



**ST.PHILOMENA'S COLLEGE (AUTONOMOUS), MYSURU**

*(AFFILIATED TO UNIVERSITY OF MYSORE & REACCREDITED BY NAAC WITH B<sup>++</sup> GRADE)*

**PROGRAMME: M.Sc in COMPUTER SCIENCE**

**CBCS with Learning Outcome Based Curriculum**

**Academic years: 2020-22**

**{Approved in the Academic Council Meeting held on 12.01.2021}**

**{The Academic Year of 2020-21 was commenced on 24.01.2021 due to first wave of Covid-19 Pandemic}**



## **ST. PHILOMENA'S COLLEGE (AUTONOMOUS), MYSURU PG DEPARTMENT OF COMPUTER SCIENCE**

### **Preamble**

The M.Sc., Computer Science programme was started in the year 2014. The curriculum was first revised in the academic year 2016-17. The present revision is the third one. The zest of post-graduation programme is to provide high quality education and an intellectual stimulus for advanced study through effective teaching learning process. Higher education has to foster in students the spirit of robust learning and ethical research to pursue further studies at globally reputed institutions.

Computer Science is one of the rapidly-changing fields in Science and Technology areas. Therefore, updating the curriculum is an important process that must be done frequently. Moreover, the educational institutions must communicate well with the companies that employ their graduates to make sure that the curriculum is evolved to meet changing needs and fit the market requirement. As requirements change through changing business circumstances, the software that supports the business must also evolve and change. Therefore, keeping computer science curriculum up-to date and application oriented is one of the important steps for any department.

This curriculum for Master degree in Computer Science (2020-2021) conforms to outcome based teaching and learning process. The proposed curriculum is drafted on the basis of guidelines suggested by University Grants Commission and MOOCs. The concerns, needs and interests of students, teachers as well as societal expectations have been taken into consideration by introducing core courses, discipline specific electives courses, generic elective courses, ability enhancement courses and skill enhancement courses with special focus on technical, communication and subject specific skills through practical, research and other innovative transactional modes to develop their employability skills. On completion of the programme the student will have competency in communication skills, critical thinking, psychological skills, affective skills, problems-solving, analytical, reasoning, research, teamwork, digital literacy, leadership moral and ethical awareness.

Further, the curriculum framework defines specific learning course outcomes at the starting of each course with key words to map the course learning outcomes with programme specific outcomes and cognitive levels.

## VISION AND MISSION OF THE COLLEGE

### VISION:

The college is guided by the visionary zeal of providing value- based education to everyone irrespective of religion, caste, creed or sex by which the character is formed, intellect is explained and one can stand on his/her feet.

### MISSION:

To transform young men and women who come to learn not from books, but also from life and to share the experience of working and playing together, which inculcates life skills to become good citizens with integrity and discipline.

## VISION AND MISSION OF THE DEPARTMENT

### VISION:

To create the most conducive environment for quality academic and research oriented postgraduate education in computer science and prepare the students for a globalised technological society and orient them towards serving the society.

### MISSION:

1. To create, share, and apply knowledge in Computer Science, including in interdisciplinary areas that extend the scope of Computer Science and benefit humanity.
2. To educate students to be successful, ethical, and effective problem solvers and life-long learners who will contribute positively to the economic well-being of our region and nation.
3. Educate students in the best practices of the field as well as integrate the latest research into the curriculum.
4. Providing a strong theoretical and practical background across the computer science discipline with an emphasis on software development.
5. To inculcate the spirit of innovative thinking among the students and prepare them to tackle complex challenges facing the world.

| PO No. | Programme Educational Objectives (PEOs)   |
|--------|---|
| PEO-1  | <b>PROFESSIONAL DEVELOPMENT</b><br>To train the students to acquire knowledge in their chosen programme and apply professionally and ethically with responsibility towards the need of the society                          |
| PEO-2  | <b>CORE PROFICIENCY</b><br>To expertise the students to organize, understand, evaluate, and solve problems by providing hands on experience through modern tools necessary for practice.                                    |
| PEO-3  | <b>TECHNICAL ACCOMPLISHMENTS</b><br>To equip the students with the talent to interpret in core applications by building up a multi-disciplinary concept.  |
| PEO-4  | <b>PROFESSIONALISM</b><br>Inculcating professional behavior, strong ethical values, innovative research capabilities and leadership abilities.  |
| PEO-5  | <b>LEARNING ENVIRONMENT</b><br>To provide quality learning experiences through effective classroom practices, active learning styles of teaching, and opportunities for meaningful interaction between students and faculty |

### Mapping of Mission of the department with Programme Educational Objectives

| Mission | Programme Educational Objectives (PEOs) |        |        |        |        |
|---------|---|--------|--------|--------|--------|
|         | PEOs-1                                  | PEOs-2 | PEOs-3 | PEOs-4 | PEOs-5 |
| M1      | ✓                                       |        |        | ✓      | ✓      |
| M2      | ✓                                       | ✓      |        |        |        |
| M3      |   | ✓      | ✓      | ✓      |        |
| M4      |   | ✓      |        | ✓      |        |
| M5      | ✓                                       |        | ✓      |        | ✓      |

| PO No. | Programme Outcomes (POs)  |
|--------|---|
|        | Upon completion of the Programme the student will be able -   |
| PO-1   | To apply knowledge of mathematics, science, technology and ability to design and conduct experiments, as well as to analyze and interpret data                          |
| PO-2   | To design an application, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, and sustainability |
| PO-3   | To provide an ability to function on multidisciplinary teams  |
| PO-4   | To identify, formulate, and solve problems  |
| PO-5   | To inculcate research culture leading to publication of review articles and research article from the projects.   |
| PO-6   | To understand the impact of technology solutions in global, economic, environmental, and societal context   |
| PO-7   | An ability to use the techniques, skills, and modern technology tools.  |

| PSO No. | Programme Specific Outcomes PSOs   |
|---------|--|
|         | Upon completion of the Programme the student will acquire the ability to-  |
| PSO-1   | Understand and Apply mathematical foundation, computing and domain knowledge for the conceptualization of computing model of problems.                                       |
| PSO-2   | Identify, Analyze the computing requirements of a problem and Solve them using computing principles.   |
| PSO-3   | Design and Evaluate a computer based system, components and process to meet the specific needs of applications.  |
| PSO-4   | Use current techniques and tools necessary for complex computing practices.  |
| PSO-5   | Develop and integrate effectively system based components into user environment.   |
| PSO-6   | Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.   |
| PSO-7   | Apply the understanding of management principles with computing knowledge to manage the projects in multidisciplinary environments.  |
| PSO-8   | Understand societal, environmental, health, legal, ethical issues within local and global contexts and the consequential responsibilities relevant to professional practice. |
| PSO-9   | Identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.   |
| PSO-10  | Use knowledge to analyze, interpret the data and synthesis the information to derive valid conclusions using research methods.   |
| PSO-11  | Expertise in developing application with required domain knowledge.  |

**Mapping of Programme Educational Objectives with Program Outcomes and Programme Specific outcomes**

|                                  | Program Outcomes |      |      |      |      |      |      |
|----------------------------------|------------------|------|------|------|------|------|------|
| Programme Educational Objectives | PO-1             | PO-2 | PO-3 | PO-4 | PO-5 | PO-6 | PO-7 |
| PEOs-1                           | ✓                | ✓    |      |      | ✓    | ✓    |      |
| PEOs-2                           | ✓                |      | ✓    | ✓    |      |      | ✓    |
| PEOs-3                           |                  | ✓    | ✓    | ✓    |      | ✓    | ✓    |
| PEOs-4                           | ✓                | ✓    |      | ✓    | ✓    |      | ✓    |
| PEOs-5                           |                  | ✓    | ✓    |      | ✓    | ✓    | ✓    |

|                                  | Program Specific Outcomes |       |       |       |       |       |       |       |       |        |        |
|----------------------------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| Programme Educational Objectives | PSO-1                     | PSO-2 | PSO-3 | PSO-4 | PSO-5 | PSO-6 | PSO-7 | PSO-8 | PSO-9 | PSO-10 | PSO-11 |
| PEOs-1                           | ✓                         | ✓     |       |       |       | ✓     |       | ✓     | ✓     |        | ✓      |
| PEOs-2                           |                           | ✓     | ✓     |       | ✓     |       | ✓     |       |       | ✓      |        |
| PEOs-3                           |                           |       | ✓     | ✓     | ✓     | ✓     |       |       |       |        | ✓      |
| PEOs-4                           | ✓                         | ✓     | ✓     |       |       |       | ✓     | ✓     | ✓     | ✓      | ✓      |
| PEOs-5                           | ✓                         |       |       |       |       | ✓     |       | ✓     |       | ✓      | ✓      |

### Changes in the Curriculum

| Sl. No                 | Existing paper to be replaced | New Paper Proposed                     | Credits | Justification   | Percentage of change |
|------------------------|-------------------------------|--|---------|---|----------------------|
| <b>First Semester</b>  |                               |  |         |   |                      |
| 1                      | <b>C and C++ Practical</b>    | Computer Organization and Architecture | 4       | This new course paper explores how machine are designed, built and operate. Knowing what's inside and how it works will help the student to design, develop and implement applications better, faster, cheaper, more efficient and easier to use. | 100                  |
| 2                      | <b>Problem Solving in C++</b> | Dot Net with C#                        | 4       | To provide the knowledge on fundamentals of new framework this new course paper is introduced. C#.net is preferred in fast development environment and it offers a great career opportunity for students  | 100                  |
| 3                      | -                             | Programming Language Pragmatics        | 2       | In order to provide the knowledge on different language classes and their relationship this new course paper is introduced. It helps the students to choose the most appropriate language for a given task.                                       | 100                  |
| 4                      | -                             | Research Techniques and Analysis       | 4       | To provide student necessary training to undertake research projects this new course paper is introduced.   | 100                  |
| <b>Second Semester</b> |                               |  |         |   |                      |
| 5                      | -                             | JAVA Programming                       | 4       | In order to train students in back-end development projects which includes big data and Android development this new course paper is introduced.  | 100                  |
| 6                      | -                             | Computer Graphics                      | 4       | This new course paper provides students knowledge on the fundamentals of Graphics and Animation, which helps students to design applications in 2D & 3D graphics which includes engineering, medical imaging, art and entertainment applications. | 100                  |
| 7                      | -                             | Cryptography and Network Security      | 4       | Cryptography plays a crucial role in encrypting modern day applications such as whatsapp, digital signature, etc. Thus this new course provides the knowledge on data encryption and data security.   | 100                  |
| <b>Third Semester</b>  |                               |  |         |   |                      |

|   |                         |                    |   |  |     |
|---|-------------------------|--------------------|---|--|-----|
| 8   | -                       | Matlab Programming | 2 | It is a high-performance language for technical computing like deep learning, image processing, data analysis etc. This new course paper is introduced to train the students for the job market requirements.                          | 100 |
| 9   | -                       | Web Technology     | 2 | In order to train students in creating effective web applications using latest web technologies this new course paper is introduced.   | 100 |
| 10  | -                       | Advanced DBMS      | 4 | In order to train students in advanced topics in DBMS to meet and fit the market requirements this new course paper is introduced.   | 100 |
| <b>Fourth Semester</b>                                |                         |                    |   |  |     |
| 11  | <b>Network Security</b> | Finite Automata    | 4 | Finite automata are used in text processing, compilers, and hardware design. CFGs are used in programming languages and artificial intelligence. Thus this new course paper helps students to learn about basic compiler construction. | 100 |
| 12  | -                       | Software Testing   | 2 | Testing is required for an effective performance of software application or product. Thus this new course paper helps students to learn different methods of identifying errors in software and removing it.                           | 100 |
| <b>OVERALL PERCENTAGE OF CHANGE IN SYLLABUS = 40%</b> |                         |                    |   |  |     |

### Scheme of Teaching

| SL. No  | Code No | QP Code | Course Title  | Type | L | T | P | Credits | Total Credits |  |
|---|---------|---------|---|------|---|---|---|---------|---------------|--|
| <b>FIRST SEMESTER</b>   |         |         |   |      |   |   |   |         |               |  |
| 1   |         |         | Data Structures   | HC   | 3 | 0 | 1 | 4       | 20            |  |
| 2   |         |         | Operating System  | HC   | 3 | 1 | 0 | 4       |               |  |
| 3   |         |         | Computer Organization and Architecture                        | HC   | 4 | 0 | 0 | 4       |               |  |
| <b>ANY TWO FROM THE SOFTCORE ELECTIVE LIST</b>  |         |         |   |      |   |   |   |         |               |  |
| 4   |         |         | Select one from Soft –Core General Courses List-A             | SC   | 4 | 0 | 0 | 4       |               |  |
| 5   |         |         | Select one from Soft –Core General Courses List-B             | SC   | 2 | 0 | 0 | 2       |               |  |
| 6   |         |         | OE from other department                                      | OE   | 2 | 0 | 0 | 2       |               |  |
| <b>SECOND SEMESTER</b>  |         |         |   |      |   |   |   |         |               |  |
| 7   |         |         | DBMS  | HC   | 3 | 0 | 1 | 4       | 22            |  |
| 8   |         |         | Computer Network  | HC   | 3 | 0 | 1 | 4       |               |  |
| <b>ANY THREE FROM THE SOFTCORE ELECTIVE LIST</b>                                      |         |         |   |      |   |   |   |         |               |  |
| 9   |         |         | Select one from Soft –Core Interdisciplinary Courses List-C   | SC   | 3 | 0 | 1 | 4       |               |  |
| 10  |         |         | Select one from Soft –Core Skill Based Courses List-D         | SC   | 3 | 0 | 1 | 4       |               |  |
| 11  |         |         | Select one from Soft –Core General Courses List-E             | SC   | 4 | 0 | 0 | 4       |               |  |
| 12  |         |         | OE from other Department                                      | OE   | 2 | 0 | 0 | 2       |               |  |
| <b>THIRD SEMESTER</b>   |         |         |   |      |   |   |   |         |               |  |
| 13  |         |         | IOT   | HC   | 3 | 1 | 0 | 4       | 18            |  |
| 14  |         |         | Software Engineering  | HC   | 4 | 0 | 0 | 4       |               |  |
| 15  |         |         | Minor Project   | HC   | 0 | 2 | 2 | 4       |               |  |
| <b>ANY TWO FROM THE SOFTCORE ELECTIVE LIST</b>  |         |         |   |      |   |   |   |         |               |  |
| 16  |         |         | Select one from Soft –Core Ability Enhancement Courses List-F | SC   | 3 | 0 | 1 | 4       |               |  |
| 17  |         |         | Select one from Soft –Core General Courses List-G             | SC   | 0 | 0 | 2 | 2       |               |  |
| <b>FOURTH SEMESTER</b>  |         |         |   |      |   |   |   |         |               |  |
| 18  |         |         | Wireless Networking   | HC   | 3 | 1 | 0 | 4       | 18            |  |
| 19  |         |         | Major Project   | HC   | 0 | 4 | 4 | 8       |               |  |
| <b>ANY TWO FROM THE SOFTCORE ELECTIVE LIST</b>  |         |         |   |      |   |   |   |         |               |  |
| 20  |         |         | Select one from Soft –Core General Courses List-H             | SC   | 4 | 0 | 0 | 4       |               |  |
| 21  |         |         | Select one from Soft –Core Self Study Courses List-I          | SC   | 0 | 2 | 0 | 2       |               |  |
| <b>Total Credits (HC-44+SC-16+ AEC-04+SEC-04+IDC-04+SS-02+OE- 04) = 78C + MOOC-04</b> |         |         |   |      |   |   |   |         | 78+4          |  |



**GENERIC ELECTIVE COURSES OFFERED FOR POST GRADUATE STUDENTS OF OTHER DEPARTMENTS**

| <b>OE FOR OTHER DEPARTMENTS</b> |            |                |  |             |          |          |          |                |
|---------------------------------|------------|----------------|--|-------------|----------|----------|----------|----------------|
| <b>Sl. No</b>                   | <b>SEM</b> | <b>QP CODE</b> | <b>Course Title</b>                          | <b>Type</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> |
| 1                               | I          |                | Internet Fundamentals                        | OE          | 4        | 0        | 0        | 4              |
| 2                               | II         |                | Web Designing                                | OE          | 4        | 0        | 0        | 4              |
| 3                               | III        |                | Information technology and office automation | OE          | 4        | 0        | 0        | 4              |

**SEMESTER WISE SOFT-CORE ELECTIVE PAPERS OFFERED TO M.Sc. COMPUTER SCIENCE STUDENTS**

| <b>List A –Soft –Core General Courses</b> |                 |                                     |          |          |          |                |
|---|-----------------|-------------------------------------|----------|----------|----------|----------------|
| <b>Sl No</b>                              | <b>Semester</b> | <b>Title of the Paper</b>           | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> |
| 1   | First           | DOT net technology                  | 3        | 0        | 1        | 4              |
| 2   |                 | Data Communication                  | 4        | 0        | 0        | 4              |
| 3   |                 | Research methodology and Techniques | 4        | 0        | 0        | 4              |

| <b>List B –Soft –Core General Courses</b> |                 |                                 |          |          |          |                |
|---|-----------------|---------------------------------|----------|----------|----------|----------------|
| <b>Sl No</b>                              | <b>Semester</b> | <b>Title of the Paper</b>       | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> |
| 1   | First           | Programming Language Pragmatics | 2        | 0        | 0        | 2              |
| 2   |                 | Data Warehousing                | 2        | 0        | 0        | 2              |

| <b>List C –Soft –Core Interdisciplinary Courses</b> |                 |                                     |          |          |          |                |
|---|-----------------|-------------------------------------|----------|----------|----------|----------------|
| <b>Sl No</b>  | <b>Semester</b> | <b>Title of the Paper</b>           | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> |
| 1   | Second          | Computer Application in Business    | 3        | 0        | 1        | 4              |
| 2   | Third           | Computer Application in Social work | 2        | 0        | 2        | 4              |
| 3   | Third           | Computer Application in Economics   | 2        | 0        | 2        | 4              |

| <b>List D –Soft –Core Skill Based Courses</b> |                 |                           |          |          |          |                |
|---|-----------------|---------------------------|----------|----------|----------|----------------|
| <b>Sl No</b>                                  | <b>Semester</b> | <b>Title of the Paper</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> |
| 1   | Second          | Java Programming          | 3        | 0        | 1        | 4              |
| 2   |                 | Computer Graphics         | 4        | 0        | 0        | 4              |

| <b>List E –Soft –Core General Courses</b> |                 |                                   |          |          |          |                |
|---|-----------------|-----------------------------------|----------|----------|----------|----------------|
| <b>Sl No</b>                              | <b>Semester</b> | <b>Title of the Paper</b>         | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> |
| 1   | Second          | Cloud Computing                   | 4        | 0        | 0        | 4              |
| 2   |                 | Cryptography and Network Security | 4        | 0        | 0        | 4              |

| <b>List F –Soft –Core Ability Enhancement Courses</b> |                 |                           |          |          |          |                |
|---|-----------------|---------------------------|----------|----------|----------|----------------|
| <b>Sl No</b>  | <b>Semester</b> | <b>Title of the Paper</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> |
| 1   | Third           | Python Programming        | 3        | 0        | 1        | 4              |
| 2   |                 | Web Engineering           | 4        | 0        | 0        | 4              |
| 3   |                 | Advanced DBMS             | 3        | 0        | 1        | 4              |

| <b>List G –Soft –Core General Courses</b> |                 |                           |          |          |          |                |
|---|-----------------|---------------------------|----------|----------|----------|----------------|
| <b>Sl No</b>                              | <b>Semester</b> | <b>Title of the Paper</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> |
| 1   | Third           | Matlab Programming        | 0        | 0        | 2        | 2              |
| 2   |                 | Web Technology            | 0        | 0        | 2        | 2              |

| <b>List H–Soft –Core General Courses</b> |                 |                           |          |          |          |                |
|--|-----------------|---------------------------|----------|----------|----------|----------------|
| <b>Sl. No</b>                            | <b>Semester</b> | <b>Title of the Paper</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> |
| 1  | Fourth          | PHP Programming           | 4        | 0        | 0        | 4              |
| 2  |                 | Finite Automata           | 4        | 0        | 0        | 4              |
| 3  |                 | Big Data Analytics        | 4        | 0        | 0        | 4              |

| <b>List I –Soft –Core Self Study Courses</b> |                 |                           |          |          |          |                |
|--|-----------------|---------------------------|----------|----------|----------|----------------|
| <b>Sl. No</b>                                | <b>Semester</b> | <b>Title of the Paper</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> |
| 1  | Fourth          | Mobile Computing          | 0        | 2        | 0        | 2              |
| 2  |                 | Data Mining               | 0        | 2        | 0        | 2              |
| 3  |                 | Software Testing          | 0        | 2        | 0        | 2              |



