# SAVITRIBAI PHULE PUNE UNIVERSITY

## Board of Studies in Civil Engineering

## Structure for B.E. Civil 2015 Course (w. e. f. June 2018)

| | Semester-I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Subject code | Subject | Teaching Scheme Hrs/Week | | | In-Semester Assessment | TW | Pract /Or | End-Semester Exam | Total | Credit | |
| | | Lect | Tu | Pr | | | | | | Th | Lab |
| 401 001 | Environmental Engineering II | 3 | -- | 2 | 30 | -- | 50 | 70 | 150 | 3 | 1 |
| 401002 | Transportation Engineering | 3 | -- | 2 | 30 | 50 | -- | 70 | 150 | 3 | 1 |
| 401 003 | Structural Design and Drawing III | 4 | -- | 2 | 30 | -- | 50 | 70 | 150 | 4 | 1 |
| 401 004 | Elective I | 3 | -- | 2 | 30 | 50 | -- | 70 | 150 | 3 | 1 |
| 401 005 | Elective II | 3 | -- | -- | 30 | -- | -- | 70 | 100 | 3 | -- |
| 401 006 | Project (Phase-I) | -- | 2 | -- | -- | -- | 50 | -- | 50 | -- | 2 |
| | **Total :** | 16 | 2 | 8 | 150 | 100 | 150 | 350 | 750 | 16 | 6 |
| | | | | | | | | | | **22 Credits** | |

| | Semester-II | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Subject code | Subject | Teaching Scheme Hrs/Week | | | In-Semester Assessment | TW | Or | End-Semester Exam | Total | Credit | |
| | | Lect | Tu | Pr | | | | | | Th | Pr |
| 401 007 | Dams and Hydraulic Structures | 3 | -- | 2 | 30 | -- | 50 | 70 | 150 | 3 | 1 |
| 401008 | Quantity Surveying, Contracts and tenders | 3 | -- | 2 | 30 | -- | 50 | 70 | 150 | 3 | 1 |
| 401 009 | Elective III | 3 | -- | 2 | 30 | 50 | -- | 70 | 150 | 3 | 1 |
| 401 010 | Elective IV | 3 | -- | 2 | 30 | 50 | -- | 70 | 150 | 3 | 1 |
| 401 006 | Project | -- | 6 | -- | -- | 50 | 100 | -- | 150 | -- | 6 |
| | **Total :** | 12 | 6 | 8 | 120 | 150 | 200 | 280 | 750 | 12 | 10 |
| | | | | | | | | | | **22 Credits** | |

**Following will be the list of electives.**

## Semester I

| Elective-I 401 004 | Elective-II 401 005 |
|---|---|
| 1. Structural Design of Bridges | 1. Matrix Methods of Structural Analysis |
| 2. Systems Approach in Civil Engineering | 2. Integrated Water Resources Planning and Management |
| 3. Advanced Concrete Technology | 3. TQM & MIS in Civil Engineering |
| 4. Architecture and Town Planning | 4. Earthquake Engineering |
| 5. Advanced Engineering Geology with Rock Mechanics | 5. Advanced Geotechnical Engineering |

## Semester-II

| Elective-III 401 009 | Elective-IV 401 010 |
|---|---|
| 1. Advanced Structural Design | 1. Construction Management |
| 2. Statistical Analysis and Computational Methods in Civil Engineering | 2. Advanced Transportation Engineering |
| 3. Hydropower Engineering | 3. Advanced foundation Engineering. |
| 4. Air Pollution and control | 4. Coastal Engineering |
| 5. Finite Element Method in Civil Engineering | **5. Open Elective** |
| 6. Airport and Bridge Engineering | a) Plumbing Engineering |
| | b) Green Building Technology |
| | c) Ferrocement Technology |
| | d) Sub sea Engineering |
| | e) Geoinformatics |

# Savitribai Phule Pune University
# Fourth Year of Computer Engineering (2015 Course)
# (with effect from 2018-19)

## Semester I

| Course Code | Course | Teaching Scheme Hours / Week | | Examination Scheme and Marks | | | | | | Credit | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Theory | Practical | In-Sem | End-Sem | TW | PR | OR/ *PRE | Total | TH/ TUT | PR |
| 410241 | High Performance Computing | 04 | -- | 30 | 70 | -- | -- | -- | 100 | 04 | -- |
| 410242 | Artificial Intelligence and Robotics | 03 | -- | 30 | 70 | -- | -- | -- | 100 | 03 | -- |
| 410243 | Data Analytics | 03 | -- | 30 | 70 | -- | -- | -- | 100 | 03 | -- |
| 410244 | Elective I | 03 | -- | 30 | 70 | -- | -- | -- | 100 | 03 | -- |
| 410245 | Elective II | 03 | -- | 30 | 70 | -- | -- | -- | 100 | 03 | -- |
| 410246 | Laboratory Practice I | -- | 04 | -- | -- | 50 | 50 | -- | 100 | -- | 02 |
| 410247 | Laboratory Practice II | -- | 04 | -- | -- | 50 | -- | *50 | 100 | -- | 02 |
| 410248 | Project Work Stage I | -- | 02 | -- | -- | -- | -- | *50 | 50 | -- | 02 |
| | | | | | | | | | Total Credit | 16 | 06 |
| | **Total** | **16** | **10** | **150** | **350** | **100** | **50** | **100** | **750** | **22** | |
| 410249 | Audit Course 5 | | | | | | | | | Grade | |

| Elective I | Elective II |
|---|---|
| **410244 (A)** Digital Signal Processing | **410245 (A)** Distributed Systems |
| **410244 (B)** Software Architecture and Design | **410245 (B)** Software Testing and Quality Assurance |
| **410244 (C)** Pervasive and Ubiquitous Computing | **410245 (C)** Operations Research |
| **410244 (D)** Data Mining and Warehousing | **410245 (D)** Mobile Communication |

