## B.E. Sem. III (Computer Science & Engineering)

**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI**
**FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING**
**BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)**
**SEMESTER: THIRD**

| Sr No | Subject Code | Subject Name | Lecture | Tutorial | P/D | Total Hours/Week | Credit | Duration of paper (Hr) | Max Marks Theory Paper | Max Marks College Assessment | Total | Min Passing Marks | External | Internal | Total | Min Passing Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | | | | | | | | | | |
| 1 | 3KS01 | Mathematics-III | 3 | 1 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | | | | |
| 2 | 3KS02 | Discrete Structure & Graph Theory | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 3 | 3KS03 | Object Oriented Programming | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 4 | 3KS04 | Data Structures | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 5 | 3KS05 | Analog & Digital Electronics | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 6 | 4ES06 | Environmental Studies * | 2 | | | 2 | 0 | | | | | | | | | |
| **Practicals** | | | | | | | | | | | | | | | | |
| 7 | 3KS06 | Object Oriented Programming (Java) Lab | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 8 | 3KS07 | Data Structures Lab | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 9 | 3KS08 | Analog & Digital Electronics Lab | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 10 | 3KS09 | C Skill-Lab I (#) | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| | | Total | 17 | 1 | 8 | 26 | 20 | | | | 500 | | | | 200 | |
| | | | | | | | | | | | | | | Total | 700 | |

\* As per the Ordinance No. 42 of 2005
# C Skill Lab I - based on technology like -**Python/Django** etc. to be decided by Individual Dept. of respective College

## B.E. Sem. IV (Computer Science & Engineering)

| | | | Teaching Scheme | | | | | Examination Scheme | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Hours per Week** | | | | | **Theory** | | | | | **Practical** | | | | |
| | | | | | | | | | | | | | **Max Marks** | | | | |
| Sr No | Subject Code | Subject Name | Lecture | Tutorial | P/D | Total Hours/Week | Credit | Duration of paper (Hr) | Max Marks Theory Paper | Max Marks College Assessment | Total | Min Passing Marks | External | Internal | Total | Min Passing Marks |
| **Theory** | | | | | | | | | | | | | | | | |
| 1 | 4KS01 | Artificial Intelligence | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 2 | 4KS02 | Data Communication & Networking | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 3 | 4KS03 | Operating System | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 4 | 4KS04 | Microprocessor & Assembly Lang. Prog. | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 5 | 4KS05 | Theory of Computation | 3 | 1 | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | | | | |
| 6 | 4ES06 | Environmental Studies * | 2 | | | 2 | 2 | 3 | 80 | 20 | 100 | 40 | | | | |
| **Practicals** | | | | | | | | | | | | | | | | |
| 7 | 4KS06 | Data Communication & Networking Lab | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 8 | 4KS07 | Operating System Lab | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 9 | 4KS08 | Microprocessor & Assembly Lang. Prog. Lab | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 10 | 4KS09 | C Skill-Lab II (#) | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| | | **Total** | 17 | 1 | 8 | 26 | 22 | | | | 600 | | | | 200 | |
| | | | | | | | | | | | | | | **Total** | **800** |

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BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)
SEMESTER: FOURTH

* As per the Ordinance No. 42 of 2005
# C Skill Lab II - based on technology like -PHP, Web Technology, Raspberry Pi/Ardino, etc. to be decided by Individual Dept. of respective College

# B.E. Sem. V (Computer Science & Engineering)

**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI**
**FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING**
**BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)**
**SEMESTER: FIFTH**

| | | | Teaching Scheme | | | | | Examination Scheme | | | | | | | | |
| | | | Hours/Week | | | | | | Theory | | | | | Practical | | | |
| | | | | | | | | | | | | | | Max Marks | | | |
| Sr No | Subject Code | Subject Name | Lecture | Tutorial | P/D | Total Hours/Week | Credit | Duration of paper (Hr) | Max Marks Theory Paper | Max Marks College Assessment | Total | Min Passing Marks | External | Internal | Total | Min Passing Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | | | | | | | | | | |
| 1 | 5KS01 | Database Management Systems | 4 | | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | | | | |
| 2 | 5KS02 | Compiler Design | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 3 | 5KS03 | Computer Architecture & Organization | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 4 | 5KS04 | Professional Elective-I (#) | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 5 | 5KS05 | Open Elective - I ($) | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| **Practicals** | | | | | | | | | | | | | | | | |
| 6 | 5KS06 | Database Management Systems Lab (@) | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 7 | 5KS07 | Compiler Design Lab | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 8 | 5KS08 | Emerging Technology Lab# I | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 9 | 5KS09 | C Skill Lab III (*) | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| | | **Total** | 16 | 0 | 8 | 24 | 20 | | | | 500 | | | | 200 | |
| | | | | | | | | | | | | | | **Total** | **700** | |