**ST. PHILOMENA'S COLLEGE (AUTONOMOUS)**  
**Programme: M.Sc Computer Science**  
**(For Candidates admitted during the Academic year 2020-2021 onwards)**

**FIRST YEAR - SEMESTER – I**

| Course Title  |   | DATA STRUCTURES |               |                  |            |          |     |
|---|---|-----------------|---------------|------------------|------------|----------|-----|
| Course Type   | Hard Core- Theory   | Total Hours     | 80            | Hours/Week       | 05         | Credits  | 04  |
| Course Code   | Evaluation  | Internal        | C1+C2 = 15+15 |                  |            | 30 Marks | 100 |
|   |   | External        | Duration      | C3               | 03Hrs      | 70 Marks |     |
| COURSE OBJECTIVES (COs)   |   |                 |               |                  |            |          |     |
| CO No.  | Course Objectives   |                 |               |                  |            |          |     |
|   | On completion of the course the student will be able  |                 |               |                  |            |          |     |
| CO-1  | To understand the linear and non-linear data structures available in solving problems             |                 |               |                  |            |          |     |
| CO-2  | To know about the sorting and searching techniques and its efficiencies                           |                 |               |                  |            |          |     |
| CO-3  | To know how to use data structures in real time applications.                                     |                 |               |                  |            |          |     |
| Mapping of CLOs with PSOs & CDLs  |   |                 |               |                  |            |          |     |
| <b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The keywords are used at the end of each unit to define CLOs.</b> |   |                 |               |                  |            |          |     |
| CLOs No.  | Course Learning Outcomes (CLOs)   |                 |               | PSOs             | CLDs       |          |     |
|   | <b>On completion of the course the student will learn to</b>                                      |                 |               | <b>Addressed</b> |            |          |     |
| CLO-1   | Develop knowledge of linear data structures which includes arrays, linked lists, stacks and queue |                 |               | PSO-1            | Understand |          |     |
| CLO-2   | Develop knowledge of non-linear data structures which includes trees, heaps and graphs            |                 |               | PSO-5            | Analyze    |          |     |
| CLO-3   | Develop knowledge on hashing and file organization.   |                 |               | PSO-5            | Analyze    |          |     |

| Units | Course Content/ Syllabus   | Duration |
|-------|--|----------|
| 1.0   | <b>INTRODUCTION TO DATA STRUCTURES:</b> Concept of data type, Definition of data structure, Types of data structures.<br><b>Keywords-</b> <i>Understanding the concept and objectives of the Data structures</i> | 08 Hrs.  |
| 1.1   | <b>Arrays:</b> Representation, processing single and multidimensional arrays, operations on arrays<br><b>Keywords-</b> <i>Understanding the concept of arrays and analyzing different</i>                        | 12Hrs    |

|            |  |              |
|------------|--|--------------|
|            | <i>operations on arrays</i>  |              |
| <b>2.0</b> | <b>LINEAR DATA STRUCTURE: Stacks:</b> definition, representation of a stack in memory, operations on stack, multiple stacks, application of stacks<br><i>Keywords- Understanding stacks, analyzing operation on stacks, application of stacks</i>            | <b>08Hrs</b> |
| <b>2.1</b> | <b>Queue:</b> definition, representation of a queue in memory, operations on queues, types – linear, circular, dequeue, priority queue, applications of queue<br><i>Keywords- Understanding queues, analyzing operation on queues, application of queues</i> | <b>06Hrs</b> |
| <b>2.2</b> | <b>Linked list:</b> definition, representation of a linked list in memory, operations on linked list<br><i>Keywords- Understanding linked list, analyzing representation and operation on linked list, application of stacks</i>                             | <b>06Hrs</b> |
| <b>3.0</b> | <b>NON-LINEAR DATASTRUCTURE: Trees:</b> Types - Binary tree, Binary search tree, AVL tree, Btree, B+-tree<br><i>Keywords- Understanding non-linear DS, analyzing the concept of Trees.</i>   | <b>12Hrs</b> |
| <b>3.1</b> | <b>Heaps and Graphs</b><br>Introduction to heaps, graphs.<br><i>Keywords- Analyzing the concept of heaps and graphs, evaluating algorithms on heaps and graphs</i>   | <b>08Hrs</b> |
| <b>4.0</b> | <b>HASHING: Hashing and hash tables:</b> Definition, Hash functions, Types of hash functions, Rehashing<br><i>Keywords-Analyzing and creating hash tables</i>  | <b>6Hrs</b>  |
| <b>4.1</b> | <b>Files:</b> Definition, Basic terminologies, Attributes of a file, Classification of files, Operations on files<br><i>Keywords-Understanding files</i>   | <b>8Hrs</b>  |
| <b>4.2</b> | <b>Types of file organization:</b> sequential, relative, indexed and multi-key file organizations<br><i>Keywords- Understanding and evaluating file structure</i>  | <b>6Hrs</b>  |

#### REFERENCES

| Sl. No | Title of the book                             | Authors                              | Edition         | Year of publication |
|--------|---|--------------------------------------|-----------------|---------------------|
| 1      | Data Structures: A Pseudocode Approach with C | Richard Gilberg, Behrouz A. Forouzan | 2 <sup>nd</sup> | 2004                |
| 2      | Data Structures Using C and C++               | YedidyahLangsam, Aaron M. Tenenbaum  | 2 <sup>nd</sup> | 2015                |
| 3      | Fundamentals Of Data Structures               | Ellis Horowitz &SartajSahni          | 2 <sup>nd</sup> | 2008                |

### FIRST YEAR - SEMESTER –I

|                                |  |             |               |            |       |          |     |
|--------------------------------|--|-------------|---------------|------------|-------|----------|-----|
| Course Title                   | <b>COMPUTER ORGANISATION AND ARCHITECTURE</b>                      |             |               |            |       |          |     |
| Course Type                    | Hard Core- Theory  | Total Hours | 64            | Hours/Week | 04    | Credits  | 04  |
| Course Code                    | Evaluation   | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                                |  | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| <b>COURSE OBJECTIVES (COs)</b> |  |             |               |            |       |          |     |
| <b>CO No.</b>                  | <b>Course Objectives</b>   |             |               |            |       |          |     |
|                                | On completion of the course the student will be able to            |             |               |            |       |          |     |
| CO-1                           | Impart basic concepts of computer architecture and organization    |             |               |            |       |          |     |
| CO-2                           | Explain key skills of constructing cost-effective computer systems |             |               |            |       |          |     |
| CO-3                           | Familiarize the basic CPU organization                             |             |               |            |       |          |     |
| CO-4                           | Help students in understanding various memory devices.             |             |               |            |       |          |     |
| CO-5                           | Facilitate students in learning IO communication                   |             |               |            |       |          |     |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |   |                       |                 |
|--|---|-----------------------|-----------------|
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)</b><br><b>On completion of the course the student will learn to</b> | <b>PSOs Addressed</b> | <b>CLDs</b>     |
| CLO-1                                      | Identify various components of computer and their interconnection                                     | <b>PSO- 1,3</b>       | <b>Analyze</b>  |
| CLO-2                                      | Identify basic components and design of the CPU: the ALU and control unit                             | <b>PSO-2,6</b>        | <b>Analyze</b>  |
| CLO-3                                      | Compare and select various Memory devices as per requirement  | <b>PSO-8</b>          | <b>Evaluate</b> |
| CLO-4                                      | Compare various types of IO mapping techniques  | <b>PSO-11</b>         | <b>Evaluate</b> |
| CLO-5                                      | Critique the performance issues of cache memory and virtual memory                                    | <b>PSO-7,9</b>        | <b>Evaluate</b> |

| <b>Units</b> | <b>Course Content/ Syllabus</b>   | <b>Duration</b> |
|--------------|---|-----------------|
| <b>1.0</b>   | <b>STRUCTURE OF COMPUTERS:</b> Computer types, Functional units, Basic operational concepts, Von-Neumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes.<br><i>Keywords: Analyzing structure of computer</i> | <b>6Hrs</b>     |
| <b>1.1</b>   | <b>COMPUTER ARITHMETIC:</b> Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations   | <b>6Hrs</b>     |

|            |  |             |
|------------|--|-------------|
|            | <i>Keywords: Analyzing arithmetic operations</i>   |             |
| <b>2.0</b> | <b>BASIC COMPUTER ORGANIZATION AND DESIGN:</b> Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt.<br><i>Keywords: Understanding computer organization</i>                          | <b>6Hrs</b> |
| <b>2.1</b> | <b>CENTRAL PROCESSING UNIT:</b> Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC<br><i>Keywords: Analyzing the concept of CPU</i>                          | <b>6Hrs</b> |
| <b>3.0</b> | <b>REGISTER TRANSFER AND MICRO-OPERATIONS:</b> Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.<br><i>Keywords: Understanding Registers and Micro operations</i> | <b>6Hrs</b> |
| <b>3.1</b> | <b>MICRO-PROGRAMMED CONTROL:</b> Control Memory, Address Sequencing, Design of Control Unit.<br><i>Keywords: Understanding of Control unit</i>   | <b>6Hrs</b> |
| <b>4.0</b> | <b>MEMORY SYSTEM:</b> Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID<br><i>Keywords: Analyzing different memory devices</i>                  | <b>4Hrs</b> |
| <b>4.1</b> | <b>INPUT OUTPUT:</b> I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA.<br><i>Keywords: Analyzing I/O operations</i>  | <b>4Hrs</b> |
| <b>4.2</b> | <b>MULTIPROCESSORS:</b> Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence.<br><i>Keywords: Understanding multiprocessor</i>  | <b>4Hrs</b> |

#### TEXT BOOK

| Sl. No | Title of the book            | Authors       | Publisher            | Edition         | Year of Publication |
|--------|------------------------------|---------------|----------------------|-----------------|---------------------|
| 1      | Computer System Architecture | M. Moris Mano | Pearson/P HI, India. | 3 <sup>rd</sup> | 2006                |

| <b>REFERENCE</b> |   |   |   |                 |                            |
|------------------|---|---|---|-----------------|----------------------------|
| <b>Sl. No</b>    | <b>Title of the book</b>  | <b>Authors</b>                                  | <b>Publisher</b>                        | <b>Edition</b>  | <b>Year of Publication</b> |
| 1.               | Computer Organization   | Carl Hamacher,<br>Zvonks Vranesic,<br>SafeaZaky | McGraw<br>Hill, New<br>Delhi,<br>India. | 5 <sup>th</sup> | 2002                       |
| 2.               | Computer Organization<br>and Architecture-<br>designing for performance | William Stallings                               | Prentice<br>Hall, New<br>Jersy          | 8 <sup>th</sup> | 2010                       |
| 3.               | Structured Computer<br>Organization                                     | Anrew S.<br>Tanenbaum                           | Pearson<br>Education<br>Inc,            | 5 <sup>th</sup> | 2006                       |
| 4.               | Computer Architecture<br>and Organization                               | John P. Hayes                                   | Tata<br>McGrawH<br>ill                  | 3 <sup>rd</sup> | 1998                       |

**FIRST YEAR - SEMESTER – I**

| Course Title   | OPERATING SYSTEM  |             |               |                         |                                   |          |     |
|--|---|-------------|---------------|-------------------------|-----------------------------------|----------|-----|
| Course Type  | Hard Core- Theory   | Total Hours | 64            | Hours/Week              | 04                                | Credits  | 04  |
| Course Code  | Evaluation  | Internal    | C1+C2 = 15+15 |                         |                                   | 30 Marks | 100 |
|  |   | External    | Duration      | C3                      | 03Hrs                             | 70 Marks |     |
| <b>COURSE OBJECTIVES (COs)</b>   |   |             |               |                         |                                   |          |     |
| <b>CO No.</b>  | <b>Course Objectives</b>  |             |               |                         |                                   |          |     |
|  | On completion of the course the student will be able  |             |               |                         |                                   |          |     |
| CO-1   | To be aware of the evolution and fundamental principles of operating system, processes and their communication;   |             |               |                         |                                   |          |     |
| CO-2   | To understand the various operating system components like process management and memory management;  |             |               |                         |                                   |          |     |
| CO-3   | To know about file management and the distributed file system concepts in operating systems;  |             |               |                         |                                   |          |     |
| CO-4   | To be aware of components of operating system with relevant case study.   |             |               |                         |                                   |          |     |
| <b>Mapping of CLOs with PSOs &amp; CDLs</b>  |   |             |               |                         |                                   |          |     |
| <p><b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The keywords are used at the end of each unit to define CLOs.</b></p> |   |             |               |                         |                                   |          |     |
| CLOs No.   | Course Learning Outcomes (CLOs)<br>On completion of the course the student will learn to  |             |               | PSOs Addressed          | CLDs                              |          |     |
| CLO-1  | Describe and explain the fundamental components of a computer operating system;   |             |               | PSO-1                   | Understand                        |          |     |
| CLO-2  | Define, discuss and explain the concepts such as scheduling, deadlocks, memory management, synchronization and file systems;  |             |               | PSO-1<br>PSO-2<br>PSO-3 | Understand<br>Analyse<br>Evaluate |          |     |
| Units  | Course Content/ Syllabus  |             |               |                         | Duration                          |          |     |
| 1.1  | Types of operating systems, Operating systems structures<br><i>Keywords: Understanding operating system and different types of operating system</i>   |             |               |                         | 3Hrs                              |          |     |
| 1.2  | Systems components, Operating system services, System calls, System programs<br><i>Keywords: Understanding components and services of operating system</i>                                  |             |               |                         | 3Hrs                              |          |     |
| 1.3  | Process concept, Process scheduling, Operation on processes, Co-operating processes, Inter process communications<br><i>Keywords: Understanding process and inter process communication</i> |             |               |                         | 3Hrs                              |          |     |
| 1.4  | CPU scheduling: Scheduling criteria, Scheduling algorithms, Multiple  |             |               |                         | 3Hrs                              |          |     |



|     |   |             |
|-----|---|-------------|
|     | processor scheduling<br><b>Keywords: Understanding different process scheduling algorithms</b>  |             |
| 2.1 | Threads: Multi-threading models, Deadlock: Deadlock Characterization, prevention, detection, avoidance, Recovery from Deadlock<br><b>Keywords: Understanding deadlock</b>   | <b>6Hrs</b> |
| 2.2 | Synchronization, Critical section problem, Semaphores, Classical problems of synchronization (Dinning Philosopher's problem, Bounded buffer problem, Reader's- Writers problem)<br><b>Keywords: Understanding synchronization and the concept of semaphores</b> | <b>6Hrs</b> |
| 3.1 | Swapping, Contiguous Memory allocation, Paging-Segmentation<br><b>Keywords: Understanding the concept of paging</b>   | <b>6Hrs</b> |
| 3.2 | Virtual Memory, Demand paging, Page Replacement, Thrashing<br><b>Keywords: Learning different page replacement algorithms</b>   | <b>6Hrs</b> |
| 4.1 | <b>Disk Structures:</b> Disk Scheduling, Free Space management, Distributed File systems, Naming and Transparency<br><b>Keywords: Understanding Disk structure and different disk scheduling algorithms</b>   | <b>6Hrs</b> |
| 4.2 | <b>File Systems Interface:</b> File concepts, Access methods, Directory Structures. File System Implementation, File Systems structures, Directory Implementation<br><b>Keywords: Understanding file concepts</b>   | <b>6Hrs</b> |

#### REFERENCES

| Sl. No | Title of the book                                  | Authors                                       | Publisher                      | Edition         | Year of publication |
|--------|--|---|--------------------------------|-----------------|---------------------|
| 1      | Operating Systems Concepts                         | Abraham Silberschalz Peter B Galvin, G.Gagne, | Addision Wesley Publishing Co. | 7 <sup>th</sup> | 2010                |
| 2      | Modern operating Systems                           | Andrew S.Tanenbaum,                           | PHI Learning Pvt.Ltd.          | 3 <sup>rd</sup> | 2008                |
| 3      | Operating Systems: Internals and Design Principles | William Stallings                             | Prentice Hall                  | 7 <sup>th</sup> | 2011                |
| 4      | Operating Systems                                  | H M Deital, P J Deital and D R Choffnes,      | Pearson Education              | 3 <sup>rd</sup> | 2011                |
| 5      | Operating Systems: A Concept-based Approach.       | D M Dhamdhare                                 | Tata McGraw-Hill Education     | 2 <sup>nd</sup> | 2007                |

**FIRST YEAR - SEMESTER – I**

|  |   |             |               |            |   |                               |     |
|--|---|-------------|---------------|------------|---|-------------------------------|-----|
| Course Title   | <b>DOT NET with C#</b>  |             |               |            |   |                               |     |
| Course Type  | Soft Core- Theory   | Total Hours | 80            | Hours/Week | 05  | Credits                       | 04  |
| Course Code  | Evaluation  | Internal    | C1+C2 = 15+15 |            |   | 30 Marks                      | 100 |
|  |   | External    | Duration      | C3         | 03Hrs   | 70 Marks                      |     |
| <b>COURSE OBJECTIVES (COs)</b>   |   |             |               |            |   |                               |     |
| <b>CO No.</b>  | <b>Course Objectives</b>  |             |               |            |   |                               |     |
|  | On completion of the course the student will be able to   |             |               |            |   |                               |     |
| CO-1   | Program in the c# programming language,   |             |               |            |   |                               |     |
| CO-2   | Have knowledge of object-oriented paradigm in the c# programming language,  |             |               |            |   |                               |     |
| CO-3   | Know the use of c# in a variety of technologies and on different platforms.   |             |               |            |   |                               |     |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b>   |   |             |               |            |   |                               |     |
| <p><b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The keywords are used at the end of each unit to define CLOs.</b></p> |   |             |               |            |   |                               |     |
| <b>CLOs No.</b>  | <b>Course Learning Outcomes (CLOs)</b><br><b>On completion of the course the student will learn to</b>  |             |               |            | <b>PSOs Addressed</b>                         | <b>CLDs</b>                   |     |
| CLO-1  | The basic components of Dot Net Framework along with the features of C#   |             |               |            | <b>PSO-1</b>                                  | <b>Understand</b>             |     |
| CLO-2  | To solve real world problems using OOP techniques.  |             |               |            | <b>PSO-1</b><br><b>PSO-4</b>                  | <b>Apply</b>                  |     |
| CLO-3  | The concepts of methods and attributes, distinction between classes and instances   |             |               |            | <b>PSO-2</b>                                  | <b>Analyse</b>                |     |
| CLO-4  | Web forms, Validation and Database Connectivity   |             |               |            | <b>PSO-4</b><br><b>PSO-5</b><br><b>PSO-11</b> | <b>Apply</b><br><b>Create</b> |     |
| CLO-5  | To develop and understand exception handling, multithreaded applications with synchronization.  |             |               |            | <b>PSO-4</b><br><b>PSO-5</b><br><b>PSO-11</b> | <b>Apply</b><br><b>Create</b> |     |
| <b>Units</b>   | <b>Course Content/ Syllabus</b>   |             |               |            |   | <b>Duration</b>               |     |
| 1.1  | <b>INTRODUCTION</b><br>Introduction: An overview of the .NET framework. CLR, FCL, ASP.NET to support Internet development and ADO.NET to support database applications<br><i>Keywords: Analyzing .NET framework</i> |             |               |            |   | <b>6Hrs</b>                   |     |
| 1.2  | Languages supported by .NET, introduction to Visual Studio .NET.<br><i>Keywords: Understanding Visual studio</i>  |             |               |            |   | <b>6Hrs</b>                   |     |
| 2.1  | <b>INTRODUCTION TO C#:</b> Program structure, Basic IO, data types, operators and expressions, relational and logical operations, control   |             |               |            |   | <b>6Hrs</b>                   |     |

|     |  |             |
|-----|--|-------------|
|     | structures.<br><b>Keywords: Understanding C# language basics</b>   |             |
| 2.2 | Writing methods, Recursion and overloading arrays and data representation.<br><b>Keywords: Working with C#</b>   | <b>6Hrs</b> |
| 2.3 | Class definitions. Properties, indexers, and access Arrays control.<br>Inheritance and polymorphism, delegates.<br><b>Keywords: Understanding Oops concept in C#</b>   | <b>4Hrs</b> |
| 2.4 | Exception Handling<br><b>Keywords: Analyzing error handling in C#</b>  | <b>6Hrs</b> |
| 3.1 | <b>ADO.NET:</b> Introduction to SQL. ADO.NET after Native Drivers, ODBC Drivers, DAO/RDO and ADO<br><b>Keywords: Understanding database connectivity</b>   | <b>5Hrs</b> |
| 3.2 | Database using VS.NET Establishing Connection with Database.<br><b>Keywords: Working with database connectivity in C#</b>  | <b>2Hrs</b> |
| 4.1 | <b>ASP.NET:</b> Web forms in ASP.NET, States, Validation, Login; ASP.NET Administrative tasks ASP.NET Data controls, Ajax Extensions, LINQ, Working with XML data, Web Services.<br><b>Keywords: Creating Web forms in ASP.NET</b> | <b>5Hrs</b> |