**410249-Audit Course 5 (AC5) Options:**

**AC5-I** Entrepreneurship Development

**AC5-II:** Botnet of Things

**AC5-III:** 3D Printing

**AC5-IV:** Industrial Safety and Environment Consciousness

**AC5-V:** Emotional Intelligence

**AC5-VI:** MOOC- Learn New Skills

**Abbreviations:**

**TW:** Term Work **TH:** Theory **OR:** Oral **PR:** Practical

**Sem:** Semester **PRE**: Project/ Mini-Project Presentation

# Savitribai Phule Pune University
# Fourth Year of Computer Engineering (2015 Course)
# (with effect from 2018-19)

## Semester II

| Course Code | Course | Teaching Scheme Hours / Week | | Examination Scheme and Marks | | | | | | Credit | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Theory | Practical | In-Sem | End-Sem | TW | PR | OR/ *PRE | Total | TH/ TUT | PR |
| 410250 | Machine Learning | 03 | -- | 30 | 70 | -- | -- | -- | 100 | 03 | -- |
| 410251 | Information and Cyber Security | 03 | -- | 30 | 70 | -- | -- | -- | 100 | 03 | -- |
| 410252 | Elective III | 03 | -- | 30 | 70 | -- | -- | -- | 100 | 03 | -- |
| 410253 | Elective IV | 03 | -- | 30 | 70 | -- | -- | -- | 100 | 03 | -- |
| 410254 | Laboratory Practice III | -- | 04 | -- | -- | 50 | 50 | -- | 100 | -- | 02 |
| 410255 | Laboratory Practice IV | -- | 04 | -- | -- | 50 | -- | *50 | 100 | -- | 02 |
| 410256 | Project Work Stage II | -- | 06 | -- | -- | 100 | -- | *50 | 150 | -- | 06 |
| | **Total** | **12** | **14** | **120** | **280** | **200** | **50** | **Total** | **750** | **Credit 22** | |
| 410257 | Audit Course 6 | | | | | | | 100 | | **Grade** | |

| Elective III | Elective IV |
|---|---|
| **410252 (A)** Advanced Digital Signal Processing | **410253 (A)** Software Defined Networks |
| **410252 (B)** Compilers | **410253 (B)** Human Computer Interface |
| **410252 (C)** Embedded and Real Time Operating System | **410253 (C)** Cloud Computing |
| **410252 (D)** Soft Computing and Optimization Algorithms | **410253 (D)** Open Elective |

**410259-Audit Course 6 (AC6) Options:**

- **AC6-I:** Business Intelligence
- **AC6-II:** Gamification
- **AC6-III:** Quantum Computing
- **AC6-IV:** Usability Engineering
- **AC6-V:** Conversational Interfaces
- **AC6-VI:** MOOC- Learn New Skills

**Abbreviations:**

**TW:** Term Work **TH:** Theory **OR:** Oral **PR:** Practical
**Sem:** Semester **PRE:** Project/ Mini-Project Presentation

# Savitribai Phule University of Pune, Pune
## Final Year E&TC Engineering (2015 Course)
**(With effect from Academic Year 2018-19)**

**Semester I**

| Course Code | Course | Teaching Scheme Hours / Week | | | Semester Examination Scheme of Marks | | | | | | Credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Theory | Tutorials | Practicals | In-Sem | End-Sem | TW | PR | OR | Total | TH/TW | PR+OR |
| 404181 | VLSI Design & Technology | 3 | -- | -- | 30 | 70 | -- | -- | -- | 100 | 3 | -- |
| 404182 | Computer Networks & Security | 4 | -- | -- | 30 | 70 | -- | -- | -- | 100 | 4 | -- |
| 404183 | Radiation & Microwave Techniques | 3 | -- | -- | 30 | 70 | -- | -- | -- | 100 | 3 | -- |
| 404184 | Elective I | 3 | -- | -- | 30 | 70 | -- | -- | -- | 100 | 3 | -- |
| 404185 | Elective II | 3 | | | 30 | 70 | -- | -- | -- | 100 | 3 | -- |
| 404186 | Lab practice -I (CNS+ RMT) | -- | -- | 4 | -- | -- | 50 | -- | 50 | 100 | -- | 2 |
| 404187 | Lab practice -II ( VLSI + Ele I) | -- | -- | 4 | -- | -- | 50 | 50 | | 100 | -- | 2 |
| 404188 | Project Stage I | - | 2 | -- | -- | -- | - | -- | 50 | 50 | -- | 2 |
| | Audit Course 5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | --- | |
| | Total | 16 | 2 | 8 | 150 | 350 | 100 | 100 | 50 | 750 | 6 | |
| Total Credits | | | | | | | | | | | 22 | |

**Elective I**

Digital Image and Video Processing
Industrial Drives and Control
Embedded Systems & RTOS
Internet of Things

**Elective II**

Wavelets

Optimization Techniques
Artificial Intelligence
Electronics in agriculture

**Audit Course 5:**

Green Energy
Human Behavior

# Final Year E&TC Engineering (2015 Course)

**(With effect from Academic Year 2018-19)**

**Semester II**

| Course Code | Course | Teaching Scheme Hours / Week | | | Semester Examination Scheme of Marks | | | | | | Credit | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Theory | Tutorials | Practicals | In-Sem | End-Sem | TW | PR | OR | Total | TH/TW | P R+OR |
| 404189 | Mobile Communication | 3 | -- | -- | 30 | 70 | -- | -- | -- | 100 | 3 | -- |
| 404190 | Broadband Communication Systems | 4 | -- | -- | 30 | 70 | -- | -- | -- | 100 | 4 | -- |
| 404191 | Elective III | 3 | -- | -- | 30 | 70 | -- | -- | -- | 100 | 3 | -- |
| 404192 | Elective IV | 3 | -- | -- | 30 | 70 | -- | -- | -- | 100 | 3 | -- |
| 404193 | Lab practice -III | -- | -- | 4 | -- | -- | 50 | 50 | -- | 100 | -- | 2 |
| 404194 | Lab practice -IV ( Ele III) | -- | -- | 2 | -- | -- | -- | -- | 50 | 50 | -- | 1 |
| 404195 | Project Stage II | -- | 6 | - | -- | -- | 150 | -- | 50 | 200 | -- | 6 |
| | **Audit Course 6** | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| | **Total** | 13 | 6 | 6 | 120 | 280 | 200 | 50 | 100 | 750 | 13 | 9 |
| | | | | | | | | | | **Total Credits** | **22** | |

| **Elective III** | **Elective IV** |
|---|---|
| Machine Learning | Robotics |
| PLC s and Automation | Bio-Medical Electronics |
| Audio and Speech Processing | Wireless Sensor Networks |
| Software Defined Radio | Renewable Energy Systems |
| Audio Video Engineering | Open Elective* |
| | **Audit Course 6:** |
| | Team Building, Leadership and Fitness for Engineers |
| | Environment and Disater Management |

