

**M.M. INSTITUTE OF COMPUTER TECHNOLOGY & BUSINESS MANAGEMENT  
MAHARISHI MARKANDESHWAR (DEEMED TO BE UNIVERSITY), MULLANA**

(Established under Section 3 of the UGC Act, 1956)  
(Accredited by NAAC with Grade 'A++')

**Scheme of  
Bachelor of Computer Applications**

**BCA – 1<sup>st</sup> Semester**

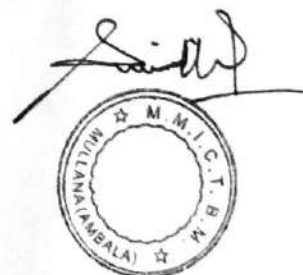
Common with

**BCA-1st Sem. with Specialization in Artificial Intelligence and Machine Learning &**

**BCA-1st Sem. with Specialization in Data Science**

| Sr. No | Course Category            | Course Code | Course Title                           | Teaching Load |          |          | Credits     | Examination Marks |            |           |            |
|--------|----------------------------|-------------|--|---------------|----------|----------|-------------|-------------------|------------|-----------|------------|
|        |                            |             |  | L             | T        | P        |             | Internal          | Theory     | Practical | Total      |
| 1.     | Core                       | BCA-101     | Programming in C                       | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 2.     | Core                       | BCA-102     | Computer Fundamentals & MS Office      | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 3.     | Interdisciplinary          | BCA-103     | Digital Electronics                    | 3             | 1        | -        | 4.0         | 40                | 60         | -         | 100        |
| 4.     | Core                       | BCA-104     | Introduction to Information Technology | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 5.     | Ability Enhancement Course | BHUM - 011  | English                                | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 6.     | Ability Enhancement Course | HSMC- 051   | Universal Human Values                 | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 7.     | Core                       | BCA-105     | C Lab.                                 | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| 8.     | Core                       | BCA-106     | MS Office Lab.                         | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
|        |                            |             | <b>Total</b>                           | <b>19</b>     | <b>1</b> | <b>4</b> | <b>22.0</b> | <b>360</b>        | <b>360</b> | <b>80</b> | <b>800</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.



**BCA – 2<sup>nd</sup> Semester**

Common with

**BCA-2nd Sem. with Specialization in Artificial Intelligence and Machine Learning &****BCA-2nd Sem. with Specialization in Data Science**

| Sr. No. | Course Category            | Course Code                     | Course Title                                    | Teaching Load |          |          | Credits     | Examination Marks |            |           |            |
|---------|----------------------------|---------------------------------|---|---------------|----------|----------|-------------|-------------------|------------|-----------|------------|
|         |                            |                                 |   | L             | T        | P        |             | Internal          | Theory     | Practical | Total      |
| 1.      | Core                       | BCA-201                         | Object Oriented Programming using C++           | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 2.      | Core                       | BCA-202                         | Data Structure                                  | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 3.      | Core                       | BCA-203                         | System Analysis & Design                        | 3             | 1        | -        | 4.0         | 40                | 60         | -         | 100        |
| 4.      | Ability Enhancement Course | BHUM-013/<br>BHUM-117           | Hindi / Essence of Indian Traditional Knowledge | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 5.      | Ability Enhancement Course | EnE-101                         | Environment Education                           | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 6.      | Core                       | BCA-204                         | C++ Lab.  | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| 7.      | Core                       | BCA-205                         | Data Structure Lab.                             | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| 8.      | Skill Enhancement course   | BCA-206                         | Seminar-I                                       | 1             | -        | -        | 1.0         | 100               | -          | -         | 100        |
| 9.      | Activity                   | CUL-001/<br>SPO-001/<br>HLY-001 | Cultural/<br>Sports/<br>Health &<br>Yoga        | -             | -        | 2        | 1.0         | 100               | -          | -         | 100        |
|         |                            |                                 | <b>Total</b>                                    | <b>18</b>     | <b>1</b> | <b>6</b> | <b>22.0</b> | <b>520</b>        | <b>300</b> | <b>80</b> | <b>900</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.



**BCA – 3<sup>rd</sup> Semester**

Common with

**BCA-3<sup>rd</sup> Sem. with Specialization in Artificial Intelligence and Machine Learning &****BCA-3<sup>rd</sup> Sem. with Specialization in Data Science**

| Sr. No       | Course Category | Course Code         | Course Title                    | Teaching Load |          |          | Credits     | Examination Marks |            |            |            |
|--------------|-----------------|---------------------|---------------------------------|---------------|----------|----------|-------------|-------------------|------------|------------|------------|
|              |                 |                     |                                 | L             | T        | P        |             | Internal          | Theory     | Practical  | Total      |
| 1.           | Core            | BCA-301             | Database Management System      | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100        |
| 2.           | Core            | BCA-302             | Web Designing Fundamentals      | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100        |
| 3.           | Core            | BCA-303             | Computer System Architecture    | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100        |
| 4.           | Core            | BCA-304             | Operating System                | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100        |
| 5.           | Core            | BCA-305             | Data Communication & Networking | 4             | -        | -        | 4.0         | 40                | 60         | -          | 100        |
| 6.           | Core            | BCA-306             | DBMS Lab.                       | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100        |
| 7.           | Core            | BCA-307             | Web Designing Lab.              | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100        |
| 8.           | Specialization  | BCA-308             | Project-I                       | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100        |
| 9.           | Activity        | NSS-001/<br>NCC-001 | NSS/ NCC                        | -             | -        | 2        | 1.0         | 100               | -          | -          | 100        |
| <b>Total</b> |                 |                     |                                 | <b>16</b>     | <b>2</b> | <b>8</b> | <b>22.0</b> | <b>480</b>        | <b>300</b> | <b>120</b> | <b>900</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.