## REFERENCES

| Sl. No | Title of the book         | Authors         | Publisher            | Edition         | Year of publication |
|--------|---------------------------|-----------------|----------------------|-----------------|---------------------|
| 1      | Pro C# with .NET 3.0      | Andrew Troelsen | Dreamtech Press      | Special Edition | 2007                |
| 2      | Microsoft ASP.NET         | Andrew Duthie   | Microsoft Press      | -               | 2002                |
| 3      | Building ASP.NET WebPages | Steve Lydford   | Microsoft web Matrix | -               | 2012                |

**FIRST YEAR – SEMESTER – I**

|  |  |             |               |  |       |   |     |
|--|--|-------------|---------------|--|-------|---|-----|
| Course Title   | <b>PROGRAMMING LANGUAGE PRAGMATICS</b>   |             |               |  |       |   |     |
| Course Type  | Soft Core-Theory   | Total Hours | 32            | Hours/Week   | 02    | Credits   | 02  |
| Course Code  | Evaluation   | Internal    | C1+C2 = 15+15 |  |       | 30 Marks  | 100 |
|  |  | External    | Duration      | C3   | 03Hrs | 70 Marks  |     |
| <b>COURSE OBJECTIVES (COs)</b>   |  |             |               |  |       |   |     |
| <b>CO No.</b>  | <b>Course Objectives</b>   |             |               |  |       |   |     |
|  | On completion of the course the student will be able to  |             |               |  |       |   |     |
| CO-1   | Know the concepts of languages   |             |               |  |       |   |     |
| CO-2   | Identify different language classes and their relationships  |             |               |  |       |   |     |
| CO-3   | Design different forms of language   |             |               |  |       |   |     |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b>   |  |             |               |  |       |   |     |
| <p><b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The keywords are used at the end of each unit to define CLOs.</b></p> |  |             |               |  |       |   |     |
| <b>CLOs No.</b>  | <b>Course Learning Outcomes (CLOs)</b><br><b>On completion of the course the student will learn to</b> |             |               | <b>PSOs Addressed</b>  |       | <b>CLDs</b>   |     |
| CLO-1  | Describe compile and understand various features of languages  |             |               | <b>PSO-1</b><br><b>PSO-2</b><br><b>PSO-3</b><br><b>PSO-4</b> |       | <b>Understand</b><br><b>Apply</b><br><b>Create</b><br><b>Evaluate</b> |     |
| CLO-2  | Write data directed schemes programs over lists, parse trees and other defined data structures         |             |               | <b>PSO-2</b><br><b>PSO-3</b>                                 |       | <b>Analyze</b><br><b>Evaluate</b>                                     |     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>   | <b>Duration</b> |
|--------------|---|-----------------|
| 1.1          | The art of language design; Programming language spectrum; Why study programming languages? Compilation and interpretation; Programming environments. Names, scope, and bindings: The notion of binding time; Object lifetime and storage management; Scope rules; Implementing scope; The meaning of names within a scope; The binding of referencing environments; Macro expansion<br><i>Keywords: Understanding the basic of languages, sets and relations</i> | <b>8Hrs</b>     |
| 2.1          | <b>CONTROL FLOW AND DATA TYPES</b><br>Expression evaluation; Structured and unstructured flow; Sequencing; Selection; Iteration; Recursion; Non-determinacy<br><i>Keyword: understanding control flow</i>   | <b>8Hrs</b>     |
| 2.2          | Type systems; Type checking; Records and variants; Arrays; Strings; Sets; Pointers and recursive types; Lists; Files and Input/ Output; Equality testing  | <b>6Hrs</b>     |

|     |  |             |
|-----|--|-------------|
|     | and assignment.<br><b>Keyword: to know about type systems</b>  |             |
| 3.1 | <b>Object oriented programming;</b> Encapsulation and Inheritance; Initialization and finalization; Dynamic method binding; Multiple inheritance; Object oriented programming revisited<br><b>Keyword: data abstraction and object orientation and functional language</b> | <b>3Hrs</b> |
| 3.2 | <b>Functional Languages:</b> Origins; Concepts; A review/overview of scheme; Evaluation or derivation. Higher-order functions; Functional programming in perspective.<br><b>Keyword: higher order functions</b>  | <b>4Hrs</b> |
| 4.1 | Virtual machines; Late binding of machine code; Inspection/introspection.<br><b>Keyword: run-time program management</b>   | <b>3Hrs</b> |

## REFERENCES

| Sl. No | Title of the book   | Authors          | Publisher           | Edition                 | Year of publication |
|--------|---|------------------|---------------------|-------------------------|---------------------|
| 1      | Programming language pragmatics                                 | Michael L.Scott. | Elsevier Science    | 3 <sup>rd</sup> edition | 2009                |
| 2      | Foundations of programming languages: design and implementation | Seyed H. Roosta  | Thomson/Brooks/Cole | -                       | 2003                |
| 3      | Programming Languages: concepts and constructs                  | Ravi Sethi       | Pearson Education   | 2nd edition             | 2007                |

**FIRST YEAR - SEMESTER –I**

|                                |  |             |               |            |       |          |     |
|--------------------------------|--|-------------|---------------|------------|-------|----------|-----|
| Course Title                   | <b>Data Warehousing</b>  |             |               |            |       |          |     |
| Course Type                    | Soft Core- Theory  | Total Hours | 32            | Hours/Week | 02    | Credits  | 02  |
| Course Code                    | Evaluation   | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                                |  | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| <b>COURSE OBJECTIVES (COs)</b> |  |             |               |            |       |          |     |
| <b>CO No.</b>                  | <b>Course Objectives</b>   |             |               |            |       |          |     |
|                                | On completion of the course the student will be able   |             |               |            |       |          |     |
| CO-1                           | To understand Data mining principles and techniques and introduce Data Mining as a cutting edge business intelligence; |             |               |            |       |          |     |
| CO-2                           | To expose the students to the concepts of Data Warehousing Architecture and Implementation;                            |             |               |            |       |          |     |
| CO-3                           | To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining;                |             |               |            |       |          |     |
| CO-4                           | To identify Business applications and Trends of Data mining.   |             |               |            |       |          |     |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |   |                          |                                       |
|--|---|--------------------------|---------------------------------------|
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)<br/>On completion of the course the student will learn to</b> | <b>PSOs Addressed</b>    | <b>CLDs</b>                           |
| CLO-1                                      | Evolve multidimensional intelligent model from typical system;                                  | <b>PSO-1 &amp; PSO-2</b> | <b>Analyse</b>                        |
| CLO-2                                      | Discover the knowledge imbibed in the high dimensional system;                                  | <b>PSO-6 &amp; PSO-7</b> | <b>Analyse<br/>Evaluate</b>           |
| CLO-3                                      | Evaluate various mining techniques on complex data objects.                                     | <b>PSO-4 &amp; PSO-5</b> | <b>Analyse<br/>Apply<br/>Evaluate</b> |

| <b>Units</b> | <b>Course Content/ Syllabus</b>   | <b>Duration</b> |
|--------------|---|-----------------|
| <b>1.0</b>   | <b>Data Warehousing:</b> Overview, Definition, Data Warehousing Components, Building a Data Warehouse, Warehouse Database, Mapping the Data Warehouse to a Multiprocessor Architecture<br><i>Keyword: Understanding data warehousing</i>                | <b>08Hrs</b>    |
| <b>2.0</b>   | Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture<br><i>Keyword: Data warehousing Architecture</i> | <b>08Hrs</b>    |
| <b>3.0</b>   | <b>Data Warehouse Process and Technology:</b> Warehousing Strategy, Warehouse/management and Support Processes, Warehouse Planning and Implementation, Hardware and Operating Systems for Data Warehousing,   | <b>08Hrs</b>    |

|            |  |              |
|------------|--|--------------|
|            | Client/Server Computing Model & Data Warehousing.<br><b>Keywords: Analyzing data warehouse process</b>   |              |
| <b>4.0</b> | Parallel Processors & Cluster Systems, Distributed DBMS implementations, Warehousing Software, Warehouse Schema Design, Data Extraction, Cleanup& Transformation Tools, Warehouse Metadata<br><b>Keyword: Analysing data warehousing methodologies</b> | <b>08Hrs</b> |

## REFERENCES

| Sl. No | Title of the book                                 | Authors   | Edition         | Year of publication |
|--------|---|---|-----------------|---------------------|
| 1      | Data Warehousing, Data-Mining & OLAP”             | Alex Berson, Stephen J. Smith                   | 1st             | 2008                |
| 2      | Data Warehousing: Architecture and Implementation | Mark Humphries, Michael W. Hawkins, Michelle C. | -               | 2006                |
| 3      | Data Mining: Introductory and Advanced Topics     | Margaret H. Dunham, S Sridhar                   | 3 <sup>rd</sup> | 2001                |

**FIRST YEAR – SEMESTER - I**

|                                |   |             |               |            |       |          |    |
|--------------------------------|---|-------------|---------------|------------|-------|----------|----|
| Course Title                   | <b>DATA COMMUNICATIONS</b>  |             |               |            |       |          |    |
| Course Type                    | Soft Core- Theory   | Total Hours | 64            | Hours/Week | 04    | Credits  | 04 |
| Course Code                    | Evaluation  | Internal    | C1+C2 = 15+15 |            |       | 30 Marks |    |
|                                |   | External    | Duration      | C3         | 03Hrs | 70 Marks |    |
| <b>COURSE OBJECTIVES (COs)</b> |   |             |               |            |       |          |    |
| <b>CO No.</b>                  | <b>Course Objectives</b>  |             |               |            |       |          |    |
|                                | On completion of the course the student will be able to                               |             |               |            |       |          |    |
| CO-1                           | Learn and develop basic skills in networking and know the modes of communications     |             |               |            |       |          |    |
| CO-2                           | Describe the way network is built and to analyse the types of networks and algorithms |             |               |            |       |          |    |

| <b>Mapping of CLOs with PSOs &amp; CDLs</b> |  |                          |                                       |
|---|--|--------------------------|---------------------------------------|
| <b>CLOs No.</b>                             | <b>Course Learning Outcomes(CLOs)<br/>On completion of the course the student will learn to</b>                                  | <b>PSOs Addressed</b>    | <b>CDLs</b>                           |
| CLO-1                                       | Identify different components and their respective roles in a computer communication system                                      | <b>PSO-1 &amp; PSO-2</b> | <b>Analyse</b>                        |
| CLO-2                                       | Apply the knowledge, concepts and terms related to data communication and networking   | <b>PSO-6 &amp; PSO-7</b> | <b>Analyse<br/>Evaluate</b>           |
| CLO-3                                       | Solve problems in networking by referring to problems solving steps through relevant information by choosing suitable techniques | <b>PSO-4 &amp; PSO-5</b> | <b>Analyse<br/>Apply<br/>Evaluate</b> |
| CLO-4                                       | Acquaint them with networking software simulation tools, configuring of networking devices and understand their functionality    | <b>PSO-6</b>             | <b>Analyse</b>                        |
| CLO-5                                       | know the strategies for securing network applications  | <b>PSO-7</b>             | <b>Evaluate</b>                       |
| CLO-6                                       | Appreciate usefulness and importance of computer communication in today life and society   | <b>PSO-1</b>             | <b>Understand</b>                     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>  | <b>Duration</b> |
|--------------|--|-----------------|
| 1.0          | <b>INTRODUCTION</b> Data Communications, A communication Model, Data Representation, Networks, Protocols and Standards, TCP/IP Protocol Suite, OSI Model, Signals, Data rate limits, Impairments<br><i>Keywords: Understanding Data transfer</i>   | <b>12Hrs</b>    |
| 2.0          | <b>DIGITAL TRANSMISSION</b> Digital transmission, Modes of transmission, Analog transmission, Telephone modems, Multiplexing, Transmission media, Circuit Switching, Error Detection and Correction, Data Link Control and Protocols<br><i>Keyword: understanding different methods of data transfer</i> | <b>12Hrs</b>    |
| 3.0          | <b>SWITCHING AND ROUTING</b> HDLC, Multiple Access, Connecting Devices, Virtual Circuit Switching, Frame Relay, ATM, Addressing, Routing, Network Layer Design   | <b>12Hrs</b>    |



|     |   |              |
|-----|---|--------------|
|     | Issues, Implementation of Connectionless and Connection Oriented Service<br><i>Keyword: Analyzing different switching and routing methods</i>   |              |
| 4.0 | <b>ROUTING ALGORITHMS</b> Routing Algorithms, Shortest Path Routing, General Principles of Congestion Control, Congestion Prevention Policies, Transport Service Primitives, Berkeley Sockets, Elements of Transport Protocols<br><i>Keyword: Analyzing different routing methods</i> | <b>12Hrs</b> |

## REFERENCES

| Sl. No | Title of the book   | Authors                              | Publisher        | Year of Publication |
|--------|---|--------------------------------------|------------------|---------------------|
| 1      | Data communication and network                                      | Behrouz A Forouzan                   | Tata McGraw Hill | 2001                |
| 2      | Communication Networks – Fundamental Concepts and Key architectures | Alberto Leon Gracia and IndraWidjaja | Tata McGraw Hill | 2004                |
| 3      | Data Communications and Networks                                    | Achyut S Godbole                     | Tata McGraw Hill | 2002                |

**SECOND YEAR - SEMESTER – I**

|  |   |             |               |                       |       |                   |                 |
|--|---|-------------|---------------|-----------------------|-------|-------------------|-----------------|
| Course Title   | <b>RESEARCH TECHNIQUES AND ANALYSIS</b>   |             |               |                       |       |                   |                 |
| Course Type  | Soft Core- Theory   | Total Hours | 64            | Hours/Week            | 04    | Credits           | 04              |
| Course Code  | Evaluation  | Internal    | C1+C2 = 15+15 |                       |       | 30 Marks          | 100             |
|  |   | External    | Duration      | C3                    | 03Hrs | 70 Marks          |                 |
| <b>COURSE OBJECTIVES (COs)</b>   |   |             |               |                       |       |                   |                 |
| <b>CO No.</b>  | <b>Course Objectives</b>  |             |               |                       |       |                   |                 |
|  | On completion of the course the student will be able  |             |               |                       |       |                   |                 |
| CO-1   | To provide student necessary training to undertake advanced level of research.  |             |               |                       |       |                   |                 |
| CO-2   | To provide a good foundation for undertaking a research at an advanced level.   |             |               |                       |       |                   |                 |
| CO-3   | To appraise the students on relevant research methods appropriate for a Masters dissertation  |             |               |                       |       |                   |                 |
| CO-4   | To prepare a research proposal to underpin the dissertation or research project.  |             |               |                       |       |                   |                 |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b>   |   |             |               |                       |       |                   |                 |
| <b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The key words are used at the end of each unit to define CLOs.</b> |   |             |               |                       |       |                   |                 |
| <b>CLOs No.</b>  | <b>Course Learning Outcomes (CLOs)</b><br><b>On completion of the course the student will learn to</b>  |             |               | <b>PSOs Addressed</b> |       | <b>CLDs</b>       |                 |
| CLO-1  | The ability to describe and discuss the issues related to carrying out research and the methods used to collect data, and how to critically evaluate ideas, concepts and practices related to computing and information systems research.   |             |               | <b>PSO – 2</b>        |       | <b>Understand</b> |                 |
| CLO-2  | The ability to gather synthesis and evaluate information.   |             |               | <b>PSO – 3, 4</b>     |       | <b>Evaluate</b>   |                 |
| CLO-3  | The ability to use critical analytical skills to relate theory to practice  |             |               | <b>PSO – 6</b>        |       | <b>Evaluate</b>   |                 |
| CLO-4  | The ability to work independently, time manage, show initiative and adaptability  |             |               | <b>PSO – 10</b>       |       | <b>Create</b>     |                 |
| <b>Units</b>   | <b>Course Content/ Syllabus</b>   |             |               |                       |       |                   | <b>Duration</b> |
| <b>1.0</b>   | <b>INTRODUCTION TO RESEARCH:</b> Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India.<br><i>Key words- Understanding the different aspects of research.</i> |             |               |                       |       |                   | <b>06hrs</b>    |
| <b>1.1</b>   | Defining the Research Problem, What is a Research Problem?, Selecting the problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration, Conclusion<br><i>Key words- Analyzing the initial steps in research</i>  |             |               |                       |       |                   | <b>06hrs</b>    |

|            |   |              |
|------------|---|--------------|
| <b>2.0</b> | <b>RESEARCH DESIGN:</b> Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs, and Conclusion.<br><i>Key words- understanding importance of research design and analysis</i>  | <b>06hrs</b> |
| <b>2.1</b> | <b>DESIGN OF SAMPLE SURVEYS:</b> Introduction, Sample Design, Sampling and Non-Sampling Errors, Sample Survey Vs. Census Survey, Types of Sampling Designs.<br><i>Key words- Analyzing different surveys involved in research</i>   | <b>06hrs</b> |
| <b>3.0</b> | <b>MEASUREMENT AND SCALING:</b> Quantitative and Qualitative Data, Classifications of Measurement Scales, Goodness of Measurement Scales, Sources of Error in Measurement, Techniques of Developing Measurement Tools, Scaling, Scale Classification Bases, Scaling Techniques, Multidimensional Scaling, Deciding the Scale Data Collection<br><i>Key words- Understanding data measurements and evaluating differences and relative magnitude of numbers.</i> | <b>04hrs</b> |
| <b>3.1</b> | <b>COLLECTION OF DATA:</b> Introduction, Experiments and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method<br><i>Key words-Analysis of collection of data and method for data collection</i>  | <b>04hrs</b> |
| <b>3.2</b> | <b>DATA PREPARATION:</b> Data Preparation Process, Some Problems in Preparation Process, Missing Values and Outliers, Types of Analysis, Statistics in Research<br><i>Key words- analyzing the methods and challenges in data preparation</i>   | <b>04hrs</b> |
| <b>4.0</b> | <b>INTERPRETATION AND REPORT WRITING:</b> Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report.<br><i>Key words-Analyzing steps involved in report writing</i>   | <b>12hrs</b> |

#### TEXT BOOKS

| Sl. No | Title of the book                                | Authors                    | Edition         | Year of Publication |
|--------|--|----------------------------|-----------------|---------------------|
| 1      | Research Methodology Methods and Techniques      | C. R. Kothari, Gaurav Garg | 3 <sup>rd</sup> | 2014                |
| 2      | Design and Analysis of Experiments (Wiley India) | Montgomery, Douglas C      | 5 <sup>th</sup> | 2007                |

## REFERENCES

| Sl. No | Title of the book  | Authors   | Edition         | Year of Publication |
|--------|--|---|-----------------|---------------------|
| 1      | Applied Statistics & probability for Engineers (Wiley India).                      | Montgomery, Douglas C. &Runger, George C                  | 3 <sup>rd</sup> | 2007                |
| 2      | Management Research Methodology; Integration of Principles, Methods and Techniques | Krishnswamy, K.N., Shivkumar, Appalyer and Mathiranjana M | -               | 2011                |