**4.2 MBA Programme Structure:** The Basic Programme Structure shall be as depicted below

| | Course# | Semester I | | Semester II | | Semester III | | Semester IV | | Credits | CCE Marks | ESE Mark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COMPULSORY CORE COURSES (GENERIC (GC) + SUBJECT (SC) + Summer Internship Project SIP)** | | | | | | | | | | | | |
| A | 1 | GC - 1 | 1 | GC - 7 | 1 | GC - 11 | 1 | GC - 14 | | 66 Credits | | |
| | 2 | GC - 2 | 2 | GC - 8 | 2 | GC - 12 | 2 | GC - 15 | | | | |
| | 3 | GC - 3 | 3 | GC - 9 | 3 | GC -13 (SIP) | 3 | SC - 5 | | | | |
| | 4 | GC - 4 | 4 | GC - 10 | 4 | SC - 3 | 4 | SC - 6 | | | | |
| | 5 | GC - 5 | 5 | SC - 1 | 5 | SC - 4 | | | | | 1050 | 105 |
| | 6 | GC- 6 | 6 | SC - 2 | | | | | | | 2100 | |
| **GENERIC ELECTIVE COURSES (UNIVERSITY LEVEL) – GE - UL** | | | | | | | | | | | | |
| B | 7 | GE UL - 1 | 7 | GE UL - 4 | 6 | GE UL – 7 | 5 | GE UL - 10 | | 22 Credits | | |
| | 8 | GE UL - 2 | 8 | GE UL - 5 | 7 | GE UL – 8 | 6 | GE UL - 11 | | | 0 | 55 |
| | 9 | GE UL - 3 | 9 | GE UL - 6 | 8 | GE UL – 9 | | | | | 550 | |
| **GENERIC / SUBJECT ELECTIVE COURSES (INSTITUTE LEVEL) - GE – IL / SE - IL** | | | | | | | | | | | | |
| C | 10 | GE IL - 1 | 10 | GE IL - 4 | 9 | SE IL -3 | 7 | SE IL -6 | | 22 Credits | | |
| | 11 | GE IL - 2 | 11 | SE IL -1 | 10 | SE IL -4 | 8 | SE IL -7 | | | 550 | |
| | 12 | GE IL - 3 | 12 | SE IL -2 | 11 | SE IL -5 | | | | | 550 | |
| | | | | | | | | | | 110 Credits | 1600 CCE | 1600 ESE |
| | 12 | | 12 | | 11 | | 8 | | 43 | | | |
| **FOUNDATION COURSES (OPTIONAL)** | | | | | | | | | | | | |
| D | | FOUNDATION 1<br>FOUNDATION 2<br>FOUNDATION 3<br>FOUNDATION 4<br>FOUNDATION 5<br>FOUNDATION 6 | | FOUNDATION 7<br>FOUNDATION 8<br>FOUNDATION 9<br>FOUNDATION 10 | | | | | | 0 to 10 Credits | | |
| **ENRICHMENT COURSES (OPTIONAL)** | | | | | | | | | | | | |
| E | | ENRICHMENT 1<br>ENRICHMENT 2<br>ENRICHMENT 3<br>ENRICHMENT 4<br>ENRICHMENT 5<br>ENRICHMENT 6 | | ENRICHMENT 7<br>ENRICHMENT 8<br>ENRICHMENT 9<br>ENRICHMENT 10 | | ENRICHMENT 11<br>ENRICHMENT 12 | | ENRICHMENT 13<br>ENRICHMENT 14 | | 0 to 14 Credits | | |
| **ALTERNATIVE STUDY CREDIT COURSES (OPTIONAL)** | | | | | | | | | | | | |
| F | | | | | | | | | | 0 to 22 Cre | | |

| GENERIC ELECTIVES INSTITUTE LEVEL (GE – IL) COURSES – 2 Credits Each<br>50 Marks CCE , 00 Marks ESE | | | |
|---|---|---|---|
| **Course No.** | **Course Code** | **Course** | **Semester** |
| **Maximum 3 courses to be selected from the following list in Semester I** | | | |
| 113 | GE - IL - 01 | Verbal Communication Lab | I |
| 114 | GE - IL - 02 | Enterprise Analysis & Desk Research | I |
| 115 | GE - IL - 03 | Selling & Negotiation Skills Lab | I |
| 116 | GE - IL - 04 | MS Excel | I |
| 117 | GE - IL - 05 | Business Systems & Procedures | I |
| 118 | GE – IL- 06 | Managing Innovation | I |
| 119 | GE – IL- 07 | Foreign Language – I | I |
| **Maximum 1 course to be selected from the following list in Semester II** | | | |
| 213 | GE – IL - 08 | Written Analysis and Communication Lab | II |
| 214 | GE – IL - 09 | Industry Analysis & Desk Research | II |
| 215 | GE – IL - 10 | Entrepreneurship Lab | II |
| 216 | GE – IL - 11 | SPSS | II |
| 217 | GE – IL - 12 | Foreign Language – II | II |

| SUBJECT CORE (SC) COURSES: Specialization – Marketing Management (MKT) | | | |
|---|---|---|---|
| 3 Credits Each, 50 Marks CCE, 50 Marks ESE | | | |
| **Course No.** | **Course Code** | **Course** | **Semester** |
| 205 MKT | SC – MKT- 01 | Marketing Research | II |
| 206 MKT | SC – MKT- 02 | Consumer Behaviour | II |
| 304 MKT | SC – MKT- 03 | Services Marketing | III |
| 305 MKT | SC – MKT- 04 | Sales & Distribution Management | III |
| 403 MKT | SC – MKT- 05 | Marketing 4.0 | IV |
| 404 MKT | SC – MKT- 06 | Marketing Strategy | IV |

