

**1.2.2(B) Structure of the program clearly indicating courses, credits/Electives and Minutes of relevant Academic Council/BOS meetings highlighting the relevant documents to this metric**

**Department of CSE-AI&DS**

**INDEX**

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| 1            | AR21 Curriculum                    | 2              |
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| 3            | 2 <sup>nd</sup> BOS Minutes        | 12             |
| 4            | 3 <sup>rd</sup> BoS Minutes        | 15             |

**Department of CSE-AI&DS**

Minimum Credits to be earned: 160 (for Regular Students)  
123 (for Lateral Entry Students)

| S.no.                  | Course Code         | Course Name   | POs            | L            | T | P            | C            |
|------------------------|---------------------|---|----------------|--------------|---|--------------|--------------|
| <b>First Semester</b>  |                     |   |                |              |   |              |              |
| 1                      | 21HSX01             | Communicative English   | 10, 12         | 2            | - | -            | 2            |
| 2                      | 21MAX01             | Engineering Mathematics I                                     | 1              | 3            | - | -            | 3            |
| 3                      | 21PYX01<br>21CYX01  | Engineering Physics /<br>Engineering Chemistry                | 1 / 1          | 3/3          | - | -            | 3/3          |
| 4                      | 21BEX01<br>21BEX06  | Basics of Engineering /<br>IT Workshop                        | 1,12/1,12      | 3/-          | - | -/ 3         | 3/1.5        |
| 5                      | 21BEX02             | Problem Solving and Programming Skills                        | 1, 12          | 3            | - | -            | 3            |
| 6                      | 21BEX03             | Problem Solving and Programming Skills Lab                    | 4              | -            | - | 3            | 1.5          |
| 7                      | 21BEX04/<br>21BEX05 | Engineering Drawing /<br>Engineering Workshop                 | 1,5,10/1,9,10  | -            | - | 3/3          | 1.5/1.5      |
| 8                      | 21PYX02/<br>21CYX02 | Engineering Physics Lab /Engineering Chemistry Lab            | 4/4            | -            | - | 3/3          | 1.5          |
| 9                      | 21HSX02/-           | Communicative English Lab/-                                   | 10,12          | -            | - | 3/-          | 1.5/-        |
|                        |                     |   | <b>Total</b>   | <b>14/11</b> | - | <b>12/12</b> | <b>20/17</b> |
| <b>Second Semester</b> |                     |   |                |              |   |              |              |
| 1                      |                     | Language Elective   | 10,12          | 2            | - | -            | 2            |
| 2                      | 21MAX02             | Engineering Mathematics II                                    | 1              | 3            | - | -            | 3            |
| 3                      | 21CYX01/<br>21PYX01 | Engineering Chemistry /Engineering Physics                    | 1/1            | 3/3          | - | -            | 3/3          |
| 4                      | 21BEX01/<br>21BEX06 | Basics of Engineering/ IT Workshop                            | 1,12/1,12      | -/3          | - | 3/-          | 1.5/3        |
| 5                      | 21BEX07             | Python Programming  | 1,12           | 3            | - | -            | 3            |
| 6                      | 21BEX08             | Python Programming Lab  | 4              | -            | - | 3            | 1.5          |
| 7                      | 21BEX05/<br>21BEX04 | Engineering Workshop / Engineering Drawing                    | 1,9,10/1,5,10  | -            | - | 3/3          | 1.5/1.5      |
| 8                      | 21CYX02/<br>21PYX02 | Engineering Chemistry Lab/Engineering Physics Lab             | 4/4            | -            | - | 3/3          | 1.5/1.5      |
| 9                      | -/21HSX02           | -/Communicative English Lab                                   | -/10,12        | -            | - | -/3          | -/1.5        |
|                        |                     |   | <b>Total</b>   | <b>11/14</b> | - | <b>12/12</b> | <b>17/20</b> |
| <b>Third Semester</b>  |                     |   |                |              |   |              |              |
| 1                      | 21MA304             | Probability and Statistics using Python                       | 1,4, 12        | 3            | - | 2            | 4            |
| 2                      | 21ML302             | Artificial Intelligence                                       | 1,2,3          | 3            | - | -            | 3            |
| 3                      | 21CS303             | Data Structures   | 1,2,12         | 3            | - | -            | 3            |
| 4                      | 21CS304             | Digital Logic Design  | 1, 4           | 3            | - | 2            | 4            |
| 5                      | 21DS305             | Mathematical Foundation for Computer Science and Data Science | 1,12,PS01      | 3            | - | -            | 3            |
| 6                      | 21CS306             | Object Oriented Programming with JAVA                         | 1,2,3          | 3            | - | -            | 3            |
| 7                      | 21CS307             | Data Structures Lab   | 2,3,4,5        | -            | - | 3            | 1.5          |
| 8                      | 21CS308             | JAVA Lab  | 2,3,4,5        | -            | - | 3            | 1.5          |
| 9                      | 21BEA01             | Environmental Studies   | 1,7            | -            | - | -            | -            |
| 10                     | 21ESX01             | Employability Skills I  | 1,2,5,8,10, 12 | 0            | - | 2            | -            |
| 11                     | 21HSX11             | CC & EC Activities I  | 6,7, 9,10      | -            | - | 1            | -            |
|                        |                     |   | <b>Total</b>   | <b>18</b>    | - | <b>13</b>    | <b>23</b>    |

**Fourth Semester**

|   |         |  |                  |           |   |           |           |
|---|---------|--|------------------|-----------|---|-----------|-----------|
| 1 | 21IT304 | Database Management Systems            | 1,4,12           | 3         | - | -         | 3         |
| 2 | 21IT403 | Operating Systems                      | 1,12             | 3         | - | -         | 3         |
| 3 | 21CS403 | Computer Organization and Architecture | 1,12             | 3         | - | -         | 3         |
| 4 | 21CS404 | Design and Analysis of Algorithms      | 2,3              | 3         | - | 2         | 4         |
| 5 | 21DS405 | Foundations of Data Science            | 2, 3, PS01, PS02 | 3         | - | -         | 3         |
| 6 | 21IT308 | Database Management Systems Lab        | 4                | -         | - | 3         | 1.5       |
| 7 | 21DS407 | Foundations of Data Science Lab        | 4,5,8            | -         | - | 3         | 1.5       |
| 8 | 21ESX01 | Employability Skills I                 | 1,2,5,8,10,12    | 0         | - | 2         | 2         |
| 9 | 21HSX11 | CC & EC Activities I                   | 6,7,9,10         | -         | - | 1         | 1         |
|   |         |  | <b>Total</b>     | <b>15</b> | - | <b>11</b> | <b>22</b> |

**Fifth Semester**

|    |         |  |               |           |   |           |           |
|----|---------|--|---------------|-----------|---|-----------|-----------|
| 1  | 21IT405 | Web Technologies (Integrated)                          | 3,5,PS01      | 3         | - | 2         | 4         |
| 2  | 21DS502 | Deep Learning for Data Science                         | 1,2,4,5,12    | 3         | - | -         | 3         |
| 3  | 21DS503 | Data Analytics & Visualization Techniques (Integrated) | 1,4,PS01      | 3         | - | 2         | 4         |
| 4  | 21ML504 | Computer Networks                                      | 1, 2,3        | 3         | - | -         | 3         |
| 5  |         | Elective I (Professional Elective)                     |               | 3         | - | -         | 3         |
| 6  |         | Elective II (Open Elective I)                          |               | 3         | - | -         | 3         |
| 7  | 21DS507 | Deep Learning Lab                                      |               | -         | - | 3         | 1.5       |
| 8  | 21TPX01 | Term Paper   | 1,4,10,12     | -         | - | 3         | 1.5       |
| 9  | 21ESX02 | Employability Skills II                                | 1,2,5,8,10,12 | 0         | - | 2         | -         |
| 10 | 21HSX12 | CC & EC Activities II                                  | 6,7,9,10      | -         | - | 1         | -         |
| 11 | 21SIX01 | Summer Internship I                                    | 1,2,8,10,12   | -         | - | -         | 1         |
|    |         |  | <b>Total</b>  | <b>18</b> | - | <b>12</b> | <b>24</b> |