| Track | # Professional Elective-I |
|---|---|
| AI | Cognitive Technologies |
| DS | Data Science and Statistics |
| IoT | Internet of Things |
| Cy. Security | Introduction to Cyber Security |

| $ Open Elective - I |
|---|
| Fundamentals of Finance & Accounting |
| Principles of Marketing for Engineering |
| Entrepreneurship |

@ Practicals using MongoDB,MySQL

**FOSS Tools & Technology for Practicals**

| Track | Emerging Technology Lab# I |
|---|---|
| AI | IBM Watson, Microsoft Cognitive Toolkit , TensorFlow, Apache SystemML, Caffe, OpenNN, Torch, Neuroph |
| DS | R, Python, Cassandra, Apache Hadoop |
| IoT | Arduino, DeviceHive, Kaa, Home Assistant |
| CS | Kali Linux, OpenVPN, NMAP, Metasploit Framework |

* C Skill Lab III - based on technology like - **Angular & React, Express, Node.js** etc. to be decided by Individual Dept. of respective College

*An Orientation Program of 15 hours duration /MOOC on Indian Constitution to be offered to the students during the Vth Semester*

Open Elective I to be opted from the courses offered by other engineering technology boards of the university /Massive Open learning Courses (MOOC) such as SWAYAM pertaining to the profession

## B.E. Sem. VI (Computer Science & Engineering)

**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI**
**FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING**
**BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)**
**SEMESTER: SIXTH**

| Sr No | Subject Code | Subject Name | Lecture | Tutorial | P/D | Total Hours/Week | Credit | Duration of paper (Hr) | Max Marks Theory Paper | Max Marks College Assessment | Total | Min Passing Marks | External | Internal | Total | Min Passing Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | | | | | | | | | | |
| 1 | 6KS01 | Security Policy & Governance | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 2 | 6KS02 | Design & Analysis of Algorithm | 4 | | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | | | | |
| 3 | 6KS03 | Software Engineering | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 4 | 6KS04 | Professional Elective-II (#) | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 5 | 6KS05 | Open Elective - II ($) | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| **Practicals** | | | | | | | | | | | | | | | | |
| 6 | 6KS06 | Design & Analysis of Algorithm Lab | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 7 | 6KS07 | Software Engineering Lab | | v | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 8 | 6KS08 | Emerging Technology Lab# II | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 9 | 6KS09 | C Skill Lab IV (*) | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| | | **Total** | 16 | 8 | | 24 | 20 | | | | 500 | | | | 200 | |
| | | | | | | | | | | | | | | **Total** | **700** | |

| Track | # Professional Elective-II |
|---|---|
| AI | Natural Language Processing |
| DS | Big Data Analytics |
| IoT | Sensors & Actuators |
| Cy.Security | Cryptography |

| $ Open Elective - II |
|---|
| Computational Biology |
| Cyber Law & Ethics |
| Intellectual Property Right |

**FOSS Tools & Technology for Practicals**

| Track | Emerging Technology Lab# II |
|---|---|
| AI | Natural Language Toolkit (NLTK),SpaCy, PyTorch-NLP, Natural, Retext, TextBlob |
| DS | KNIME, Spark, Neo4J, MongoDB, Hive, Storm, |
| IoT | Devicehub, Zetta, Node-RED, Flutter, M2MLabs Mainspring |
| CS | VeraCrypt, ModSecurity, AdBlocker, CheckShortURL, SPAMfighter, SpamBully |

\* C Skill Lab IV - based on technology like - **DevOp** to be decided by Individual Dept. of respective College

*An Orientation Program of 15 hours duration /MOOC on Indian Constitution to be offered to the students during the Vth Semester*

Open Elective II to be opted from the courses offered by other engineering technology boards of the university /Massive Open learning Courses (MOOC) such as SWAYAM pertaining to the profession