| SUBJECT ELECTIVE (SE - IL) COURSES: Specialization – Marketing Management (MKT) | | | |
|---|---|---|---|
| 2 Credits Each, 50 Marks CCE, 00 Marks ESE | | | |
| **Course No.** | **Course Code** | **Course** | **Semester** |
| **Maximum 2 courses to be selected from the following list in Semester II** | | | |
| 217 MKT | SE – IL - MKT- 01 | Integrated Marketing Communications | II |
| 218 MKT | SE – IL - MKT- 02 | Product & Brand Management | II |
| 219 MKT | SE – IL - MKT- 03 | Personal Selling Lab | II |
| 220 MKT | SE – IL - MKT- 04 | Digital Marketing - I | II |
| 221 MKT | SE – IL - MKT- 05 | Marketing of Financial Services - I | II |
| 222 MKT | SE – IL - MKT- 06 | Marketing of Luxury Products | II |
| **Maximum 3 courses to be selected from the following list in Semester III** | | | |
| 312 MKT | SE – IL - MKT- 07 | Business to Business Marketing | III |
| 313 MKT | SE – IL - MKT- 08 | International Marketing | III |
| 314 MKT | SE – IL - MKT- 09 | Digital Marketing - II | III |
| 315 MKT | SE – IL - MKT- 10 | Marketing of Financial Services - II | III |
| 316 MKT | SE – IL - MKT- 11 | Marketing Analytics | III |
| 317 MKT | SE – IL - MKT- 12 | Marketing of High Technology Products | III |
| **Maximum 2 courses to be selected from the following list in Semester IV** | | | |
| 409 MKT | SE – IL - MKT- 13 | Customer Relationship Management | IV |
| 410 MKT | SE – IL - MKT- 14 | Rural & Agriculture Marketing | IV |
| 411 MKT | SE – IL - MKT- 15 | Tourism & Hospitality Marketing | IV |
| 412 MKT | SE – IL - MKT- 16 | Retail Marketing | IV |
| 413 MKT | SE – IL - MKT- 17 | Retailing Analytics | IV |
| 414 MKT | SE – IL - MKT- 18 | Marketing to Emerging Markets & Bottom of the Pyramid | IV |

| SUBJECT CORE (SC) COURSES: Specialization – Financial Management (FIN) | | | |
|---|---|---|---|
| 3 Credits Each, 50 Marks CCE, 50 Marks ESE | | | |
| **Course No.** | **Course Code** | **Course** | **Semester** |
| 205 FIN | SC – FIN - 01 | Financial Markets and Banking Operations | II |
| 206 FIN | SC – FIN - 02 | Personal Financial Planning | II |
| 304 FIN | SC – FIN - 03 | Advanced Financial Management | III |
| 305 FIN | SC – FIN - 04 | International Finance | III |
| 403 FIN | SC – FIN - 05 | Financial Laws | IV |
| 404 FIN | SC – FIN - 06 | Current Trends & Cases in Finance | IV |

| SUBJECT ELECTIVE (SE - IL) COURSES: Specialization – Financial Management (FIN) | | | |
|---|---|---|---|
| 2 Credits Each, 50 Marks CCE, 00 Marks ESE | | | |
| **Course No.** | **Course Code** | **Course** | **Semester** |
| Maximum 2 courses to be selected from the following list in Semester II | | | |
| 217 FIN | SE – IL - FIN - 01 | Securities Analysis & Portfolio Management | II |
| 218 FIN | SE – IL - FIN - 02 | Futures and Options | II |
| 219 FIN | SE – IL - FIN - 03 | Direct Taxation | II |
| 220 FIN | SE – IL - FIN - 04 | Financial Reporting | II |
| 221 FIN | SE – IL - FIN - 05 | Retail Credit Management- Lending & Recovery | II |
| 222 FIN | SE – IL - FIN - 06 | Banking Laws & Regulations | II |
| 223 FIN | SE – IL - FIN - 07 | Fundamentals of Life Insurance – Products and Underwriting | II |
| 224 FIN | SE – IL - FIN - 08 | General Insurance - Health and Vehicle | II |
| Maximum 3 courses to be selected from the following list in Semester III | | | |
| 312 FIN | SE – IL - FIN - 09 | Behavioural Finance | III |
| 313 FIN | SE – IL - FIN - 10 | Technical Analysis of Financial Markets | III |
| 314 FIN | SE – IL - FIN - 11 | Commodities Markets | III |
| 315 FIN | SE – IL - FIN – 12 | Indirect Taxation | III |
| 316 FIN | SE – IL - FIN – 13 | Corporate Financial Restructuring | III |
| 317 FIN | SE – IL - FIN - 14 | Financial Modeling | III |
| 318 FIN | SE – IL - FIN – 15 | Digital Banking | III |
| 319 FIN | SE – IL - FIN – 16 | Treasury Management | III |
| 320 FIN | SE – IL - FIN – 17 | Project Finance and Trade Finance | III |
| 321 FIN | SE – IL - FIN – 18 | Insurance Laws & Regulations | III |
| 322 FIN | SE – IL - FIN – 19 | Marine Insurance | III |
| 323 FIN | SE – IL - FIN – 20 | Fire Insurance | III |
| Maximum 2 courses to be selected from the following list in Semester IV | | | |
| 409 FIN | SE – IL - FIN – 21 | Fixed Income Securities | IV |
| 410 FIN | SE – IL - FIN – 22 | Business Valuation | IV |
| 411 FIN | SE – IL - FIN – 23 | Risk Management | IV |
| 412 FIN | SE – IL - FIN – 24 | Strategic Cost Management | IV |
| 413 FIN | SE – IL - FIN – 25 | Rural and Micro Finance | IV |
| 414 FIN | SE – IL - FIN - 26 | Reinsurance | IV |
| 415 FIN | SE – IL - FIN – 27 | Agricultural Insurance | IV |