**Six Semester**

|    |          |   |                   |           |           |          |           |
|----|----------|---|-------------------|-----------|-----------|----------|-----------|
| 1  | 21DS601  | Optimization Techniques for ML          | 2,3,PS01,PS02     | 3         | -         | -        | 3         |
| 2  | 21ML602  | Automata Theory and Language Processors | 1,2,3             | 3         | -         | -        | 3         |
| 3  | 21CS603  | Software Engineering                    | 4,5,8,11, PS01    | 3         | -         | -        | 3         |
| 4  |          | Elective III (Professional Elective)    |                   | 3         | -         | 2        | 4         |
| 5  |          | Elective IV (Open Elective II)          |                   | 3         | -         | -        | 3         |
| 6  | 21DS606  | Optimization Techniques for ML Lab      | 4, 5              | -         | -         | 3        | 1.5       |
| 7  | 21MPX01  | Mini Project                            | 4, 5,08           | -         | -         | 3        | 1.5       |
| 8  | 21ESX02  | Employability Skills II                 | All Pos & PSOs    | 0         | -         | 2        | 2         |
| 9  | 21HSX12  | CC & EC Activities II                   | 1,2,3,5,6,8,10,12 | -         | -         | 1        | 1         |
| 10 | 21ATX01  | Environmental Studies                   | 6,7,9,10          | -         | -         | -        | -         |
| 11 | 21ATX02  | Professional Ethics and Human Values    | 1,7               | -         | -         | -        | -         |
| 12 | 21ATX--- | Audit Course                            | ----              | -         | -         | -        | -         |
|    |          |   | <b>Total</b>      | <b>12</b> | <b>15</b> | <b>8</b> | <b>22</b> |

**Seventh Semester**

|   |         |                                     |               |          |   |           |           |
|---|---------|-------------------------------------|---------------|----------|---|-----------|-----------|
| 1 |         | Elective V (Professional Elective)  |               | 3        | - | -         | 3         |
| 2 |         | Elective VI (Professional Elective) |               | 3        | - | -         | 3         |
| 3 |         | Elective VII (Open Elective III)    |               | 3        | - | -         | 3         |
| 4 | 21SIX02 | Summer Internship II                | 1,2,5,6,10,12 | -        | - | -         | 1         |
| 5 | 21PWX01 | Project Work                        | All POs& PSOs | -        | - | 16        | 8         |
|   |         |                                     | <b>Total</b>  | <b>9</b> | - | <b>16</b> | <b>18</b> |

**Eighth Semester**

|   |         |                                       |                         |          |   |   |           |
|---|---------|---------------------------------------|-------------------------|----------|---|---|-----------|
| 1 |         | Elective VIII (Professional Elective) |                         | -        | - | - | 3         |
| 2 |         | Elective IX (Open Elective IV)        |                         | -        | - | - | 3         |
| 3 | 21FIX01 | Full Semester Internship (FSI)        | 1,2,5,8,9,10, PS01,PS02 | -        | - | - | 8         |
|   |         |                                       | <b>Total</b>            | <b>6</b> | - | - | <b>14</b> |

## List of Electives

## Language Electives

| No. | Course Code | Course                         | POs   | Contact Hours |   |   |   |
|-----|-------------|--------------------------------|-------|---------------|---|---|---|
|     |             |                                |       | L             | T | P | C |
| 1   | 21HSX03     | Advanced Communicative English | 10,12 | 2             | - | - | 2 |
| 2   | 21HSX04     | Communicative German           |       | 2             | - | - | 2 |
| 3   | 21HSX05     | Communicative French           |       | 2             | - | - | 2 |
| 4   | 21HSX06     | Communicative Japanese         |       | 2             | - | - | 2 |
| 5   | 21HSX07     | Communicative Spanish          |       | 2             | - | - | 2 |
| 6   | 21HSX08     | Communicative Korean           |       | 2             | - | - | 2 |
| 7   | 21HSX09     | Communicative Hindi            |       | 2             | - | - | 2 |

**Comment [A1]:** Approved in 3<sup>rd</sup> BOS

## Elective I

## **Career Path I, II, III**

|   |                |   |               |   |   |   |   |
|---|----------------|---|---------------|---|---|---|---|
| 1 | <b>21MLC11</b> | <b>Computer Vision &amp; Pattern Recognition</b>          | 1,3,PS01,PS02 | 3 | - | - | 3 |
| 2 | <b>21CSC21</b> | <b>Web Programming Languages (Full Stack Development)</b> | 1,2,7,12      | 3 | - | - | 3 |
| 3 | <b>21MLC31</b> | <b>Fundamentals of Cloud Computing</b>                    | 2,6,7,8       | 3 | - | - | 3 |

**Comment [A2]:** Approved in 3<sup>rd</sup> BOS

## **Elective II: Open Elective II**

| Elective A: Open Electives |         |  |         |   |   |   |   |
|----------------------------|---------|--|---------|---|---|---|---|
| 1                          | 21CE001 | Disaster Management  | 2, 7    | 3 | - | - | 3 |
| 2                          | 21EE001 | Electrical Installation and Safety Measures                          | 2,3,6,8 | 3 | - | - | 3 |
| 3                          | 21DS001 | Fundamentals of Data Science   | 1,2     | 3 | - | - | 3 |
| 4                          | 21ME001 | Fundamentals of Optimization Techniques                              | 1, 2    | 3 | - | - | 3 |
| 5                          | 21EC001 | Sensors for Engineering Applications                                 | 1, 2    | 3 | - | - | 3 |
| 6                          | 21CS001 | Fundamentals of Artificial Intelligence <b>(Except CSE &amp; IT)</b> | 1, 2, 3 | 3 | - | - | 3 |
| 7                          | 21ME002 | Fundamentals of Manufacturing  | 1, 5, 7 | 3 | - | - | 3 |

**Comment [A3]:** Approved  
in 3<sup>rd</sup> BOS

## Elective I

## **Career Path I, II, III**

|   |                |  |               |   |   |   |   |
|---|----------------|--|---------------|---|---|---|---|
| 1                                       | <b>21MLC12</b> | <b>Machine Learning for Business Intelligence</b>                      | 2,3,PSO1,PSO2 | 3 | - | 2 | 4 |
| 2                                       | <b>21CSC22</b> | <b>Web Application Developments Framework (Full Stack Development)</b> | 1, 3,4        | 3 | - | 2 | 4 |
| 3                                       | <b>21MLC32</b> | <b>Cloud Services using AWS</b>  |               | 3 | - | 2 | 4 |
| <b>Non-Career Path (Core Electives)</b> |                |  |               |   |   |   |   |
| 4                                       | 21CS007        | Cloud Computing Essentials   | 2,5,6,7,8     | 3 | - | 2 | 4 |
| 5                                       | 21CS008        | Cryptography and Network Security                                      | 3, 6,8        | 3 | - | 2 | 4 |

**Comment [A4]:** Approved in 3<sup>rd</sup> BOS

## Elective IV: Open Elective II

| Elective IV: Open Elective II |         |   |            |   |   |   |
|-------------------------------|---------|---|------------|---|---|---|
| 1                             | 21CE002 | Air Pollution and Environmental Impact Assessment | 6, 7, 12   |   |   |   |
| 2                             | 21EE002 | Renewable Energy Sources                          | 2, 7       | 3 | - | - |
| 3                             | 21ME002 | Principles of Entrepreneurship                    | 1, 11      | 3 | - | - |
| 4                             | 21EC002 | Electronics for Agriculture                       | 1, 2       | 3 | - | - |
| 5                             | 21CS002 | Fundamentals of Machine Learning                  | 2, 3       | 3 | - | - |
| 6                             | 21CH002 | Industrial Safety and Hazard Management           | 2, 6, 7, 8 | 3 | - | - |
| 7                             | 21IT002 | Fundamentals of Cloud Computing                   | 1, 7       | 3 | - | - |
| 8                             | 21BS002 | Advanced Numerical Techniques                     | 1, 2       | 3 | - | - |
| 9                             | 21BS003 | Functional Materials and Applications             | 1, 2       | 3 | - | - |

**Comment [A5]:** Approved  
in 3<sup>rd</sup> BOS

## Elective V

### Career Path I, II, III

| Career Path I, II, III |         |  |               |   |   |   |   |
|------------------------|---------|--|---------------|---|---|---|---|
| 1                      | 21MLC13 | Conversational AI                                  | 1,2,4,12,PS01 | 3 | - | - | 3 |
| 2                      | 21CSC23 | Web Application Databases (Full Stack Development) | 2,3           | 3 | - | - | 3 |
| 3                      | 21MLC33 | Cloud Security Essentials                          | 2,3           | 3 | - | - | 3 |

**Non-Career Path (Core Electives)**

|   |         |                            |         |   |   |   |   |
|---|---------|----------------------------|---------|---|---|---|---|
| 4 | 21IT010 | Social Network Analysis    | 2, 4, 5 | 3 | - | - | 3 |
| 5 | 21ML001 | Human Computer Interaction | 2, 3    | 3 | - | - | 3 |
| 6 | 21CS012 | Wireless Adhoc Networks    | 2, 3    | 3 | - | - | 3 |
| 7 |         | MOOCs/Honors               |         | 3 | - | - | 3 |

