

## Course Structure

### Computer Science and Engineering - Data Science - MLR 20

| I B.Tech.- I-Semester         |   |             |                |    |    |         |                                     |                |       |
|-------------------------------|---|-------------|----------------|----|----|---------|-------------------------------------|----------------|-------|
| Course Code                   | Course Title                                  | Course Area | Hours per Week |    |    | Credits | Scheme of Examination Maximum Marks |                |       |
|                               |   |             | L              | T  | P  |         | Internal (CIE)                      | External (SEE) | Total |
| A5BS02                        | Linear Algebra and Calculus                   | BSC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5BS11                        | Applied Chemistry                             | BSC         | 4              | -  | -  | 4       | 30                                  | 70             | 100   |
| A5CS01                        | Programming for Problem Solving               | ESC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| A5HS01                        | English                                       | HSMC        | 2              | -  | -  | 2       | 30                                  | 70             | 100   |
| A5CS02                        | Programming for Problem Solving Lab           | ESC         | -              | -  | 3  | 1.5     | 30                                  | 70             | 100   |
| A5BS12                        | Applied Chemistry Lab                         | BSC         | -              | -  | 3  | 1.5     | 30                                  | 70             | 100   |
| A5HS02                        | English Language and Communication Skills Lab | HSMC        | -              | -  | 2  | 1       | 30                                  | 70             | 100   |
| <b>TOTAL</b>                  |   |             | 12             | 01 | 08 | 17      | 210                                 | 490            | 700   |
| Mandatory Course (Non-Credit) |   |             |                |    |    |         |                                     |                |       |
| A5MC01                        | Seminar-I                                     | MC          | -              | -  | 02 | -       | 30                                  | 70             | 100   |

| I B.Tech.- II-Semester        |  |             |                |    |    |         |                                     |                |       |
|-------------------------------|--|-------------|----------------|----|----|---------|-------------------------------------|----------------|-------|
| Course Code                   | Course Title                                 | Course Area | Hours per Week |    |    | Credits | Scheme of Examination Maximum Marks |                |       |
|                               |  |             | L              | T  | P  |         | Internal (CIE)                      | External (SEE) | Total |
| A5BS04                        | Advanced Calculus                            | BSC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5BS08                        | Applied Physics                              | BSC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5EE70                        | Basic Electrical and Electronics Engineering | ESC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5ME02                        | Engineering Graphics                         | ESC         | 1              | -  | 4  | 3       | 30                                  | 70             | 100   |
| A5BS15                        | Applied Physics Lab                          | BSC         | -              | -  | 3  | 1.5     | 30                                  | 70             | 100   |
| A5EC01                        | Introduction to Internet of Things           | ESC         | -              | -  | 3  | 1.5     | 30                                  | 70             | 100   |
| A5ME04                        | Engineering Workshop                         | ESC         | -              | -  | 2  | 1       | 30                                  | 70             | 100   |
| <b>TOTAL</b>                  |  |             | 10             | 03 | 12 | 19      | 210                                 | 490            | 700   |
| Mandatory Course (Non-Credit) |  |             |                |    |    |         |                                     |                |       |
| A5MC02                        | Seminar-II                                   | MC          | -              | -  | 02 | -       | 30                                  | 70             | 100   |

| <b>II B.TECH.- I SEMESTER</b>        |   |             |                |    |    |         |                                     |                |       |
|--------------------------------------|---|-------------|----------------|----|----|---------|-------------------------------------|----------------|-------|
| Course Code                          | Course Title                                  | Course Area | Hours per Week |    |    | Credits | Scheme of Examination Maximum Marks |                |       |
|                                      |   |             | L              | T  | P  |         | Internal (CIE)                      | External (SEE) | Total |
| A5BS05                               | Probability and Statistics                    | BSC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| A5BS16                               | Discrete Mathematics                          | BSC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5EC72                               | Digital Electronics and Computer Organization | ESC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5IT01                               | Object Oriented Programming                   | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5IT03                               | Python Programming                            | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5IT05                               | Python Programming Lab                        | PCC         | -              | -  | 3  | 1.5     | 30                                  | 70             | 100   |
| A5IT02                               | Object Oriented Programming Lab               | PCC         | -              | -  | 3  | 1.5     | 30                                  | 70             | 100   |
| <b>Total</b>                         |   |             | 15             | 04 | 06 | 22      | 210                                 | 490            | 700   |
| <b>Mandatory Course (Non-Credit)</b> |   |             |                |    |    |         |                                     |                |       |
| A5MC03                               | Environmental Studies                         | MC          | 2              | -  | -  | -       | 30                                  | 70             | 100   |