| SUBJECT CORE (SC) COURSES: Specialization – Human Resource Management (HRM) | | | |
|---|---|---|---|
| 3 Credits Each, 50 Marks CCE, 50 Marks ESE | | | |
| **Course No.** | **Course Code** | **Course** | **Semester** |
| 205 HR | SC – HRM – 01 | Competency Based Human Resource Management | II |
| 206 HR | SC – HRM – 02 | Employee Relations & Labour Legislation | II |
| 304 HR | SC – HRM - 03 | Strategic Human Resource Management | III |
| 305 HR | SC – HRM - 04 | HR Operations | III |
| 403 HR | SC – HRM - 05 | Organizational Diagnosis & Development | IV |
| 404 HR | SC – HRM - 06 | Current Trends & Cases in Human Resource Management | IV |

| SUBJECT ELECTIVE (SE - IL) COURSES: Specialization – Human Resource Management (HRM) | | | |
|---|---|---|---|
| 2 Credits Each, 50 Marks CCE, 00 Marks ESE | | | |
| **Course No.** | **Course Code** | **Course** | **Semester** |
| Maximum 2 courses to be selected from the following list in Semester II | | | |
| 217 HRM | SE – IL - HRM - 01 | Labour Welfare | II |
| 218 HRM | SE – IL - HRM - 02 | Lab in Recruitment and Selection | II |
| 219 HRM | SE – IL - HRM - 03 | Learning and Development | II |
| 220 HRM | SE – IL - HRM - 04 | Public Relations & Corporate Communications | II |
| 221 HRM | SE – IL - HRM - 05 | HR Analytics | II |
| 222 HRM | SE – IL - HRM - 06 | Conflict and Negotiation Management | II |
| Maximum 3 courses to be selected from the following list in Semester III | | | |
| 312 HR | SE – IL - HRM - 07 | Talent Management | III |
| 313 HR | SE – IL - HRM - 08 | Psychometric Testing and Assessment | III |
| 314 HR | SE – IL - HRM - 09 | HR perspective in Mergers and Acquisition | III |
| 315 HR | SE – IL - HRM - 10 | International HR | III |
| 316 HR | SE – IL - HRM - 11 | Mentoring and Coaching | III |
| 317 HR | SE – IL - HRM - 12 | Compensation and Reward management | III |
| 318 HR | SE – IL - HRM - 13 | Performance Management System | III |
| 319 HR | SE – IL - HRM - 14 | Change Management & New Technologies in HRM | III |
| Maximum 2 courses to be selected from the following list in Semester IV | | | |
| 409 HR | SE – IL - HRM - 15 | Labour Legislation | IV |
| 410 HR | SE – IL - HRM - 16 | Designing HR Policies | IV |
| 411 HR | SE – IL - HRM - 17 | Labour Economics and Costing | IV |
| 412 HR | SE – IL - HRM - 18 | Best Practices in HRM | IV |
| 413 HR | SE – IL - HRM - 19 | Employee Engagement and Ownership | IV |
| 414 HR | SE – IL - HRM – 20 | Leadership and Succession Planning | IV |
| 415 HR | SE – IL - HRM - 21 | E - HRM | IV |

| SUBJECT CORE (SC) COURSES: Specialization – Operations & Supply Chain Management (OSCM) | | | |
|---|---|---|---|
| 3 Credits Each, 50 Marks CCE, 50 Marks ESE | | | |
| **Course No.** | **Course Code** | **Course** | **Semester** |
| 205 OSCM | SC – OSCM - 01 | Services Operations Management - I | II |
| 206 OSCM | SC – OSCM - 02 | Supply Chain Management | II |
| 304 OSCM | SC – OSCM - 03 | Services Operations Management - II | III |
| 305 OSCM | SC – OSCM - 04 | Logistics Management | III |
| 403 OSCM | SC – OSCM - 05 | E Supply Chains & Logistics | IV |
| 404 OSCM | SC – OSCM - 06 | Industry 4.0 | IV |

| SUBJECT ELECTIVE (SE - IL) COURSES : Specialization – Operations & Supply Chain Management (OSCM) | | | |
|---|---|---|---|
| 2 Credits Each, 50 Marks CCE, 00 Marks ESE | | | |
| **Course No.** | **Course Code** | **Course** | **Semester** |
| **Maximum 2 courses to be selected from the following list in Semester II** | | | |
| **217 OSCM** | **SE – IL - OSCM - 01** | **Planning & Control of Operations** | **II** |
| **218 OSCM** | **SE – IL - OSCM - 02** | **Productivity Management** | **II** |
| **219 OSCM** | **SE – IL - OSCM - 03** | **Inventory Management** | **II** |
| **220 OSCM** | **SE – IL - OSCM - 04** | **Theory of Constraints** | **II** |
| **221 OSCM** | **SE – IL - OSCM - 05** | **Quality Management Standards** | **II** |
| **222 OSCM** | **SE – IL - OSCM - 06** | **Service Value Chain Management** | **II** |
| **Maximum 3 courses to be selected from the following list in Semester III** | | | |
| 312 OSCM | SE – IL - OSCM – 07 | Manufacturing Resource Planning | III |
| 313 OSCM | SE – IL - OSCM – 08 | Sustainable Supply Chains | III |
| 314 OSCM | SE – IL - OSCM – 09 | Business Excellence | III |
| 315 OSCM | SE – IL - OSCM – 10 | Toyota Production System | III |
| 316 OSCM | SE – IL - OSCM – 11 | Operations and Services Strategy | III |
| 317 OSCM | SE – IL - OSCM – 12 | Six Sigma for Operations | III |
| 318 OSCM | SE – IL - OSCM – 13 | Industrial Internet of Things | III |
| **Maximum 2 courses to be selected from the following list in Semester IV** | | | |
| 409 OSCM | SE – IL - OSCM – 14 | Enterprise Resource Planning | IV |
| 410 OSCM | SE – IL - OSCM – 15 | World Class Manufacturing | IV |
| 411 OSCM | SE – IL - OSCM – 16 | Supply Chain Strategy | IV |
| 412 OSCM | SE – IL – OSCM – 17 | Financial Perspectives in Operations Management | IV |
| **413 OSCM** | **SE – IL - OSCM – 18** | **Facilities Planning** | **IV** |
| 414 OSCM | SE – IL - OSCM – 19 | Purchasing and Supplier Relationship Management | IV |
| 415 OSCM | SE – IL - OSCM - 20 | Strategic Supply Chain Management | IV |