**Comment [A6]:** Approved in 3<sup>rd</sup> BOS

**Elective VI**

|   |         |                                  |         |   |   |   |   |
|---|---------|----------------------------------|---------|---|---|---|---|
| 1 | 21DS002 | Data Visualization with Power BI | 2,3,5,6 | 3 | - | - | 3 |
| 2 | 21CS015 | Software Project Management      | 3,6     | 3 | - | - | 3 |
| 3 | 21ML003 | Reinforcement Learning           | 6,7     | 3 | - | - | 3 |
| 4 |         | MOOCs/Honors                     |         | 3 | - | - | 3 |

**Comment [A7]:** Approved in 3<sup>rd</sup> BOS

**Elective VII: Open Elective III**

|   |         |  |        |   |   |   |   |
|---|---------|--|--------|---|---|---|---|
| 1 | 21CE003 | Solid Waste Management                         | 2,3,12 | 3 | - | - | 3 |
| 2 | 21EE003 | Fundamentals of Electrical Vehicle Technology  | 2,3,12 | 3 | - | - | 3 |
| 3 | 21ME003 | Industrial Engineering and Management          | 1,11   | 3 | - | - | 3 |
| 4 | 21EC003 | Interfacing and Programming with Arduino       | 1,2    | 3 | - | - | 3 |
| 5 | 21CS003 | Data Science for Engineering Applications      | 2,3,4  | 3 | - | - | 3 |
| 6 | 21CH003 | Industrial Ecology for Sustainable Development | 2,6,7  | 3 | - | - | 3 |
| 7 | 21IT003 | Fundamentals of Mobile Computing               | 1,7    | 3 | - | - | 3 |
| 8 | 21BS004 | Advanced Materials of Renewable Energy         | 1,7    | 3 | - | - | 3 |
| 9 | 21BS005 | Applied Linear Algebra for Engineers           | 1,12   | 3 | - | - | 3 |

**Comment [A8]:** Approved in 3<sup>rd</sup> BOS

**Elective VIII: Professional Elective**

|   |         |                               |              |   |   |   |   |
|---|---------|-------------------------------|--------------|---|---|---|---|
| 1 | 21CS018 | Information Retrieval Systems | 1,2,3,4      | - | - | - | 3 |
| 2 | 21CS019 | Fundamentals of Devops        | 1,3, 5,8,10  | - | - | - | 3 |
| 3 | 21DS003 | Cyber Security                | 1,3,4,5,PS01 |   |   |   | 3 |
| 4 |         | MOOCs/Honors                  |              | - | - | - | 3 |

**Comment [A9]:** Approved in 3<sup>rd</sup> BOS

**Elective IX: Open Elective IV**

|   |         |   |           |   |   |   |   |
|---|---------|---|-----------|---|---|---|---|
| 1 | 21CE019 | Green Buildings                             | 2,3,4,5,7 | - | - | - | 3 |
| 2 | 21EE017 | Sustainable Energy                          | 1,2,12    | - | - | - | 3 |
| 3 | 21ME004 | Total Quality Management                    | 1,11      | - | - | - | 3 |
| 4 | 21EC011 | Communication Technologies                  | 1,2       | - | - | - | 3 |
| 5 | 21CS020 | Applications of Artificial Intelligence     | 2,3,6,7   | - | - | - | 3 |
| 6 | 21CH016 | Green Technologies                          | 1,6,7     | - | - | - | 3 |
| 7 | 21IT015 | Human Computer Interaction                  | 1,7       | - | - | - | 3 |
| 8 | 21BS006 | Handling of Industrial Waste and Wastewater | 1,7       | - | - | - | 3 |

**Comment [A10]:** Approved in 3<sup>rd</sup> BOS

**Audit Course**

|    |         |   |   |   |   |   |   |
|----|---------|---|---|---|---|---|---|
| 1  | 21AT001 | Communication Etiquette in Workplaces           | - | - | - | - | - |
| 2  | 21AT002 | Contemporary India: Economy, Policy and Society | - | - | - | - | - |
| 3  | 21AT003 | Design The Thinking                             | - | - | - | - | - |
| 4  | 21AT004 | Ethics and Integrity                            | - | - | - | - | - |
| 5  | 21AT005 | Indian Heritage and Culture                     | - | - | - | - | - |
| 6  | 21AT007 | Intellectual Property Rights and Patents        | - | - | - | - | - |
| 7  | 21AT008 | Introduction to Journalism                      | - | - | - | - | - |
| 8  | 21AT009 | Mass Media Communication                        | - | - | - | - | - |
| 9  | 21AT010 | Science, Technology and Development             | - | - | - | - | - |
| 10 | 21AT011 | Social Responsibility                           | - | - | - | - | - |
| 11 | 21AT012 | The Art of Photography and Film Making          | - | - | - | - | - |
| 12 | 21AT013 | Gender Equality for Sustainability              | - | - | - | - | - |
| 13 | 21AT014 | Women in Leadership                             | - | - | - | - | - |
| 14 | 21AT015 | Introduction to Research Methodology            | - | - | - | - | - |
| 15 | 21AT016 | Climate Change and Circular Economy             | - | - | - | - | - |

**B. Tech. (Honors)****Domain I (Data Engineering)**

|    |         |                          |       |   |   |   |   |
|----|---------|--------------------------|-------|---|---|---|---|
| 01 | 21CSH11 | Advanced Data Structures | 2,3,4 | 4 | - | - | 4 |
|----|---------|--------------------------|-------|---|---|---|---|

|  |         |  |              |   |   |   |   |
|--|---------|--|--------------|---|---|---|---|
| 02   | 21CSH12 | Advanced Databases                                       | 2,3,4        | 4 | - | - | 4 |
| 03   | 21CSH13 | Programming, Data Structures and Algorithms Using Python | 2,3,4,5      | 4 | - | - | 4 |
| 04   | 21CSH14 | Bioinformatics   | 2,3          | 4 | - | - | 4 |
| <b>Domain II (Modern Software Engineering)</b> |         |  |              |   |   |   |   |
| 01   | 21CSH21 | DevOps   | 1,3,5,8,10   | 4 | - | - | 4 |
| 02   | 21CSH22 | Design Patterns  | 2,3          | 4 | - | - | 4 |
| 03   | 21CSH23 | Advanced Software Engineering                            | 1,3,4, PSO1  | 4 | - | - | 4 |
| 04   | 21CSH24 | Robotic Process Automation                               | 3,5, 8, PSO2 | 4 | - | - | 4 |
| <b>Domain III (Security)</b>                   |         |  |              |   |   |   |   |
| 01   | 21CSH31 | Computer Systems Security                                | 1,2          | 4 | - | - | 4 |
| 02   | 21CSH32 | Python Programming for Security                          | 2,3,4        | 4 | - | - | 4 |
| 03   | 21CSH33 | Management of Information Security                       | 3,6,7        | 4 | - | - | 4 |
| 04   | 21CSH34 | Computer Forensics                                       | 2,3          | 4 | - | - | 4 |
| <b>Domain IV (User Interface Design)</b>       |         |  |              |   |   |   |   |
| 01   | 21CSH41 | Computer Graphics  | 1,2,3,4      | 4 | - | - | 4 |
| 02   | 21CSH42 | Multimedia Systems                                       | 3,4          | 4 | - | - | 4 |
| 03   | 21CSH43 | Human Computer Interaction                               | 2,3          | 4 | - | - | 4 |
| 04   | 21CSH44 | Mobile Programming                                       | 3,4          | 4 | - | - | 4 |

**B. Tech. (Minors)**
**Energy Science & Technology**

|    |         |   |              |   |   |   |   |
|----|---------|---|--------------|---|---|---|---|
| 01 | 21CHM11 | Foundation of Energy Science and Technology | 1,2,3,5,7,12 | 4 | - | - | 4 |
| 02 | 21CHM12 | Energy Generation from Waste                | 1,2,3,4,5    | 4 | - | - | 4 |
| 03 | 21CHM13 | Energy Storage Systems                      | 1,2,3,6,7    | 4 | - | - | 4 |
| 04 | 21CHM14 | Hydrogen Energy and Fuel Cells              | 1,2,3,7      | 4 | - | - | 4 |

**Nano Science & Technology**

|    |         |   |          |   |   |   |   |
|----|---------|---|----------|---|---|---|---|
| 01 | 21CHM21 | Introduction and Characterization of Nano Materials | 1,2,3,7  | 4 | - | - | 4 |
| 02 | 21CHM22 | Carbon Nanostructures and Applications              | 1,3,4,5  | 4 | - | - | 4 |
| 03 | 21CHM23 | Energy, Environment & Biomedical Nanotechnology     | 1,2,3,7  | 4 | - | - | 4 |
| 04 | 21CHM24 | Industrial Applications of Nano Technology          | 2,3,5,,7 | 4 | - | - | 4 |