**BCA – 4th Semester**

Common with

**BCA-4th Sem. with Specialization in Artificial Intelligence and Machine Learning & BCA-4<sup>th</sup> Sem. with Specialization in Data Science**

| Sr. No.      | Course Category          | Course Code | Course Title               | Teaching Load |          |          | Credits     | Examination Marks |            |            |            |
|--------------|--------------------------|-------------|----------------------------|---------------|----------|----------|-------------|-------------------|------------|------------|------------|
|              |                          |             |                            | L             | T        | P        |             | Internal          | Theory     | Practical  | Total      |
| 1.           | Core                     | BCA-401     | Java Programming           | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100        |
| 2.           | Specialization           | BCA-402     | Python Programming         | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100        |
| 3.           | Core                     | BCA-403     | Mathematical Foundation    | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100        |
| 4.           | Core                     | BCA-404     | Software Engineering       | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100        |
| 5.           | Core                     | BCA-405     | Java Programming Lab.      | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100        |
| 6.           | Specialization           | BCA-406     | Python Programming Lab.    | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100        |
| 7.           | Interdisciplinary        | BHUM-022    | English Communication Lab. | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100        |
| 8.           | Interdisciplinary        | BCIV-180    | Disaster Management        | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100        |
| 9.           | Skill Enhancement Course | MAN-001     | Indian Constitution        | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100        |
| <b>Total</b> |                          |             |                            | <b>18</b>     | <b>1</b> | <b>6</b> | <b>22.0</b> | <b>420</b>        | <b>360</b> | <b>120</b> | <b>900</b> |

**Note:**

1. Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.
2. Students have to undergo a mandatory summer training of 6 weeks after the examinations of 4th semester of 6 credits. If the student want to exit after 2nd year, the viva-voce examination of the training will be held after completion of training otherwise the same will be held in BCA-5th semester.



## BCA – 5<sup>th</sup> Semester

| Sr. No       | Course Category              | Course Code | Course Title                              | Teaching Load |          |          | Credits     | Examination Marks |            |            |             |
|--------------|------------------------------|-------------|---|---------------|----------|----------|-------------|-------------------|------------|------------|-------------|
|              |                              |             |   | L             | T        | P        |             | Internal          | Theory     | Practical  | Total       |
| 1.           | Core                         | BCA-501     | Open Source Programming                   | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 2.           | Specialization               | BCA-502     | Mobile Application Development            | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 3.           | Interdisciplinary            | BCA-503     | Statistical Methods                       | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100         |
| 4.           | Discipline Specific Elective |             | Elective-I                                | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 5.           | Discipline Specific Elective |             | Elective-II                               | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 6.           | Core                         | BCA-504     | Open Source Programming Lab.              | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 7.           | Specialization               | BCA-505     | Mobile Application Development Lab.       | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 8.           | Specialization               | BCA-506     | Project-II                                | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 9.           | Specialization               | BCA-507     | Training viva-voce                        | -             | -        | -        | 6.0         | 60                | -          | 40         | 100         |
| 10.          | Activity                     | BHUM-003    | Entrepreneurship Development & Management | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 11.          | Mandatory Course             | BCT-1       | Cognitive Skills Training - I             | -             | 2        | -        | 2.0         | 100               | -          | -          | 100         |
| <b>Total</b> |                              |             |   | <b>18</b>     | <b>3</b> | <b>6</b> | <b>30.0</b> | <b>580</b>        | <b>360</b> | <b>160</b> | <b>1100</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.

**Student can choose any one of the following electives:**

**Elective – I**

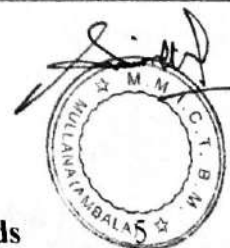
- i) BCA-514: Internet of Things
- ii) BCA-515: E-Commerce
- iii) BCA-516: Software Quality & Testing

**Elective – II**

- i) BCA-508: Artificial Intelligence
- ii) BCA-517: Theory of Computation
- iii) BCA-519: Data Warehousing & Data Mining

OR

| Sr. No.      | Course Category | Course Code | Course Title         | Teaching Load |          |          | Credits     | Examination Marks |          |            |            |
|--------------|-----------------|-------------|----------------------|---------------|----------|----------|-------------|-------------------|----------|------------|------------|
|              |                 |             |                      | L             | T        | P        |             | Internal          | Theory   | Practical  | Total      |
| 1.           | Specialization  | BCA-523     | Industrial Project-I | -             | -        | -        | 30.0        | 100               | -        | 200        | 300        |
| <b>Total</b> |                 |             |                      | <b>-</b>      | <b>-</b> | <b>-</b> | <b>30.0</b> | <b>100</b>        | <b>-</b> | <b>200</b> | <b>300</b> |