| SUBJECT CORE (SC) COURSES: Specialization – Business Analytics (BA) | | | |
|---|---|---|---|
| 3 Credits Each, 50 Marks CCE, 50 Marks ESE | | | |
| **Course No.** | **Course Code** | **Course** | **Semester** |
| 205 BA | SC – BA - 01 | Basic Business Analytics using R | II |
| 206 BA | SC – BA - 02 | Data Mining | II |
| 304 BA | SC – BA - 03 | Advanced Statistical Methods using R | III |
| 305 BA | SC – BA - 04 | Machine Learning & Cognitive intelligence using Python | III |
| 403 BA | SC – BA - 05 | Economics of Network Industries | IV |
| 404 BA | SC – BA - 06 | Artificial Intelligence in Business Applications | IV |

| SUBJECT ELECTIVE (SE - IL) COURSES: Specialization – Business Analytics (BA) | | | |
|---|---|---|---|
| 2 Credits Each, 50 Marks CCE, 00 Marks ESE | | | |
| **Course No.** | **Course Code** | **Course** | **Semester** |
| Maximum 2 courses to be selected from the following list in Semester II | | | |
| 217 BA | SE – IL - BA - 01 | Marketing Analytics | II |
| 218 BA | SE – IL - BA - 02 | Retailing Analytics | II |
| 219 BA | SE – IL - BA - 03 | Workforce Analytics | II |
| 220 BA | SE – IL - BA - 04 | Tableau | II |
| 221 BA | SE – IL - BA - 05 | Data Warehousing Project Life Cycle Management | II |
| Maximum 3 courses to be selected from the following list in Semester III | | | |
| 312 BA | SE – IL - BA – 06 | Social Media, Web & Text Analytics | III |
| 313 BA | SE – IL - BA – 07 | Industrial Internet of Things | III |
| 314 BA | SE – IL - BA – 08 | Supply Chain Analytics | III |
| 315 BA | SE – IL - BA – 09 | Cognos Analytics | III |
| 316 BA | SE – IL - BA – 10 | Predictive Modelling using SPSS Modeler | III |
| 317 BA | SE – IL - BA – 11 | E commerce Analytics - I | III |
| Maximum 2 courses to be selected from the following list in Semester IV | | | |
| 409 BA | SE – IL - BA - 13 | E Commerce Analytics - II | IV |
| 410 BA | SE – IL - BA - 14 | Healthcare Analytics | IV |
| 411 BA | SE – IL - BA – 15 | Watson | IV |
| 412 BA | SE – IL - BA – 16 | Scala and Spark | IV |

# Savitribai Phule Pune University, Pune

## *Faculty of Commerce and Management*

## Master of Computer Application (MCA)

## *Programme Curriculum (2020-2022)*

## Preamble:

1. The name of the programme shall be Masters of Computer Application (M.C.A)
2. The revised MCA Curriculum 2020 builds on the implementation of the Choice Based Credit System (CBCS) and Grading System initiated in the AY 2015. The curriculum takes the MCA programme to the next level in terms of implementing Outcome Based Education along with the Choice Based Credit System (CBCS) and Grading System.
3. The Institutes should organize placement programme for M.C.A. students by interacting with Industries and software consultancy.
4. At the end of each semester, appearing for various certifications is possible for each student enabling them to make their resume rich.
5. With the rapidly changing scenario industry and academia should identify possible areas of collaboration and work together. Institute's placement cell should focus on identifying industrial expectations and institutional preparation for meeting industrial needs.

## Introduction:

### 1. Definition: Outcome Based Education:

**1.1 Outcome Based Education (OBE) Approach:** Outcomes are about performance, and this implies:

- **1.1.1** There must be a performer – the student (learner), not only the teacher
- **1.1.2** There must be something performable (thus demonstrable or assessable) to perform
- **1.1.3** The focus is on the performance, not the activity or task to be performed

**1.2 Programme Educational Objectives (PEOs):** Programme educational objectives are broad statements that describe the career and professional accomplishments that the programme is preparing graduates to achieve. Programme Educational Objectives are a set of broad future focused learner's performance outcomes that explicitly identify what learners will be able to do with what they have learned, and what they will be like after they leave institution and are living full and productive lives. Thus, PEOs are what the programme is preparing graduates for in their career and professional life (to attain within a few years after graduation).

**1.3 Programme Outcomes (POs):** Programme Outcomes are a set of narrow statements that describes what students (learners) of the programme are expected to know and be able to perform or attain by the time of graduation.

**1.4 Course Outcomes (COs):** Course Outcomes are narrower statements that describe what students are expected to know and be able to do at the end of each course. These relate to the skills, knowledge, and behavior that students acquire in their matriculation through the course.

**1.5 Learning Outcomes:** A learning outcome is what a student CAN DO because of a learning experience. It describes a specific task that he/she can perform at a given level of competence under a certain situation. The three broad types of learning outcomes are: a) Disciplinary knowledge and skills b) Generic skills c) Attitudes and values

**1.6 Teaching and Learning Activities (TLAs):** The set of pedagogical tools and techniques or the teaching and learning activities that aim to help students to attain the intended learning outcomes and engage them in these learning activities through the teaching process.

**1.7 Assessment and Evaluation:** Assessment is one or more processes, carried out by the institution, that identify, collect, and prepare data to evaluate the achievement of programme educational objectives and programme outcomes. Evaluation is one or more processes, done by the evaluation team, for interpreting the data and evidence accumulated through assessment practices. Evaluation

**1.8** determines the extent to which programme educational objectives or programme outcomes are being achieved, and results in decisions and actions to improve the programme.