**Environmental Engineering**

|    |         |  |          |   |   |   |   |
|----|---------|--|----------|---|---|---|---|
| 01 | 21CEM11 | Watershed Management                         | 6,7      | 4 | - | - | 4 |
| 02 | 21CEM12 | Industrial Pollution Control and Engineering | 3,6,7,12 | 4 | - | - | 4 |
| 03 | 21CEM13 | Solid and Hazardous Waste Management         | 1,3,6,7  | 4 | - | - | 4 |
| 04 | 21CEM14 | Ecology and Environmental Assessment         | 1,3,6,7  | 4 | - | - | 4 |

**Artificial Intelligence & Machine Learning**

|    |         |  |        |   |   |   |   |
|----|---------|--|--------|---|---|---|---|
| 01 | 21CSM11 | Fundamentals of AI & Machine Learning    | 1,12   | 4 | - | - | 4 |
| 02 | 21CSM12 | Feature Engineering for Machine Learning | 1,2,3  | 4 | - | - | 4 |
| 03 | 21CSM13 | Exploratory Data Analytics               | 1,4    | 4 | - | - | 4 |
| 04 | 21CSM14 | Foundations of Deep Learning             | 1,2, 4 | 4 | - | - | 4 |

**Cyber Security**

|    |         |                                    |       |   |   |   |   |
|----|---------|------------------------------------|-------|---|---|---|---|
| 01 | 21CSM21 | Fundamentals of Security           | 1,2   | 4 | - | - | 4 |
| 02 | 21CSM22 | Management of Information Security |       |   |   |   |   |
| 03 | 21CSM23 | Cyber Security                     | 1,3,4 | 4 | - | - | 4 |
| 04 | 21CSM24 | Fundamentals of Cloud Security     | 2,3   | 4 | - | - | 4 |

**Data Science & Analytics**

|    |         |                                      |         |   |   |   |   |
|----|---------|--------------------------------------|---------|---|---|---|---|
| 01 | 21CSM31 | Data Cleaning                        | 2,3,4   | 4 | - | - | 4 |
| 02 | 21CSM32 | Data Engineering                     | 1,2,3,4 | 4 | - | - | 4 |
| 03 | 21CSM33 | Text Analytics                       | 1,2,4   | 4 | - | - | 4 |
| 04 | 21CSM34 | Social Network and Semantic Analysis | 2, 4    | 4 | - | - | 4 |

**Computer Systems Programming**

|    |         |                              |         |   |   |   |   |
|----|---------|------------------------------|---------|---|---|---|---|
| 01 | 21CSM41 | Programming Fundamentals     | 1,2,3   | 4 | - | - | 4 |
| 02 | 21CSM41 | Data Structures & Algorithms | 1,2,3,4 | 4 | - | - | 4 |

|                                       |         |  |                |   |   |   |   |
|---------------------------------------|---------|--|----------------|---|---|---|---|
| 03                                    | 21CSM41 | Fundamentals of Databases                                  | 1,4            | 4 | - | - | 4 |
| 04                                    | 21CSM41 | Fundamentals of Computer Networks & Operating Systems      | 1,2,3          | 4 | - | - | 4 |
| <b>Digital IC Design</b>              |         |  |                |   |   |   |   |
| 01                                    | 21ECM11 | Fundamentals of VLSI Design                                | 1,2,3          | 4 | - | - | 4 |
| 02                                    | 21ECM12 | Digital Design using HDL                                   | 1,2,3          | 4 | - | - | 4 |
| 03                                    | 21ECM13 | FPGA Technology  | 1,2            | 4 | - | - | 4 |
| 04                                    | 21ECM14 | Analog and Mixed Signal Design                             | 1,2            | 4 | - | - | 4 |
| <b>Industrial Automation</b>          |         |  |                |   |   |   |   |
| 01                                    | 21ECM21 | Microcontrollers and Interfacing                           | 1,2,3          | 4 | - | - | 4 |
| 02                                    | 21ECM22 | Sensors and Data Acquisition System                        | 1,2            | 4 | - | - | 4 |
| 03                                    | 21ECM23 | Fundamentals of Labview                                    | 1,2            | 4 | - | - | 4 |
| 04                                    | 21ECM24 | Medical Robotics   | 1,2,3          | 4 | - | - | 4 |
| <b>Communications and Networking</b>  |         |  |                |   |   |   |   |
| 01                                    | 21ECM31 | Principles of Communications                               | 1,2            | 4 | - | - | 4 |
| 02                                    | 21ECM32 | Coding Theory and Practice                                 | 1,2            | 4 | - | - | 4 |
| 03                                    | 21ECM33 | Ad-hoc and Wireless Sensor Networks                        | 1,2,3          | 4 | - | - | 4 |
| 04                                    | 21ECM34 | Fundamentals of Multimedia Networking                      | 1,2,3          | 4 | - | - | 4 |
| <b>Avionics</b>                       |         |  |                |   |   |   |   |
| 01                                    | 21ECM41 | Principles of Aerodynamics                                 | 1,2            | 4 | - | - | 4 |
| 02                                    | 21ECM42 | Aircraft Electrical Systems                                | 1,2            | 4 | - | - | 4 |
| 03                                    | 21ECM43 | Aircraft Instrument Systems                                | 1,2            | 4 | - | - | 4 |
| 04                                    | 21ECM44 | Aircraft Communication and Navigational Systems            | 1,2            | 4 | - | - | 4 |
| <b>Geographic Information System</b>  |         |  |                |   |   |   |   |
| 01                                    | 21ECM51 | Sensors and Sensing Technology                             | 1,2            | 4 | - | - | 4 |
| 02                                    | 21ECM52 | Geographic Information Systems                             | 1,2            | 4 | - | - | 4 |
| 03                                    | 21ECM53 | Digital Image Processing                                   | 1,2            | 4 | - | - | 4 |
| 04                                    | 21ECM54 | Lidar Systems  | 1,2            | 4 | - | - | 4 |
| <b>Electric Vehicles Technology</b>   |         |  |                |   |   |   |   |
| 01                                    | 21EEM11 | Introduction to Electric Vehicles Technologies             | 2,3            | 4 | - | - | 4 |
| 02                                    | 21EEM12 | Electrical Drives and Controllers for Electric Vehicles    | 2,3            | 4 | - | - | 4 |
| 03                                    | 21EEM13 | Charging Technology in Electric Vehicles                   | 2,3            | 4 | - | - | 4 |
| 04                                    | 21EEM14 | Computer Vision in Electric Vehicles                       | 2,3            | 4 | - | - | 4 |
| <b>Electric Vehicles Technology</b>   |         |  |                |   |   |   |   |
| 01                                    | 21EEM21 | Fundamentals of Smart City                                 | 2,3            | 4 | - | - | 4 |
| 02                                    | 21EEM22 | Smart City Infrastructure                                  | 2,3            | 4 | - | - | 4 |
| 03                                    | 21EEM23 | Computational Methods for Smart City Management            | 2,3            | 4 | - | - | 4 |
| 04                                    | 21EEM24 | Communication Technologies and Mobility for Smart City     | 2,3            | 4 | - | - | 4 |
| <b>Electric Vehicles Technology</b>   |         |  |                |   |   |   |   |
| 01                                    | 21EEM31 | Modelling and Simulations of Industrial Applications       | 2,3            | 4 | - | - | 4 |
| 02                                    | 21EEM32 | Industrial Sensors and Actuators                           | 2,3            | 4 | - | - | 4 |
| 03                                    | 21EEM33 | Programmable Logic Controllers                             | 2,3            | 4 | - | - | 4 |
| 04                                    | 21EEM34 | Control Design for Industrial Applications                 | 2,3            | 4 | - | - | 4 |
| <b>Cloud Application Development</b>  |         |  |                |   |   |   |   |
| 01                                    | 21ITM11 | Introduction to Cloud Computing                            | 6, 7, 12       | 4 | - | - | 4 |
| 02                                    | 21ITM12 | Introduction to Web Development with HTML, CSS, JavaScript | 1, 2, 3, 9, 12 | 4 | - | - | 4 |
| 03                                    | 21ITM13 | Developing Cloud Native Applications                       | 5, 8, 10       | 4 | - | - | 4 |
| 04                                    | 21ITM14 | Developing Cloud Apps with Node.js and React               | 5, 8, 10       | 4 | - | - | 4 |
| <b>Robotics and Automation</b>        |         |  |                |   |   |   |   |
| 01                                    | 21MEM11 | Introduction to Robotics                                   | 1,2,3          | 4 | - | - | 4 |
| 02                                    | 21MEM12 | Drives and Sensors   | 1,2,3,4        | 4 | - | - | 4 |
| 03                                    | 21MEM13 | Control Systems for Robotics                               | 1,2,3,4        | 4 | - | - | 4 |
| 04                                    | 21MEM14 | Machine Learning for Robotics                              | 2,5            | 4 | - | - | 4 |
| <b>Industrial Systems Engineering</b> |         |  |                |   |   |   |   |
| 01                                    | 21MEM21 | Industrial Management                                      | 1,10,11,12     | 4 | - | - | 4 |
| 02                                    | 21MEM22 | Fundamentals of Operations Research                        | 1,2,3,5        | 4 | - | - | 4 |
| 03                                    | 21MEM23 | Enterprise Resource Planning                               | 1,2,3,5,11,12  | 4 | - | - | 4 |
| 04                                    | 21MEM24 | Production Planning and Control                            | 1,2,3,5,11,12  | 4 | - | - | 4 |