## B.E. Sem. VII (Computer Science & Engineering)

**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI**
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**BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)**
**SEMESTER: SEVENTH**

| Sr No | Subject Code | Subject Name | Lecture | Tutorial | P/D | Total Hours/Week | Credit | Duration of paper (Hr) | Max Marks Theory Paper | Max Marks College Assessment | Total | Min Passing Marks | External | Internal | Total | Min Passing Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | | | | | | | | | | |
| 1 | 7KS01 | Social Science & Engineering Economics | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 2 | 7KS02 | Computer Graphics | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 3 | 7KS03 | Cloud Computing | 4 | | | 4 | 4 | 3 | 80 | 20 | 100 | 40 | | | | |
| 4 | 7KS04 | Professional Elective-III (#) | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 5 | 7KS05 | Professional Elective-IV ($) | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| **Practicals** | | | | | | | | | | | | | | | | |
| 6 | 7KS06 | Computer Graphics Lab | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 7 | 7KS07 | Emerging Technology Lab# III | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 8 | 7KS08 | Emerging Technology Lab# IV | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 9 | 7KS09 | Project & Seminar | | | 8 | 8 | 4 | | | | | | | 50 | 50 | 25 |
| | | **Total** | 16 | 14 | 30 | 23 | | | | | 500 | | | | 200 | |
| | | | | | | | | | | | | | | **Total** | **700** | |

| Track | # Professional Elective-III | Emerging Technology Lab# III | Emerging Technology Lab# V |
|---|---|---|---|
| AI | Robotics | ROS, YARP, MRPT, Gazebo, OROCOS. | Ethereum, BigchainDB, Corda |
| DS | Data Warehousing & Mining | RapidMiner, Weka, Scrapy, Pandas | OpenCV, SimpleCV, Keras, Caffe |
| IoT | Embedded Systems | ThingsBoard, Kinoma, SiteWhere | OpenEaagles, Repast, OpenSimulator |
| Cy.Security | Digital Forensics | Security Onion, LastPass, KeePAss | ← FOSS Tools & Technology for Practicals ↑ |

| $ Professional Elective-IV | Blockchain Fundamentals | Image Processing | Optimization Techniques |
|---|---|---|---|

## B.E. Sem. VIII (Computer Science & Engineering)

**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI**
**FOUR YEAR DEGREE COURSE IN BACHELOR OF ENGINEERING**
**BRANCH: COMPUTER SCIENCE & ENGINEERING - SEMESTER PATTERN (CREDIT GRADE SYSTEM)**
**SEMESTER: EIGHTH**

| Sr No | Subject Code | Subject Name | Lecture | Tutorial | P/D | Total Hours/Week | Credit | Duration of paper (Hr) | Max Marks Theory Paper | Max Marks College Assessment | Total | Min Passing Marks | External | Internal | Total | Min Passing Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | | | | | | | | | | |
| 1 | 8KS01 | Object Oriented Analysis & Design | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 2 | 8KS02 | Professional Ethics & Management | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 3 | 8KS03 | Professional Elective-V (#) | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| 4 | 8KS04 | Professional Elective-VI ($) | 3 | | | 3 | 3 | 3 | 80 | 20 | 100 | 40 | | | | |
| **Practicals** | | | | | | | | | | | | | | | | |
| 5 | 8KS05 | Emerging Technology Lab# V | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 6 | 8KS06 | Emerging Technology Lab# VI | | | 2 | 2 | 1 | | | | | | 25 | 25 | 50 | 25 |
| 7 | 8KS07 | Project & Seminar | | | 12 | 12 | 6 | | | | | | 75 | 75 | 150 | 75 |
| | | **Total** | 12 | | 16 | 28 | 20 | | | | 400 | | | | 250 | |
| | | | | | | | | | | | | | | **Total** | 650 | |

| Track | # Professional Elective-V |
|---|---|
| AI | Virtual & Augmented Reality |
| DS | Machine Learning and AI |
| IoT | Wireless Sensor Networks |
| Cy.Security | System & Software Security |

| Emerging Technology Lab# IV |
|---|
| Google's ARCore, AR.js, ARToolKit, DroidAR, Brio, Adobe Aero |
| R Studio, Orange, D3.js, Ggplot2, Jupyter Notebooks |
| DSA,Thinger,RIOT,OpenRemote,Anjay |
| Wireshark, Burp Suit, Nessus |

| Emerging Technology Lab# VI |
|---|
| Hyperledger, HydraChain, MultiChain, Elements |
| Google Colab, GPUImage, Cuda, Aforge/Accord.NET |
| OR-Tools, Locust.io, httperf, Apache JMeter, Siege |

← **FOSS Tools & Technology for Practicals** ↑

| $ Professional Elective-VI | Distributed Ledger Technology | Multimedia Computing | Modeling & Simulation |
|---|---|---|---|