## BCA – 6<sup>th</sup> Semester

| Sr. No.      | Course Category              | Course Code                     | Course Title                       | Teaching Load |          |           | Credits     | Examination Marks |            |            |            |
|--------------|------------------------------|---------------------------------|------------------------------------|---------------|----------|-----------|-------------|-------------------|------------|------------|------------|
|              |                              |                                 |                                    | L             | T        | P         |             | Internal          | Theory     | Practical  | Total      |
| 1.           | Core                         | BCA-601                         | R Programming                      | 3             | -        | -         | 3.0         | 40                | 60         | -          | 100        |
| 2.           | Core                         | BCA-602                         | R Programming Lab.                 | -             | -        | 2         | 1.0         | 60                | -          | 40         | 100        |
| 3.           | Specialization               | BCA-603                         | Cloud Computing                    | 3             | -        | -         | 3.0         | 40                | 60         | -          | 100        |
| 4.           | Specialization               | BCA-604                         | Cloud Computing Lab.               | -             | -        | 2         | 1.0         | 60                | -          | 40         | 100        |
| 5.           | Discipline Specific Elective |                                 | Elective-III                       | 3             | -        | -         | 3.0         | 40                | 60         | -          | 100        |
| 6.           | Specialization               | BCA-605                         | Project-III                        | -             | -        | 2         | 1.0         | 60                | -          | 40         | 100        |
| 7.           | Activity                     | CUL-002/<br>SPO-002/<br>HLY-002 | Cultural/ Sports/<br>Health & Yoga | -             | -        | 2         | 1.0         | 100               | -          | -          | 100        |
| 8.           | Mandatory Course             | BCT- II                         | Cognitive Skills Training – II     | -             | -        | 2         | 1.0         | 100               | -          | -          | 100        |
| <b>Total</b> |                              |                                 |                                    | <b>9</b>      | <b>-</b> | <b>10</b> | <b>14.0</b> | <b>500</b>        | <b>180</b> | <b>120</b> | <b>800</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.

**Student can choose any one of the following electives:**

**Elective – III**

- i) BCA-610: Cyber Security
- ii) BCA-611: Computer Graphics
- iii) BCA-612: Software Project Management

OR

| Sr. No.      | Course Category | Course Code | Course Title          | Teaching Load |          |          | Credits     | Examination Marks |          |            |            |
|--------------|-----------------|-------------|-----------------------|---------------|----------|----------|-------------|-------------------|----------|------------|------------|
|              |                 |             |                       | L             | T        | P        |             | Internal          | Theory   | Practical  | Total      |
| 1.           | Specialization  | BCA-613     | Industrial Project-II | -             | -        | -        | 14.0        | 100               | -        | 200        | 300        |
| <b>Total</b> |                 |             |                       | <b>-</b>      | <b>-</b> | <b>-</b> | <b>14.0</b> | <b>100</b>        | <b>-</b> | <b>200</b> | <b>300</b> |



## BCA (AIML) – 5<sup>th</sup> Semester

| Sr. No | Course Category              | Course Code | Course Title                              | Teaching Load |          |          | Credits     | Examination Marks |            |            |             |
|--------|------------------------------|-------------|---|---------------|----------|----------|-------------|-------------------|------------|------------|-------------|
|        |                              |             |   | L             | T        | P        |             | Internal          | Theory     | Practical  | Total       |
| 1.     | Core                         | BCA-501     | Open Source Programming                   | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 2.     | Interdisciplinary            | BCA-503     | Statistical Methods                       | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100         |
| 3.     | Core                         | BCA-504     | Open Source Programming Lab.              | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 4.     | Discipline Specific Elective |             | Elective-I                                | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 5.     | Discipline Specific Elective |             | Elective-II                               | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 6.     | Specialization               | BCA-506     | Project-II                                | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 7.     | Specialization               | BCA-507     | Training viva-voce                        | -             | -        | -        | 6.0         | 60                | -          | 40         | 100         |
| 8.     | Specialization               | BCA-508     | Artificial Intelligence                   | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 9.     | Specialization               | BCA-509     | Artificial Intelligence Lab.              | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 10.    | Activity                     | BHUM-003    | Entrepreneurship Development & Management | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 11.    | Mandatory Course             | BCT- I      | Cognitive Skills Training - I             | -             | 2        | -        | 2.0         | 100               | -          | -          | 100         |
|        |                              |             | <b>Total</b>                              | <b>18</b>     | <b>3</b> | <b>6</b> | <b>30.0</b> | <b>580</b>        | <b>360</b> | <b>160</b> | <b>1100</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.

**Student can choose any one of the following electives:**

### **Elective – I**

- i) BCA-514: Internet of Things
- ii) BCA-517: Theory of Computation
- iii) BCA-518: Neural Networks and Fuzzy Logic

### **Elective – II**

- i) BCA-519: Data Warehousing & Data Mining
- ii) BCA-520: Soft Computing
- iii) BCA-521: Natural Language Processing

**OR**

| Sr. No. | Course Category | Course Code | Course Title         | Teaching Load |          |          | Credits     | Examination Marks |          |            |            |
|---------|-----------------|-------------|----------------------|---------------|----------|----------|-------------|-------------------|----------|------------|------------|
|         |                 |             |                      | L             | T        | P        |             | Internal          | Theory   | Practical  | Total      |
| 1.      | Specialization  | BCA-523     | Industrial Project-I | -             | -        | -        | 30.0        | 100               | -        | 200        | 300        |
|         |                 |             | <b>Total</b>         | <b>-</b>      | <b>-</b> | <b>-</b> | <b>30.0</b> | <b>100</b>        | <b>-</b> | <b>200</b> | <b>300</b> |