**Department of CSE-AI&DS**

Minimum Credits to be earned: 160 (for Regular Students)

120 for Lateral Entry Students

| S.no.                  | Course Code          | Course Name  | POs                | L     | T  | P     | C       |
|------------------------|----------------------|--|--------------------|-------|----|-------|---------|
| <b>First Semester</b>  |                      |  |                    |       |    |       |         |
| 1                      | 23PYX01<br>23CYX01   | Engineering Physics/Chemistry  | 3/3                | 3     | 0  | 0     | 3/3     |
| 2                      | 23MAX01<br>23MAX02   | Linear Algebra& Calculus/Differential Equations and Vector calculus                | 3/3                | 3     | 0  | 0     | 3/3     |
| 3                      | 23BEX01/<br>23BEX02  | Basic Electrical and Electronics Engineering/ Basic Civil & Mechanical Engineering | 3/3                | 3     | 0  | 0     | 3/3     |
| 4                      | 23BEX03              | Introduction to Programming  | 3                  | 3     | 0  | 0     | 3       |
| 5                      | 23BEX04/<br>23HSX01  | Engineering Graphics/Communicative English   | 2/2                | 2     | 0  | 2/0   | 3/2     |
| 6                      | 23PYX02/<br>23CYX03/ | Engineering Physics Lab/Chemistry Lab  | 4                  |       | 0  | 2/2   | 1/1     |
| 7                      | 23BEX05/<br>23BEX06  | Electrical & Electronics Engineering workshop/Engineering Workshop                 | 1,9,10/1,5,10      |       | 0  | 3/3   | 1.5/1.5 |
| 8                      | 23BEX07              | Computer Programming Lab   | 4                  | -     | 0  | 3     | 1.5     |
| 9                      | 23HSX11              | -/ECA (Yoga / Sports)  | -                  | -     | 0  | -/1   | -/0.5   |
| 10                     | 23HSX12              | -/CCA (NSS/NCC/Community Service)  | -                  | -     | 0  | -/1   | -/0.5   |
| 11                     | 23BEX08              | IT Workshop/-  |                    | 0     | 0  | 2/-   | 1/-     |
| 12                     | 23HSX02              | -/Communicative English Lab  |                    | 0     | 0  | -/2   | -/1     |
|                        |                      |  | <b>Total</b>       | 14/14 | 00 | 12/12 | 20/20   |
| <b>Second Semester</b> |                      |  |                    |       |    |       |         |
| 1                      | 23HSX01/<br>23BEX04  | Communicative English/ Engineering Graphics  | 10,12              | 2/2   | 0  | 0/2   | 2/3     |
| 2                      | 23MAX02/<br>23MAX01  | Differential Equations and Vector calculus/Linear Algebra& Calculus                | 1                  | 3/3   | 0  | 0     | 3/3     |
| 3                      | 23CYX01/<br>23PYX01  | Chemistry /Engineering Physics   | 1/1                | 3/3   | 0  | 0     | 3/3     |
| 4                      | 23BEX02/<br>23BEX01  | Basic Civil & Mechanical Engineering/ Basic Electrical and Electronics Engineering | 1,12/1,12          | 3/3   | 0  | 0     | 3/3     |
| 5                      | 23CS201              | Data Structures(CSE,CSE-AI&DS,CSE-AI&ML, IT)                                       | 1,12               | 3/3   | 0  | 0     | 3/3     |
| 6                      | 23CYX03/<br>23PYX02  | Chemistry Lab / Engineering Physics Lab  | 4                  | 0     | 0  | 2/2   | 1/1     |
| 7                      | 23BEX06/<br>23BEX05  | Engineering Workshop/Electrical & Electronics Engineering workshop                 | 1,9,10/1,5,10      | 0     | 0  | 3/3   | 1.5/1.5 |
| 8                      | 23BEX08              | IT Workshop/-  | 4/4                | 0     | 0  | 2/-   | 1/-     |
| 9                      | 23HSX02              | Communicative English Lab/-  | -/10,12            | 0     | 0  | 2/-   | 1/-     |
| 10                     | 23CS202              | Data Structures Lab (CSE, CSE-AI&DS, CSE-AI&ML, IT)                                | 2,3,4,5            | 0     | 0  | 3/3   | 1.5/1.5 |
| 11                     | 23HSX11              | -/ECA (Yoga / Sports)  |                    | -     | -  | -/1   | -/0.5   |
| 12                     | 23HSX12              | -/CCA (NSS/NCC/Community Service)  |                    | -     | -  | -/1   | -/0.5   |
|                        |                      |  | <b>Total</b>       | 14/14 | 0  | 12/12 | 20/20   |
| <b>Third Semester</b>  |                      |  |                    |       |    |       |         |
| 1                      | 23CS301              | Problem Solving using Python   | 1,2,3,5,12         | 3     | -  | 2     | 4       |
| 2                      | 23ML302              | Artificial Intelligence  | 1,2,3,PS01,PS02    | 3     | -  | -     | 3       |
| 3                      | 23CS303              | Design and Analysis of Algorithms  | 1,2,12, PS01       | 3     | -  | -     | 3       |
| 4                      | 23CS304              | Digital Logic Design   | 1, 2,3,4,5,PS01    | 3     | -  | 2     | 4       |
| 5                      | 23DS305              | Mathematical Foundation for Data Science   | 1,2,3,4,12         | 3     | -  | -     | 3       |
| 6                      | 23CS306              | Object Oriented Programming with JAVA  | 1,2,3,12,PS02      | 3     | -  | -     | 3       |
| 7                      | 23CS307              | Design and Analysis of Algorithms Lab  | 1,2,3,4,10,12,PS01 | -     | -  | 3     | 1.5     |
| 8                      | 23CS308              | JAVA Lab   | 1,2,3,4,10,12,PS02 | -     | -  | 3     | 1.5     |

|    |         |                        |                      |           |   |           |           |
|----|---------|------------------------|----------------------|-----------|---|-----------|-----------|
| 9  | 23BEA01 | Environmental Studies  | 1,7                  | -         | - | -         | -         |
| 10 | 23ESX01 | Employability Skills I | 1,2,3,4,5,9,10,11,12 | 0         | - | 2         | -         |
|    |         |                        | <b>Total</b>         | <b>18</b> | - | <b>12</b> | <b>23</b> |

**Fourth Semester**

|   |         |   |                      |           |   |           |           |
|---|---------|---|----------------------|-----------|---|-----------|-----------|
| 1 | 23IT304 | Database Management Systems             | 1,2,3,4,12,PSO2      | 3         | - | -         | 3         |
| 2 | 23IT403 | Operating Systems                       | 1,2,3,4,7,12         | 3         | - | -         | 3         |
| 3 | 23CS403 | Computer Organization and Architecture  | 1,2,3,12,PSO1        | 3         | - | -         | 3         |
| 4 | 23MA404 | Probability and Statistics using python | 1,2,4,10,12          | 3         | - | 2         | 4         |
| 5 | 23DS405 | Foundations of Data Science             | 1,2,4,PSO1,PSO2      | 3         | - | -         | 3         |
| 6 | 23IT308 | Database Management Systems Lab         | 1,2,3,4,5,9,PSO2     | -         | - | 3         | 1.5       |
| 7 | 23DS407 | Foundations of Data Science Lab         | 1,2,3,4,5,PSO1,PSO2  | -         | - | 3         | 1.5       |
| 8 | 23ESX01 | Employability Skills I                  | 1,2,3,4,5,9,10,11,12 | 0         | - | 2         | 2         |
|   |         |   | <b>Total</b>         | <b>15</b> | - | <b>10</b> | <b>21</b> |