**FIRST YEAR - SEMESTER – II**

|  |  |             |               |            |   |  |     |
|--|--|-------------|---------------|------------|---|--|-----|
| Course Title   | <b>DATABASE MANAGEMENT SYSTEM</b>  |             |               |            |   |  |     |
| Course Type  | Hard Core- Theory  | Total Hours | 80            | Hours/Week | 04  | Credits  | 04  |
| Course Code  | Evaluation   | Internal    | C1+C2 = 15+15 |            |   | 30 Marks   | 100 |
|  |  | External    | Duration      | C3         | 03Hrs   | 70 Marks   |     |
| <b>COURSE OBJECTIVES (COs)</b>   |  |             |               |            |   |  |     |
| <b>CO No.</b>  | <b>Course Objectives</b>   |             |               |            |   |  |     |
|  | On completion of the course the student will be able   |             |               |            |   |  |     |
| CO-1   | To understand the fundamentals of data models and depict a database system using ER diagram;           |             |               |            |   |  |     |
| CO-2   | To make a study of SQL and relational database design;   |             |               |            |   |  |     |
| CO-3   | To know about data storage techniques and query processing;  |             |               |            |   |  |     |
| CO-4   | To impart knowledge in transaction processing, concurrency control techniques and recovery procedures; |             |               |            |   |  |     |
| <b>Mapping of CLOs with PSOs &amp; CDLs</b>  |  |             |               |            |   |  |     |
| <p><b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The keywords are used at the end of each unit to define CLOs.</b></p> |  |             |               |            |   |  |     |
| <b>CLOs No.</b>  | <b>Course Learning Outcomes (CLOs)</b><br><b>On completion of the course the student will learn to</b> |             |               |            | <b>PSOs Addressed</b>   | <b>CLDs</b>                                      |     |
| CLO-1  | Understand the database concepts and models  |             |               |            | <b>PSO-1</b>  | <b>Understand</b>                                |     |
| CLO-2  | Design a database using ER diagrams and map ER into relations and normalize the relations              |             |               |            | <b>PSO-1</b><br><b>PSO-3</b>                                  | <b>Apply</b><br><b>Create</b><br><b>Evaluate</b> |     |
| CLO-3  | Write SQL commands.  |             |               |            | <b>PSO-1</b><br><b>PSO-4</b><br><b>PSO-5</b><br><b>PSO-11</b> | <b>Apply</b><br><b>Create</b>                    |     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>   | <b>Duration</b> |
|--------------|---|-----------------|
| 1.1          | A historical perspective File system versus a DBMS, Advantage of a DBMS, Levels of abstraction in a DBMS, Structure of a DBMS, People who work with databases, An example of database application<br><b>Keywords: Understanding the concept of database and DBMS</b>                        | <b>6Hrs</b>     |
| 1.2          | Attributes and Entities: Entity types, Entity sets, Attributes and keys, Relationships and relationship sets, additional features of ER-model-key constraints, participation constraints, weak entities<br><b>Keywords: Understanding different types of keys, ER model and constraints</b> | <b>6Hrs</b>     |
| 2.1          | Relational constraints and relational database schemas, basic relational algebra operations, additional relational operations, examples of queries in relational algebra.   | <b>6Hrs</b>     |

|     |   |             |
|-----|---|-------------|
|     | <b>Keywords: Understanding relational algebra operations</b>  |             |
| 2.2 | Data definition, constraints and schema changes in SQL, basic queries in SQL, insert, delete and update statements in SQL, views in SQL<br><b>Keywords: Learning SQL commands</b>   | <b>6Hrs</b> |
| 3.1 | Informal design guidelines for relational schemas, functional dependencies, normal forms, general definitions of second and third normal forms, Boyce-codd normal forms.<br><b>Keywords: Understanding the concept of normalization and different normal forms</b>      | <b>4Hrs</b> |
| 3.2 | File organization and indexing, clustered indexes primary and secondary indexes, index data structures, hash based indexing, tree-based indexing, comparison of file organizations.<br><b>Keywords: Understanding file organization and different types of indexing</b> | <b>3Hrs</b> |
| 4.1 | The ACID properties: Consistency and isolation, atomicity and durability.<br><b>Keywords: understanding transaction and properties of transaction</b>   | <b>2Hrs</b> |
| 4.2 | Transaction on schedules, concurrent execution of transactions, motivation of concurrent execution, serializability, anomalies due to interleaved execution.<br><b>Keywords: understanding the concept of concurrent execution and serializability</b>                  | <b>4Hrs</b> |
| 4.3 | Lock based concurrency control, Strict two face locking, Performance of locking.<br><b>Keywords: Learning and analysing different locking protocols</b>   | <b>2Hrs</b> |

## REFERENCES

| Sl. No | Title of the book   | Authors   | Publisher                | Edition         | Year of publication |
|--------|---|---|--------------------------|-----------------|---------------------|
| 1      | Database system concepts  | AbrahamSilberschatz<br>Henry<br>F.KorthS.Sudarshan, | McGraw-Hill Publications | 6 <sup>th</sup> | 2011                |
| 2      | Database management systems   | Alexis Leon<br>Mathews Leon                         | Vikas Publications House | 1 <sup>st</sup> | 2002                |
| 3      | Database system: A practical approach to design, implementation and management: | Thomas Connolly<br>Carolyn E. Begg                  | Pearson Education,India  | 4 <sup>th</sup> | 2014                |

## RECOMMENDED BOOKS

|   |                                  |                                      |                                     |                 |      |
|---|----------------------------------|--------------------------------------|-------------------------------------|-----------------|------|
| 1 | Database management systems      | Raghu Ramakrishnan and JohnesGehrke, | McGraw-Hill,                        | 3 <sup>rd</sup> | 2003 |
| 2 | Fundamental of database systems, | RamezElmasri<br>ShamkanthB.Navathe   | Addison Wesley<br>Pearson education | 3 <sup>rd</sup> | 2000 |

**FIRST YEAR - SEMESTER – II**

| Course Title                   | <b>COMPUTER NETWORKS</b>   |             |               |            |       |          |     |
|--------------------------------|--|-------------|---------------|------------|-------|----------|-----|
| Course Type                    | Hard Core- Theory  | Total Hours | 80            | Hours/Week | 04    | Credits  | 04  |
| Course Code                    | Evaluation   | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                                |  | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| <b>COURSE OBJECTIVES (COs)</b> |  |             |               |            |       |          |     |
| CO No.                         | <b>Course Objectives</b>   |             |               |            |       |          |     |
|                                | On completion of the course the student will be able   |             |               |            |       |          |     |
| CO-1                           | To understand networking concepts and basic communication model;                                       |             |               |            |       |          |     |
| CO-2                           | To understand network architectures and components required for data communication;                    |             |               |            |       |          |     |
| CO-3                           | To analyze the function and design strategy of physical, data link, network layer and transport layer; |             |               |            |       |          |     |
| CO-3                           | To acquire knowledge of various application protocol standard developed for internet.                  |             |               |            |       |          |     |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |  |                |                   |
|--|--|----------------|-------------------|
| CLOs No.                                   | Course Learning Outcomes(CLOs)<br>On completion of the course the student will learn to  | PSOs Addressed | CLDs              |
| CLO-1                                      | Identify the components required to build different types of networks;   | <b>PSO-1</b>   | <b>Understand</b> |
| CLO-2                                      | Understand the functionalities needed for data communication into layers;  | <b>PSO-1</b>   | <b>Understand</b> |
| CLO-3                                      | Understand the working principles of various application protocols and acquire knowledge about security issues and services available. | <b>PSO-1</b>   | <b>Understand</b> |

| Units      | Course Content/ Syllabus  | Duration      |
|------------|---|---------------|
| <b>1.0</b> | <b>INTRODUCTION</b> :Uses of networks, categories of networks, communication model, data transmission concepts and terminology, protocol architecture, OSI & TCP/IP, LAN topology, transmission media<br><i>Key words- Understanding the concept and objectives of networking</i> | <b>04 Hrs</b> |
| <b>1.1</b> | <b>DATA LINK LAYER:</b> Data link control, Flow Control, Error Detection and Error Correction, MAC, Ethernet, Token ring, Wireless LAN MAC, Bluetooth, Bridges<br><i>Key words-understanding how data link layer makes data error free and along with frame formats</i>           | <b>08 Hrs</b> |

|            |  |               |
|------------|--|---------------|
| <b>2.0</b> | <b>NETWORK LAYER:</b> Switching concepts, Circuit switching, Packet switching, IP–Datagrams, IP addresses, IPV6, ICMP, Routing Protocols, Distance Vector, Link State-BGP<br><i>Key words-understanding switching concepts used in routing protocols along with addressing modes</i>   | <b>12 Hrs</b> |
| <b>3.0</b> | <b>TRANSPORT LAYER:</b> Transport layer, service, connection establishment, flow control, transmission control protocol, congestion control and avoidance<br>User datagram protocol, Transport for Real Time Applications (RTP)<br><i>Key words- understanding the services provided by transport layer along with protocols</i> | <b>12 Hrs</b> |
| <b>4.0</b> | <b>APPLICATION LAYER:</b> DNS, SMTP, WWW, SNMP, Security, Threats and services, DES, RSA, web security, SSL<br><i>Key words- Understanding Different protocols in application layer and different types of security</i>  | <b>12 Hrs</b> |

#### REFERENCES

| Sl. No | Title of the book                                   | Authors                                 | Edition         | Year of Publication |
|--------|---|---|-----------------|---------------------|
| 1      | Computer Networks – A systems Approach.             | Larry L. Peterson & Bruce S. Davie      | 4 <sup>TH</sup> | 2007                |
| 2      | Data and Computer Communications                    | William Stallings                       | 9 <sup>TH</sup> | 2011                |
| 3      | Data Communication and Networking                   | Forouzan                                | 5 <sup>TH</sup> | 2012                |
| 4      | Computer Networks                                   | Andrew S.Tannenbaum David J. Wetherall, | 5 <sup>TH</sup> | 2011                |
| 5      | Computer Networking                                 | James F. Kurose, Keith W. Ross          | 6 <sup>TH</sup> | 2012                |
| 6      | Communications and Networking: An Introduction      | John Cowley                             | 1 <sup>ST</sup> | 2010                |
| 7      | Data Communications and Networks                    | Achyut S Godbole, AtulHahate            | 6TH             | 2011                |
| 8      | Introduction to Data communications and Networking. | Wayne Tomasi,                           | 1 <sup>ST</sup> | 2011                |



**FIRST YEAR - SEMESTER –II**

|                                |  |             |               |            |       |          |     |
|--------------------------------|--|-------------|---------------|------------|-------|----------|-----|
| Course Title                   | <b>COMPUTER APPLICATION IN BUSINESS</b>  |             |               |            |       |          |     |
| Course Type                    | Soft Core-<br>Interdisciplinary-Theory   | Total Hours | 80            | Hours/Week | 05    | Credits  | 04  |
| Course Code                    | Evaluation   | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                                |  | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| <b>COURSE OBJECTIVES (COs)</b> |  |             |               |            |       |          |     |
| <b>CO No.</b>                  | <b>Course Objectives</b><br>On completion of the course the student will be able |             |               |            |       |          |     |
| CO-1                           | To understand basic operations of computer which is excel                        |             |               |            |       |          |     |
| CO-2                           | To know how to use the software in business industry                             |             |               |            |       |          |     |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |   |                          |                                       |
|--|---|--------------------------|---------------------------------------|
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)<br/>On completion of the course the student will learn to</b> | <b>PSOs Addressed</b>    | <b>CLDs</b>                           |
| CLO-1                                      | Solve problems using excel  | <b>PSO-1 &amp; PSO-2</b> | <b>Understand<br/>Analyse</b>         |
| CLO-2                                      | Identify formulas and understand macros,and tally   | <b>PSO-6 &amp; PSO-7</b> | <b>Analyse<br/>Evaluate</b>           |
| CLO-3                                      | To understand strategic management and CRM,ERP  | <b>PSO-4 &amp; PSO-5</b> | <b>Analyse<br/>Apply<br/>Evaluate</b> |

| <b>Units</b> | <b>Course Content/ Syllabus</b>  | <b>Duration</b> |
|--------------|--|-----------------|
| <b>1.1</b>   | <b>INTRODUCTION TO EXCEL:</b><br>data modelling in excel, power pivot, charts, working with functions, instant data analysis<br><i>Key words-understanding the fundamentals of EXCEL</i>   | <b>15Hrs</b>    |
| <b>2.1</b>   | <b>APPLICATIONS IN FINANCIAL MANAGEMENT AND TAXATION</b><br>using ms excel to solve financial management problems- present value, future value, npv etc. online trading of securities, online banking, filing of online application for pan and tan, online submission of income tax returns and tds return. e-filing of indirect taxes return<br><i>Key words-implementing different functions in EXCEL</i> | <b>12Hrs</b>    |
| <b>3.1</b>   | <b>ENTERPRISE RESOURCE PLANNING:</b><br>meaning and importance erp and functional areas of management, marketing / sales-supply chain management, finance and accounting, human resources, types of reports and methods of report generation<br><i>keyword: understand ERP</i>   | <b>12Hrs</b>    |

|            |   |              |
|------------|---|--------------|
| <b>4.1</b> | <b>APPLICATIONS IN FINANCIAL ACCOUNTING</b><br>features of tally erp.9. setting up a new company and creating masters in tally.erp9.<br>technological advantages of tally.erp9<br><i>keyword: features of tally</i>   | <b>12Hrs</b> |
| <b>4.2</b> | preparation of project and erp, meaning of project, project identification, project selection, project report, need and significance of report, contents formulation, guidelines by planning commission for project report<br><i>keyword: learn preparation of project and report</i> | <b>10hrs</b> |

## REFERENCES

| Sl. No | Title of the book   | Authors                   | Edition                           | Year of Publication |
|--------|---|---------------------------|-----------------------------------|---------------------|
| 1      | Tally. ERP 9 Essentials   | Tally Solutions Pvt. Ltd. | -                                 | 2009                |
| 2      | Excel: Quick Start Guide From Beginner to Expert                              | William Fischer           | 2 <sup>nd</sup>                   | -                   |
| 3      | Building Financial Models with MS Excel<br>A Guide for Business Professionals | K Scott Proctor           | 2 <sup>nd</sup> edition,<br>2010. | -                   |

## FIRST YEAR - SEMESTER – II

| Course Title   | JAVA PROGRAMMING  |             |               |                          |       |                 |     |
|--|---|-------------|---------------|--------------------------|-------|-----------------|-----|
| Course Type  | Soft Core-Theory  | Total Hours | 80            | Hours/Week               | 05    | Credits         | 04  |
| Course Code  | Evaluation  | Internal    | C1+C2 = 15+15 |                          |       | 30 Marks        | 100 |
|  |   | External    | Duration      | C3                       | 03Hrs | 70 Marks        |     |
| <b>COURSE OBJECTIVES (COs)</b>   |   |             |               |                          |       |                 |     |
| <b>CO No.</b>  | <b>Course Objectives</b>  |             |               |                          |       |                 |     |
|  | On completion of the course the student will be able to   |             |               |                          |       |                 |     |
| CO-1   | Programming in the Java programming language,   |             |               |                          |       |                 |     |
| CO-2   | Knowledge of object-oriented paradigm in the Java programming language,                             |             |               |                          |       |                 |     |
| CO-3   | The use of Java in a variety of technologies and on different platforms.                            |             |               |                          |       |                 |     |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b>   |   |             |               |                          |       |                 |     |
| <p><b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The keywords are used at the end of each unit to define CLOs.</b></p> |   |             |               |                          |       |                 |     |
| CLOs No.   | Course Learning Outcomes (CLOs)<br>On completion of the course the student will learn to            |             |               | PSOs Addressed           |       | CLDs            |     |
| CLO-1  | Able to understand the use of OOPs concepts.  |             |               | PSO-1                    |       | Understand      |     |
| CLO-2  | Able to solve real world problems using OOP techniques.   |             |               | PSO-1<br>PSO-4           |       | Apply           |     |
| CLO-3  | Able to understand the use of abstraction.  |             |               | PSO-2                    |       | Analyze         |     |
| CLO-4  | Able to understand the use of Packages and Interface in java  |             |               | PSO-4<br>PSO-5<br>PSO-11 |       | Apply<br>Create |     |
| CLO-5  | Able to develop and understand exception handling, multithreaded applications with synchronization. |             |               | PSO-4<br>PSO-5<br>PSO-11 |       | Apply<br>Create |     |
| CLO-6  | Able to develop applets for web applications.   |             |               | PSO-4<br>PSO-5<br>PSO-11 |       | Apply<br>Create |     |

| Units | Course Content/ Syllabus  | Duration    |
|-------|---|-------------|
| 1.1   | Origin and features of Java. Java Program Structure, Java Tokens, Java statements, Java Virtual machine, Command Line Parameters, Java Variables and Data Types, Operators, Decision Making, Branching and looping statements.<br><b>Keywords: Understanding fundamentals of java programming</b> | <b>6Hrs</b> |
| 1.2   | Classes, Objects and Methods used in Java: Class fundamentals, Methods, Constructors, Overloading, Inheritance, Interfaces, One and two dimensional   | <b>6Hrs</b> |

|     |  |              |
|-----|--|--------------|
|     | arrays, Vectors, Strings, Wrapper Classes.<br><b>Keywords: Implementing object oriented concepts</b>   |              |
| 2.1 | Java Packages: API packages, system packages, naming conventions, creating and accessing a package, adding a class to a package, hiding classes.<br><b>Keywords: Understanding the concept of Java packages</b>  | <b>6Hrs</b>  |
| 2.2 | Multi-threads Programming: Java thread Model, Main Thread, creating a Thread, Creating Multiple Threads, Extending the thread class, Stopping and blocking a thread, Life cycle of a thread, Managing Errors and Exceptions.<br><b>Keywords: Understanding multi threading and exception handling</b>  | <b>6Hrs</b>  |
| 3.1 | Applet Programming: Introduction, how applet differ from application, Applet life cycle, Applet tag, passing parameters to applet.<br><b>Keywords: Understanding the concept of applets</b>  | <b>6Hrs</b>  |
| 3.2 | Abstract Windows Toolkit: Components, Container, Panel, Label, Button, Checkbox, Checkbox Group, Choice, List, Text Field, Text Area, Scrollbars. Graphics Programming: The Graphics class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets.<br><b>Keywords: Learning AWT controls</b> | <b>6Hrs</b>  |
| 4.1 | Managing Input/output Files in Java: Stream Classes, Byte Stream Classes, Character Stream Classes, Creation of Files, Reading/Writing characters, Reading/Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Random Access Files.<br><b>Keywords: Understanding the concept of File handling</b>                                | <b>12Hrs</b> |

## REFERENCES

| Sl. No | Title of the book                | Authors                              | Publisher                      | Edition         | Year of publication |
|--------|----------------------------------|--------------------------------------|--------------------------------|-----------------|---------------------|
| 1      | Programming with Java – A PRIMER | E.Balagurusamy, Tata McGraw-Hill     | Addision Wesley Publishing Co. | 3 <sup>rd</sup> | 2010                |
| 2      | The Complete Reference - Java-2  | Patrick Naughton and Herbert Schildt | Tata McGraw-Hill India.        | 5th             | 2002                |
| 3      | The Complete Reference – J2EE    | Jim Keogh                            | Tata McGraw-Hill               | -               | 2002                |

