**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURJADA VZM**
**VIZIANAGARAM – 535 003, Andhra Pradesh, India**

# B. Tech CSE (DATA SCIENCE)

## (R23-COURSE STRUCTURE)

## (Applicable from the academic year 2023-24 and onwards)

### B.Tech.– I Year I Semester

| S. No. | Course Code | Course Name | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1. | R23BS01 | Linear Algebra & Calculus | 3 | 0 | 0 | 3 |
| 2. | R23BS03 | Engineering Physics | 3 | 0 | 0 | 3 |
| 3. | R23HS01 | Communicative English | 2 | 0 | 0 | 2 |
| 4. | R23ES01 | Basic Civil &Mechanical Engineering | 3 | 0 | 0 | 3 |
| 5. | R23ES07 | Introduction to Programming | 3 | 0 | 0 | 3 |
| 6. | R23HS01 | Communicative English Lab | 0 | 0 | 2 | 1 |
| 7. | R23BS03 | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 8. | R23ES02 | Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 9. | R23ES06 | IT Workshop | 0 | 0 | 2 | 1 |
| 10. | R23ES07 | Computer Programming Lab | 0 | 0 | 3 | 1.5 |
| 11. | R23MC01 | Health and Wellness, Yoga and Sports | 0 | 0 | 1 | 0.5 |
| | | **Total** | | | | **20.5** |

### B.Tech.– I Year II Semester

| S. No. | Course Code | Course Name | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1. | R23BS02 | Differential Equations and Vector calculus | 3 | 0 | 0 | 3 |
| 2. | R23BS05 | Chemistry | 3 | 0 | 0 | 3 |
| 3. | R23ES03 | Engineering Graphics | 1 | 0 | 4 | 3 |
| 4. | R23ES04 | Basic Electrical & Electronics Engineering | 3 | 0 | 0 | 3 |
| 5. | R23PC04 | Data Structures | 3 | 0 | 0 | 3 |
| 6. | R23BS05 | Chemistry Lab | 0 | 0 | 2 | 1 |
| 7. | R23ES05 | Electrical & Electronics Engineering workshop | 0 | 0 | 3 | 1.5 |
| 8. | R23PC04 | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 9. | R23MC02 | NSS/NCC/Scouts &Guides/Community Service | 0 | 0 | 1 | 0.5 |
| | | **Total** | | | | **19.5** |

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# B. Tech CSE (DATA SCIENCE)

**(R23-COURSE STRUCTURE)**

## (Applicable from the academic year 2023-24 and onwards)

**B.Tech.– II Year I Semester**

| S. No. | Category | Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | Basic Science | Discrete Mathematics & Graph Theory | 3 | 0 | 0 | 3 |
| 2 | HSMC | Universal Human Values - Understanding Harmony & Ethical Human Conduct | 2 | 1 | 0 | 3 |
| 3 | Engineering Science | Introduction to Data Science | 3 | 0 | 0 | 3 |
| 4 | Professional Core | Advanced Data Structures Algorithms Analysis | 3 | 0 | 0 | 3 |
| 5 | Professional Core | Object Oriented Programming Through Java | 3 | 0 | 0 | 3 |
| 6 | Professional Core | Data Science Lab | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | Object Oriented Programming Through Java Lab | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement course | Python Programming | 0 | 1 | 2 | 2 |
| 9 | Audit Course | Environmental Science | 2 | 0 | 0 | - |
| **Total** | | | **16** | **2** | **8** | **20** |

**B.Tech.– II Year II Semester**

| **S. No.** | Category | **Title** | **L** | **T** | **P** | **Credits** |
|---|---|---|---|---|---|---|
| 1 | Basic Science | Probability And Stastics | 2 | 0 | 0 | 2 |
| 2 | Engineering Science / Basic Science | Statistical Methods for Data Science | 3 | 0 | 0 | 3 |
| 3 | Professional Core | Data Engineering | 3 | 0 | 0 | 3 |
| 4 | Professional Core | Database Management System | 3 | 0 | 0 | 3 |
| 5 | Professional Core | Digital Logic& Computer Organization | 3 | 0 | 0 | 3 |
| 6 | Professional Core | Data Engineering Lab | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | Database Management System Lab | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement Course | Exploratory Data Analysis with Python | 0 | 1 | 2 | 2 |
| 9 | Engineering Science | Design Thinking & Innovation | 1 | 0 | 2 | 2 |
| **Total** | | | **15** | **1** | **10** | **21** |
| Mandatory Community Service Project Internship of 08weeks duration during summer vacation | | | | | | |

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# B. Tech CSE (DATA SCIENCE)