**Fifth Semester**

|    |         |   |                               |           |   |           |           |
|----|---------|---|-------------------------------|-----------|---|-----------|-----------|
| 1  | 23IT405 | Web Technologies                          | 1,2,3,5,PSO1,PSO2             | 3         | - | 2         | 4         |
| 2  | 23DS502 | Deep Learning for Data Science            | 1,2,3,4,5,PSO1                | 3         | - | -         | 3         |
| 3  | 23DS503 | Data Analytics & Visualization Techniques | 1,2,3,4,5,12,PSO1,PSO2        | 3         | - | 2         | 4         |
| 4  | 23ML504 | Computer Networks                         | 1,2,4,5,7,12,PSO1             | 3         | - | -         | 3         |
| 5  |         | Elective I (Professional Elective)        |                               | 3         | - | -         | 3         |
| 6  |         | Elective II (Open Elective I)             |                               | 3         | - | -         | 3         |
| 7  | 23DS507 | Deep Learning Lab                         | 1,2,4,5,8,PSO1,PSO2           | -         | - | 3         | 1.5       |
| 8  | 23TPX01 | Term Paper                                | 1,2,4,5,6,8,9,10,12,PSO1,PSO2 | -         | - | 3         | 1.5       |
| 9  | 23ESX02 | Employability Skills II                   | 1,2,3,4,5,9,10,11,12          | 0         | - | 2         | -         |
| 11 | 23SIX01 | Summer Internship I                       | All PO's & PSO's              | -         | - | -         | 1         |
|    |         |   | <b>Total</b>                  | <b>18</b> | - | <b>12</b> | <b>24</b> |

**Six Semester**

|    |          |   |                     |           |   |           |           |
|----|----------|---|---------------------|-----------|---|-----------|-----------|
| 1  | 23DS601  | Optimization Techniques for ML          | 1,2,4,PSO1,PSO2     | 3         | - | -         | 3         |
| 2  | 23ML602  | Automata Theory and Language Processors | 1,2,3,5,12          | 3         | - | -         | 3         |
| 3  | 23CS603  | Software Engineering                    | 1,2,3,5,8,11, PSO1  | 3         | - | -         | 3         |
| 4  |          | Elective III (Professional Elective)    |                     | 3         | - | 2         | 4         |
| 5  |          | Elective IV (Open Elective II)          |                     | 3         | - | -         | 3         |
| 6  | 23DS606  | Optimization Techniques for ML Lab      | 1,2,3,4,5,PSO1,PSO2 | -         | - | 3         | 1.5       |
| 7  | 23MPX01  | Mini Project                            | All POs & PSOs      | -         | - | 3         | 1.5       |
| 8  | 23ESX02  | Employability Skills II                 | 1,2,3,5,6,8,10,12   | 0         | - | 2         | 2         |
| 9  | 23ATX01  | Environmental Studies                   | 1,7                 | -         | - | -         | -         |
| 10 | 23ATX02  | Professional Ethics and Human Values    | ----                | -         | - | -         | -         |
| 11 | 23ATX--- | Audit Course                            | 6,7,8,9,10,12       | -         | - | -         | -         |
|    |          |   | <b>12</b>           | <b>15</b> | - | <b>10</b> | <b>21</b> |

**Seventh Semester**

|   |         |                                     |                  |          |   |           |           |
|---|---------|-------------------------------------|------------------|----------|---|-----------|-----------|
| 1 |         | Elective V (Professional Elective)  |                  | 3        | - | -         | 3         |
| 2 |         | Elective VI (Professional Elective) |                  | 3        | - | -         | 3         |
| 3 |         | Elective VII (Open Elective III)    |                  | 3        | - | -         | 3         |
| 4 | 23SIX02 | Summer Internship II                | All PO's & PSO's | -        | - | -         | 1         |
| 5 | 23PWX01 | Project Work                        | All PO's & PSO's | -        | - | 16        | 8         |
|   |         |                                     | <b>Total</b>     | <b>9</b> | - | <b>16</b> | <b>18</b> |

**Eighth Semester**

|   |         |                                       |                  |          |   |   |           |
|---|---------|---------------------------------------|------------------|----------|---|---|-----------|
| 1 |         | Elective VIII (Professional Elective) |                  | -        | - | - | 3         |
| 2 |         | Elective IX (Open Elective IV)        |                  | -        | - | - | 2         |
| 3 | 23FIX01 | Full Semester Internship (FSI)        | All PO's & PSO's | -        | - | - | 8         |
|   |         |                                       | <b>Total</b>     | <b>6</b> | - | - | <b>13</b> |

**List of Electives****Language Electives**

| No. | Course Code | Course                         | POs   | Contact Hours |   |   |   |
|-----|-------------|--------------------------------|-------|---------------|---|---|---|
|     |             |                                |       | L             | T | P | C |
| 1   | 23HSX03     | Advanced Communicative English | 10,12 | 2             | - | - | 2 |
| 2   | 23HSX04     | Communicative German           |       | 2             | - | - | 2 |
| 3   | 23HSX05     | Communicative French           |       | 2             | - | - | 2 |
| 4   | 23HSX06     | Communicative Japanese         |       | 2             | - | - | 2 |
| 5   | 23HSX07     | Communicative Spanish          |       | 2             | - | - | 2 |
| 6   | 23HSX08     | Communicative Korean           |       | 2             | - | - | 2 |
| 7   | 23HSX09     | Communicative Hindi            |       | 2             | - | - | 2 |

**Comment [A1]:** Approved in 3<sup>rd</sup> BOS

**Elective I****Career Path I**

|   |         |  |                     |   |   |   |   |
|---|---------|--|---------------------|---|---|---|---|
| 1 | 23MLC11 | Computer Vision & Pattern Recognition(ML Ops)        | 1,2,3,12,PS01       | 3 | - | - | 3 |
| 2 | 23CSC21 | Backend Programming Languages (Full Stack Developer) | 1,2,3,5,PS01, PS02  | 3 | - | - | 3 |
| 3 | 23MLC31 | Fundamentals of Cloud Computing (Cloud Computing)    | 1,2,3,4,5,PS01,PS02 | 3 | - | - | 3 |
| 4 | 23CS004 | Principles of Programming Languages                  | 1, 2, 3, 4,PS01     | 3 | - | - | 3 |
| 5 | 23CS005 | Mobile Computing                                     | 1,3,8,10,12,PS02    | 3 | - | - | 3 |
| 6 | 23CS006 | Distributed Operating Systems                        | 1,2,3,12,PS01,PS02  | 3 | - | - | 3 |

**Comment [A2]:** Approved in 3<sup>rd</sup> BOS

**Elective III****Career Path II**

|   |         |  |                     |   |   |   |   |
|---|---------|--|---------------------|---|---|---|---|
| 1 | 23MLC12 | Machine Learning for Business Intelligence(ML Ops) | 1,2,3,4,5,PS01,PS02 | 3 | - | 2 | 4 |
| 2 | 23CSC22 | Web Application Frameworks(Full Stack Developer)   | 1,2,3,5,PS01,PS02   | 3 | - | 2 | 4 |
| 3 | 23MLC32 | Cloud Services using AWS(Cloud Computing)          | 1,2,3,4,5,PS01      | 3 | - | 2 | 4 |
| 4 | 23CS007 | Cloud Computing Essentials                         | 1,3,6,7,8,9         | 3 | - | 2 | 4 |
| 5 | 23CS008 | Cryptography and Network Security                  | 1,2,3,6,8,12        | 3 | - | 2 | 4 |

**Comment [A3]:** Approved in 3<sup>rd</sup> BOS

**Elective V****Career Path III**

|   |         |  |                |   |   |   |   |
|---|---------|--|----------------|---|---|---|---|
| 1 | 23MLC13 | Conversational AI(ML Ops)                        | 1,2,4,12,PS01  | 3 | - | - | 3 |
| 2 | 23CSC23 | Web Application Databases (Full Stack Developer) | 1,3,5,PS01     | 3 | - | - | 3 |
| 3 | 23MLC33 | Cloud Security Essentials(Cloud Computing)       | 1,2,3,4,5,PS01 | 3 | - | - | 3 |
| 4 | 23IT010 | Social Network Analysis                          | 2, 4, 5,12     | 3 | - | - | 3 |
| 5 | 23ML001 | Human Computer Interaction                       | 1,2, 3,12,PS01 | 3 | - | - | 3 |
| 6 | 23CS012 | Wireless Adhoc Networks                          | 1,2,3,6,7,10   | 3 | - | - | 3 |

**Comment [A4]:** Approved in 3<sup>rd</sup> BOS

**Elective VI**

|   |         |                                  |                         |   |   |   |   |
|---|---------|----------------------------------|-------------------------|---|---|---|---|
| 1 | 23DS002 | Data Visualization with Power BI | 1,2,3,4,5,12,PS01, PS02 | 3 | - | - | 3 |
| 2 | 23CS015 | Software Project Management      | 1,2,3,11,12,PS02        | 3 | - | - | 3 |
| 3 | 23ML003 | Reinforcement Learning           | 1,2,3,PS01,PS02         | 3 | - | - | 3 |