**FIRST YEAR - SEMESTER – II**

|                                |  |             |               |            |       |          |     |
|--------------------------------|--|-------------|---------------|------------|-------|----------|-----|
| Course Title                   | <b>COMPUTER GRAPHICS</b>   |             |               |            |       |          |     |
| Course Type                    | Soft Core- Theory  | Total Hours | 64            | Hours/Week | 04    | Credits  | 04  |
| Course Code                    | Evaluation   | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                                |  | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| <b>COURSE OBJECTIVES (COs)</b> |  |             |               |            |       |          |     |
| <b>CO No.</b>                  | <b>Course Objectives</b><br>On completion of the course the student will be able to  |             |               |            |       |          |     |
| CO-1                           | The main objective of this module is to introduce to the students the concepts of computer graphics.   |             |               |            |       |          |     |
| CO-2                           | It starts with an overview of interactive computer graphics, two dimensional system and mapping, then it presents the most important drawing algorithm, two-dimensional transformation; Clipping, filling and an introduction to 3-D graphics. |             |               |            |       |          |     |

| <b>Mapping of CLOs with PSOs &amp; CDLs</b> |  |                          |                                       |
|---|--|--------------------------|---------------------------------------|
| <b>CLOs No.</b>                             | <b>Course Learning Outcomes(CLOs)<br/>On completion of the course the student will learn</b>                               | <b>PSOs Addressed</b>    | <b>CLDs</b>                           |
| CLO-1                                       | To list the basic concepts used in computer graphics.  | <b>PSO-1 &amp; PSO-2</b> | <b>Understand<br/>Analyse</b>         |
| CLO-2                                       | To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping | <b>PSO-6 &amp; PSO-7</b> | <b>Analyse<br/>Evaluate</b>           |
| CLO-3                                       | To describe the importance of viewing and projections  | <b>PSO-4 &amp; PSO-5</b> | <b>Analyse<br/>Apply<br/>Evaluate</b> |
| CLO-4                                       | To understand a typical graphics pipeline  | <b>PSO-1</b>             | <b>Understand</b>                     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>   | <b>Duration</b> |
|--------------|---|-----------------|
| <b>1.1</b>   | <b>INTRODUCTION TO COMPUTER GRAPHICS</b><br>Applications of computer graphics, operations of computer graphics, graphics software packages. Graphical input – output devices- graphical input devices, graphical output devices Raster and random scan devices.<br><i>Key words-understanding fundamentals of computer graphics</i> | <b>6Hrs</b>     |

|     |  |      |
|-----|--|------|
| 1.2 | <p>Scan conversion – scan conversion methods, polynomial method for line, polynomial method for circle, DDA algorithm for line, circle and ellipse, Bresenham’s algorithm for line drawing and circle. Midpoint methods for line and circle .</p> <p><i>Key words-implementing different algorithms</i></p>  | 6Hrs |
| 2.1 | <p><b>SCAN CONVERSION FOR SOLIDS AND 2D GEOMETRICAL REPRESENTATION</b></p> <p>Scan conversion for solids- solid areas or polygons, inside-outside test – odd even method, winding number method. Solid area filling algorithms- boundary fill algorithm, scan line fill algorithm, scan line seed fill algorithm, ordered edge list algorithm.</p> <p><i>Key words-understanding scan conversion for solids</i></p>              | 6Hrs |
| 2.2 | <p>2D geometrical transformations – basic 2d transformations- translation, rotation, scaling, homogeneous co-ordinate system – transformations in homogeneous notation, Other transformations – reflection about any arbitrary line, shearing, combined transformation computational efficiency, visual reality, inverse of combines’ transformations.</p> <p><i>Key words-implementing different operations on 2D image</i></p> | 6Hrs |
| 3.1 | <p><b>3D TRANSFORMATIONS AND PROJECTION</b></p> <p>3D geometrical transformations- basic 3D transformation- 3D translation, 3D scaling. 3D rotation, rotation about an arbitrary axis in space, other 3D transformations- 3D reflection, reflection about any arbitrary plane, 3D shearing.</p> <p><i>Key words-understanding 3D image and its functionalities</i></p>   | 6Hrs |
| 3.2 | <p>Projection – introduction, parallel projection and perspective projections. Image formation inside a camera.</p> <p><i>Key words-learning projection and its variance</i></p>   | 6Hrs |
| 4.1 | <p><b>2D VIEWING AND CLIPPING</b></p> <p>2D viewing and clipping- windows and viewports, viewing transformation, clipping of lines in 2Dcohen-sutherland clipping algorithm, midpoint subdivision method, polygon clipping – Sutherland – hogman polygon clipping.</p> <p><i>Key words-understanding clipping and viewing with algorithms</i></p>  | 6Hrs |
| 4.2 | <p>Curve design – classical techniques for designing curves and object surfaces, modern curve representations.</p> <p><i>Key words-Understanding curve and its features</i></p>  | 6Hrs |

## REFERENCES

| Sl. No | Title of the book                                 | Authors   | Edition         | Year of Publication |
|--------|---|---|-----------------|---------------------|
| 1      | Computer Graphics,                                | Donald Hearn, M. Pauline Baker, Prentice-Hall                     | 2 <sup>nd</sup> | 1994                |
| 2      | Computer Graphics,                                | Roy A. Plastock, Gordon Kalley, Schaum's Outlines, McGraw Hill    | -               | 1986                |
| 3      | Computer Graphics : Principles and Practice in C, | Andries Van Dam, F. Hughes John, James D. Foley, Steven K. Feiner | 2 <sup>nd</sup> | 1996                |
| 4      | Computer Graphics Edition (Paperback)             | Steven Harrington, Tata McGraw Hill                               | 2 <sup>nd</sup> | 2008                |

**FIRST YEAR - SEMESTER – II**

| Course Title                               | <b>CLOUD COMPUTING</b>  |             |               |            |                       |          |             |     |
|--|---|-------------|---------------|------------|-----------------------|----------|-------------|-----|
| Course Type                                | Soft Core- Theory   | Total Hours | 64            | Hours/Week | 04                    | Credits  | 04          |     |
| Course Code                                | Evaluation  | Internal    | C1+C2 = 15+15 |            |                       | 30 Marks |             | 100 |
|  |   | External    | Duration      | C3         | 03Hrs                 | 70 Marks |             |     |
| <b>COURSE OBJECTIVES (COs)</b>             |   |             |               |            |                       |          |             |     |
| <b>CO No.</b>                              | <b>Course Objectives</b>  |             |               |            |                       |          |             |     |
|  | On completion of the course the student will be able  |             |               |            |                       |          |             |     |
| CO-1                                       | To understand the concept of Virtualization and design of cloud Services                              |             |               |            |                       |          |             |     |
| CO-2                                       | To be familiar with the lead players in cloud.  |             |               |            |                       |          |             |     |
| CO-3                                       | To apply different cloud programming model as per need  |             |               |            |                       |          |             |     |
| CO-4                                       | To learn to design the trusted cloud Computing system   |             |               |            |                       |          |             |     |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |   |             |               |            |                       |          |             |     |
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)</b><br><b>On completion of the course the student will learn to</b> |             |               |            | <b>PSOs Addressed</b> |          | <b>CLDs</b> |     |
| CLO-1                                      | Compare the strengths and limitations of cloud computing  |             |               |            | PSO – 1,2             |          | Evaluate    |     |
| CLO-2                                      | Identify the architecture, infrastructure and delivery models of cloud computing                      |             |               |            | PSO – 4               |          | Analyze     |     |
| CLO-3                                      | Apply suitable virtualization concept.  |             |               |            | PSO – 3,5             |          | Apply       |     |
| CLO-4                                      | Choose the appropriate cloud player Programming Models and approach                                   |             |               |            | PSO – 6               |          | Analyze     |     |
| CLO-5                                      | Address the core issues of cloud computing such as security, privacy and interoperability             |             |               |            | PSO - 8               |          | Analyze     |     |

| Units      | Course Content/ Syllabus  | Duration     |
|------------|---|--------------|
| <b>1.0</b> | <b>CLOUD COMPUTING:</b> Cloud architecture and model, cloud computing basics, applications, cloud models, cloud service models, service management, computing on demand software architecture issues, cloud benefits and limitations<br><i>Key words- Analysis of cloud architecture and models</i>   | <b>12Hrs</b> |
| <b>2.0</b> | <b>CLOUD HARDWARE AND INFRASTRUCTURE:</b> Introduction to cloud hardware, clients, security, network, services, platforms, cloud storage, operating system for the cloud, application patterns and architecture.<br><i>Key words- Analyzing cloud infrastructure</i>  | <b>12Hrs</b> |
| <b>3.0</b> | <b>VIRTUALIZATION:</b> Basics of Virtualization, types of virtualization, implementation levels, virtualization structures, virtualization of CPU, memory, I/O devices, virtual clusters and resource management, virtualization for data-centre automation<br><i>Key words- Analyzing the concept of virtualization in cloud computing</i> | <b>06Hrs</b> |



|     |  |       |
|-----|--|-------|
| 3.1 | <b>SECURITY:</b> Security overview, cloud security challenges and risk, risk management, security monitoring.<br><i>Key words- Analyzing and evaluating security management in clouds.</i>   | 06Hrs |
| 4.0 | <b>PROGRAMMING MODEL:</b> Introduction to Parallel and distributed programming paradigms, Introduction to map-reduce, twister and iterative map-reduce, hadoop library from apache.<br><i>Key words- Analysis of the mapping technique in cloud.</i> | 06Hrs |
| 4.1 | Mapping applications, Google app engine, amazon AWS, cloud software environments, eucalyptus, openstack, aneka, cloudsim, open nebula<br><i>Key words- Evaluating different cloud providing platforms</i>  | 06Hrs |

#### REFERENCES

| Sl. No | Title of the book   | Authors  | Edition         | Year of Publication |
|--------|---|--|-----------------|---------------------|
| 1      | Cloud Computing –A Practical Approach   | Anthony T.Velte, Toby J.Velte, Robert Elsenpeter         | -               | 2009                |
| 2      | Cloud Computing: Web based Applications that change the way you work and Collaborate online   | Michael Miller   | -               | 2008                |
| 3      | Cloud Computing Best Practices for Managing and Measuring Processes for on demand computing, Applications and Data Centers in the Cloud with SLAs | Haley Beard  | -               | 2008                |
| 4      | A Comparative Analysis of Cloud Computing Environments  | Prof (Dr.) Andreas Polze                                 | 4 <sup>th</sup> | 2003                |
| 5      | Distributed and Cloud Computing, From Parallel Processing to the Internet of Things   | Kai Hwang, Geoffrey C Fox, Jack G Dongarra               | -               | 2012                |
| 6      | Cloud Computing: Implementation, Management, and Security   | John W.Rittinghouse and James F.Ransome                  | -               | 2010                |
| 7      | Grid and Cloud Computing – A Business Perspective on Technology and Applications  | Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol | 2 <sup>nd</sup> |                     |
| 8      | Cloud Security – A comprehensive Guide to Secure Cloud Computing  | Ronald L. Krutz, Russell Dean Vines                      | 4 <sup>th</sup> | 2010                |
| 9      | Mastering Cloud Computing   | RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi      | 1 <sup>st</sup> | 2013                |
| 10     | Enterprise Cloud Computing  | GautamShroff   | 2 <sup>nd</sup> | 2011                |

**FIRST YEAR - SEMESTER – II**

|                                |  |             |               |            |       |          |     |
|--------------------------------|--|-------------|---------------|------------|-------|----------|-----|
| Course Title                   | <b>CRYPTOGRAPHY AND NETWORK SECURITY</b>   |             |               |            |       |          |     |
| Course Type                    | Soft Core- Theory  | Total Hours | 64            | Hours/Week | 04    | Credits  | 04  |
| Course Code                    | Evaluation   | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                                |  | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| <b>COURSE OBJECTIVES (COs)</b> |  |             |               |            |       |          |     |
| <b>CO No.</b>                  | <b>Course Objectives</b><br>On completion of the course the student will be able   |             |               |            |       |          |     |
| CO-1                           | To develop basic skills of secure network architecture and explain the theory behind the security of different cryptographic algorithms.     |             |               |            |       |          |     |
| CO-2                           | To describe common network vulnerabilities and attacks, defense mechanisms against network attacks, and cryptographic protection mechanisms. |             |               |            |       |          |     |

| <b>Mapping of CLOs with PSOs &amp; CDLs</b> |  |                          |                               |
|---|--|--------------------------|-------------------------------|
| <b>CLOs No.</b>                             | <b>Course Learning Outcomes(CLOs)<br/>On completion of the course the student will learn</b> | <b>PSOs Addressed</b>    | <b>CDLs</b>                   |
| CLO-1                                       | To Classify the symmetric encryption techniques  | <b>PSO-1 &amp; PSO-2</b> | <b>Understand Analyse</b>     |
| CLO-2                                       | To illustrate various Public key cryptographic techniques                                    | <b>PSO-6 &amp; PSO-7</b> | <b>Analyse Evaluate</b>       |
| CLO-3                                       | To evaluate the authentication and hash algorithms   | <b>PSO-4 &amp; PSO-5</b> | <b>Analyse Apply Evaluate</b> |
| CLO-4                                       | To discuss authentication applications   | <b>PSO-6</b>             | <b>Analyse</b>                |
| CLO-5                                       | To summarize the intrusion detection and its solutions to overcome the attacks               | <b>PSO-7</b>             | <b>Evaluate</b>               |
| CLO-6                                       | Basic concepts of system level security Basic concepts of system level security              | <b>PSO-1</b>             | <b>Understand</b>             |

| <b>Units</b> | <b>Course Content/ Syllabus</b>  | <b>Duration</b> |
|--------------|--|-----------------|
| <b>1.1</b>   | <b>INTRODUCTION</b><br>Introduction-computer security concepts, attacks, security services, security mechanisms;<br><b>Key words</b> -understanding basics of network security | <b>6Hrs</b>     |
| <b>1.2</b>   | Classical encryption techniques-symmetric cipher models, substitution techniques,  | <b>6Hrs</b>     |

|            |  |              |
|------------|--|--------------|
|            | transposition techniques, rotor machines<br><b>Key words</b> -understanding different encryption methods   |              |
| <b>2.1</b> | <b>DES</b><br>Symmetric ciphers-Block cipher principles; DES-Algorithm, strengths and weaknesses of DES, attacks on DES and defense,<br><b>Key words</b> –understanding and implementing DES algorithm                                       | <b>6Hrs</b>  |
| <b>2.2</b> | multiple encryptions; Asymmetric ciphers-Essential mathematics, public key cryptography<br><b>Key words</b> -understanding multiple encryptions and  | <b>6Hrs</b>  |
| <b>3.1</b> | <b>RSA AND DIGITAL SIGNATURE</b><br>RSA, Diffie Hellman key exchange, random number generation, Data integrity and authentication Hash functions; MAC; Digital signatures;.<br><b>Key words</b> -understanding RSA and digital signature     | <b>12Hrs</b> |
| <b>4.1</b> | <b>NETWORK SECURITY</b><br>Key management; Authentication, Web and system security, Web security; IP security; E mail security; System security-intruders, malicious software, firewalls<br><b>Key words</b> -understanding network security | <b>12Hrs</b> |

## REFERENCES

| Sl. No | Title of the book  | Authors                       | Edition         | Year of publication |
|--------|--|-------------------------------|-----------------|---------------------|
| 1      | Cryptography and Network Security – Principles and Practice, | William Stallings,<br>PEARSON | 4 <sup>th</sup> | 2006                |
| 2      | Cryptography and Network Security,                           | AtulKahate, Tata McGraw Hill  | 4 <sup>th</sup> | 2019                |

**SECOND YEAR – SEMESTER – III**

|                                |   |             |               |            |       |          |     |
|--------------------------------|---|-------------|---------------|------------|-------|----------|-----|
| Course Title                   | <b>INTERNET OF THINGS</b>   |             |               |            |       |          |     |
| Course Type                    | Hard Core- Theory   | Total Hours | 64            | Hours/Week | 04    | Credits  | 04  |
| Course Code                    | Evaluation  | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                                |   | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| <b>COURSE OBJECTIVES (Cos)</b> |   |             |               |            |       |          |     |
| <b>CO No.</b>                  | <b>Course Objectives</b><br>On completion of the course the student will be learn   |             |               |            |       |          |     |
| CO-1                           | The main objective of this module is to introduce to the students the concepts of internet of things  |             |               |            |       |          |     |
| CO-2                           | Overview of interactive internet of things, and concepts of cloud and web and demonstrates few application of IOT and explains logic in business modeling |             |               |            |       |          |     |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |  |                          |                                       |
|--|--|--------------------------|---------------------------------------|
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)<br/>On completion of the course the student will learn</b> | <b>PSOs Addressed</b>    | <b>CLDs</b>                           |
| CLO-1                                      | To list the concepts of IOT  | <b>PSO-1 &amp; PSO-2</b> | <b>Understand<br/>Analyze</b>         |
| CLO-2                                      | To implement various middleware's of the sensors   | <b>PSO-6 &amp; PSO-7</b> | <b>Analyze<br/>Evaluate</b>           |
| CLO-3                                      | To describe the importance of cloud and web in IOT   | <b>PSO-4 &amp; PSO-5</b> | <b>Analyze<br/>Apply<br/>Evaluate</b> |
| CLO-4                                      | To understand a the applications of IOT  | <b>PSO-1</b>             | <b>Understand</b>                     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>  | <b>Duration</b> |
|--------------|--|-----------------|
| <b>1.1</b>   | <b>INTRODUCTION TO IOT</b><br><b>What is IoT</b> , Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.<br><i>Keyword: design and structures of iot</i> | <b>6Hrs</b>     |

|            |   |              |
|------------|---|--------------|
| <b>1.2</b> | <b>IoT</b> middleware, four pillars:RFID,SCADA,WSN,M2M of IoT<br><i>Keyword: the middleware and pillars</i>   | <b>6Hrs</b>  |
| <b>2.1</b> | <b>SMART OBJECTS</b><br>The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.<br><i>Keyword: introducing the smart objects and technologies</i>  | <b>6Hrs</b>  |
| <b>2.2</b> | IOT protocols: network protocols, data protocols and iot standardization with security issues<br><i>Keyword: protocol and iot standardization</i>   | <b>6Hrs</b>  |
| <b>3.1</b> | <b>DATA AND ANALYTICS FOR IOT</b><br>An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment<br><i>Keyword: data analytics and machine learning concepts</i>   | <b>12Hrs</b> |
| <b>4.1</b> | <b>IOT PHYSICAL DEVICES AND ENDPOINTS</b><br>Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture<br><i>Keywords: application of iot and sensors</i> | <b>12Hrs</b> |

#### REFERENCE BOOKS

| Sl. No | Title of the book   | Authors   | Edition         | Year of Publication |
|--------|---|---|-----------------|---------------------|
| 1      | The Internet of Things in the Cloud: A Middleware Perspective       | Honbo Zhou  | -               | 2012                |
| 2      | Architecting the Internet of Things                                 | Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds) | 1 <sup>st</sup> | 2011                |
| 3      | Networks, Crowds, and Markets                                       | David Easley and Jon Kleinberg                              | 2 <sup>nd</sup> | 2010                |
| 4      | The Internet of Things: Applications to the Smart Grid and Building | Olivier Hersent, Omar Elloumi and David Boswarthick         | -               | -                   |

**SECOND YEAR - SEMESTER – III**

|  |  |             |               |            |   |                                   |     |
|--|--|-------------|---------------|------------|---|-----------------------------------|-----|
| Course Title                               | <b>SOFTWARE ENGINEERING</b>  |             |               |            |   |                                   |     |
| Course Type                                | Hard Core- Theory  | Total Hours | 64            | Hours/Week | 04  | Credits                           | 04  |
| Course Code                                | Evaluation   | Internal    | C1+C2 = 15+15 |            |   | 30 Marks                          | 100 |
|  |  | External    | Duration      | C3         | 03Hrs                                     | 70 Marks                          |     |
| <b>COURSE OBJECTIVES (COs)</b>             |  |             |               |            |   |                                   |     |
| <b>CO No.</b>                              | <b>Course Objectives</b><br>On completion of the course the student will be able   |             |               |            |   |                                   |     |
| CO-1                                       | To understand an insight into the processes of software development  |             |               |            |   |                                   |     |
| CO-2                                       | To understand and practice the various fields such as analysis, design, development, testing of Software Engineering                           |             |               |            |   |                                   |     |
| CO-3                                       | To develop skills to construct software of high quality with high reliability  |             |               |            |   |                                   |     |
| CO-4                                       | To apply metrics and testing techniques to evaluate the software   |             |               |            |   |                                   |     |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |  |             |               |            |   |                                   |     |
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)</b><br><b>On completion of the course the student will learn to</b>  |             |               |            | <b>PSOs Addressed</b>                     | <b>CLDs</b>                       |     |
| CLO-1                                      | Apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction and deployment |             |               |            | <b>PSO-1, PSO-2, PSO-3, PSO-4, PSO-11</b> | <b>Understand</b><br><b>Apply</b> |     |
| CLO-2                                      | Work as an individual and as part of a multidisciplinary team to develop and deliver quality software  |             |               |            | <b>PSO-5, PSO-6, PSO-7</b>                | <b>Evaluate</b><br><b>Create</b>  |     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>   | <b>Duration</b> |
|--------------|---|-----------------|
| <b>1.0</b>   | <b>INTRODUCTION TO SOFTWARE ENGINEERING:</b> FAQs, importance, diversities and ethics of software engineering<br><i>Key words- Understanding the concept of Software Engineering</i>  | <b>06Hrs</b>    |
| <b>1.1</b>   | <b>PROCESS MODELS:</b> The system engineering process, process models, process activities and coping with change<br><i>Key words- Understanding and analyzing different process models</i>  | <b>06Hrs</b>    |
| <b>2.0</b>   | <b>REQUIREMENT ENGINEERING:</b> Functional and Non-functional requirements, s/w requirements document, requirements specification, requirements engineering processes, requirements elicitation, analysis, validation and management<br><i>Key words- Analysis and evaluation of RE</i> | <b>06Hrs</b>    |
| <b>2.1</b>   | <b>SYSTEM MODELING:</b> Context models, interaction models, structural models and behavioural models<br><i>Key words- Understanding and Analyzing different system models</i>   | <b>03Hrs</b>    |

|            |   |              |
|------------|---|--------------|
|            |   |              |
| <b>2.2</b> | <b>DESIGN AND IMPLEMENTATION:</b> Object oriented design, function oriented design, detailed design, User interface design: Principles, User interaction, Information presentation, User support<br><i>Key words- understanding the importance of design phase and analysis of implementation methods</i> | <b>03Hrs</b> |
| <b>3.0</b> | <b>CODING :</b> Coding and metrics(design level and coding metrics), Verification and Validation planning, clean room software development<br><i>Key words- Analyzing coding phase of the software engineering</i>  | <b>06Hrs</b> |
| <b>3.1</b> | <b>SOFTWARE TESTING:</b> testing fundamentals, black box and white box testing, testing process and metrics<br><i>Key words- analyzing different software testing techniques</i>  | <b>06Hrs</b> |
| <b>4.0</b> | <b>PROJECT MANAGEMENT:</b> Risk management, managing people and team work<br><i>Key words- Analysis of different project management techniques</i>  | <b>06Hrs</b> |
| <b>4.1</b> | <b>PROJECT PLANNING:</b> S/w pricing, plan driven development, project scheduling, agile planning, estimation techniques, S/w reengineering, quality management<br><i>Key words- Analysis of the overall project planning</i>   | <b>06Hrs</b> |