## BCA (AIML) – 6<sup>th</sup> Semester

| Sr. No.      | Course Category              | Course Code                     | Course Title                       | Teaching Load |          |           | Credits     | Examination Marks |            |            |            |
|--------------|------------------------------|---------------------------------|------------------------------------|---------------|----------|-----------|-------------|-------------------|------------|------------|------------|
|              |                              |                                 |                                    | L             | T        | P         |             | Internal          | Theory     | Practical  | Total      |
| 1.           | Core                         | BCA-601                         | R Programming                      | 3             | -        | -         | 3.0         | 40                | 60         | -          | 100        |
| 2.           | Core                         | BCA-602                         | R Programming Lab.                 | -             | -        | 2         | 1.0         | 60                | -          | 40         | 100        |
| 3.           | Discipline Specific Elective |                                 | Elective-III                       | 3             | -        | -         | 3.0         | 40                | 60         | -          | 100        |
| 4.           | Specialization               | BCA-605                         | Project-III                        | -             | -        | 2         | 1.0         | 60                | -          | 40         | 100        |
| 5.           | Specialization               | BCA-606                         | Machine Learning                   | 3             | -        | -         | 3.0         | 40                | 60         | -          | 100        |
| 6.           | Specialization               | BCA-607                         | Machine Learning Lab.              | -             | -        | 2         | 1.0         | 60                | -          | 40         | 100        |
| 7.           | Activity                     | CUL-002/<br>SPO-002/<br>HLY-002 | Cultural/ Sports/<br>Health & Yoga | -             | -        | 2         | 1.0         | 100               | -          | -          | 100        |
| 8.           | Mandatory Course             | BCT- II                         | Cognitive Skills Training – II     | -             | -        | 2         | 1.0         | 100               | -          | -          | 100        |
| <b>Total</b> |                              |                                 |                                    | <b>9</b>      | <b>-</b> | <b>10</b> | <b>14.0</b> | <b>500</b>        | <b>180</b> | <b>120</b> | <b>800</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.

**Student can choose any one of the following electives:**

**Elective – III**

- i) BCA-603: Cloud Computing
- ii) BCA-608: Data Visualization
- iii) BCA-610: Cyber Security

OR

| Sr. No.      | Course Category | Course Code | Course Title          | Teaching Load |          |          | Credits     | Examination Marks |          |            |            |
|--------------|-----------------|-------------|-----------------------|---------------|----------|----------|-------------|-------------------|----------|------------|------------|
|              |                 |             |                       | L             | T        | P        |             | Internal          | Theory   | Practical  | Total      |
| 1.           | Specialization  | BCA-613     | Industrial Project-II | -             | -        | -        | 14.0        | 100               | -        | 200        | 300        |
| <b>Total</b> |                 |             |                       | <b>-</b>      | <b>-</b> | <b>-</b> | <b>14.0</b> | <b>100</b>        | <b>-</b> | <b>200</b> | <b>300</b> |



## BCA (DS) – 5<sup>th</sup> Semester

| Sr. No | Course Category              | Course Code | Course Title                              | Teaching Load |          |          | Credits     | Examination Marks |            |            |             |
|--------|------------------------------|-------------|---|---------------|----------|----------|-------------|-------------------|------------|------------|-------------|
|        |                              |             |   | L             | T        | P        |             | Internal          | Theory     | Practical  | Total       |
| 1.     | Interdisciplinary            | BCA-503     | Statistical Methods                       | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100         |
| 2.     | Specialization               | BCA-506     | Project-II                                | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 3.     | Specialization               | BCA-507     | Training viva-voce                        | -             | -        | -        | 6.0         | 60                | -          | 40         | 100         |
| 4.     | Discipline Specific Elective |             | Elective-I                                | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 5.     | Discipline Specific Elective |             | Elective-II                               | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100         |
| 6.     | Specialization               | BCA-510     | Big Data Analytics                        | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 7.     | Specialization               | BCA-511     | Big Data Analytics Lab.                   | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 8.     | Specialization               | BCA-512     | Data Science                              | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 9.     | Specialization               | BCA-513     | Data Science Lab.                         | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 10.    | Activity                     | BHUM - 003  | Entrepreneurship Development & Management | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100         |
| 11.    | Mandatory Course             | BCT- I      | Cognitive Skills Training - I             | -             | -        | 2        | 0.0         | 60                | -          | 40         | 100         |
|        |                              |             | <b>Total</b>                              | <b>18</b>     | <b>3</b> | <b>8</b> | <b>30.0</b> | <b>540</b>        | <b>360</b> | <b>200</b> | <b>1100</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.

### Student can choose any one of the following electives:

#### Elective – I

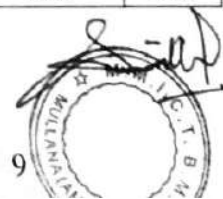
- i) BCA-514: Internet of Things
- ii) BCA-515: E-Commerce
- iii) BCA-516: Software Quality & Testing

#### Elective – II

- i) BCA-519: Data Warehousing & Data Mining
- ii) BCA-520: Soft Computing
- iii) BCA-522: NoSQL Database

OR

| Sr. No. | Course Category | Course Code | Course Title         | Teaching Load |          |          | Credits     | Examination Marks |          |            |            |
|---------|-----------------|-------------|----------------------|---------------|----------|----------|-------------|-------------------|----------|------------|------------|
|         |                 |             |                      | L             | T        | P        |             | Internal          | Theory   | Practical  | Total      |
| 1.      | Specialization  | BCA-523     | Industrial Project-I | -             | -        | -        | 30.0        | 100               | -        | 200        | 300        |
|         |                 |             | <b>Total</b>         | <b>-</b>      | <b>-</b> | <b>-</b> | <b>30.0</b> | <b>100</b>        | <b>-</b> | <b>200</b> | <b>300</b> |



