

*Progressive Education Society's*  
**Modern College of Arts, Science and Commerce (Autonomous),  
Shivajinagar, Pune 5**

**(An Autonomous College Affiliated to Savitribai Phule Pune University)**

## **Framework of Syllabus**

**For**

**B. Sc. (Computer Science)**

(Based on NEP 2020 framework)

(To be implemented from 2023-24)

## Semester 1 (First Year)

| Course Type                    | Course                           | Subject Code                | Course / Paper Title                                            | Hours / Week | Credit    | CIA        | ESE        | Total      |
|--------------------------------|----------------------------------|-----------------------------|-----------------------------------------------------------------|--------------|-----------|------------|------------|------------|
| <b>Major Mandatory (4 + 2)</b> | Major Paper 1 (Theory) Section 1 | 23CsCmpU1101                | <b>Programming in 'C' and Database Concepts</b>                 | 2            | 4         | 40         | 60         | 100        |
|                                | Major Paper 1 (Theory) Section 2 |                             |                                                                 | 2            |           |            |            |            |
|                                | Major Paper 2 (Practical)        | 23CsCmpU1102                | <b>Lab Course on 23CsCmpU1101</b>                               | 4            | 2         | 20         | 30         | 50         |
| <b>Major Electives</b>         | —                                |                             |                                                                 |              |           |            |            |            |
| <b>Minor</b>                   | —                                |                             |                                                                 |              |           |            |            |            |
| <b>OE (2+2)</b>                | Theory                           | 23CsCopU1401                | <b>Computer Fundamentals</b>                                    | 2            | 4         | 40         | 60         | 100        |
|                                |                                  | 23CpCopU1402                | Democracy, Election and Governance                              | 2            |           |            |            |            |
| <b>VSC (2)</b>                 | Major Specific Practical I       | 23CsEleU1501                | <b>Lab Course on Basic Analog &amp; Digital Electronics</b>     | 4            | 2         | 20         | 30         | 50         |
| <b>SEC (2)</b>                 | Skill Paper 1 (Practical)        | 23CsStaU1601                | <b>Lab Course on Statistical analysis using R programming I</b> | 4            | 2         | 20         | 30         | 50         |
| <b>AEC(2)</b>                  | MIL                              | 23CpCopU1701 / 23CpCopU1702 | MIL-I (Hindi ) / MIL-I (Marathi)                                | 2            | 2         | 20         | 30         | 50         |
| <b>VEC (2)</b>                 | EVS Theory                       | 23CpCopU1801                | Environment Science I                                           | 2            | 2         | 20         | 30         | 50         |
| <b>IKS (2)</b>                 | Generik IKS                      | 23CpCopU1901                | <b>Generic IKS</b>                                              | 2            | 2         | 20         | 30         | 50         |
| <b>CC (2)</b>                  | CC-I Course                      | 23CpCopU1001                | Online Course Based on Yoga                                     | 2            | 2         | 20         | 30         | 50         |
| <b>Total</b>                   |                                  |                             |                                                                 | <b>28</b>    | <b>22</b> | <b>220</b> | <b>330</b> | <b>550</b> |

