

**1.3.2(B) Brochure and Course content or syllabus along with course outcome of Value-added courses offered**

**Department of CSE-AI&ML**  
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# **GMR INSTITUTE OF TECHNOLOGY RAJAM**

## **DEPARTMENT OF CSE -AI/ML**

### **CIRCULAR**

**Date:** 28-10-2024

This is to inform you that department of CSE offering an industry driven value added course for 3<sup>rd</sup> years titled “**AWS Academy cloud foundations**” during 18<sup>th</sup> Nov to 20<sup>th</sup> Jan 2025. Students those who are interested can register their names.

Total No of Hours: 30 hours

Name(s) of the faculty: Mr S. Vinod Kumar

Venue: Blended Mode

  
HOD-CSE-AI&ML

# AWS Academy Cloud Foundations

## Course Outcomes:

- 1) Demonstrate foundational understanding of cloud computing concepts.
- 2) Evaluate and apply AWS Pricing models and Billing Tools.
- 3) Identify and utilize core AWS services and global infrastructure.
- 4) Implement Security best practices using AWS identity and access management tools.
- 5) Design , deploy and manage scalable and reliable cloud architectures.
- 6) Monitor, manage and optimize cloud performance.

## Syllabus:

Cloud Concepts Overview- Introduction to cloud computing, Advantages of the Cloud, Introduction to AWS, Moving to the AWS Cloud

Cloud Economics and Billing- Fundamentals of Pricing, Total Cost of Ownership, AWS Organizations, AWS Billing & Cost Management, Technical Support Models. AWS Global Infrastructure Overview- AWS Global Infrastructure, AWS Services & Service Categories

AWS Cloud Security- AWS Shared Responsibility Model, AWS IAM (Identity and Access Management), Securing a New AWS Account, Securing Accounts, Securing Data, Working to Ensure Compliance

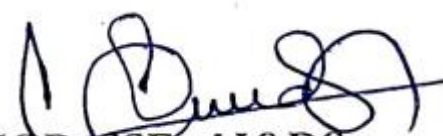
Networking and Content Delivery- Networking Basics, Amazon VPC, VPC Wizard, VPC Networking, VPC Security, Route 53, CloudFront

Compute-Compute Services Overview, Amazon EC2 Part 1, Amazon EC2 Part 2, Amazon EC2, Amazon EC2 Cost Optimization, Container Services, Introduction to AWS Lambda, AWS Lambda, Introduction to AWS Elastic Beanstalk

Storage-AWS EBS, AWS S3, AWS EFS, AWS S3 Glacier

Databases- Amazon RDS, Amazon DynamoDB, Amazon Redshift, Amazon Aurora Cloud Architecture-AWS Well-Architected Framework Design Principles, Operational Excellence, Security, Reliability, Performance Efficiency, Cost Optimization, Reliability & High Availability, AWS Trusted Advisor

Auto Scaling and Monitoring- Elastic Load Balancing, Amazon CloudWatch, Amazon EC2 Auto Scaling

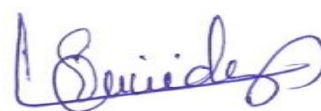
  
HOD-CSE- AI&DS

Value Added Course : AWS Academy Cloud Foundations Registrations

Dept: CSE-AI&ML

Academic Year:2024-25

| SNO | JNTU NO    | STUDENT NAME           |
|-----|------------|------------------------|
| 1   | 22341A4233 | NADAMUNI HARI CHANDANA |
| 2   | 22341A4210 | GOLLAPALLI MAHEENDRA   |
| 3   | 22341A4240 | PETA PRUDHVI RAJ       |
| 4   | 22341A4242 | POGIRI NAVEEN BABU     |
| 5   | 22341A4248 | RAYI GIREESH KUMAR     |



HOD Signature

**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<br>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<br>Physics                    | 1/1            | 3/3          | - | -            | 3/3          |
| 4                      | 21BEX01/<br>21BEX06 | Basics of Engineering/<br>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<br>Drawing                    | 1,9,10/1,5,10  | -            | - | 3/3          | 1.5/1.5      |
| 8                      | 21CYX02/<br>21PYX02 | Engineering Chemistry Lab/Engineering<br>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<br>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, PSO1, PSO2        | 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,PSO1                | 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,PSO1                | 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,PSO1,PSO2           | 3         | - | -         | 3         |
| 2                | 21ML602  | Automata Theory and Language Processors                | 1,2,3                   | 3         | - | -         | 3         |
| 3                | 21CS603  | Software Engineering                                   | 4,5,8,11, PSO1          | 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>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, PSO1,PSO2 | -         | - | -         | 8         |
|                  |          |                                                        | <b>Total</b>            | <b>6</b>  | - | -         | <b>14</b> |

**List of Electives**

| <b>Language Electives</b> |             |                                |       |               |   |   |   |
|---------------------------|-------------|--------------------------------|-------|---------------|---|---|---|
| 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 |

**Elective I****Career Path I, II, III**

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

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

|   |         |                                     |            |   |   |   |   |
|---|---------|-------------------------------------|------------|---|---|---|---|
| 4 | 21CS004 | Principles of Programming Languages | 1, 2, 3, 4 | 3 | - | - | 3 |
| 5 | 21CS005 | Mobile Computing                    | 3, 8       | 3 | - | - | 3 |
| 6 | 21CS006 | Distributed Operating Systems       | 1,2        | 3 | - | - | 3 |
| 7 |         | MOOCs/Honors                        |            | 3 | - | - | 3 |

**Elective II: Open Elective I**

|   |         |                                                           |         |   |   |   |   |
|---|---------|-----------------------------------------------------------|---------|---|---|---|---|
| 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 (Except CSE & IT) | 1, 2, 3 | 3 | - | - | 3 |
| 7 | 21IT001 | Fundamentals of Multimedia                                | 1, 5, 7 | 3 | - | - | 3 |

**Elective III****Career Path I, II, III**

|   |         |                                                                 |               |   |   |   |   |
|---|---------|-----------------------------------------------------------------|---------------|---|---|---|---|
| 1 | 21MLC12 | Machine Learning for Business Intelligence                      | 2,3,PS01,PS02 | 3 | - | 2 | 4 |
| 2 | 21CSC22 | Web Application Developments Framework (Full Stack Development) | 1, 3,4        | 3 | - | 2 | 4 |
| 3 | 21MLC32 | Cloud Services using AWS                                        |               | 3 | - | 2 | 4 |

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

|   |         |                                   |           |   |   |   |   |
|---|---------|-----------------------------------|-----------|---|---|---|---|
| 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 |

**Elective IV: Open Elective II**

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

**Elective V****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 |
| 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 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 |
| 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 |
| 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 |
| 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, PS01  | 4 | - | - | 4 |
| 04                                             | 21CSH24 | Robotic Process Automation                               | 3,5, 8, PS02 | 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 | 3,6,7 | 4 | - | - | 4 |
| 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 |