## BCA (DS) – 6<sup>th</sup> Semester

| Sr. No.      | Course Category              | Course Code                     | Course Title                             | Teaching Load |          |           | Credits     | Examination Marks |            |            |            |
|--------------|------------------------------|---------------------------------|--|---------------|----------|-----------|-------------|-------------------|------------|------------|------------|
|              |                              |                                 |  | L             | T        | P         |             | Internal          | Theory     | Practical  | Total      |
| 1.           | Core                         | BCA-601                         | R Programming                            | 3             | -        | -         | 3.0         | 40                | 60         | -          | 100        |
| 2.           | Core                         | BCA-602                         | R Programming Lab.                       | -             | -        | 2         | 1.0         | 60                | -          | 40         | 100        |
| 3.           | Discipline Specific Elective |                                 | Elective-III                             | 3             | 1        | -         | 4.0         | 40                | 60         | -          | 100        |
| 4.           | Specialization               | BCA-605                         | Project-III                              | -             | -        | 2         | 1.0         | 60                | -          | 40         | 100        |
| 5.           | Specialization               | BCA-608                         | Data Visualization                       | 3             | -        | -         | 3.0         | 40                | 60         | -          | 100        |
| 6.           | Specialization               | BCA-609                         | Data Visualization Lab.                  | -             | -        | 2         | 1.0         | 60                | -          | 40         | 100        |
| 7.           | Activity                     | CUL-002/<br>SPO-002/<br>HLY-002 | Cultural/<br>Sports/<br>Health &<br>Yoga | -             | -        | 2         | 1.0         | 100               | -          | -          | 100        |
| 8.           | Mandatory Course             | BCT- II                         | Cognitive Skills Training - II           | -             | -        | 2         | 0.0         | 60                | -          | 40         | 100        |
| <b>Total</b> |                              |                                 |  | <b>9</b>      | <b>1</b> | <b>10</b> | <b>14.0</b> | <b>460</b>        | <b>180</b> | <b>160</b> | <b>800</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.

**Student can choose any one of the following electives:**

**Elective – III**

- i) BCA-603: Cloud Computing
- ii) BCA-608: Data Visualization
- iii) BCA-610: Cyber Security

**OR**

| Sr. No.      | Course Category | Course Code | Course Title          | Teaching Load |          |          | Credits     | Examination Marks |          |            |            |
|--------------|-----------------|-------------|-----------------------|---------------|----------|----------|-------------|-------------------|----------|------------|------------|
|              |                 |             |                       | L             | T        | P        |             | Internal          | Theory   | Practical  | Total      |
| 1.           | Specialization  | BCA-613     | Industrial Project-II | -             | -        | -        | 14.0        | 100               | -        | 200        | 300        |
| <b>Total</b> |                 |             |                       | <b>-</b>      | <b>-</b> | <b>-</b> | <b>14.0</b> | <b>100</b>        | <b>-</b> | <b>200</b> | <b>300</b> |



**M.M. INSTITUTE OF COMPUTER TECHNOLOGY & BUSINESS MANAGEMENT  
MAHARISHI MARKANDESHWAR (DEEMED TO BE UNIVERSITY), MULLANA**

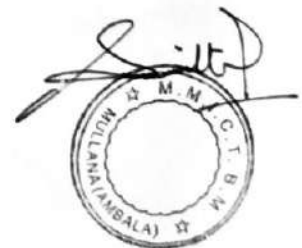
(Established under Section 3 of the UGC Act, 1956)  
(Accredited by NAAC with Grade 'A++')

**Scheme of  
Bachelor of Science (Artificial Intelligence & Machine Learning)**

**B.Sc (AIML) – 1<sup>st</sup> Semester**

| Sr. No.      | Course Category            | Course Code | Course Title                           | Teaching Load |          |          | Credits     | Examination Marks |            |           |            |
|--------------|----------------------------|-------------|--|---------------|----------|----------|-------------|-------------------|------------|-----------|------------|
|              |                            |             |  | L             | T        | P        |             | Internal          | Theory     | Practical | Total      |
| 1.           | Core                       | BCA-101     | Problem Solving using C                | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 2.           | Core                       | BCA-102     | Computer Fundamentals & MS Office      | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 3.           | Specialization             | BSC-111     | Foundation of Artificial Intelligence  | 3             | 1        | -        | 4.0         | 40                | 60         | -         | 100        |
| 4.           | Core                       | BCA-104     | Introduction to Information Technology | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 5.           | Ability Enhancement Course | BHUM - 011  | English                                | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 6.           | Ability Enhancement Course | HSMC- 051   | Universal Human Values                 | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 7.           | Core                       | BCA-105     | C Lab.                                 | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| 8.           | Core                       | BCA-106     | MS Office Lab.                         | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| <b>Total</b> |                            |             |  | <b>19</b>     | <b>1</b> | <b>4</b> | <b>22.0</b> | <b>360</b>        | <b>360</b> | <b>80</b> | <b>800</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.



