambiguation

| UNIT II - QUERYING | (9) |
|---|---|

Languages – Key Word based Querying – Pattern Matching – Structural Queries – Query Operations –User Relevance Feedback – Local and Global Analysis – Text and Multimedia languages

| UNIT III - TEXT OPERATIONS AND USER INTERFACE | (9) |
|---|---|

Document Pre-processing – Clustering – Text Compression - Indexing and Searching – Inverted files –Boolean Queries – Sequential searching – Pattern matching – User Interface and Visualization – Human Computer Interaction – Access Process – Starting Points –Query Specification - Context – User relevance Judgment – Interface for Search.

| UNIT IV - MULTIMEDIA INFORMATION RETRIEVAL | (9) |
|---|---|

Data Models – Query Languages – Spatial Access Models – Generic Approach – One Dimensional Time Series – Two Dimensional Color Images – Feature Extraction

| UNIT V - APPLICATIONS | (9) |
|---|---|

Searching the Web – Challenges – Characterizing the Web – Search Engines – Browsing – Meta-searchers– Online IR systems – Online Public Access Catalogs – Digital Libraries – Architectural Issues –Document Models, Representations and Access – Prototypes, Projects, Interfaces and Standards.

| | **TOTAL (L: 45) = 45 PERIODS** |
|---|---|

**TEXT BOOK:**

1. R. Baeza-Yates and B. Ribeiro Neto, "Modern Information Retrieval: The Concepts and Technology behind Search", 2nd ed., Addison Wesley, 2011.

**REFERENCES:**

1. Christopher D. Manning, Prabhakar Raghavan and Hinrich Schutze, "Introduction to Information Retrieval", Cambridge University Press, 2008.
2. David A.Grossman and Ophir Frieder,"Information Retrieval – Algorithms and Heuristics", 2nd ed., Springer International Edition, 2009.

| 17AIC12 - DESIGN THINKING | | | | |
|---|---|---|---|---|
| | L | T | P | C |
| | 3 | 0 | 0 | 3 |

| PRE REQUISITE : NIL | QUESTION PATTERN: TYPE – 1 |
|---|---|

**COURSE OBJECTIVES AND OUTCOMES:**

| | Course Objectives | | Course Outcomes | Related Program outcomes |
|---|---|---|---|---|
| **1.0** | To recognize the importance of design thinking and its different phases | **1.1** | The students will be able to understand the importance of design thinking and its different phases. | **a,b,c,d,k,l** |
| **2.0** | To understand the empathize phase and the scope of the problem. | **2.1** | The students will be able to empathize with use situation and be able to define clear problem statement | **a,b,c,d,e,j,k,l,** |
| **3.0** | To make students understand the importance of ideate and prototyping phase | **3.1** | The students will be able to use the different ideation methods and come with different feasible and viable ideas for solving the problem statements. | **a,b,c,d,e,j,k,l** |
| **4.0** | To understand rapid prototypes and importance of story boarding in design thinking | **4.1** | The students will be able to create the prototype and storyboarding for clear understanding of the problem statement. | **a,b,c,d,e,l,j,k,l** |
| **5.0** | To provide the importance of the evolve phase and agile methodology | **5.1** | The students will be able to plan the implementation of the evolved activity system. | **a,b,c,d,j,k,l** |

| UNIT I – INTRODUCTION TO DESIGN THINKING | (9) |
|---|---|
| Introduction – Need for design thinking – Design and Business – The Design Process — Phases in design thinking process – Five stage mode- Design Brief –Visualization – Four Questions, Ten Tools – Explore – STEEP Analysis – Strategic Priorities – Activity System – Stakeholder Mapping – Opportunity Framing. | |
| **UNIT II - EMPATHIZE PHASE** | **(9)** |
| Visualization – Mind Mapping – Empathize – Empathize with the users - Steps in empathize phase – Developing empathy towards people –Observations – Need Finding – User Personas. | |
| **UNIT-III - IDEATE PHASE AND PROTOTYPE PHASE** | **(9)** |
| Ideation – Need for ideation – Uses of ideation – Ideation Methods- Brainstorming-Rules for brainstorming -Ideation games - Six Thinking Hats –Doodling – Use of doodling in expressing creative ideas- Idea refinement. Prototyping- Guidelines for prototyping –Types of prototyping- Importance of prototyping in design thinking. | |
| **UNIT IV – ENGAGE PHASE** | **(9)** |
| Assumption Testing-Rapid Prototyping – Engage – Story telling – Characteristics of good stories – Reaching users through stories-Storyboarding-Characteristics of good stories-Value proposition- Guidelines to write value proposition. | |
| **UNIT V – EVOLVE PHASE** | **(9)** |
| Customer Co-Creation Learning Launch – Leading Growth and Innovation – Evolve– Concept Synthesis – Strategic Requirements – Evolved Activity Systems– Quick Wins Agile Methodology – Complementing agile with design thinking. | |
| | **TOTAL= 45 PERIODS** |