## REFERENCES

| Sl. No | Title of the book                             | Authors                             | Edition         | Year of publication |
|--------|---|-------------------------------------|-----------------|---------------------|
| 1      | Software Engineering                          | Ian Sommerville                     | 9 <sup>th</sup> | 2001                |
| 2      | Software Engineering A practitioners approach | Roger S. Pressman, Tata-McGraw Hill | 5 <sup>th</sup> | 2015                |
| 3      | Software Engineering, A precise approach      | PankajJalote                        | 5 <sup>th</sup> | 2010                |

## SECOND YEAR - SEMESTER –III

|              |                           |             |          |               |    |          |          |
|--------------|---------------------------|-------------|----------|---------------|----|----------|----------|
| Course Title | <b>PYTHON PROGRAMMING</b> |             |          |               |    |          |          |
| Course Type  | Soft Core- Theory         | Total Hours | 80       | Hours/Week    | 05 | Credits  | 04       |
| Course Code  |                           | Evaluation  | Internal | C1+C2 = 15+15 |    | 30 Marks |          |
|              |                           |             | External | Duration      | C3 | 03Hrs    | 70 Marks |
|              |                           |             |          |               |    |          | 100      |

| <b>COURSE OBJECTIVES (COs)</b> |  |
|--------------------------------|--|
| CO No.                         | Course Objectives<br>On completion of the course the student will be able to       |
| CO-1                           | Learn Syntax and Semantics and create Functions in Python;                         |
| CO-2                           | Handle Strings and Files in Python;  |
| CO-3                           | Understand Lists, Dictionaries and Regular expressions in Python;                  |
| CO-4                           | Implement Object Oriented Programming concepts in Python;                          |
| CO-5                           | Build Web Services and introduction to Network and Database Programming in Python. |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |   |                          |                                       |
|--|---|--------------------------|---------------------------------------|
| CLOs No.                                   | Course Learning Outcomes(CLOs)<br>On completion of the course the student will learn to                                     | PSOs Addressed           | CLDs                                  |
| CLO-1                                      | Examine Python syntax and semantics and be fluent in the use of Python flow control and functions;                          | <b>PSO-1 &amp; PSO-2</b> | <b>Understand<br/>Analyse</b>         |
| CLO-2                                      | Demonstrate proficiency in handling Strings and File Systems;   | <b>PSO-3</b>             | <b>Analyse<br/>Evaluate</b>           |
| CLO-3                                      | Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions; | <b>PSO-1 &amp; PSO-2</b> | <b>Analyse<br/>Apply<br/>Evaluate</b> |
| CLO-4                                      | Interpret the concepts of Object-Oriented Programming as used in Python;  | <b>PSO-6</b>             | <b>Evaluate</b>                       |
| CLO-5                                      | Implement exemplary applications related to Network Programming, Web Services and Databases in Python.                      | <b>PSO-5</b>             | <b>Analyse</b>                        |

| Units      | Course Content/ Syllabus  | Duration     |
|------------|---|--------------|
| <b>1.0</b> | <b>INTRODUCTION</b><br>Why should you learn to write programs, Variables, expressions and statements, Conditional execution, Functions<br><i>Key words-understanding the basics of python programming with tokens</i> | <b>12Hrs</b> |
| <b>2.0</b> | <b>FUNCTIONS</b><br>Iteration, Strings, Files Lists, Dictionaries, Tuples, Regular Expressions<br><i>Key words-understanding and implementing functions</i>   | <b>12Hrs</b> |



|            |  |              |
|------------|--|--------------|
| <b>3.0</b> | <b>CLASSES AND OBJECTS</b><br>Classes and objects, Classes and functions, Classes and methods<br><i>Key words-understanding and implementing objective oriented concepts</i> | <b>12Hrs</b> |
| <b>4.0</b> | <b>NETWORK AND WEB SERVICES</b><br>Networked programs, Using Web Services, Using databases and SQL<br><i>Key words-understanding networking and DBMS concepts</i>            | <b>12Hrs</b> |

#### REFERENCES

| Sl. No | Title of the book                                 | Authors  | Edition         | Year of publication |
|--------|---|--|-----------------|---------------------|
| 1      | "Introduction to Computer Science Using Python    | Charles Dierbach,  | 1 <sup>ST</sup> | -                   |
| 2      | Programming Python                                | Mark Lutz  | 4 <sup>TH</sup> | 2011                |
| 3      | Core Python Applications Programming              | Wesley J Chun  | 3 <sup>RD</sup> | 2015                |
| 4      | Data Structures and Algorithms in Python          | Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich | 1 <sup>ST</sup> | 2016                |
| 5      | Python Programming using problem solving approach | ReemaThareja   | 1 <sup>ST</sup> | 2017                |

**SECOND YEAR - SEMESTER –III**

|  |   |             |               |            |                          |                               |     |
|--|---|-------------|---------------|------------|--------------------------|-------------------------------|-----|
| Course Title                               | <b>MATLAB PROGRAMMING</b>   |             |               |            |                          |                               |     |
| Course Type                                | Soft Core- Practical  | Total Hours | 32            | Hours/Week | 04                       | Credits                       | 02  |
| Course Code                                | Evaluation  | Internal    | C1+C2 = 15+15 |            |                          | 30 Marks                      | 100 |
|  |   | External    | Duration      | C3         | 03Hrs                    | 70 Marks                      |     |
| <b>COURSE OBJECTIVES (COs)</b>             |   |             |               |            |                          |                               |     |
| <b>CO No.</b>                              | <b>Course Objectives</b>  |             |               |            |                          |                               |     |
|  | On completion of the course the student will be able  |             |               |            |                          |                               |     |
| CO-1                                       | To understand fundamental concepts in graph theory, lattices, matrices and Boolean algebra; |             |               |            |                          |                               |     |
| CO-2                                       | To introduce MATLAB programming with few examples.  |             |               |            |                          |                               |     |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |   |             |               |            |                          |                               |     |
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)</b>   |             |               |            | <b>PSOs Addressed</b>    | <b>CLDs</b>                   |     |
|  | <b>On completion of the course the student will learn to</b>                                |             |               |            |                          |                               |     |
| CLO-1                                      | Solve problems using algebraic properties;  |             |               |            | <b>PSO-1 &amp; PSO-2</b> | <b>Understand Analyse</b>     |     |
| CLO-2                                      | Identify bounded and complete lattice;  |             |               |            | <b>PSO-6 &amp; PSO-7</b> | <b>Analyse Evaluate</b>       |     |
| CLO-3                                      | Use MATLAB for solving problems on vectors, matrices, plotting data etc.                    |             |               |            | <b>PSO-4 &amp; PSO-5</b> | <b>Analyse Apply Evaluate</b> |     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>   | <b>Duration</b> |
|--------------|---|-----------------|
| <b>1.0</b>   | <b>INTRODUCTION TO MATLAB:</b><br>MATLAB Basics, Programming Environment: MATLAB Windows, A First Program, Expressions, Constants Variables and assignment statement.<br>Array operations: performing calculations with vectors, creating multiple plots; working with matrix.<br><i>Key words-understanding the fundamentals of MATLAB</i> | <b>12Hrs</b>    |
| <b>2.0</b>   | <b>Loops and execution control :</b> programming constructs, user interaction, flow control, loops, functions: creating functions, calling functions, setting the MATLAB path, debugging<br><i>Key words-Working with different decision making and looping statement in MATLAB</i>   | <b>5Hrs</b>     |
| <b>2.1</b>   | <b>Procedures and Functions:</b> Arguments and return values, M-files, Formatted console input-output, String handling.<br><i>Key words-implementing different functions in MATLAB</i>  | <b>5Hrs</b>     |
| <b>3.0</b>   | <b>Graph Plots:</b> Basic plotting, Built in functions, Generating waveforms<br><i>Key words-Implementing graph plots in MATLAB</i>   | <b>5Hrs</b>     |

|            |   |             |
|------------|---|-------------|
| <b>3.1</b> | <b>Manipulating Text:</b> Writing to a text file, Reading from a text file, Randomizing and sorting a list, searching a list.<br><i>Key words-Working with text files in MATLAB</i> | <b>5Hrs</b> |
|------------|---|-------------|

## REFERENCES

| Sl. No | Title of the book   | Authors                      | Edition         | Year of publication |
|--------|---|------------------------------|-----------------|---------------------|
| 1      | Basics of mathematics,  | Kate S.K Bhapkar H.R:        | -               | -                   |
| 2      | S.Lipschutz and M.Lipson: Theory and problems of discrete mathematics – | AtulKahate, Tata McGraw Hill | 2 <sup>nd</sup> | .                   |
| 3      | Basic graph theory,   | K.R.Parthasarathy            | -               | 1994.               |
| 4      | Elements of discrete mathematics  | L.Liu                        | -               | 1986.               |
| 5      | The theory of matrices with applications , Academic press               | Lancaster and Tismenetsky    | 2 <sup>nd</sup> | 1984.               |
| 6      | Programming in MATLAB, Cengage learning,                                | Marc E Herniter              | -               | 2000.               |
| 7      | Getting started with Matlab, oxford university press,.                  | RudraPatap:                  | -               | 2010                |

**SECOND YEAR - SEMESTER –III**

|                                |  |             |               |            |       |          |     |
|--------------------------------|--|-------------|---------------|------------|-------|----------|-----|
| Course Title                   | <b>WEB TECHNOLOGY</b>  |             |               |            |       |          |     |
| Course Type                    | Soft Core- Practical   | Total Hours | 32            | Hours/Week | 04    | Credits  | 02  |
| Course Code                    | Evaluation   | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                                |  | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| <b>COURSE OBJECTIVES (COs)</b> |  |             |               |            |       |          |     |
| <b>CO No.</b>                  | <b>Course Objectives</b>   |             |               |            |       |          |     |
|                                | On completion of the course the student will be able   |             |               |            |       |          |     |
| CO-1                           | To understand the concepts, principles, strategies, and methodologies of Web applications and development. |             |               |            |       |          |     |
| CO-2                           | To apply current Web technologies to understand current Web business models.                               |             |               |            |       |          |     |
| CO-3                           | To enable students to program for the www using HTML and Java Script                                       |             |               |            |       |          |     |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |   |                       |             |
|--|---|-----------------------|-------------|
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)<br/>On completion of the course the student will learn to</b> | <b>PSOs Addressed</b> | <b>CLDs</b> |
| CLO-1                                      | Develop web applications and web services   | PSO-5                 | Apply       |
| CLO-2                                      | Develop user-interfaces.  | PSO-5                 | Apply       |

| <b>Units</b> | <b>Course Content/ Syllabus</b>  | <b>Duration</b> |
|--------------|--|-----------------|
| <b>1.0</b>   | HTML: creating web pages using basic tags ,Creating tables, frames and Lists.<br>Creating forms - adding background, validating, redirecting, formatting, input attributes, checkboxes, radio buttons, dropdown menus.<br>HTML5: Using new features of HTML5 such as images, videos, canvas, header, footer, article, section, date, time.<br><b>Keyword: Understanding the fundamentals of HTML and HTML5</b> | <b>16Hrs</b>    |
| <b>2.0</b>   | CSS: styling web pages using inline, embedded and external CSS<br>Java script: using JS for validating and computing using functions, exception handling.<br>Servlets: get, post actions, session handling and cookies<br><b>Keyword: Learning CSS , basic programming concepts of Java script</b>   | <b>16Hrs</b>    |

## REFERENCES

| Sl. No | Title of the book                                     | Authors                         | Edition         | Year of publication |
|--------|---|---------------------------------|-----------------|---------------------|
| 1      | “Web Programming                                      | Guy W. Lecky-Thompson           |                 |                     |
| 2      | “Web Programming: Building Internet Applications,.    | Chris Bates                     | 3 <sup>rd</sup> | 2007                |
| 3      | HTML- Definitive Guide                                | -                               | 5 <sup>th</sup> | 2002                |
| 5      | Java Script- Definitive Guide                         | David Flanagan                  | 7 <sup>th</sup> | 2020                |
| 6      | Complete Reference HTML-Tata McGraw hill              | Thomas A Powell                 | 5 <sup>th</sup> | 2010                |
| 2      | HTML & JAVA script programming concepts               | Shane turner e / Karl Barksdale | 1 <sup>st</sup> | 1999                |
| 5      | HTML & JavaScript for Visual Learners                 | Chris Charuhas                  | -               | 2008                |
| 6      | Magic with HTML, DHTML & JavaScript                   | Dr.Ravinder Singh<br>AmitGupta  | 1 <sup>st</sup> | 2009                |
| 7      | HTML, XHTML, CSS and XML by Example A Practical Guide | TeodoruGugoiu                   | -               | 2007                |

## SECOND YEAR - SEMESTER – III

|              |                        |             |               |            |       |          |     |
|--------------|------------------------|-------------|---------------|------------|-------|----------|-----|
| Course Title | <b>WEB ENGINEERING</b> |             |               |            |       |          |     |
| Course Type  | Soft Core- Theory      | Total Hours | 64            | Hours/Week | 04    | Credits  | 04  |
| Course Code  | Evaluation             | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|              |                        | External    | Duration      | C3         | 03Hrs | 70 Marks |     |

| <b>COURSE OBJECTIVES (COs)</b> |  |
|--------------------------------|--|
| <b>CO No.</b>                  | <b>Course Objectives</b><br>On completion of the course the student will be able   |
| CO-1                           | To understand the concepts, principles, strategies, and methodologies of Web applications and development. To apply current Web technologies to understand current Web business models, to understand and apply Web development processes. |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |  |                        |                             |
|--|--|------------------------|-----------------------------|
| CLOs No.                                   | Course Learning Outcomes (CLOs)<br>On completion of the course the student will learn to | PSOs Addressed         | CLDs                        |
| CLO-1                                      | Develop web applications and web services  | <b>PSO-1<br/>PSO-5</b> | <b>Understand<br/>Apply</b> |
| CLO-2                                      | Develop user-interfaces.   | <b>PSO-1<br/>PSO-3</b> | <b>Understand<br/>Apply</b> |

| Units | Course Content/ Syllabus   | Duration      |
|-------|--|---------------|
| 1.1   | Web applications, motivation, categories of web applications, characteristics of web applications, product related characteristics, usage related characteristics, development-related characteristic, evolution of web engineering.<br><i>Keywords: Understanding web applications and different categories of web applications</i> | <b>12 Hrs</b> |
| 2.1   | Introduction, fundamentals, where do requirements come from, requirements engineering activities re specifics in web engineering<br><i>Keywords: Learning requirement engineering</i>  | <b>6Hrs</b>   |
| 2.2   | Principles for RE of web applications, adapting re methods to web application development, requirement types, notations, tools<br><i>Keywords: Understanding requirement types and principles of RE</i>  | <b>6Hrs</b>   |
| 3.1   | The role of the information architect, collaboration and communication, organizing information, organizational challenges, organizing web sites and intranets<br><i>Keywords: Understanding the concept of information architecture</i>  | <b>6Hrs</b>   |
| 3.2   | Navigation systems, creating cohesive organization systems designing navigation systems, types of navigation systems, integrated navigation elements, remote navigation elements, designing elegant navigation systems   | <b>6Hrs</b>   |

|     |   |             |
|-----|---|-------------|
|     | <b>Keywords: Understanding different navigation systems.</b>  |             |
| 4.1 | Searching Systems, searching your web site, designing the search interface, indexing the right stuff, to search or not to search, grouping content, conceptual design, high-level architecture blueprints, architectural page mockups, design sketches<br><b>Keywords: Understanding searching and indexing</b> | <b>6Hrs</b> |
| 4.2 | Web Project Management, understanding scope, refining framework activities, building a web E team, managing risk, developing a schedule, managing quality, managing change, tracking the project<br><b>Keywords: Understanding risk management and quality management</b>                                       | <b>6Hrs</b> |

## REFERENCES

| Sl. No | Title of the book | Authors                       | Publisher                    | Edition | Year of publication |
|--------|-------------------|-------------------------------|------------------------------|---------|---------------------|
| 1      | Web Engineering   | GertiKappel, Birgit Proll     | John Wiley and Sons Ltd,     | -       | 2006                |
| 2      | Web Engineering   | Roger S.Pressman, David Lowe, | Tata McGraw Hill Publication | -       | 2007                |
| 3      | Web Programming   | Guy W. Lecky-Thompson         | Cengage Learning.            | -       | -                   |

## RECOMMENDED BOOKS

|   |   |  |                             |                 |      |
|---|---|--|-----------------------------|-----------------|------|
| 1 | An Introduction to XML and Web Technologies                               | Moller   | Pearson Education New Delhi | -               | 2009 |
| 2 | Web Programming: Building Internet Applications                           | Chris Bates  | Wiley India Edition, 2007   | 3rd             | 2007 |
| 3 | Web Development with Microsoft Visual Studio 2005”, Wiley Dreamtech, 2006 | John Paul Mueller                                  | -                           | -               | 2006 |
| 4 | CGI Programming with Perl 2/e   | Scott Guelich, ShishirGundavaram, Gunther Birzniek | O’Reilly                    | 2 <sup>nd</sup> | 2006 |
| 5 | Programing Web Services with SOAP   | Doug Tidwell, James Snell, PavelKulchenko          | O’ Reilly                   | 1 <sup>st</sup> | 2002 |
| 6 | XML in Action, Web Technology   | Pardi  | PHI                         | -               | 1999 |