## B.Sc (AIML) – 2<sup>nd</sup> Semester

| Sr. No.      | Course Category            | Course Code                     | Course Title                          | Teaching Load |          |          | Credits     | Examination Marks |            |           |            |
|--------------|----------------------------|---------------------------------|---------------------------------------|---------------|----------|----------|-------------|-------------------|------------|-----------|------------|
|              |                            |                                 |                                       |               |          |          |             | Internal          | Theory     | Practical | Total      |
| 1.           | Core                       | BCA-201                         | Object Oriented Programming using C++ | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 2.           | Core                       | BCA-202                         | Data Structure                        | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 3.           | Interdisciplinary          | BSC-201                         | Elementary Mathematics-I              | 3             | 1        | -        | 4.0         | 40                | 60         | -         | 100        |
| 4.           | Specialization             | BSC-211                         | Foundation of Machine Learning        | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 5.           | Ability Enhancement Course | EnE-101                         | Environment Education                 | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 6.           | Core                       | BCA-204                         | C++ Lab.                              | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| 7.           | Core                       | BCA-205                         | Data Structure Lab.                   | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| 8.           | General                    | BCA-206                         | Seminar-I                             | 1             | -        | -        | 1.0         | 100               | -          | -         | 100        |
| 9.           | Activity                   | CUL-001/<br>SPO-001/<br>HLY-001 | Cultural/<br>Sports/ Health<br>& Yoga | -             | -        | 2        | 1.0         | 100               | -          | -         | 100        |
| <b>Total</b> |                            |                                 |                                       | <b>18</b>     | <b>1</b> | <b>6</b> | <b>22.0</b> | <b>520</b>        | <b>300</b> | <b>80</b> | <b>900</b> |

### Note:

1. Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.
2. If the student wants to exit after 1<sup>st</sup> year, he/she will be eligible to get the Under Graduate Certificate in Computer Applications after completing the mandatory summer training of 6 weeks of 6 credits.



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(Established under Section 3 of the UGC Act, 1956)

(Accredited by NAAC with Grade 'A++')

**Scheme of  
Bachelor of Science (Programming & Data Science)**

**B.Sc (PDS) – 1<sup>st</sup> Semester**

| Sr. No. | Course Category            | Course Code | Course Title                           | Teaching Load |          |          | Credits     | Examination Marks |            |           |            |
|---------|----------------------------|-------------|--|---------------|----------|----------|-------------|-------------------|------------|-----------|------------|
|         |                            |             |  | L             | T        | P        |             | Internal          | Theory     | Practical | Total      |
| 1.      | Core                       | BCA-101     | Problem Solving using C                | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 2.      | Core                       | BCA-102     | Computer Fundamentals & MS Office      | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 3.      | Specialization             | BSC-101     | Principles of Programming Languages    | 3             | 1        | -        | 4.0         | 40                | 60         | -         | 100        |
| 4.      | Core                       | BCA-104     | Introduction to Information Technology | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 5.      | Ability Enhancement Course | BHUM - 011  | English                                | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 6.      | Ability Enhancement Course | HSMC-051    | Universal Human Values                 | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 7.      | Core                       | BCA-105     | C Lab.                                 | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| 8.      | Core                       | BCA-106     | MS Office Lab.                         | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
|         |                            |             | <b>Total</b>                           | <b>19</b>     | <b>1</b> | <b>4</b> | <b>22.0</b> | <b>360</b>        | <b>360</b> | <b>80</b> | <b>800</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.



**B.Sc (PDS) – 2<sup>nd</sup> Semester**

| Sr. No.      | Course Category            | Course Code                     | Course Title                          | Teaching Load |          |          | Credits     | Examination Marks |            |           |            |
|--------------|----------------------------|---------------------------------|---------------------------------------|---------------|----------|----------|-------------|-------------------|------------|-----------|------------|
|              |                            |                                 |                                       |               |          |          |             | Internal          | Theory     | Practical | Total      |
| 1.           | Core                       | BCA-201                         | Object Oriented Programming using C++ | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 2.           | Core                       | BCA-202                         | Data Structure                        | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 3.           | Interdisciplinary          | BSC-201                         | Elementary Mathematics-I              | 3             | 1        | -        | 4.0         | 40                | 60         | -         | 100        |
| 4.           | Specialization             | BSC-202                         | Foundation of Data Science            | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 5.           | Ability Enhancement Course | EnE-101                         | Environment Education                 | 3             | -        | -        | 3.0         | 40                | 60         | -         | 100        |
| 6.           | Core                       | BCA-204                         | C++ Lab.                              | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| 7.           | Core                       | BCA-205                         | Data Structure Lab.                   | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| 8.           | General                    | BCA-206                         | Seminar-I                             | 1             | -        | -        | 1.0         | 100               | -          | -         | 100        |
| 9.           | Activity                   | CUL-001/<br>SPO-001/<br>HLY-001 | Cultural/<br>Sports/ Health<br>& Yoga | -             | -        | 2        | 1.0         | 100               | -          | -         | 100        |
| <b>Total</b> |                            |                                 |                                       | <b>18</b>     | <b>1</b> | <b>6</b> | <b>22.0</b> | <b>520</b>        | <b>300</b> | <b>80</b> | <b>900</b> |

**Note:**

1. Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits and course category of the replaced subject.
2. If the student wants to exit after 1<sup>st</sup> year, he/she will be eligible to get the Under Graduate Certificate in Computer Applications after completing the mandatory summer training of 6 weeks of 6 credits.