| <b>II B.Tech.- II SEMESTER</b>       |   |             |                |    |    |         |                                     |                |       |
|--------------------------------------|---|-------------|----------------|----|----|---------|-------------------------------------|----------------|-------|
| Course Code                          | Course Title                              | Course Area | Hours per Week |    |    | Credits | Scheme of Examination Maximum Marks |                |       |
|                                      |   |             | L              | T  | P  |         | Internal (CIE)                      | External (SEE) | Total |
| A5HS06                               | Business Economics and Financial Analysis | HSMC        | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| A5AI01                               | Data structures using Python              | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5CS05                               | Database Management Systems               | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5CS08                               | Design and Analysis of Algorithms         | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5CS13                               | Operating Systems                         | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5AI02                               | Data structures using Python Lab          | PCC         | -              | -  | 3  | 1.5     | 30                                  | 70             | 100   |
| A5CS06                               | Database Management Systems Lab           | PCC         | -              | -  | 3  | 1.5     | 30                                  | 70             | 100   |
| <b>Total</b>                         |   |             | 15             | 04 | 06 | 22      | 210                                 | 490            | 700   |
| <b>Mandatory Course (Non-Credit)</b> |   |             |                |    |    |         |                                     |                |       |
| A5HS03                               | Gender Sensitization                      | HSMC        | -              | -  | 2  | -       | 30                                  | 70             | 100   |

| <b>III B.Tech.- I SEMESTER</b> |                              |             |                |    |    |         |                                     |                |       |
|--------------------------------|------------------------------|-------------|----------------|----|----|---------|-------------------------------------|----------------|-------|
| Course Code                    | Course Title                 | Course Area | Hours per Week |    |    | Credits | Scheme of Examination Maximum Marks |                |       |
|                                |                              |             | L              | T  | P  |         | Internal (CIE)                      | External (SEE) | Total |
| A5DS01                         | Data Analytics               | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5IT04                         | Automata and Compiler Design | PCC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| A5DS03                         | Web Programming              | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| PEC                            | Professional Elective-I      | PEC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| OEC                            | Open Elective-I              | OEC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| A5DS04                         | Web Programming Lab          | PCC         | -              | -  | 3  | 1.5     | 30                                  | 70             | 100   |
| A5DS02                         | Data Analytics Lab           | PCC         | -              | -  | 2  | 1       | 30                                  | 70             | 100   |
| A5DS14                         | Mini Project                 | PWC         | -              | -  | -  | 2       | 30                                  | 70             | 100   |
| <b>Total</b>                   |                              |             | 15             | 02 | 05 | 21.5    | 260                                 | 540            | 800   |

| <b>III B.Tech.- II SEMESTER</b> |                          |             |                |    |    |         |                                     |                |       |
|---------------------------------|--------------------------|-------------|----------------|----|----|---------|-------------------------------------|----------------|-------|
| Course Code                     | Course Title             | Course Area | Hours per Week |    |    | Credits | Scheme of Examination Maximum Marks |                |       |
|                                 |                          |             | L              | T  | P  |         | Internal (CIE)                      | External (SEE) | Total |
| A5AI19                          | Machine Learning         | PCC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| A5CS15                          | Computer Networks        | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| A5CS17                          | Big Data Analytics       | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| PEC                             | Professional Elective-II | PEC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| OEC                             | Open Elective-II         | OEC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| A5AI20                          | Machine Learning Lab     | PCC         | -              | -  | 3  | 1.5     | 30                                  | 70             | 100   |
| A5CS18                          | Big Data Analytics Lab   | PCC         | -              | -  | 2  | 1       | 30                                  | 70             | 100   |
| A5DS15                          | Independent Study/MOOCs  | PWC         | -              | -  | -  | 1       | -                                   | 100            | 100   |
| <b>Total</b>                    |                          |             | 15             | 02 | 05 | 20.5    | 210                                 | 590            | 800   |