## Semester 2 (First Year)

| Course Type                    | Course                           | Subject Code                                                                                                                               | Course / Paper Title                                                                                                                 | Hours / Week | Credit    | CIA        | ESE        | Total      |
|--------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|------------|------------|------------|
| <b>Major Mandatory (4 + 2)</b> | Major Paper 3 (Theory) Section 1 | 23CsCmpU2101                                                                                                                               | <b>Advanced 'C' Programming &amp; Advanced Database Concepts</b>                                                                     | 2            | 4         | 40         | 60         | 100        |
|                                | Major Paper 3 (Theory) Section 2 |                                                                                                                                            |                                                                                                                                      | 2            |           |            |            |            |
|                                | Major Paper 4 (Practical)        | 23CsCmpU2102                                                                                                                               | <b>Lab Course on 23CsCmpU2101</b>                                                                                                    | 4            | 2         | 20         | 30         | 50         |
| <b>Major Electives</b>         | —                                |                                                                                                                                            |                                                                                                                                      |              |           |            |            |            |
| <b>Minor(2)</b>                | Minor Paper I (Practical)        | 23CsMatU2301                                                                                                                               | <b>Lab Course on Applied Sciences –I (Numerical Methods Using C)</b>                                                                 | 4            | 2         | 20         | 30         | 50         |
| <b>OE (2+2)</b>                | Theory                           | 23CsCopU2401                                                                                                                               | <b>Digital Marketing</b>                                                                                                             | 2            | 4         | 40         | 60         | 100        |
|                                |                                  | 23CpCopU2402                                                                                                                               | Fundamentals of Music                                                                                                                | 2            |           |            |            |            |
| <b>VSC (2)</b>                 | Major Specific Practical II      | 23CsCmpU2501                                                                                                                               | <b>Lab Course on Scripting Languages</b>                                                                                             | 4            | 2         | 20         | 30         | 50         |
| <b>SEC (2)</b>                 | Skill Paper II (Practical)       | 23CsStaU2601                                                                                                                               | <b>Lab Course on Statistical analysis using R programming II</b>                                                                     | 4            | 2         | 20         | 30         | 50         |
| <b>AEC(2)</b>                  | English Theory                   | 23CpCopU2703                                                                                                                               | English Communication Skills I                                                                                                       | 2            | 2         | 20         | 30         | 50         |
| <b>VEC (2)</b>                 | EVS Theory                       | 23CpCopU2801                                                                                                                               | Environment Science II                                                                                                               | 2            | 2         | 20         | 30         | 50         |
| <b>IKS (2)</b>                 | —                                |                                                                                                                                            |                                                                                                                                      |              |           |            |            |            |
| <b>CC (2)</b>                  | CC-II Course                     | 23CpCopU2001 /<br>23CpCopU2011 /<br>23CpCopU2021 /<br>23CpCopU2031 /<br>23CpCopU2041 /<br>23CpCopU2051 /<br>23CpCopU2061 /<br>23CpCopU2071 | Physical Education /<br>Cultural Activities /<br>NSS /<br>NCC /<br>Fine Arts /<br>Applied Arts /<br>Visual Arts /<br>Performing Arts | 2            | 2         | 20         | 30         | 50         |
| <b>Total</b>                   |                                  |                                                                                                                                            |                                                                                                                                      | <b>30</b>    | <b>22</b> | <b>220</b> | <b>330</b> | <b>550</b> |

### Semester 3 (Second Year)

| Course Type                    | Course                                          | Subject Code | Course / Paper Title                                            | Hours / Week | Credit    | CIA        | ESE        | Total      |
|--------------------------------|-------------------------------------------------|--------------|-----------------------------------------------------------------|--------------|-----------|------------|------------|------------|
| <b>Major Mandatory (2 * 4)</b> | Major Paper 5<br>Section 1 (Theory + Practical) | 23CsCmpU3101 | Data Structures (T + P)                                         | 2            | 4         | 40         | 60         | 100        |
|                                |                                                 |              |                                                                 | 4            |           |            |            |            |
|                                | Major Paper 6<br>Section 1 (Theory)             | 23CsCmpU3102 | Computer Networks                                               | 2            | 2         | 20         | 30         | 50         |
|                                | Major Paper 7<br>(Theory) (Major Specific IKS)  | 23CsCopU1901 | Vedic Maths and Computer Fundamentals                           | 2            | 2         | 20         | 30         | 50         |
| <b>Major Electives</b>         | –                                               |              |                                                                 |              |           |            |            |            |
| <b>Minor (4)</b>               | Minor Paper II<br>(Theory + Practical)          | 23CsMatU3301 | Lab Course on Applied Sciences –II Discrete Mathematics (T + P) | 2            | 4         | 40         | 60         | 100        |
|                                |                                                 |              |                                                                 | 4            |           |            |            |            |
| <b>OE (2)</b>                  | Theory                                          | 23CsCopU3401 | Cyber Security                                                  | 2            | 2         | 20         | 30         | 50         |
| <b>VSC (2)</b>                 | Major Specific Practical III                    | 23CsCmpU3501 | Lab Course on Python Programming                                | 4            | 2         | 20         | 30         | 50         |
| <b>SEC (2)</b>                 | –                                               |              |                                                                 |              |           |            |            |            |
| <b>AEC(2)</b>                  | English Theory                                  | 23CpCopU3703 | English Communication Skills II                                 | 2            | 2         | 20         | 30         | 50         |
| <b>VEC (2)</b>                 | –                                               |              |                                                                 |              |           |            |            |            |
| <b>IKS (2)</b>                 | –                                               |              |                                                                 |              |           |            |            |            |
| <b>FP/CEP (2)</b>              | FP –I                                           | 23CsCmpU3002 | Field Project I                                                 | 4            | 2         | 20         | 30         | 50         |
| <b>CC(2)</b>                   | CC-III                                          | 23CpCopU3001 | Fitness                                                         | 2            | 2         | 20         | 30         | 50         |
| <b>Total</b>                   |                                                 |              |                                                                 | <b>32</b>    | <b>22</b> | <b>220</b> | <b>330</b> | <b>550</b> |