**SECOND YEAR - SEMESTER – III**

|              |                           |             |               |            |       |          |     |
|--------------|---------------------------|-------------|---------------|------------|-------|----------|-----|
| Course Title | <b>ADVANCED DATABASES</b> |             |               |            |       |          |     |
| Course Type  | Soft Core- Theory         | Total Hours | 80            | Hours/Week | 05    | Credits  | 04  |
| Course Code  | Evaluation                | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|              |                           | External    | Duration      | C3         | 03Hrs | 70 Marks |     |

| <b>COURSE OBJECTIVES (COs)</b> |   |
|--------------------------------|---|
| <b>CO No.</b>                  | <b>Course Objectives</b>  |
|                                | On completion of the course the student will be able to   |
| CO-1                           | Expose to the implementation techniques of database system.   |
| CO-2                           | Explains techniques for query processing and optimization with transaction and concurrency control techniques |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |  |                                   |  |
|--|--|-----------------------------------|--|
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes (CLOs) On completion of the course</b>                                   | <b>PSOs Addressed</b>             | <b>CLDs</b>                            |
| CLO-1                                      | It enables the students to understand the concept of relational databases and relational operations. | <b>PSO-1<br/>PSO-2</b>            | <b>Understand<br/>Apply</b>            |
| CLO-2                                      | It enables the students to understand the concept of Object Oriented Databases and its Operations.   | <b>PSO-1<br/>PSO-2<br/>PSO-4</b>  | <b>Understand<br/>Apply<br/>Create</b> |
| CLO-3                                      | It enables the students to understand the concept of Parallel and Distributed Databases.             | <b>PSO-1<br/>PSO-2</b>            | <b>Understand<br/>Analyse</b>          |
| CLO-4                                      | It enables the students to understand the concept of Transaction Processing.                         | <b>PSO-1<br/>PSO-3<br/>PSO-10</b> | <b>Understand<br/>Apply</b>            |

| <b>Units</b> | <b>Course Content/ Syllabus</b>  | <b>Duration</b> |
|--------------|--|-----------------|
| 1.0          | Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Multi valued and Join Dependency, Normal Forms, Rules about functional dependencies.<br><b>Keywords: Understanding the concept of relational algebra ,relational calculus and normalization</b>     | <b>8Hrs</b>     |
| 2.0          | Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information<br><b>Keywords: Understanding different functions in relational algebra</b>                                 | <b>8Hrs</b>     |
| 2.1          | Modelling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases.<br><b>Keywords: understanding how relations can be referenced as object</b> | <b>10Hrs</b>    |



|     |  |               |
|-----|--|---------------|
| 3.0 | Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modelling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation.<br><i>Keywords: understanding distributed data storage and deadlocks</i> | <b>10Hrs</b>  |
| 4.0 | Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors. Multimedia databases, Databases on the Web and Semi-Structured Data<br><i>Keywords: understanding different methods in transaction with case study</i>                                    | <b>12 Hrs</b> |

## REFERENCES

| Sl. No | Title of the book                            | Authors                            | Publisher         | Edition         | Year of publication |
|--------|--|------------------------------------|-------------------|-----------------|---------------------|
| 1      | An Advanced Course in Database Systems 2008. | Dietrich, Urban                    | Pearson           | -               | 2008                |
| 2      | Fundamentals of Database Systems             | Elmars, Navathe, Somayajuu, Gupta, | Pearson Education | 4 <sup>th</sup> | 2007                |
| 3      | Database Systems, The complete book          | Garcia, Ullman, Widom,             | Pearson Education | -               | 2007.               |

**SECOND YEAR - SEMESTER – IV**

|              |                            |             |               |            |       |          |     |
|--------------|----------------------------|-------------|---------------|------------|-------|----------|-----|
| Course Title | <b>WIRELESS NETWORKING</b> |             |               |            |       |          |     |
| Course Type  | Hard Core- Theory          | Total Hours | 80            | Hours/Week | 05    | Credits  | 04  |
| Course Code  | Evaluation                 | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|              |                            | External    | Duration      | C3         | 03Hrs | 70 Marks |     |

| <b>COURSE OBJECTIVES (COs)</b> |   |
|--------------------------------|---|
| <b>CO No.</b>                  | <b>Course Objectives</b>  |
|                                | On completion of the course the student will be able to           |
| CO-1                           | Understand some fundamental concepts in wireless networks         |
| CO-2                           | Understand physical as wireless MAC layer alternatives techniques |
| CO-3                           | Learn planning and operation of wireless networks                 |
| CO-4                           | Study various wireless LAN and WAN concepts                       |
| CO-5                           | Study various wireless LAN and WAN concepts                       |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |   |                          |                                       |
|--|---|--------------------------|---------------------------------------|
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)<br/>On completion of the course the student will learn to</b>   | <b>PSOs Addressed</b>    | <b>CLDs</b>                           |
| CLO-1                                      | Describe the lower layer issues in wireless communication system  | <b>PSO-1 &amp; PSO-2</b> | <b>Understand<br/>Analyze</b>         |
| CLO-2                                      | Discuss the principles of mobile computing and its enabling technologies  | <b>PSO-6&amp; PSO-7</b>  | <b>Analyze<br/>Evaluate</b>           |
| CLO-3                                      | Explain the problems and solutions introduced by wireless network and mobile computing to traditional networking, operating system, human computer interface, architecture and security | <b>PSO-4 &amp; PSO-5</b> | <b>Analyze<br/>Apply<br/>Evaluate</b> |

| <b>Units</b> | <b>Course Content/ Syllabus</b>  | <b>Duration</b> |
|--------------|--|-----------------|
| <b>1.0</b>   | <b>MULTIPLE RADIO ACCESS:</b> Medium access alternatives, fixed-assignment for voice oriented networks random access for data oriented networks, handoff and roaming support, security and privacy<br><i>Key words- Understanding and analyzing different radio access methods.<br/>Analyzing handoff and security in wireless networks.</i> | <b>12Hrs</b>    |
| <b>2.0</b>   | <b>WIRELESS TECHNOLOGY:</b> Wireless WANs, First Generation analog, Second Generation TDMA, GSM, Short Messaging Service in GSM, Second Generation CDMA – IS-95, GPRS - Third Generation Systems (WCDMA/CDMA 2000)<br><i>Key words- Understanding, analyzing and evaluating different wireless technology</i>                                | <b>06Hrs</b>    |
| <b>2.1</b>   | <b>WIRELESS LANs:</b> Introduction, IEEE 802.11 WLAN – Architecture and  | <b>06Hrs</b>    |

|            |  |              |
|------------|--|--------------|
|            | Services, Physical Layer- MAC sub layer- MAC Management Sub layer, HIPERLAN, WiMax.<br><i>Key words- Understanding WLAN</i>  |              |
| <b>3.0</b> | <b>ADHOC AND SENSOR NETWORKS:</b> Protocols, characteristics of MANETs, table-driven and source-initiated on demand routing protocols, hybrid protocols, wireless sensor networks- classification, MAC and routing protocols<br><i>Key words- Understanding, analyzing and evaluating different protocols in AdHoc and sensor networks</i> | <b>12Hrs</b> |
| <b>4.0</b> | <b>WIRELESS MANS AND PANS:</b> Layer details: Wireless MANs – physical and MAC layer details, wireless PANs – architecture of Bluetooth systems, physical and MAC layer details, standards<br><i>Key words- Understanding and analyzing MANs and PANs</i>  | <b>12Hrs</b> |

#### REFERENCES

| Sl. No | Title of the book                           | Authors                            | Edition         | Year of publication |
|--------|---|------------------------------------|-----------------|---------------------|
| 1      | Wireless Communications and networks        | William Stallings                  | 2 <sup>nd</sup> | 2007                |
| 2      | Introduction to Wireless and Mobile Systems | Dharma PrakashAgrawal& Qing-AnZeng | 2 <sup>nd</sup> | 2007                |

**SECOND YEAR - SEMESTER – IV**

|  |   |             |               |            |                       |                            |     |
|--|---|-------------|---------------|------------|-----------------------|----------------------------|-----|
| Course Title   | <b>PHP PROGRAMMING</b>  |             |               |            |                       |                            |     |
| Course Type  | Soft Core- Theory   | Total Hours | 80            | Hours/Week | 05                    | Credits                    | 04  |
| Course Code  | Evaluation  | Internal    | C1+C2 = 15+15 |            |                       | 30 Marks                   | 100 |
|  |   | External    | Duration      | C3         | 03Hrs                 | 70 Marks                   |     |
| <b>COURSE OBJECTIVES (COs)</b>   |   |             |               |            |                       |                            |     |
| <b>CO No.</b>  | <b>Course Objectives</b>  |             |               |            |                       |                            |     |
| CO-1   | Understand how server-side programming works on the web.  |             |               |            |                       |                            |     |
| CO-2   | Giving all students exposure to basic of PHP  |             |               |            |                       |                            |     |
| CO-3   | To provide the necessary knowledge to design and develop dynamic, database driven applications using PHP. |             |               |            |                       |                            |     |
| CO-4   | Understand secure submission.   |             |               |            |                       |                            |     |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b>   |   |             |               |            |                       |                            |     |
| <p><b>Course Learning Outcomes(CLOs):</b>The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The keywords are used at the end of each unit to define CLOs.</b></p> |   |             |               |            |                       |                            |     |
| <b>CLOs No.</b>  | <b>Course Learning Outcomes(CLOs)<br/>On completion of the course the student will learn to</b>           |             |               |            | <b>PSOs Addressed</b> | <b>CLDs</b>                |     |
| CLO-1  | Write PHP code to produce outcomes and solve problems   |             |               |            | <b>PSO-1,PSO-2</b>    | <b>Create</b>              |     |
| CLO-2  | Display and insert data using PHP and MySQL   |             |               |            | <b>PSO-3,PSO-5</b>    | <b>Evaluate<br/>Create</b> |     |
| CLO-3  | Analyze and solve various database tasks using the PHP language   |             |               |            | <b>PSO-7,PSO-9</b>    | <b>Analyze</b>             |     |
| CLO-4  | Build dynamic website using server side PHP Programming and Database connectivity                         |             |               |            | <b>PSO-11</b>         | <b>Create</b>              |     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>  | <b>Duration</b> |
|--------------|--|-----------------|
| <b>1.0</b>   | <p><b>INTRODUCTION:</b> Introduction, Introduction to Server Side Programming, Introduction to PHP, PHP and HTML, Essentials of PHP, Why Use PHP, Installation of Web Server, WAMP Configurations</p> <p><b>Key words- understanding server side programming</b></p> | <b>04Hrs</b>    |
| <b>1.1</b>   | <p><b>PHP BASIC:</b> Writing simple PHP program, Embedding with HTML, Comments in PHP, Variables, naming conventions, Data types, Operators</p> <p><b>Key words- Understanding various components of PHP</b></p>   | <b>04Hrs</b>    |
| <b>1.2</b>   | <p><b>STRINGS:</b> String concatenation, string functions, float functions</p> <p><b>Key words- Analyzing different String functions</b></p>   | <b>04Hrs</b>    |
| <b>2.0</b>   | <p><b>ARRAYS:</b> Introduction, array–key pair, array functions, value, isset(), unset(), gettype(), settype(), control statements(if,switch) loops</p> <p><b>Key words- Understanding arrays in PHP and analyzing different operation on</b></p>                    | <b>04Hrs</b>    |

|     |  |              |
|-----|--|--------------|
|     | <i>arrays</i>  |              |
| 2.1 | <b>Functions:</b> Built-in functions, user defined functions(with argument and return values), Global variable, default value<br><i>Key words- understanding and analyzing Functions in PHP</i>                                      | <b>04Hrs</b> |
| 2.2 | Get & Post method, url encoding, html encoding, cookies, sessions<br><i>Key words- Analyzing and evaluating concepts of data transaction</i>   | <b>04Hrs</b> |
| 3.0 | <b>FILES:</b> Basic, Creating, Reading from file and writing into file. Different file operation methods.<br><i>Key words- Applying different file operations</i>  | <b>03Hrs</b> |
| 3.1 | <b>MySQL:</b> Introduction to MySQL, CRUD - select statements, creating database/tables, inserting values, updating and deleting<br><i>Key words- Creating data base using MySQL queries</i>   | <b>04Hrs</b> |
| 3.2 | <b>PHP WITH MYSQL:</b> Creating connection, selecting database, perform database (query), use returned data, close connections, file handling in PHP, using MySQL from PHP.<br><i>Key words- Creating data base using PHP script</i> | <b>06Hrs</b> |
| 4.0 | <b>OOPs:</b> Introduction to OOPS, creating classes, creating objects, setting access to properties and methods, constructors, destructors.<br><i>Key words- Analyzing OOPs concept and creating class and objects</i>               | <b>04Hrs</b> |
| 4.1 | <b>INHERITANCE and POLYMORPHISM:</b> Access specifiers, Types of Inheritance, Abstract class, Interface, Method Overloading<br><i>Key words- Evaluating different inheritance methods and polymorphism</i>                           | <b>04Hrs</b> |
| 4.2 | <b>FORM VALIDATION:</b> Forms, Building a form, Validating a form.<br><i>Key words- Creating forms and validating it.</i>  | <b>04Hrs</b> |

## REFERENCES

| Sl. No | Title of the book             | Authors                       | Edition         | Year of publication |
|--------|-------------------------------|-------------------------------|-----------------|---------------------|
| 1      | PHP: The Complete Reference   | Steven Holzner                | -               | 2008                |
| 2      | PHP: A Beginner's Guide       | VikramVaswani                 | 1 <sup>st</sup> | 2008                |
| 3      | Beginning PHP 5.3             | Wiley Publishing              | 2 <sup>nd</sup> | 2010                |
| 4      | PHP and MySQL Web Development | Luke Welling<br>Laura Thomson | 4 <sup>th</sup> | 2003                |

**SECOND YEAR – SEMESTER – IV**

| Course Title   | FINITE AUTOMATA  |             |               |  |   |          |     |
|--|--|-------------|---------------|--|---|----------|-----|
| Course Type  | Soft Core-Theory   | Total Hours | 64            | Hours/Week   | 04  | Credits  | 04  |
| Course Code  | Evaluation   | Internal    | C1+C2 = 15+15 |  |   | 30 Marks | 100 |
|  |  | External    | Duration      | C3   | 3Hrs  | 70 Marks |     |
| <b>COURSE OBJECTIVES (Cos)</b>   |  |             |               |  |   |          |     |
| <b>CO No.</b>  | <b>Course Objectives</b><br>On completion of the course the student will be able to  |             |               |  |   |          |     |
| CO-1   | Introduce concepts in automata theory and theory of computation  |             |               |  |   |          |     |
| CO-2   | Identify different formal language classes and their relationships   |             |               |  |   |          |     |
| CO-3   | Design grammars and recognizers for different formal languages   |             |               |  |   |          |     |
| CO-4   | Prove or disprove theorems in automata theory using its properties   |             |               |  |   |          |     |
| CO-5   | Determine the decidability and intractability of computational problems  |             |               |  |   |          |     |
| <b>Mapping of CLOs with PSOs &amp; CDLs</b>  |  |             |               |  |   |          |     |
| <p><b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The keywords are used at the end of each unit to define CLOs.</b></p> |  |             |               |  |   |          |     |
| CLOs No.   | Course Learning Outcomes (CLOs)<br>On completion of the course the student will learn to   |             |               | PSOs Addressed   | CLDs  |          |     |
| CLO-1  | Explain and manipulate the different concepts in automata theory and formal languages such as formal proofs, non-deterministic automata, regular expressions, regular languages, context-free grammars, context-free languages, Turing machines; |             |               | <b>PSO-1</b><br><b>PSO-2</b><br><b>PSO-3</b><br><b>PSO-4</b> | <b>Understand</b><br><b>Apply</b><br><b>Create</b><br><b>Evaluate</b> |          |     |
| CLO-2  | Explain the power and the limitations of regular languages and context-free languages.   |             |               | <b>PSO-2</b><br><b>PSO-3</b>                                 | <b>Analyse</b><br><b>Evaluate</b>                                     |          |     |

| Units | Course Content/ Syllabus  | Duration    |
|-------|---|-------------|
| 1.1   | Introduction: Strings, alphabets and languages, graphs and trees, inductive proofs, set notation, relations<br><i>Keywords: Understanding the basic of languages, sets and relations</i>  | <b>6Hrs</b> |
| 1.2   | Finite state systems, basic definitions, non-deterministic finite automata<br><i>Keywords: Understanding DFA and NFA</i>  | <b>6Hrs</b> |
| 2.1   | Finite Automata and Regular Expressions: finite automata with $\epsilon$ - moves, regular expressions, two way finite automata, finite automata with output, applications of finite automata.<br><i>Keywords: Understanding regular languages</i> | <b>6Hrs</b> |

|     |  |              |
|-----|--|--------------|
| 2.2 | Properties of Regular Sets: The pumping lemma for regular sets, closure properties of regular sets, decision algorithms for regular sets<br><i>Keywords: Understanding the properties of regular set and checking non regular languages</i>  | <b>6Hrs</b>  |
| 3.1 | Context Free Grammars: Motivation and Introduction, Context free grammars, derivation trees, simplification of context-free grammars, Chomsky normal form, Greibach normal form, the existence of inherently ambiguous context-free languages.<br><i>Keywords: Understanding the concept of CFG and different normal forms</i> | <b>12Hrs</b> |
| 4.1 | Pushdown Automata: Definitions, Pushdown automata and context free languages, Properties of Context-Free Languages (CFL): The pumping lemma for CFL's, closure properties of CFL's, decision algorithms for CFL's.<br><i>Keywords: Learning the concept of pushdown automata and CFL</i>                                       | <b>12Hrs</b> |

## REFERENCES

| Sl. No | Title of the book   | Authors  | Publisher          | Edition         | Year of publication |
|--------|---|--|--------------------|-----------------|---------------------|
| 1      | Introduction to Automata Theory, Languages, and Computation | J D Ullman,<br>J E Hopcraft,<br>Rajeev Motwani | Pearson Education  | 3 <sup>rd</sup> | 2008                |
| 2      | An Introduction to Formal Languages and Automata            | Peter Linz                                     | Jones and Bartlett | 3 <sup>rd</sup> | 2001                |

**SECOND YEAR – SEMESTER – IV**

| Course Title   | <b>BIG DATA ANALYTICS</b>   |             |               |            |       |   |                                      |
|--|---|-------------|---------------|------------|-------|---|--------------------------------------|
| Course Type  | soft Core-Theory  | Total Hours | 64            | Hours/Week | 04    | Credits                                     | 04                                   |
| Course Code  | Evaluation  | Internal    | C1+C2 = 15+15 |            |       | 30 Marks                                    | 100                                  |
|  |   | External    | Duration      | C3         | 03Hrs | 70 Marks                                    |                                      |
| <b>COURSE OBJECTIVES (COs)</b>   |   |             |               |            |       |   |                                      |
| <b>CO No.</b>  | <b>Course Objectives</b>  |             |               |            |       |   |                                      |
|  | On completion of the course the student will be able to   |             |               |            |       |   |                                      |
| CO-1   | Demonstrate knowledge of big data analytics; and learn to analyse the concepts of big data  |             |               |            |       |   |                                      |
| CO-2   | Demonstrate the ability to use technical skills in predicative and prescriptive modelling to support business decision-making   |             |               |            |       |   |                                      |
| CO-3   | Demonstrate the ability to think critically in making decision based on data and deep analytics   |             |               |            |       |   |                                      |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b>   |   |             |               |            |       |   |                                      |
| <p><b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The keywords are used at the end of each unit to define CLOs.</b></p> |   |             |               |            |       |   |                                      |
| <b>CLOs No.</b>  | <b>Course Learning Outcomes (CLOs)</b><br><b>On completion of the course the student will learn to</b>  |             |               |            |       | <b>PSOs Addressed</b>                       | <b>CLDs</b>                          |
| CLO-1  | Understand the big data concepts and tools  |             |               |            |       | <b>PSO-1</b>                                | <b>Understand</b>                    |
| CLO-2  | Learn to analyze the big data using intelligent techniques  |             |               |            |       | <b>PSO-1<br/>PSO-3</b>                      | <b>Apply<br/>Create<br/>Evaluate</b> |
| CLO-3  | Understand the various search methods and visualization techniques  |             |               |            |       | <b>PSO-1<br/>PSO-4<br/>PSO-5<br/>PSO-11</b> | <b>Apply<br/>Create</b>              |
| <b>Units</b>   | <b>Course Content/ Syllabus</b>   |             |               |            |       |   | <b>Duration</b>                      |
| 1.1  | Introduction to big data platform, challenges of conventional systems, intelligent data nature of data, Analytical process and tools, analysis v/s reporting modern data analytic tools<br><i>Keyword: Understanding the concept of bigdata</i>   |             |               |            |       |   | <b>5Hrs</b>                          |
| 1.2  | Statistical concepts, sampling distributions, re-sampling, statistical inference, prediction error, mining data streams, introduction to streams concepts, stream data model and architecture, stream computing sampling data in a stream, filtering streams<br><i>Keywords: Understanding different types of distribution and techniques</i> |             |               |            |       |   | <b>5Hrs</b>                          |
| 2.0  | Counting distinct elements in a stream, decaying window, real time  |             |               |            |       |   |                                      |



|     |   |              |
|-----|---|--------------|
|     | analytics platform (RTAP) applications, estimating moments, counting oneness in a window. Case studies, real time sentiment analysis, stock market predictions.<br><b>Keywords: Case studies</b>  |              |
| 2.1 | Introduction, history of hadoop, the hadoop distributed file system, components of hadoop, analyzing the data with hadoop, scaling out, hadoop streaming, design of HDFS, java interfaces to HDFS basics<br><b>Keywords: basic techniques of bigdata</b>  | <b>8Hrs</b>  |
| 2.2 | Developing a map reduce application, how map reduce works, anatomy of a map reduce job run, failures, job scheduling, shuffle and sort – task execution, map reduce types and formats- map reduce features<br><b>Keywords: Understanding the concept of map and hadoop</b>  | <b>8Hrs</b>  |
| 3.1 | Hadoop cluster, setting up a hadoop cluster, cluster specification, cluster setup and installation<br><b>Keywords: Understanding clusters and applications</b>  | <b>8Hrs</b>  |
| 3.2 | Configuration, security in hadoop, administering hadoop, HDFS, monitoring and maintenance, hadoop benchmarks, hadoop in the cloud<br><b>Keywords: understanding monitoring and benchmarks</b>   | <b>8Hrs</b>  |
| 4.1 | Applications on Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, HiveQL, Querying Data in Hive, Fundamentals of HBase and ZooKeeper, IBM. InfoSphere BigInsights and Streams, Visualizations, Visual data analysis techniques, Interaction techniques, Systems and applications<br><b>Keywords: understanding the concept of hive and fundamentals of its operations</b> | <b>16Hrs</b> |