| <b>IV B.Tech.- I SEMESTER</b> |                           |             |                |    |    |         |                                     |                |       |
|-------------------------------|---------------------------|-------------|----------------|----|----|---------|-------------------------------------|----------------|-------|
| Course Code                   | Course Title              | Course Area | Hours per Week |    |    | Credits | Scheme of Examination Maximum Marks |                |       |
|                               |                           |             | L              | T  | P  |         | Internal (CIE)                      | External (SEE) | Total |
| A5DS05                        | Deep Learning             | PCC         | 3              | 1  | -  | 4       | 30                                  | 70             | 100   |
| PEC                           | Professional Elective-III | PEC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| PEC                           | Professional Elective-IV  | PEC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| PEC                           | Professional Elective-V   | PEC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| OEC                           | Open Elective-III         | OEC         | 3              | -  | -  | 3       | 30                                  | 70             | 100   |
| A5DS06                        | Deep Learning Lab         | PCC         | -              | -  | 2  | 1       | 30                                  | 70             | 100   |
| A5DS16                        | Major Project Phase - 1   | PWC         | -              | -  | 8  | 4       | 100                                 | -              | 100   |
| <b>Total</b>                  |                           |             | 15             | 01 | 10 | 21      | 280                                 | 420            | 700   |

| <b>IV B.Tech. - II SEMESTER</b> |                              |             |                |   |    |         |                                     |                |       |
|---------------------------------|------------------------------|-------------|----------------|---|----|---------|-------------------------------------|----------------|-------|
| Course Code                     | Course Title                 | Course Area | Hours per Week |   |    | Credits | Scheme of Examination Maximum Marks |                |       |
|                                 |                              |             | L              | T | P  |         | Internal (CIE)                      | External (SEE) | Total |
| PEC                             | Professional Elective-VI     | PEC         | 3              | - | -  | 3       | 30                                  | 70             | 100   |
| A5HS16                          | Intellectual Property Rights | HSMC        | 3              | - | -  | 3       | 30                                  | 70             | 100   |
| OEC                             | Open Elective-IV             | OEC         | 3              | - | -  | 3       | 30                                  | 70             | 100   |
| A5DS17                          | Major Project Phase - 2      | PWC         | -              | - | 16 | 8       | 50                                  | 150            | 200   |
| <b>Total</b>                    |                              |             | 09             | - | 16 | 17      | 140                                 | 360            | 500   |

| <b>PROFESSIONAL ELECTIVES</b> |  |                |  |
|-------------------------------|--|----------------|--|
| <b>PE - I</b>                 |  | <b>PE - II</b> |  |
| A5DS07                        | Exploratory Data Analytics             | A5DS08         | Python for Data Science                        |
| A5DS09                        | NoSQL Databases                        | A5DS18         | Data Wrangling                                 |
| A5AI07                        | Data Mining Algorithms                 | A5AI03         | Artificial Intelligence                        |
| <b>PE - III</b>               |  | <b>PE - IV</b> |  |
| A5DS22                        | Social Network Analytics               | A5DS10         | Big Data Management                            |
| A5DS20                        | Time Series Analysis and Forecasting   | A5DS21         | Text Analytics and Natural Language Processing |
| A5CS23                        | Cloud Computing                        | A5AI12         | Computer Vision                                |
| <b>PE - V</b>                 |  | <b>PE - VI</b> |  |
| A5DS11                        | Data Collection and Analysis with IOT. | A5DS12         | Data Visualization                             |
| A5DS19                        | Predictive Modeling and Analytics      | A5DS13         | Business Intelligence and Analytics            |
| A5CY23                        | Bit Coins                              | A5IT25         | Information Retrieval System                   |