### Semester 4 (Second Year)

| Course Type                    | Course                                  | Subject Code                | Course / Paper Title                                                                  | Hours / Week | Credit    | CIA        | ESE        | Total      |
|--------------------------------|-----------------------------------------|-----------------------------|---------------------------------------------------------------------------------------|--------------|-----------|------------|------------|------------|
| <b>Major Mandatory (2 * 4)</b> | Major Paper 8<br>(Theory + Practical)   | 23CsCmpU4101                | <b>Operating System Concepts (T + P)</b>                                              | 2            | 4         | 40         | 60         | 100        |
|                                |                                         |                             |                                                                                       | 4            |           |            |            |            |
|                                | Major Paper 9<br>(Theory + Practical)   | 23CsCmpU4102                | <b>Object Oriented Programming using C++ (T + P)</b>                                  | 2            | 4         | 40         | 60         | 100        |
|                                |                                         |                             |                                                                                       | 4            |           |            |            |            |
| <b>Major Electives</b>         | -                                       |                             |                                                                                       |              |           |            |            |            |
| <b>Minor (4)</b>               | Minor Paper III<br>(Theory + Practical) | 23CsEleU4301                | <b>Applied Sciences –III ( Electronic Communication and Instrumentation ) (T + P)</b> | 2            | 4         | 40         | 60         | 100        |
|                                |                                         |                             |                                                                                       | 4            |           |            |            |            |
| <b>OE (2)</b>                  | Theory                                  | 23CsCopU4401                | <b>Web Designing</b>                                                                  | 2            | 2         | 20         | 30         | 50         |
| <b>VSC (2)</b>                 | –                                       |                             |                                                                                       |              |           |            |            |            |
| <b>SEC (2)</b>                 | Skill Paper III (Theory)                | 23CsStaU4601                | <b>Data Mining</b>                                                                    | 2            | 2         | 20         | 30         | 50         |
| <b>AEC(2)</b>                  | MIL                                     | 23CpCopU4701 / 23CpCopU4702 | MIL-II (Hindi ) / MIL-II (Marathi)                                                    | 2            | 2         | 20         | 30         | 50         |
| <b>VEC (2)</b>                 | –                                       |                             |                                                                                       |              |           |            |            |            |
| <b>IKS (2)</b>                 | –                                       |                             |                                                                                       |              |           |            |            |            |
| <b>FP / CEP(2)</b>             | CEP –I                                  | 23CsCmpU4003                | <b>Community Engagement Project</b>                                                   | 4            | 2         | 20         | 30         | 50         |
| <b>CC(2)</b>                   | CC-IV Course                            | 23CpCopU4001                | Health and Wellness                                                                   | 2            | 2         | 20         | 30         | 50         |
| <b>Total</b>                   |                                         |                             |                                                                                       | <b>30</b>    | <b>22</b> | <b>220</b> | <b>330</b> | <b>550</b> |

## Semester 5 (Third Year)

| Course Type                        | Course                              | Subject Code | Course / Paper Title                                              | Hours / Week | Credit    | CIA        | ESE        | Total      |
|------------------------------------|-------------------------------------|--------------|-------------------------------------------------------------------|--------------|-----------|------------|------------|------------|
| <b>Major Mandatory (2 * 4 + 2)</b> | Major Paper 10 Section 1 (Theory)   | 23CsCmpU5101 | Web Technology & Programming in Core Java                         | 2            | 4         | 40         | 60         | 100        |
|                                    | Major Paper10 Section 2 (Theory)    |              |                                                                   | 2            |           |            |            |            |
|                                    | Major Paper 11 Section 1 (Theory)   | 23CsCmpU5102 | Object Oriented Software Engineering & Theory of Computer Science | 2            | 4         | 40         | 60         | 100        |
|                                    | Major Paper 11 Section 2 (Theory)   |              |                                                                   | 2            |           |            |            |            |
|                                    | Major Paper 12 (Practical)          | 23CsCmpU5103 | Lab Course on 23CsCmpU5101                                        | 4            | 2         | 20         | 30         | 50         |
| <b>Major Electives</b>             | Elective I (Theory + Practical)     | 23CsCmpU5201 | Android Programming ( T +P)                                       | 2            | 4         | 40         | 60         | 100        |
|                                    |                                     |              |                                                                   | 4            |           |            |            |            |
|                                    | Elective I (Theory + Practical)     | 23CsMatU5202 | Operations Research (T + P)                                       | 2            | 4         | 40         | 60         | 100        |
|                                    |                                     |              |                                                                   | 4            |           |            |            |            |
|                                    | Elective I (Theory + Practical)     | 23CsEleU5203 | Intel 8051 and AVR Microcontrollers (T+P)                         | 2            | 4         | 40         | 60         | 100        |
|                                    |                                     |              |                                                                   | 4            |           |            |            |            |
| <b>Minor (4)</b>                   | Minor Paper IV (Theory + Practical) | 23CsMatU5301 | Applied Sciences – IV (T + P) (Linear Algebra )                   | 2            | 4         | 40         | 60         | 100        |
|                                    |                                     |              |                                                                   | 4            |           |            |            |            |
| <b>OE (2)</b>                      | –                                   |              |                                                                   |              |           |            |            |            |
| <b>VSC (2)</b>                     | Major Specific Practical IV         | 23CsEleU5501 | Lab Course on Raspberry Pi Programming & Computer Maintenance     | 4            | 2         | 20         | 30         | 50         |
| <b>SEC (2)</b>                     | –                                   |              |                                                                   |              |           |            |            |            |
| <b>AEC(2)</b>                      | –                                   |              |                                                                   |              |           |            |            |            |
| <b>VEC (2)</b>                     | –                                   |              |                                                                   |              |           |            |            |            |
| <b>IKS (2)</b>                     | –                                   |              |                                                                   |              |           |            |            |            |
| <b>FP / CEP(2)</b>                 | FP –II                              | 23CsCmpU5002 | Field Project II                                                  | 4            | 2         | 20         | 30         | 50         |
| <b>Total</b>                       |                                     |              |                                                                   | <b>32</b>    | <b>22</b> | <b>220</b> | <b>330</b> | <b>550</b> |