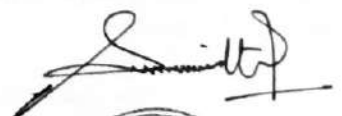
**M.M. INSTITUTE OF COMPUTER TECHNOLOGY & BUSINESS MANAGEMENT**  
**MAHARISHI MARKANDESHWAR (DEEMED TO BE UNIVERSITY), MULLANA**  
**(Accredited by NAAC with Grade 'A++')**

**MCA – 1<sup>st</sup> Semester**

| Sr. No.      | Course Category           | Course Code | Course Title                               | Teaching Load |          |          | Credits     | Examinational Marks |            |            |            |
|--------------|---------------------------|-------------|--|---------------|----------|----------|-------------|---------------------|------------|------------|------------|
|              |                           |             |  | L             | T        | P        |             | Internal            | Theory     | Practical  | Total      |
| 1.           | Core                      | MCA-101     | Data Structure using C++                   | 4             | -        | -        | 4.0         | 40                  | 60         | -          | 100        |
| 2.           | Core                      | MCA-102     | Advanced Database Management System        | 4             | -        | -        | 4.0         | 40                  | 60         | -          | 100        |
| 3.           | Core                      | MCA-103     | Operating System                           | 3             | 1        | -        | 4.0         | 40                  | 60         | -          | 100        |
| 4.           | Core                      | MCA-104     | Software Engineering                       | 3             | 1        | -        | 4.0         | 40                  | 60         | -          | 100        |
| 5.           | Core                      | MCA-105     | Business Intelligence and its Applications | 4             | -        | -        | 4.0         | 40                  | 60         | -          | 100        |
| 6.           | Core                      | MCA-106     | Data Structure using C++ Lab.              | -             | -        | 2        | 1.0         | 60                  | -          | 40         | 100        |
| 7.           | Core                      | MCA-107     | Advanced Database Management System Lab.   | -             | -        | 2        | 1.0         | 60                  | -          | 40         | 100        |
| 8.           | Skill Enhance ment Course | MCA-108     | Seminar-I                                  | 1             | -        | -        | 1.0         | 100                 | -          | -          | 100        |
| 9.           | Mandatory Course          | MCT-I       | Career Skills Training-I                   | -             | -        | 2        | 0.0         | 60                  | -          | 40         | 100        |
| <b>Total</b> |                           |             |  | <b>19</b>     | <b>2</b> | <b>6</b> | <b>23.0</b> | <b>480</b>          | <b>300</b> | <b>120</b> | <b>900</b> |

| Sr. No. | Course Category | Course Code | Course Title                         | Teaching Load |   |   | Credits | Examinational Marks |        |           |       |
|---------|-----------------|-------------|--------------------------------------|---------------|---|---|---------|---------------------|--------|-----------|-------|
|         |                 |             |                                      | L             | T | P |         | Internal            | Theory | Practical | Total |
| 1.      | Bridge Course*  | MCA-B101    | Computer Fundamentals and Web Design | 3             | - | - | -       | 40                  | 60     | -         | 100   |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits of the replaced subject.




## MCA – 2<sup>nd</sup> Semester

| Sr. No.      | Course Category          | Course Code | Course Title                                | Teaching Load |          |          | Credits     | Examination Marks |            |            |            |
|--------------|--------------------------|-------------|---|---------------|----------|----------|-------------|-------------------|------------|------------|------------|
|              |                          |             |   | L             | T        | P        |             | Internal          | Theory     | Practical  | Total      |
| 1.           | Core                     | MCA-201     | Object Oriented Programming using Java      | 4             | -        | -        | 4.0         | 40                | 60         | -          | 100        |
| 2.           | Skill Enhancement Course | MCA-202     | Web Technologies                            | 4             | -        | -        | 4.0         | 40                | 60         | -          | 100        |
| 3.           | Core                     | MCA-203     | Data Communication & Networking             | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100        |
| 4.           | Core                     | MCA-204     | Software Testing and Quality Assurance      | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100        |
| 5.           | General                  | MCA-205     | Digital Marketing                           | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100        |
| 6.           | Core                     | MCA-206     | Object Oriented Programming using Java Lab. | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100        |
| 7.           | Skill Enhancement Course | MCA-207     | Web Technologies Lab.                       | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100        |
| 8.           | Specialization           | MCA-208     | Project-I                                   | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100        |
| 9.           | Mandatory Course         | MCT-II      | Career Skills Training-II                   | -             | -        | 2        | 0.0         | 60                | -          | 40         | 100        |
| <b>Total</b> |                          |             |   | <b>17</b>     | <b>2</b> | <b>8</b> | <b>22.0</b> | <b>440</b>        | <b>300</b> | <b>160</b> | <b>900</b> |

| Sr. No. | Course Category | Course Code | Course Title                      | Teaching Load |   |   | Credits | Examination Marks |        |           |       |
|---------|-----------------|-------------|-----------------------------------|---------------|---|---|---------|-------------------|--------|-----------|-------|
|         |                 |             |                                   | L             | T | P |         | Internal          | Theory | Practical | Total |
| 1.      | Bridge Course*  | MCA-B201    | Logical Organization of Computers | 3             | - | - | -       | 40                | 60     | -         | 100   |
| 2.      | Bridge Course*  | MCA-B202    | Fundamentals of Mathematics       | 3             | 1 | - | -       | 40                | 60     | -         | 100   |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits of the replaced subject.

\* Bridge course is only for the students having no Mathematics or Computer background. Students are required to qualify these courses also. These courses will be of qualifying in nature and shall not be considered towards semester total of marks.