## OPEN ELECTIVES

| <b>OPEN ELECTIVE - I</b>   |                    |   |   |
|----------------------------|--------------------|---|---|
| <b>S. No.</b>              | <b>Course Code</b> | <b>Course Name</b>                                | <b>Offering Department</b>                |
| 1                          | A5AE62             | Fundamentals of Avionics                          | Aeronautical Engineering                  |
| 2                          | A5CS30             | Core Java Programming                             | Computer Science and Engineering          |
| 3                          | A5CS26             | Introduction to Data Analytics                    |   |
| 4                          | A5EC54             | Microprocessors and Interfacing                   | Electronics and Communication Engineering |
| 5                          | A5EC55             | Principles of Communications                      |   |
| 6                          | A5EE52             | Electrical Wiring and Safety Measures             | Electrical and Electronics Engineering    |
| 7                          | A5EE53             | Electrical Materials                              |   |
| 8                          | A5IT20             | Fundamentals of Data Structures                   | Information Technology                    |
| 9                          | A5ME72             | Fundamentals of Engineering Materials             | Mechanical Engineering                    |
| 10                         | A5HS06             | Business Economics and Financial Analysis         | MBA                                       |
| 11                         | A5HS07             | Basics of Entrepreneurship                        |   |
| 12                         | A5HS08             | Human Values and Professional Ethics              |   |
| <b>OPEN ELECTIVE - II</b>  |                    |   |   |
| <b>S. No.</b>              | <b>Course Code</b> | <b>Course Name</b>                                | <b>Offering Department</b>                |
| 1                          | A5AE65             | Non-Destructive Testing Methods                   | Aeronautical Engineering                  |
| 2                          | A5CS31             | Fundamentals of DBMS                              | Computer Science and Engineering          |
| 3                          | A5CS32             | Introduction to Machine Learning                  |   |
| 4                          | A5CS07             | Introduction to Design and Analysis of Algorithms |   |
| 5                          | A5EC58             | Microcontrollers and Applications                 | Electronics and Communication Engineering |
| 6                          | A5EC61             | Fundamentals of Image processing                  |   |
| 7                          | A5EE56             | Analysis of Linear Systems                        | Electrical and Electronics Engineering    |
| 8                          | A5EE57             | Neural Networks and Fuzzy Logic                   |   |
| 9                          | A5IT29             | Basics of Python Programming                      | Information Technology                    |
| 10                         | A5IT11             | Human Computer Interaction                        |   |
| 11                         | A5IT31             | Software Testing Fundamentals                     |   |
| 12                         | A5ME73             | Fundamentals of Mechatronics                      | Mechanical Engineering                    |
| 13                         | A5HS09             | Advanced Entrepreneurship                         | MBA                                       |
| <b>OPEN ELECTIVE - III</b> |                    |   |   |
| <b>S. No.</b>              | <b>Course Code</b> | <b>Course Name</b>                                | <b>Offering Department</b>                |
| 1                          | A5AE67             | Unmanned Aerial Vehicles                          | Aeronautical Engineering                  |
| 2                          | A5CS33             | Introduction to Cloud Computing                   | Computer Science and Engineering          |
| 3                          | A5CS34             | Computer Organization and Operating Systems       |   |
| 4                          | A5CS29             | Software Project Management                       |   |
| 5                          | A5EC62             | Introduction to Sensors and Actuators             | Electronics and Communication Engineering |
| 6                          | A5EC63             | Introduction to Computer Vision                   |   |
| 7                          | A5EE60             | Solar Energy and Applications                     | Electrical and Electronics Engineering    |
| 8                          | A5IT34             | Introduction to AI                                | Information Technology                    |
| 9                          | A5ME75             | Basics of Robotics                                | Mechanical Engineering                    |
| 10                         | A5ME76             | Fundamentals of Operation Research                |   |
| 11                         | A5HS10             | Indian Ethos and Business Ethics                  | MBA                                       |

| <b>OPEN ELECTIVE - IV</b> |                    |  |   |
|---------------------------|--------------------|--|---|
| <b>S. No.</b>             | <b>Course Code</b> | <b>Course Name</b>                             | <b>Offering Department</b>                |
| 1                         | A5AE68             | Fundamentals of Wind Power Technology          | Aeronautical Engineering                  |
| 2                         | A5CS20             | Distributed Databases                          | Computer Science and Engineering          |
| 3                         | A5CS35             | Fundamentals of Software Testing               |   |
| 4                         | A5EC64             | Introduction to Mobile Communications          | Electronics and Communication Engineering |
| 5                         | A5EC65             | Basics of Embedded System Design               |   |
| 6                         | A5EE61             | Instrumentation and Control                    | Electrical and Electronics Engineering    |
| 7                         | A5EE63             | Energy Storage Systems                         |   |
| 8                         | A5IT35             | Introduction to Mobile Application Development | Information Technology                    |
| 9                         | A5IT36             | Big Data                                       |   |
| 10                        | A5ME78             | Renewable Energy Sources                       | Mechanical Engineering                    |
| 11                        | A5HS15             | Management Science                             | MBA                                       |
| 12                        | A5HS16             | Intellectual Property Rights                   |   |