## 2. MCA Programme Focus:

The basic objective of the Master of Computer Application (MCA) is to provide a steady stream of necessary knowledge, skills and foundation for acquiring a wide range of rewarding careers into rapidly expanding world of Information Technology

**2.1 Programme Educational Objectives:** PEOs are defined by institution. Following are the guidelines for defining PEOs

**2.1.1** PEOs should be assessable and realistic within the context of the committed resources.
**2.1.2** The PEOs should be consistent with the mission of the institution.
**2.1.3** All the stakeholders should participate in the process of framing PEOs.
**2.1.4** The number of PEOs should be manageable.
**2.1.5** It should be based on the needs of the stakeholders.
**2.1.6** It should be achievable by the programme.
**2.1.7** It should be specific to the programme and not too broad.
**2.1.8** It should not be too narrow and similar to the POs.

**2.2 MCA Programme Outcomes (POs):** At the end of the MCA programme the learner will possess the following Program Outcome:

**PO1:** Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

**PO2:** Identify, formulate, research literature, and solve *complex* Computing problems reaching substantiated conclusions using fundamental principles of Mathematics, Computing sciences, and relevant domain disciplines.

**PO3:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

**PO4:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

**PO5:** Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

**PO6:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

**PO7:** Recognize the need, and have the ability, to engage in independent learning for continual development as a Computing professional.

**PO8:** Demonstrate knowledge and understanding of computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO9:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

**PO10:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

**PO11:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

**PO12:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

## 3. Admission Details:

**3.1 Eligibility for Admission:** The eligibility criteria for admission for the MCA course will be as decided by the All Indian Council of Technical Education (AICTE), New Delhi and Directorate of Technical Education (DTE), Government of Maharashtra. It will published on their respective websites time to time.

**3.2 Reservation of Seat:** The percentage of seat reserved for candidates belonging to backward classes only from Maharashtra State in all the Government Aided, Un-aided Institutions/Colleges and University Departments is as per the norms given by Government of Maharashtra, time to time.

**3.3 Selection Basis:** The selection would be done as per the guidelines given by the Director of Technical Education, Maharashtra State, time to time.

## 4. Lecture-Practical/Project-Tutorial (L-P-T)

A course shall have either or all the three components, i.e. a course may have only lecture component, or only practical/project component or a combination of any two/three components

**4.1 Lecture(L):** Classroom sessions delivered by faculty in an interactive mode. It should be conducted as per the scheme of lectures indicated in respective course.

**4.2 Practical/Project(P)**: Practical / Project Work consisting of Hands-on experience /Field Studies / Case studies that equip students to acquire the much required skill component. Besides separate Practical/Project course, three course in each semester include few practical assignment and it will be evaluated under internal evaluation

**4.3 Tutorial(T):** Session consisting of participatory discussion/ self-study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture sessions

**4.4 A Mini project** is an assignment that the student needs to complete at the end of every semester in order to strengthen the understanding of fundamentals through effective application of the courses learnt. The details guidelines have been given in the course structure.

**4.5 The Project Work** to be conducted in the FINAL Semester and evaluated at the end of the semester. The detail guidelines have been in the respective course structure.

**4.6** The teaching / learning as well as evaluation are to be interpreted in a broader perspective as follows:

i) Teaching – Learning Processes: Classroom sessions, Group Exercises, Seminars, Small Group Projects, Self-study, etc.

*ii)* Evaluation: Tutorials, Class Tests, Presentations, Field work, Assignments, competency-based Activity, Research papers, Term papers, etc.

**The MCA programme is a combination of:**

a. Three-Credit Courses (75 Marks each): 3 Credits each
b. Two-Credit Courses (50 Marks each): 2 Credits each
c. One-Credit Courses (25 Marks each) : 1 Credits each

**Following are the session details per credit for each of L-P-T model**

1) **Every <u>ONE-hour session per week</u> of L amounts to <u>1 credit</u> per semester,**
2) **Minimum of <u>TWO hours per week</u> of P amounts to <u>1 credit</u> per semester,**
3) **Minimum of <u>ONE hours per week</u> of T amounts to <u>1 credit</u> per semester**

## 5. Open Courses (OC):

Institute has to offer two open courses of 1 credit each per semester to the students from Semester I to Semester III. The motive behind keeping an open course is to make students aware of current/upcoming trends in Information Technology and other domains. Full autonomy is given to the Institute to plan and execute the open courses. It is expected to extend the autonomy to the student also. Care must be taken to consider credit points and necessary contact hours assigned to it while finalizing any open course for the given semester. In each semester total 2 credits are reserved for open courses.

**Suggestive List of OPEN Courses**

| FOR SEMESTER I | | FOR SEMESTER II | | FOR SEMESTER III | |
|---|---|---|---|---|---|
| 1 | Data Privacy and Protection | 1 | Software Agent | 1 | Speech Recognition |
| 2 | Linux system administration | 2 | Aptitude building -1 | 2 | Sentiment Analysis |
| 3 | social media listening | 3 | Basics of Tableau | 3 | R Programming |
| 4 | Research Methodology | 4 | Fraud detection | 4 | Gesture recognition |
| 5 | Applied Statistical Methods | 5 | Ruby Basics | 5 | Aptitude building-2 |
| 6 | Digital Marketing | 6 | LaTeX | 6 | Digital Image processing |
| 7 | G-Suite | 7 | Big data Analytics | 7 | Network Security |
| 8 | Joomla | 8 | Game Programming in Unity | 8 | big data Technologies |
| 9 | e-trading | 9 | Block Chain Technology | 9 | AWS Fundamentals |
| 10 | Scratch and MIT App Inventor Programming | 10 | Business Intelligence - be specific | 10 | Edge Computing |
| 11 | Random Forest using MS Excel | 11 | Design Thinking & Problem-solving skills | | |
| 12 | WordPress | 12 | Green Computing | | |
| 13 | MS-OFFICE | 13 | IoT | | |
| 14 | Code ignitor | | | | |

## 6. Extra Reading and Certification:

Each Chapter in the course is added with the extra reading part which gives extra pointer to gain In-depth knowledge apart from basic knowledge imparted in the syllabus. Learners should be encouraged to complete this extra reading portion as regular practice. Also, each course(Where ever applicable) includes suggested certification which help learners to enrich themselves as per industry demands and requirements.