| TEXT BOOK: |
| :--- |
| 1. Lee Chong Hwa "Design Thinking The Guidebook", Design Thinking Master Trainers of Bhutan, 1st Edition, 2017. |
| 2. Eli Woolery, Design Thinking Handbook, Invision, 2019. |
| 3. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires,1stEdition, HarperCollins, 2009. |
| **REFERENCES:** |
| 1. Lee Chong Hwa, "Design Thinking The Guidebook", Design Thinking Master Trainers of Bhutan, 2017. |
| 2. Jeanne Liedtka, Tim Ogilvie, and Rachel Brozenske, "The Designing for Growth FieldBook: A Step-by-Step Project Guide", Columbia University Press, 2014. |

| 17AID01 PROJECT WORK - I | | | | | |
|---|---|---|---|---|---|
| | | L | T | P | C |
| | | 0 | 0 | 8 | 4 |

**PRE REQUISITE : NIL**

**COURSE OBJECTIVES AND OUTCOMES:**

| | Course Objectives | | Course Outcomes | Related Program Outcomes |
|---|---|---|---|---|
| **1.0** | To identify the problem in the specific domain or enhance the existing product to the next level. | **1.1** | The students will be able to demonstrate a sound technical knowledge of their selected project topic. | **a, b, l** |
| **2.0** | To learn how to formulate solution for the problem. | **2.1** | The students will be able to undertake problem formulation and solution legally for the sustainable development. | **c, d, e, g, h** |
| **3.0** | To be trained to function effectively as an individual and a member in diverse teams. | **3.1** | The students will be able to develop an attitude of team work and independent working on real time problems. | **h, i** |
| **4.0** | To interpret and justify the experimental results | **4.1** | The students will be able to design engineering solutions to complex problems based on engineering and management principles. | **c, d, e, k** |
| **5.0** | To develop an effective communication and be trained to write dissertation report | **5.1** | The students will be able to communicate with engineers and the community at large in written and oral forms. | **f, j** |

**DESCRIPTION**

Project work may be allotted to a single student or to a group of students not exceeding 4 per group. The title of project work is approved by head of the department under the guidance of a faculty member and student(s) shall prepare a comprehensive project report after completing the work to the satisfaction of the guide. The Head of the department shall constitute a review committee for project work. There shall be three reviews during the semester by the committee to review the progress. Student(s) shall make presentation on the progress made by him / her / them before the committee and evaluation is done as per Rules and Regulations.

**TOTAL (P:120) = 120 PERIODS**

| 17AID02 PROJECT WORK II | | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 16 | 8 |

**PRE REQUISITE : NIL**

**COURSE OBJECTIVES AND OUTCOMES:**

| | Course Objectives | | Course Outcomes | Related Program Outcomes |
|---|---|---|---|---|
| **1.0** | To identify the problem in the specific domain or enhance the existing product to the next level. | **1.1** | The students will be able to demonstrate a sound technical knowledge of their selected project topic. | **a, b, l** |
| **2.0** | To learn how to formulate solution for the problem. | **2.1** | The students will be able to undertake problem formulation and solution legally for the sustainable development. | **c, d, e, g, h** |
| **3.0** | To be trained to function effectively as an individual and a member in diverse teams. | **3.1** | The students will be able to develop an attitude of team work and independent working on real time problems. | **h, i** |
| **4.0** | To interpret and justify the experimental results | **4.1** | The students will be able to design engineering solutions to complex problems based on engineering and management principles. | **c, d, e, k** |
| **5.0** | To develop an effective communication and be trained to write dissertation report | **5.1** | The students will be able to communicate with engineers and the community at large in written and oral forms. | **f, j** |

**DESCRIPTION**

Project work may be allotted to a single student or to a group of students not exceeding 4 per group. The title of project work (same title as in project work-I if the same project is continued in project work-II or the title will be selected based on different project) is approved by head of the department under the guidance of a faculty member and student(s) shall prepare a comprehensive project report after completing the work to the satisfaction of the guide. The Head of the department shall constitute a review committee for project work. There shall be three reviews during the semester by the committee to review the progress. Student(s) shall make presentation on the progress made by him / her / them before the committee and evaluation is done as per Rules and Regulations.

**TOTAL (P:240) = 240 PERIODS**