**Comment [A5]:** Approved in 3<sup>rd</sup> BOS

**Elective VIII: Professional Elective**

|   |         |                               |                 |   |   |   |   |
|---|---------|-------------------------------|-----------------|---|---|---|---|
| 1 | 23CS018 | Information Retrieval Systems | 1,2,3,4,10,PS02 | - | - | - | 3 |
| 2 | 23CS019 | Fundamentals of Devops        | 1,2,3,11,PS02   | - | - | - | 3 |
| 3 | 23DS003 | Cyber Security                | 1,3,4,5,PS01    | - | - | - | 3 |

**Comment [A6]:** Approved in 3<sup>rd</sup> BOS

**Audit Course**

|   |         |   |   |   |   |   |   |
|---|---------|---|---|---|---|---|---|
| 1 | 23AT001 | Communication Etiquette in Workplaces           | - | - | - | - | - |
| 2 | 23AT002 | Contemporary India: Economy, Policy and Society | - | - | - | - | - |
| 3 | 23AT003 | Design The Thinking                             | - | - | - | - | - |
| 4 | 23AT004 | Ethics and Integrity                            | - | - | - | - | - |
| 5 | 23AT005 | Indian Heritage and Culture                     | - | - | - | - | - |
| 6 | 23AT007 | Intellectual Property Rights and Patents        | - | - | - | - | - |
| 7 | 23AT008 | Introduction to Journalism                      | - | - | - | - | - |
| 8 | 23AT009 | Mass Media Communication                        | - | - | - | - | - |

|    |         |  |   |   |   |   |   |
|----|---------|--|---|---|---|---|---|
| 9  | 23AT010 | Science, Technology and Development    | - | - | - | - | - |
| 10 | 23AT011 | Social Responsibility                  | - | - | - | - | - |
| 11 | 23AT012 | The Art of Photography and Film Making | - | - | - | - | - |
| 12 | 23AT013 | Gender Equality for Sustainability     | - | - | - | - | - |
| 13 | 23AT014 | Women in Leadership                    | - | - | - | - | - |
| 14 | 23AT015 | Introduction to Research Methodology   | - | - | - | - | - |
| 15 | 23AT016 | Climate Change and Circular Economy    | - | - | - | - | - |

**B. Tech. (Honors)****Domain I (Data Engineering)**

|    |         |  |         |   |   |   |   |
|----|---------|--|---------|---|---|---|---|
| 01 | 23CSH11 | Advanced Data Structures                                 | 2,3,4   | 4 | - | - | 4 |
| 02 | 23CSH12 | Advanced Databases                                       | 2,3,4   | 4 | - | - | 4 |
| 03 | 23CSH13 | Programming, Data Structures and Algorithms Using Python | 2,3,4,5 | 4 | - | - | 4 |
| 04 | 23CSH14 | Bioinformatics   | 2,3     | 4 | - | - | 4 |

**Domain II (Modern Software Engineering)**

|    |         |                               |              |   |   |   |   |
|----|---------|-------------------------------|--------------|---|---|---|---|
| 01 | 23CSH21 | DevOps                        | 1,3,5,8,10   | 4 | - | - | 4 |
| 02 | 23CSH22 | Design Patterns               | 2,3          | 4 | - | - | 4 |
| 03 | 23CSH23 | Advanced Software Engineering | 1,3,4, PSO1  | 4 | - | - | 4 |
| 04 | 23CSH24 | Robotic Process Automation    | 3,5, 8, PSO2 | 4 | - | - | 4 |

**Domain III (Security)**

|    |         |                                    |       |   |   |   |   |
|----|---------|------------------------------------|-------|---|---|---|---|
| 01 | 23CSH31 | Computer Systems Security          | 1,2   | 4 | - | - | 4 |
| 02 | 23CSH32 | Python Programming for Security    | 2,3,4 | 4 | - | - | 4 |
| 03 | 23CSH33 | Management of Information Security | 3,6,7 | 4 | - | - | 4 |
| 04 | 23CSH34 | Computer Forensics                 | 2,3   | 4 | - | - | 4 |

**Domain IV (User Interface Design)**

|    |         |                            |         |   |   |   |   |
|----|---------|----------------------------|---------|---|---|---|---|
| 01 | 23CSH41 | Computer Graphics          | 1,2,3,4 | 4 | - | - | 4 |
| 02 | 23CSH42 | Multimedia Systems         | 3,4     | 4 | - | - | 4 |
| 03 | 23CSH43 | Human Computer Interaction | 2,3     | 4 | - | - | 4 |
| 04 | 23CSH44 | Mobile Programming         | 3,4     | 4 | - | - | 4 |

**B. Tech. (Minors)****CSE- Artificial Intelligence & Data Science**

|   |         |  |    |   |   |   |   |
|---|---------|--|----|---|---|---|---|
| 1 | 23DSM01 | Fundamentals of Data Science             | -- | 4 | - | - | 4 |
| 2 | 23DSM02 | Principles of Artificial Intelligence    | -- | 4 | - | - | 4 |
| 3 | 23DSM03 | Statistics for Data Science using Python | -- | 4 | - | - | 4 |
| 4 | 23DSM04 | Deep Learning                            | -- | 4 | - | - | 4 |
| 5 | 23DSM05 | Natural Language Processing(MOOCs)       | -- | 4 | - | - | 4 |

## Department of CSE-Artificial Intelligence & Data Science

### 2<sup>nd</sup> BOS - MINUTES OF MEET

**Person in Chair:** Dr. K. Srividya, HOD CSE-AI&DS, GMRIT

**Dated:** 25.02.2023 (Saturday)

**Venue:** Online Teams

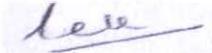
**Time(s):** 2.30 PM TO 5.00PM

| S.No | Points Discussed   | Remarks |
|------|--|---------|
| 1    | <p><b>Agenda:</b></p> <ul style="list-style-type: none"> <li>Review of the Curriculum and Course Titles of AR21 Academic Regulation for CSE in AIDS Specialization</li> <li>Review of Titles and Syllabus of 5th and 6th Semesters under AR21 for CSE in AIDS Specialization</li> <li>Review of B.Tech Career Paths Tracks and the course titles with syllabus for AIDS Specialization</li> <li>Finalization of Course Titles of Electives under Academic Regulations 2021 for AIDS Specialization</li> <li>Review of syllabus changes in 3rd and 4th semesters of AR21 for CSE in AIDS Specialization</li> <li>Approval regarding the Readmitted students from AR19 &amp; AR20 to AR21 Regulation to study an additional subject titled: Fundamentals of Python Programming and its Applications (20CS408)</li> <li>Any other Items with the permission of the chair</li> </ul>   |         |
| 2    | <p><b><u>Curriculum and Course Titles of AR21 Academic Regulation for CSE in AIML &amp; AIDS Specializations</u></b></p> <p>Curriculum and Course Titles of the CSE-AIDS Specialization for the AR21 Academic Regulation is presented to the BoS members.</p> <p>The curriculums were approved by the members of the BoS after a thorough discussion, with the following suggestions.</p> <p>It has been confirmed that CSE-AIDS syllabus covers the subjects required for GATE-CSE examination.</p> <p>The subjects which are in lined with the CSE curriculum have already been approved by BoS members at the previous BOS meeting. The new courses introduced for CSE-AIDS are discussed for approval.</p> <p>Dr. M.H.M. Krishna Prasad, Professor/CSE at JNTUK, appreciated the incorporation of integrated courses into the curriculum. In an integrated course, students must complete both theory and lab simultaneously, allowing them to develop both theoretical and practical competencies simultaneously.</p> <p>It was suggested that during summer internships, students should engage in community service projects to</p> |         |