**Note:** All the students have to undergo a mandatory industry internship of 6-weeks after MCA-2<sup>nd</sup> semester examinations. A report shall be submitted to the institute by every student at the completion of the internship. The presentation/ viva-voce examination of the industry internship will be held during MCA-3<sup>rd</sup> semester.

*[Signature]*



## MCA – 3<sup>rd</sup> Semester

| Sr. No.      | Course Category          | Course Code | Course Title                   | Teaching Load |          |          | Credits     | Examination Marks |            |            |             |
|--------------|--------------------------|-------------|--------------------------------|---------------|----------|----------|-------------|-------------------|------------|------------|-------------|
|              |                          |             |                                | L             | T        | P        |             | Internal          | Theory     | Practical  | Total       |
| 1.           | Core                     | MCA-301     | Programming with Python        | 4             | -        | -        | 4.0         | 40                | 60         | -          | 100         |
| 2.           | Core                     | MCA-302     | Cloud Computing                | 4             | -        | -        | 4.0         | 40                | 60         | -          | 100         |
| 3.           | Core                     | MCA-303     | Advanced Computer Architecture | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100         |
| 4.           | Specialization           | MCA-304     | Elective – I                   | 3             | -        | -        | 3.0         | 40                | 60         | -          | 100         |
| 5.           | Specialization           | MCA-305     | Elective – II                  | 3             | 1        | -        | 4.0         | 40                | 60         | -          | 100         |
| 6.           | Core                     | MCA-306     | Programming with Python Lab.   | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 7.           | Core                     | MCA-307     | Cloud Computing Lab.           | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 8.           | Specialization           | MCA-308     | Lab. based on Elective – I     | -             | -        | 2        | 1.0         | 60                | -          | 40         | 100         |
| 9.           | Skill Enhancement Course | MCA-309     | Industry Internship Viva-Voce  | -             | -        | -        | 4.0         | 60                | -          | 40         | 100         |
| 10.          | Mandatory Course         | MCT-III     | Career Skills Training –III    | -             | -        | 2        | 0.0         | 60                | -          | 40         | 100         |
| <b>Total</b> |                          |             |                                | <b>17</b>     | <b>2</b> | <b>8</b> | <b>26.0</b> | <b>500</b>        | <b>300</b> | <b>200</b> | <b>1000</b> |

**Note:** Student can replace two subjects in a semester from the MOOC courses (SWAYAM) with the same credits of the replaced subject.

**Students can choose any one of the following elective for MCA-304 and MCA-305:**

**Elective – I**

- i) MCA-304 (a): Advanced Java Programming
- ii) MCA-304 (b): Mobile Application Development
- iii) MCA-304 (c): NoSQL Database

**Elective – II**

- i) MCA-305 (a): Artificial Intelligence
- ii) MCA-305 (b): Software Project Management
- iii) MCA-305 (c): Cryptography & Network Security




## MCA – 4<sup>th</sup> Semester

| Sr. No. | Course Category          | Course Code | Course Title                            | Teaching Load |   |   | Credits     | Examination Marks |        |            |            |
|---------|--------------------------|-------------|---|---------------|---|---|-------------|-------------------|--------|------------|------------|
|         |                          |             |   | L             | T | P |             | Internal          | Theory | Practical  | Total      |
| 1.      | Skill Enhancement Course | MCA-401     | Industrial Project                      | -             | - | - | 16.0        | 100               | -      | 300        | 400        |
| 2.      | General                  | MCA-402     | General Fitness & Professional Aptitude | -             | - | - | 4.0         | -                 | -      | -          | 200        |
|         |                          |             | <b>Total</b>                            | -             | - | - | <b>20.0</b> | <b>100</b>        | -      | <b>300</b> | <b>600</b> |

**OR**

| Sr. No. | Course Category | Course Code | Course Title                            | Teaching Load |          |          | Credits     | Examination Marks |            |           |            |
|---------|-----------------|-------------|---|---------------|----------|----------|-------------|-------------------|------------|-----------|------------|
|         |                 |             |   | L             | T        | P        |             | Internal          | Theory     | Practical | Total      |
| 1.      | Specialization  | MCA-401     | Machine Learning                        | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 2.      | Specialization  | MCA-402     | Open Source Technologies using PHP      | 4             | -        | -        | 4.0         | 40                | 60         | -         | 100        |
| 3.      | Specialization  | MCA-403     | Elective – III                          | 4             | 1        | -        | 5.0         | 40                | 60         | -         | 100        |
| 4.      | Specialization  | MCA-404     | Elective – IV                           | 4             | 1        | -        | 5.0         | 40                | 60         | -         | 100        |
| 5.      | Specialization  | MCA-405     | Open Source Technologies using PHP Lab. | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
| 6.      | Specialization  | MCA-406     | Project-II                              | -             | -        | 2        | 1.0         | 60                | -          | 40        | 100        |
|         |                 |             | <b>Total</b>                            | <b>16</b>     | <b>2</b> | <b>4</b> | <b>20.0</b> | <b>280</b>        | <b>240</b> | <b>80</b> | <b>600</b> |

**Students can choose any one of the following elective for MCA-403 and MCA-404:**

### **Elective – III**

- i) MCA-403 (a): Blockchain Technology
- ii) MCA-403 (b): Computer Graphics
- iii) MCA-403 (c): Design and Analysis of Algorithms

### **Elective – IV**

- i) MCA-404 (a): Big Data
- ii) MCA-404 (b): Data Mining and Warehousing
- iii) MCA-404 (c): Internet of Things