## 7. Evaluation and Assessment:

In total 112 credits represent the workload of a year for MCA program.

| Semester | Credit | IE | UE |
|---|---|---|---|
| Semester I | 28 | 350 | 350 |
| Semester II | 28 | 350 | 350 |
| Semester III | 28 | 350 | 350 |
| Semester IV | 28 | 350 | 350 |
| **Total** | **112** | **1400** | **1400** |
| | | | **2800** |

The final total assessment of the candidate is made in terms of an internal (concurrent) evaluation and an external (university) examination for each course. In total the internal (concurrent) to external (university) marks ratio is maintained 50:50.

In general

1) For each course, 25 will be based on evaluation and 50 marks for semester end examination conducted by University, unless otherwise stated.
2) The internal evaluation of 25 marks further divided into Written Examination (Assignments/Unit test/written examination etc.), Practicals and Tutorials. The details have been specified in each course.
3) There will be one Practical course and one Mini Project course in each semester with 75 marks allotted for internal evaluation and 50 marks allotted for University examination. External assessment will be done by university appointed examiner. During external examination, examiner should ask the programs/practical ONLY from the work book of the students.
4) The internal marks will be communicated to the University at the end of each semester, but before the semester-end examinations. These marks will be considered for the declaration of the results.

**Examination:** Examinations shall be conducted at the end of the semester i.e. during November and in April/May. However supplementary examinations will also be held in November and April/May.

**Concurrent Evaluation:** A continuous assessment system in semester system (also known as internal assessment/comprehensive assessment) is spread through the duration of course and is done by the teacher teaching the course. The continuous assessment provides a feedback on teaching learning process. The feedback after being analyzed is passed on to the concerned student for implementation and subsequent improvement. As a part of concurrent evaluation, the learners shall be evaluated on a continuous basis by the Institute to ensure that student learning takes place in a graded manner. Concurrent evaluation components should be designed in such a way that the faculty can monitor the student learning & development and intervene wherever required. The faculty must share the outcome of each concurrent evaluation component with the students, soon after the evaluation, and guide the students for betterment Individual faculty member shall have the flexibility to design the concurrent evaluation components in a manner so as to give a balanced assessment of student capabilities across Knowledge, Skills & Attitude (KSA) dimensions based on variety of assessment tools.

Suggested components for Concurrent Evaluation (CE) are:

1. Case Study / Situation Analysis – (Group Activity or Individual Activity)
2. Class Test
3. Open Book Test
4. Field Visit / Study tour and report of the same
5. Small Group Project & Internal Viva-Voce
6. Learning Diary
7. Scrap Book
8. Group Discussion
9. Role Play / Story Telling
10. Individual Term Paper / Thematic Presentation
11. Written Home Assignment
12. Industry Analysis – (Group Activity or Individual Activity)
13. Literature Review / Book Review
14. Model Development / Simulation Exercises – (Group Activity or Individual Activity)
15. In-depth Viva
16. Quiz

# Savitribai Phule Pune University

## B. E. (Mechanical) (2015 Course) Semester – I

| Code | Subject | Teaching Scheme Hrs / week | | | Examination Scheme | | | | | Total Marks | Credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Tut | Pract | In Sem | End Sem | TW | PR | OR | | Theory | TW/ Pr/OR |
| 402041 | Hydraulics and Pneumatics | 3 | - | 2 | 30 | 70 | 25 | - | 25 | 150 | 3 | 1 |
| 402042 | CAD CAM Automation | 3 | - | 2 | 30 | 70 | 25 | 50 | - | 175 | 3 | 1 |
| 402043 | Dynamics of Machinery | 4 | - | 2 | 30 | 70 | 25 | - | 25 | 150 | 4 | 1 |
| 402044 | Elective-I | 3 | - | 2 | 30 | 70 | 25 | - | - | 125 | 3 | 1 |
| 402045 | Elective-II | 3 | - | - | 30 | 70 | - | - | - | 100 | 3 | - |
| 402046 | Project-I | - | - | 4 | - | - | 25 | - | 25 | 50 | - | 2 |
| Total | | 16 | - | 12 | 150 | 350 | 125 | 50 | 75 | 750 | 16 | 6 |
| | | | | | | | | | | | 22 | |

## B. E. (Mechanical) (2015 Course) Semester – II

| Code | Subject | Teaching Scheme Hrs / week | | | Examination Scheme | | | | | Total Marks | Credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Tut | Pract | In Sem | End Sem | TW | PR | OR | | Theory | TW/ Pr/OR |
| 402047 | Energy Engineering | 3 | - | 2 | 30 | 70 | 25 | - | 25 | 150 | 3 | 1 |
| 402048 | Mechanical System Design | 4 | - | 2 | 30 (1.5 Hrs) | 70 (3 Hrs) | 25 | - | 50 | 175 | 4 | 1 |
| 402049 | Elective-III | 3 | - | 2 | 30 | 70 | 25 | - | - | 125 | 3 | 1 |
| 402050 | Elective-IV | 3 | - | - | 30 | 70 | - | - | - | 100 | 3 | - |
| 402051 | Project-II | - | - | 12 | - | - | 100 | - | 100 | 200 | - | 6 |
| Total | | 13 | - | 18 | 120 | 280 | 175 | - | 175 | 750 | 13 | 9 |
| | | | | | | | | | | | 22 | |

| Elective – I | | Elective – II | |
|---|---|---|---|
| Code | Subject | Code | Subject |
| 402044 A | Finite Element Analysis | 402045 A | Automobile Engineering |
| 402044 B | Computational Fluid Dynamics | 402045 B | Operation Research |
| 402044 C | Heating Ventilation and Air Conditioning | 402045 C | Energy Audit and Management |
| | | 402045 D | Open Elective** |

| Elective – III | | Elective – IV | |
|---|---|---|---|
| 402049 A | Tribology | 402050 A | Advanced Manufacturing Processes |
| 402049 B | Industrial Engineering | 402050 B | Solar & Wind Energy |
| 402049 C | Robotics | 402050 C | Product Design and Development |
| | | 402050 D | Open Elective** |