|    |  |  |
|----|--|--|
|    | <p>broaden their perspectives and encourage social responsibility.</p> <p>Dr. M.H.M. Krishna Prasad has made a point that the B.Tech curriculum must include a course "Universal Human Values -2" under the humanity stream with a credit value of 3, in accordance with AICTE guidelines. It is recommended that the course "Professional Ethics and Human Values," which is currently offered as an audit course, be replaced with the standard course "Universal Human Values -2."</p> <p>It is also suggested that a course with explicit tutorial hours be given extra credit to recognise the students' extra effort and time.</p> <p>It was confirmed that the "Computer Vision and Pattern Recognition" elective course in the "ML Ops" career path does not overlap with the machine learning and deep learning subjects.</p> <p>The members expressed their satisfaction with the presented curriculum and course titles and approved the AR21 Academic Regulation Curriculum and Course titles for CSE-AIML Specialization.</p> |  |
| 2. | <p><b>CSE-AIDS</b></p> <p>Neural Networks – suggested to prescribe latest edition textbooks</p> <p>Neural Networks Lab – suggested to add experiments on activation functions, Loss functions and optimization in week 4.</p> <p>-Week 11 and Week 12 experiments need to be modified.</p> <p>Data Analytics &amp; Visualization Techniques (Integrated) – Suggested to include Kafka concepts for data ingestion</p>  |  |
| 3. | <p><b>Review of B.Tech Career Paths Tracks and the course titles with syllabus for AIML &amp; AIDS Specializations</b></p> <p>The subjects offered under Full Stack Developer career path have already been approved by BoS members at the previous BOS meeting.</p> <p><b>Cloud Computing:</b></p> <ol style="list-style-type: none"> <li>1) Fundamentals of Cloud Computing –suggested to include CERT-IN in unit 4</li> <li>2) Cloud Services using AWS (VI-Sem) Suggested to include SSH(secure shell) concepts in unit 1</li> <li>3) Cloud Security Essentials (VII-Sem)</li> </ol> <p>Suggested to include topics from AWS Sagemaker related to Data science and Artificial intelligence.</p> <p><b>ML Ops:</b></p> <ol style="list-style-type: none"> <li>1) Computer Vision &amp; Pattern Recognition (V-Sem)</li> <li>2) ML for Business Intelligence (VI-Sem)</li> <li>3) Conversational AI (VII-Sem)</li> </ol>   |  |

|   |   |  |
|---|---|--|
|   | Proposed Courses for ML Ops are approved.<br>The detail syllabus could be mailed for BOS members for their thorough suggestions as discussed. |  |
| 4 | Fundamentals of Python Programming and its Applications (20CS408) the restructured syllabus is approved.                                      |  |

Prepared By: Dr.S.Akila Agnes




(Dr. V. Vallikumari)

(Dr.M.H.M.Krishna Prasad)



Board Chairman HOD

**Department of CSE-Artificial Intelligence and Machine Learning/  
 CSE-Artificial Intelligence and Data Science**  
**3<sup>rd</sup> Board of Studies**

**Agenda**

**Virtual Meeting through MS Teams**

**Dated: 16.03.2024 (Saturday)**

**Time(s): 11.30 AM TO 1.00PM**

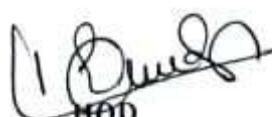
**Agenda:**

- Review of Titles and Syllabus of 7<sup>th</sup> & 8<sup>th</sup> Semesters under AR21 for CSE-AI&ML / AI &DS.
- Finalization of Course structure and syllabus for AR-23 3<sup>rd</sup> and 4<sup>th</sup> semesters.
- Review of syllabus changes in 2<sup>nd</sup> and 3<sup>rd</sup> year courses if any!!
- Any other Items with the permission of the chair person and BOS members.

**External Members : Members of BoS (Industry, Academia, Alumni)**

| S. No | Representatives from Industry   | Representatives from Academia   | Representatives from Alumni   |
|-------|---|---|---|
| 1     | <b>Mrs. Vasantha Khambampati</b><br>Vice President ,<br>Cap Gemini,<br>Bangalore.<br>Mobile: 9535859646<br>sailu.kham@gmail.com | <b>Prof. Vallikumari</b><br>Dept. of CS&SE,<br>AU college of Engineering,<br>Visakhapatnam<br>vallikumari@gmail.com<br>( University Nominee for AIML)           | <b>Mr. Reddi Harsha Vardhan</b><br>Senior Associate<br>PWC, Hyderabad<br>Harsha.r.reddi@pwc.com |
| 2     |   | <b>Dr. P. Arunakumari</b><br>HoD- CSE,<br>JNTUGV, Vizianagaram<br>Mobile: 9440520606<br>arunakumarip.cse@jntugvcev.edu.in<br>(University Nominee for CSE-AI&ML) | <b>Mr. G. Ashok</b><br>Systems Engineer<br>TCS, Hyderabad,<br>Ashok.gunturu@tcs.com             |

  
**Prepared By**  
**Dr. T. Daniya**

  
**HOD**  
**Dr. K. Srividya**

## Minutes of the Meeting

Person in Chair : Dr. K.Srividya, Associate Professor & HOD(AI&ML/AI&DS), GMRIT

- Review of Titles and Syllabus of 7th and 8th Semesters under AR21 for CSE in AIML & AIDS Specializations

### AI&ML

- **Elective V**

**Career Path I, II, III**

|   |         |  |               |   |   |   |   |
|---|---------|--|---------------|---|---|---|---|
| 1 | 21MLC13 | Conversational AI                                  | 1,2,4,12,PSO1 | 3 | - | - | 3 |
| 2 | 21CSC23 | Web Application Databases (Full Stack Development) | 2,3           | 3 | - | - | 3 |
| 3 | 21MLC33 | Cloud Security Essentials                          | 2,3           | 3 | - | - | 3 |
| 4 | 21IT010 | Social Network Analysis                            | 2, 4, 5       | 3 | - | - | 3 |
| 5 | 21ML001 | Human Computer Interaction                         | 2, 3          | 3 | - | - | 3 |
| 6 | 21CS012 | Wireless Adhoc Networks                            | 2, 3          | 3 | - | - | 3 |
| 7 |         | MOOCs/Honors                                       |               | 3 | - | - | 3 |

**Elective VI**

|   |         |                             |         |   |   |   |   |
|---|---------|-----------------------------|---------|---|---|---|---|
| 1 | 21ML002 | Large Language Models       | 2,3,5,6 | 3 | - | - | 3 |
| 2 | 21CS015 | Software Project Management | 3,6     | 3 | - | - | 3 |
| 3 | 21ML003 | Reinforcement Learning      | 6,7     | 3 | - | - | 3 |
| 4 |         | MOOCs/Honors                |         | 3 | - | - | 3 |

**Elective VIII: Professional Elective**

|   |         |                               |               |   |   |   |   |
|---|---------|-------------------------------|---------------|---|---|---|---|
| 1 | 21CS018 | Information Retrieval Systems | 1,2,3,4       | - | - | - | 3 |
| 2 | 21CS019 | Fundamentals of Devops        | 1,3, 5, 8, 10 | - | - | - | 3 |
| 3 | 21DS003 | Cyber Security                | 1,3,4,5,PSO1  |   |   |   | 3 |
| 4 |         | MOOCs/Honors                  |               | - | - | - | 3 |

### AI&DS

- **Elective V**

**Career Path I, II, III**

|   |         |  |               |   |   |   |   |
|---|---------|--|---------------|---|---|---|---|
| 1 | 21MLC13 | Conversational AI                                  | 1,2,4,12,PSO1 | 3 | - | - | 3 |
| 2 | 21CSC23 | Web Application Databases (Full Stack Development) | 2,3           | 3 | - | - | 3 |
| 3 | 21MLC33 | Cloud Security Essentials                          | 2,3           | 3 | - | - | 3 |
| 4 | 21IT010 | Social Network Analysis                            | 2, 4, 5       | 3 | - | - | 3 |
| 5 | 21ML001 | Human Computer Interaction                         | 2, 3          | 3 | - | - | 3 |
| 6 | 21CS012 | Wireless Adhoc Networks                            | 2, 3          | 3 | - | - | 3 |
| 7 |         | MOOCs/Honors                                       |               | 3 | - | - | 3 |

**Elective VI**

|   |         |                                  |         |   |   |   |   |
|---|---------|----------------------------------|---------|---|---|---|---|
| 1 | 21DS002 | Data Visualization with Power BI | 2,3,5,6 | 3 | - | - | 3 |
| 2 | 21CS015 | Software Project Management      | 3,6     | 3 | - | - | 3 |
| 3 | 21ML003 | Reinforcement Learning           | 6,7     | 3 | - | - | 3 |
| 4 |         | MOOCs/Honors                     |         | 3 | - | - | 3 |

**Elective VIII: Professional Elective**

|   |         |                               |              |   |   |   |   |
|---|---------|-------------------------------|--------------|---|---|---|---|
| 1 | 21CS018 | Information Retrieval Systems | 1,2,3,4      | - | - | - | 3 |
| 2 | 21CS019 | Fundamentals of Devops        | 1,3, 5,8,10  | - | - | - | 3 |
| 3 | 21DS003 | Cyber Security                | 1,3,4,5,PSO1 |   |   |   | 3 |
| 4 |         | MOOCs/Honors                  |              | - | - | - | 3 |

Course Titles and syllabus of the CSE-AI&ML / AI&DS Specialization for the AR21 Academic Regulation is presented in the meeting.

A thorough discussion was made and the syllabus was verified.



Prepared By:  
**Dr. T. Daniya**



**Dr. K. Srividya**