**(R23-COURSE STRUCTURE)**

**(Applicable from the academic year 2023-24 and onwards)**

**B.Tech. – III Year I Semester**

| S. No. | Category | Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | Professional Core | Operating System | 3 | 0 | 0 | 3 |
| 2 | Professional Core | Machine Learning\ | 3 | 0 | 0 | 3 |
| 3 | Professional Core | Computer Networks | 3 | 0 | 0 | 3 |
| 4 | Professional Elective-I | 1. Soft computing<br>2. Software Engineering<br>3. Digital Twin<br>4. Predictive Analytics<br>5. Any of 12 Week Course Swayam /NPTEL Course suggested by BOS | 3 | 0 | 0 | 3 |
| 5 | Open Elective- I | Managerial Economics & Financial Analysis | 3 | 0 | 0 | 3 |
| 6 | Professional Core | Machine Learning Lab | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | Computer Networks Lab | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement course | MEAN Stack Technologies | 0 | 1 | 2 | 2 |
| 9 | ES | Tinkering Lab | 0 | 0 | 2 | 1 |
| 10 | Evaluation of Community Service Internship | | - | - | - | 2 |
| Total | | | 15 | 1 | 10 | 23 |

**Note: -** Managerial Economics & Financial Analysis is Mandatory.

**B.Tech.– III Year II Semester**

| S.No. | Category | Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | Professional Core | Massive Data Analytics | 3 | 0 | 0 | 3 |
| 2 | Professional Core | Deep Learning | 3 | 0 | 0 | 3 |
| 3 | Professional Core | Automata Theory & Compiler Design | 3 | 0 | 0 | 3 |
| 4 | Professional Elective-II | 1. Model Evaluation and Selection<br>2. Internet of Things<br>3. Recommender Systems<br>4. Quantum computing<br>5. 12-Week SWAYAM /NPTEL Course suggested by the BoS | 3 | 0 | 0 | 3 |
| 5 | Professional Elective-III | 1. Computer Vision<br>2. Cryptography & Network Security<br>3. AI chatbot<br>4. CYBER SECURITY<br>5. 12-Week SWAYAM /NPTEL Course suggested by the BoS | 3 | 0 | 0 | 3 |
| 6 | Open Elective – II | **Open elective offered by other department** | 3 | 0 | 0 | 3 |
| 7 | Professional Core | Deep Learning Lab | 0 | 0 | 3 | 1.5 |
| 8 | Professional Core | Massive Data Analytics Lab | 0 | 0 | 3 | 1.5 |
| 9 | Skill Enhancement course | Soft skills | 0 | 1 | 2 | 2 |
| 10 | Audit Course | Technical Paper Writing & IPR | 2 | 0 | 0 | - |
| **Total** | | | **19** | **1** | **06** | **23** |
| Mandatory Industry Internship of 08 weeks duration during summer vacation | | | | | | |

**B.Tech. – IV Year I Semester**

| S. No. | Category | Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | Professional Core | Data Wrangling & Visualization | 3 | 0 | 0 | 3 |
| 2 | Management Course- II | Management Science<br>Human Resource Management<br>Entrepreneurship & Incubation | 2 | 0 | 0 | 2 |
| 3 | Professional Elective-IV | 1. Cloud Computing<br>2. Software Testing Methodology<br>3. DevOps<br>4. NoSQL databases<br>5. 12-Week SWAYAM /NPTEL Course suggested by the BoS | 3 | 0 | 0 | 3 |
| 4 | Professional Elective-V | 1. Model Evaluation & Selection<br>2. Expert Systems<br>3. Reinforcement Learning<br>4. HPC (High-Performance Computing)<br>5. 12-Week SWAYAM /NPTEL Course suggested by the BoS | 3 | 0 | 0 | 3 |
| 5 | Open Elective-III | **Open elective offered by other department** | 3 | 0 | 0 | 3 |
| 6 | Open Elective-IV | **Open elective offered by other department** | 3 | 0 | 0 | 3 |
| 7 | Skill Enhancement Course | Prompt Engineering | 0 | 1 | 2 | 2 |
| 8 | Audit Course | Gender Sensitization | 2 | 0 | 0 | - |
| 9 | Internship | Evaluation of Industry Internship | - | - | - | 2 |
| | | **Total** | **19** | **1** | **02** | **21** |

**B.Tech.– IV Year II Semester**

| S. No. | Category | Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | Internship & Project Work | Full semester Internship & Project Work | 0 | 0 | 24 | 12 |

**OPEN ELECTIVES OFFERED BY CSE(DS) TO OTHER BRANCHES:**

| OPEN ELECTIVE -I | OPEN ELECTIVE -II |
|---|---|
| 1. Fundamentals of Data Science<br>2. Exploratory Data Analysis with Python<br>3. Internet of Things | 1. Fundamentals of Data Base Management System<br>2. Data Wrangling and Pre-processing<br>3. Social Media Analytics |
| **OPEN ELECTIVE -III** | **OPEN ELECTIVE -IV** |
| 1. Introduction to Artificial Intelligence<br>2. Data science applications<br>3. Java Programming | 1. Introduction to Machine Learning<br>2. Block Chain Technologies<br>3. AI Chabot |