### Semester 6 (Third Year)

| Course Type                        | Course                             | Subject Code | Course / Paper Title                                                                | Hours / Week | Credit    | CIA        | ESE        | Total      |
|------------------------------------|------------------------------------|--------------|-------------------------------------------------------------------------------------|--------------|-----------|------------|------------|------------|
| <b>Major Mandatory (2 * 4 + 2)</b> | Major Paper 13 (Theory) Section 1  | 23CsCmpU6101 | System Programming & Programming in Advanced Java                                   | 2            | 4         | 40         | 60         | 100        |
|                                    | Major Paper 13 (Theory) Section 2  |              |                                                                                     | 2            |           |            |            |            |
|                                    | Major Paper 14 (Theory) Section 1  | 23CsCmpU6102 | Software Project Management & Introduction to Data Science                          | 2            | 4         | 40         | 60         | 100        |
|                                    | Major Paper 14 (Theory) Section 1  |              |                                                                                     | 2            |           |            |            |            |
|                                    | Major Paper 15 (Practical)         | 23CsCmpU6103 | Lab Course on 23CsCmpU6101                                                          | 4            | 2         | 20         | 30         | 50         |
| <b>Major Electives</b>             | Elective II (Theory + Practical)   | 23CsCmpU6201 | Big Data Analytics (T + P)                                                          | 2            | 4         | 40         | 60         | 100        |
|                                    |                                    |              |                                                                                     | 4            |           |            |            |            |
|                                    | Elective II (Theory + Practical)   | 23CsMatU6202 | Computational Geometry ( T +P)                                                      | 2            | 4         | 40         | 60         | 100        |
|                                    |                                    |              |                                                                                     | 4            |           |            |            |            |
|                                    | Elective II (Theory + Practical)   | 23CsEleU6203 | Embedded Systems (T + P)                                                            | 2            | 4         | 40         | 60         | 100        |
|                                    |                                    |              |                                                                                     | 4            |           |            |            |            |
| <b>Minor (4)</b>                   | Minor Paper V (Theory + Practical) | 23CsEleU6301 | Applied Sciences –V (T + P)<br>Advanced Communication and IoT Based Instrumentation | 2            | 4         | 40         | 60         | 100        |
|                                    |                                    |              |                                                                                     | 4            |           |            |            |            |
| <b>OE (2)</b>                      | –                                  |              |                                                                                     |              |           |            |            |            |
| <b>VSC (2)</b>                     | –                                  |              |                                                                                     |              |           |            |            |            |
| <b>SEC (2)</b>                     | –                                  |              |                                                                                     |              |           |            |            |            |
| <b>AEC(2)</b>                      | –                                  |              |                                                                                     |              |           |            |            |            |
| <b>VEC (2)</b>                     | –                                  |              |                                                                                     |              |           |            |            |            |
| <b>OJT (4)</b>                     | OJT                                | 23CpCopU6004 | On job Training                                                                     | 8            | 4         | 40         | 60         | 100        |
| <b>FP / CEP(2)</b>                 | –                                  |              |                                                                                     |              |           |            |            |            |
| <b>Total</b>                       |                                    |              |                                                                                     | <b>32</b>    | <b>22</b> | <b>220</b> | <b>330</b> | <b>550</b> |

OE : Open Elective  
 AEC: Ability Enhancement Course  
 VEC: value Education Courses  
 CC : Co-Curricular Courses  
 IKS : Indian Knowledge System  
 OJT : On Job Training  
 FP : Field Project  
 VSC : Vocational Skill Courses  
 CEP : Community Engagement Project