## REFERENCES

| Sl. No | Title of the book  | Authors  | Publisher      | Edition | Year of publication |
|--------|--|--|----------------|---------|---------------------|
| 1      | Intelligent Data Analysis  | Michael Berthold, David J. Hand,                                     | springer       | -       | 2007                |
| 2      | Hadoop: The Definitive Guide   | Tom White  | O'reilly Media | 3rd     | 2012                |
| 3      | Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data | Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos | McGrawHill     | -       | 2012                |

**SECOND YEAR - SEMESTER – IV**

|  |   |             |               |            |                       |                   |     |
|--|---|-------------|---------------|------------|-----------------------|-------------------|-----|
| Course Title   | <b>MOBILE COMPUTING</b>   |             |               |            |                       |                   |     |
| Course Type  | Soft Core- Self Study- Theory   | Total Hours | 32            | Hours/Week | 4                     | Credits           | 02  |
| Course Code  | Evaluation  | Internal    | C1+C2 = 15+15 |            |                       | 30 Marks          | 100 |
|  |   | External    | Duration      | C3         | 03Hrs                 | 70 Marks          |     |
| <b>COURSE OBJECTIVES (COs)</b>   |   |             |               |            |                       |                   |     |
| <b>CO No.</b>  | <b>Course Objectives</b>  |             |               |            |                       |                   |     |
|  | On completion of the course the student will be able  |             |               |            |                       |                   |     |
| CO-1   | To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture.                                    |             |               |            |                       |                   |     |
| CO-2   | To have an exposure about wireless protocols -WLN, Bluetooth, WAP, ZigBee issues                          |             |               |            |                       |                   |     |
| CO-3   | To Know the Network, Transport Functionalities of Mobile communication                                    |             |               |            |                       |                   |     |
| CO-4   | To understand the concepts of Adhoc and wireless sensor networks.   |             |               |            |                       |                   |     |
| CO-5   | To impart knowledge about Mobile Application Development  |             |               |            |                       |                   |     |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b>   |   |             |               |            |                       |                   |     |
| <b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The key words are used at the end of each unit to define CLOs.</b> |   |             |               |            |                       |                   |     |
| <b>CLOs No.</b>  | <b>Course Learning Outcomes (CLOs)<br/>On completion of the course the student will learn to</b>          |             |               |            | <b>PSOs Addressed</b> | <b>CLDs</b>       |     |
| CLO-1  | Gain the knowledge about various types of Wireless Data Networks and Wireless Voice Networks.             |             |               |            | <b>PSO – 2</b>        | <b>Understand</b> |     |
| CLO-2  | Understand the architectures, the challenges and the Solutions of Wireless Communication those are in use |             |               |            | <b>PSO – 4</b>        | <b>Understand</b> |     |
| CLO-3  | Realize the role of Wireless Protocols in shaping the future Internet                                     |             |               |            | <b>PSO – 3</b>        | <b>Analyze</b>    |     |
| CLO-4  | Know about different types of Wireless Communication Networks and their functionalities                   |             |               |            | <b>PSO - 6</b>        | <b>Evaluate</b>   |     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>   | <b>Duration</b> |
|--------------|---|-----------------|
| <b>1.0</b>   | <b>MOBILE IP NETWORK LAYER:</b> IP and Mobile IP Network Layer- Packet delivery and Handover Management-Location Management- Registration Tunnelling and Encapsulation-Route Optimization- Dynamic Host Configuration Protocol- VoIP -IPsec -Mobile<br><i>Keywords- understanding and analyzing mobile IP n/w layer</i> | <b>08Hrs</b>    |
| <b>2.0</b>   | <b>TRANSPORT LAYER:</b><br>Transport Layer-Conventional TCP/IP Transport Layer Protocol-Indirect, Snooping, Mobile TCP<br><i>Keyword: understanding and analyzing mobile transport layer</i>  | <b>08Hrs</b>    |

|            |  |              |
|------------|--|--------------|
| <b>3.0</b> | <b>MOBILE AD-HOC:</b> Introduction to Mobile Ad hoc Network- MANET-Routing and Routing Algorithm-Security –<br><i>Key words- Analysis and evaluating of the Adhoc</i>  | <b>08Hrs</b> |
| <b>4.0</b> | <b>SENSOR NETWORKS:</b> Wireless Sensor Networks-Applications- Distributed Network and Characteristics- Communication Coverage Sensing Coverage Localization- Routing -Function Computation- Scheduling.<br><i>Key words- Analysis and evaluating of the sensor networks</i> | <b>08Hrs</b> |

## REFERENCES

| Sl. No | Title of the book                      | Authors  | Edition         | Year of publication |
|--------|--|--|-----------------|---------------------|
| 1      | Mobile Computing                       | Asoke K Talukder, HasanAhmed,Roopa R Yavagal                 | -               | 2010                |
| 2      | Mobile Computing                       | Raj Kamal  | 2 <sup>nd</sup> | 2012                |
| 3      | Wireless Networking Complete reference | Pei Zheng, Larry L. Peterson, Bruce S. Davie, Adrian Farrell | -               | 2009                |
| 4      | Wireless Communications & Networking   | Vijay K Garg   | -               | 2010                |
| 5      | Mobile Communications                  | JochenSchillar   | 2 <sup>nd</sup> |                     |

**SECOND YEAR - SEMESTER –IV**

|                                |  |             |               |            |       |          |     |
|--------------------------------|--|-------------|---------------|------------|-------|----------|-----|
| Course Title                   | <b>DATA MINING</b>   |             |               |            |       |          |     |
| Course Type                    | Soft Core- Self Study- Theory  | Total Hours | 32            | Hours/Week | 02    | Credits  | 02  |
| Course Code                    | Evaluation   | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                                |  | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| <b>COURSE OBJECTIVES (COs)</b> |  |             |               |            |       |          |     |
| <b>CO No.</b>                  | <b>Course Objectives</b>   |             |               |            |       |          |     |
|                                | On completion of the course the student will be able   |             |               |            |       |          |     |
| CO-1                           | To understand Data mining principles and techniques and introduce Data Mining as a cutting edge business intelligence; |             |               |            |       |          |     |
| CO-2                           | To expose the students to the concepts of Data Warehousing Architecture and Implementation;                            |             |               |            |       |          |     |
| CO-3                           | To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining;                |             |               |            |       |          |     |
| CO-4                           | To identify Business applications and Trends of Data mining.   |             |               |            |       |          |     |

| <b>Mapping of CLOs with PSOs &amp; CDLs</b> |   |                          |                                       |
|---|---|--------------------------|---------------------------------------|
| CLOs No.                                    | Course Learning Outcomes(CLOs)<br>On completion of the course the student will learn to | PSOs Addressed           | CLDs                                  |
| CLO-1                                       | Evolve multidimensional intelligent model from typical system;                          | <b>PSO-1 &amp; PSO-2</b> | <b>Understand<br/>Analyse</b>         |
| CLO-2                                       | Discover the knowledge imbibed in the high dimensional system;                          | <b>PSO-6 &amp; PSO-7</b> | <b>Analyse<br/>Evaluate</b>           |
| CLO-3                                       | Evaluate various mining techniques on complex data objects.                             | <b>PSO-4 &amp; PSO-5</b> | <b>Analyse<br/>Apply<br/>Evaluate</b> |

| Units      | Course Content/ Syllabus   | Duration     |
|------------|--|--------------|
| <b>1.0</b> | <b>Data Mining:</b><br>Overview, Motivation, Definition & Functionalities, Data Processing, Form of Data Pre-processing. Data Cleaning: Missing Values, Noisy-Data,(Binning, Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integration and Transformation.<br><b>Keyword: Understanding Data Mining and data collection methods</b> | <b>08Hrs</b> |
| <b>2.0</b> | Data Reduction: Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Discretization and Concept hierarchy generation, Decision Tree<br><b>Keyword: Understanding data processing</b>   | <b>08Hrs</b> |

|     |   |      |
|-----|---|------|
| 3.0 | <p><b>Classification:</b> Definition, Data Generalization, Analytical Characterization, 8 Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases, Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms.</p> <p><i>Keyword: Understanding data classification</i></p> | 8Hrs |
| 4.1 | <p><b>Clustering:</b> Introduction, Similarity and Distance Measures, Hierarchical and Partitional Algorithms. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach</p> <p><i>Keyword: Analyzing clustering methodologies</i></p>         | 8Hrs |

## REFERENCES

| Sl. No | Title of the book   | Authors                               | Edition         | Year of publication |
|--------|---|---------------------------------------|-----------------|---------------------|
| 1      | “Data Mining Concepts and Techniques”, Elsevier, Reprinted. | Jiawei Han and MichelineKamber,       | 2 <sup>nd</sup> | 2008                |
| 2      | “Insight into Data mining Theory and Practice”              | K.P. Soman, ShyamDiwakar and V. Ajay, | -               | 2006.               |

**SECOND YEAR - SEMESTER – IV**

| Course Title   | <b>SOFTWARE TESTING</b>  |             |               |                              |       |                 |                 |
|--|--|-------------|---------------|------------------------------|-------|-----------------|-----------------|
| Course Type  | Soft Core- Self study - theory   | Total Hours | 32            | Hours/Week                   | 2     | Credits         | 02              |
| Course Code  | Evaluation   | Internal    | C1+C2 = 15+15 |                              |       | 30 Marks        | 100             |
|  |  | External    | Duration      | C3                           | 03Hrs | 70 Marks        |                 |
| <b>COURSE OBJECTIVES (COs)</b>   |  |             |               |                              |       |                 |                 |
| <b>CO No.</b>  | <b>Course Objectives</b>   |             |               |                              |       |                 |                 |
|  | On completion of the course the student will be able   |             |               |                              |       |                 |                 |
| CO-1   | To know the behaviour of the testing techniques to detect the errors in the software   |             |               |                              |       |                 |                 |
| CO-2   | To understand standard principles to check the occurrence of defects and its removal.  |             |               |                              |       |                 |                 |
| CO-3   | To learn the functionality of automated testing tools -  |             |               |                              |       |                 |                 |
| CO-4   | To understand the models of software reliability   |             |               |                              |       |                 |                 |
| <b>Mapping of CLOs with PSOs &amp; CDLs</b>  |  |             |               |                              |       |                 |                 |
| <p><b>Course Learning Outcomes (CLOs):</b> The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. <b>The keywords are used at the end of each unit to define CLOs.</b></p> |  |             |               |                              |       |                 |                 |
| <b>CLOs No.</b>  | <b>Course Learning Outcomes (CLOs)</b><br><b>On completion of the course the student will learn to</b>   |             |               | <b>PSOs Addressed</b>        |       | <b>CLDs</b>     |                 |
| CLO-1  | Evaluate the web applications using bug tracking tools.  |             |               | <b>PSO-1</b><br><b>PSO-3</b> |       | <b>Evaluate</b> |                 |
| CLO-2  | Investigate the scenario and the able to select the proper testing technique   |             |               | <b>PSO-3</b>                 |       | <b>Evaluate</b> |                 |
| CLO-3  | Explore the test automation concepts and tools   |             |               | <b>PSO-4</b><br><b>PSO-5</b> |       | <b>Apply</b>    |                 |
| CLO-4  | Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma   |             |               | <b>PSO-5</b>                 |       | <b>Apply</b>    |                 |
| CLO-5  | Evaluate the estimation of cost, schedule based on standard metrics  |             |               | <b>PSO-3</b>                 |       | <b>Evaluate</b> |                 |
| <b>Units</b>   | <b>Course Content/ Syllabus</b>  |             |               |                              |       |                 | <b>Duration</b> |
| <b>1.0</b>   | World-Class Software Testing Model – Building a Software Testing Environment - Overview of Software Testing Process – Organizing for Testing – Developing the Test Plan – Verification Testing –Analyzing and Reporting Test Results – Acceptance Testing – Operational Testing – Post Implementation Analysis<br><i>Keywords: Understanding the testing process</i> |             |               |                              |       |                 | <b>08Hrs</b>    |
| <b>2.0</b>   | Using White Box Approach to Test design - Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs – Using Black Box Approaches to Test Case Design –Random Testing – Requirements based testing –Decision tables –State-based testing –Cause effect graphing – Error guessing –   |             |               |                              |       |                 | <b>08Hrs</b>    |

|            |  |              |
|------------|--|--------------|
|            | <b>Keywords: Understanding various testing techniques</b>  |              |
| <b>3.0</b> | Compatibility testing – Levels of Testing - Unit Testing –Integration Testing - Defect Bash Elimination. System Testing - Usability and Accessibility Testing –Configuration Testing - Compatibility Testing - Case study for White box testing and Black box Testing techniques.<br><b>Keywords: Understanding various testing techniques</b>   | <b>08Hrs</b> |
| <b>4.0</b> | Testing Client/Server Systems – Rapid Application Development Testing – Testing in a Multi platform Environment – Testing Software System Security - Testing Object-Oriented Software –Object Oriented Testing – Testing Web based systems – Web based system – Web Technology Evolution –Traditional Software and Web based Software – Challenges in Testing for Web-based Software –Testing a Data Warehouse - Case Study for Web Application Testing.<br><b>Keywords: Understanding testing in different types of systems</b> | <b>08Hrs</b> |

## REFERENCES

| Sl. No | Title of the book  | Authors                                   | Publisher                                | Edition         | Year of Publication |
|--------|--|---|--|-----------------|---------------------|
| 1      | Effective Methods of Software Testing                      | William Perry                             | Wiley Publishing                         | 3 <sup>rd</sup> | 2007                |
| 2      | Software Testing – Principles and Practices                | SrinivasanDesikan and Gopaldaswamy Ramesh | Pearson Education                        | 3 <sup>rd</sup> | 2007                |
| 3      | Software Testing Principles and Practices                  | NareshChauhan ,                           | Oxford University Press , New Delhi ,    |                 | 2010                |
| 4      | Total Quality Management                                   | Dale H. Besterfiled et al.                | Pearson Education Asia,                  | 3 <sup>rd</sup> | 2006                |
| 5      | Metrics and Models in Software Quality                     | Stephen Kan                               | Addison – Wesley,                        | 2 <sup>nd</sup> | 2004                |
| 6      | Practical Software Testing                                 | LleneBurnstein                            | Springer International Edition, Chennai, | -               | 2003                |
| 7      | Software Testing – Effective Methods, Tools and Techniques | RenuRajani,Pradeep Oak,                   | Tata McGraw Hill,                        | -               | 2004                |
| 8      | Software Testing in the Real World – Improving the Process | Edward Kit                                | Pearson Education                        | -               | 1995                |
| 9      | Software Testing Techniques                                | Boris Beizer                              | Van Nostrand Reinhold, New York          | 2 <sup>nd</sup> | 1990                |

**GENERIC ELECTIVE COURSES FOR OTHER DEPARTMENTS**

**FIRST YEAR - SEMESTER – I**

|  |  |             |               |            |                       |                   |     |
|--|--|-------------|---------------|------------|-----------------------|-------------------|-----|
| Course Title                               | <b>INTERNET FUNDAMENTALS</b>   |             |               |            |                       |                   |     |
| Course Type                                | Open Elective- Theory  | Total Hours | 64            | Hours/Week | 04                    | Credits           | 04  |
| Course Code                                | Evaluation   | Internal    | C1+C2 = 15+15 |            |                       | 30 Marks          | 100 |
|  |  | External    | Duration      | C3         | 03Hrs                 | 70 Marks          |     |
| <b>COURSE OBJECTIVES (COs)</b>             |  |             |               |            |                       |                   |     |
| <b>CO No.</b>                              | <b>Course Objectives</b>   |             |               |            |                       |                   |     |
|  | On completion of the course the student will be able                         |             |               |            |                       |                   |     |
| CO-1                                       | To learn basic principles of using windows operation                         |             |               |            |                       |                   |     |
| CO-2                                       | To access internet, World Wide Web, internet directories and search engines; |             |               |            |                       |                   |     |
| CO-3                                       | To learn basic networking skills   |             |               |            |                       |                   |     |
| CO-4                                       | To learn web languages   |             |               |            |                       |                   |     |
| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |  |             |               |            |                       |                   |     |
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)</b>  |             |               |            | <b>PSOs Addressed</b> | <b>CLDs</b>       |     |
|  | <b>On completion of the course the student will learn to</b>                 |             |               |            |                       |                   |     |
| CLO- 1                                     | Create web pages   |             |               |            | <b>PSO-2</b>          | <b>Create</b>     |     |
| CLO-2                                      | Describe and explain the fundamental components of Internet                  |             |               |            | <b>PSO-5</b>          | <b>Understand</b> |     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>  | <b>Duration</b> |
|--------------|--|-----------------|
| <b>1.0</b>   | <b>ELECTRONIC MAIL:</b> Introduction, advantages and disadvantages, User IDs, Passwords, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management, Mime types, Newsgroups, mailing lists, chat rooms<br><i>Keywords: Understanding E-mails</i>   | <b>06Hrs</b>    |
| <b>1.1</b>   | <b>INTERNET:</b> Introduction to networks and internet, history, Working of Internet, Internet Congestion, internet culture, business culture on internet. Collaborative computing & the internet. Modes of Connecting to Internet, Internet Service Providers(ISPs), Internet address, standard address, domain name, DNS<br><i>Keywords: Understanding the concept of internet</i> | <b>06Hrs</b>    |
| <b>2.0</b>   | <b>WORLD WIDE WEB:</b> Introduction, Miscellaneous Web Browser details, searching the www: Directories search engines and meta search engines, search fundamentals, search strategies, working of the search engines, Telnet and FTP<br><i>Keywords: Understanding the concept of surfing</i>  | <b>06Hrs</b>    |



|            |   |              |
|------------|---|--------------|
| <b>2.1</b> | <b>Introduction to Browser:</b> Coast-to-coast surfing, hypertext markup language, Web page installation, Web page setup, Basics of HTML& formatting and hyperlink creation. Using FrontPage Express, Plug-ins<br><i>Keywords: Understanding browsers</i> | <b>06Hrs</b> |
| <b>3.0</b> | <b>LANGUAGES:</b> Basic and advanced HTML, java script language, Client and Server Side Programming in java script. Forms and data in java script<br><i>Keywords: Learning basics of markup languages</i>   | <b>06Hrs</b> |
| <b>3.1</b> | <b>Introduction to Web Servers:</b> PWS, IIS, Apache; Microsoft Personal Web Server. Accessing & using these servers<br><i>Keywords: Understanding different servers</i>  | <b>06Hrs</b> |
| <b>4.0</b> | <b>PRIVACY AND SECURITY TOPICS:</b> Introduction, Software Complexity, Encryption schemes, Secure Web document, Digital Signatures, Firewalls<br><i>Keywords: Analysis of the security methods in internet</i>  | <b>12Hrs</b> |

#### REFERENCES

| <b>Sl. No</b> | <b>Title of the book</b>                 | <b>Authors</b>  | <b>Edition</b>  | <b>Year of publication</b> |
|---------------|--|-----------------|-----------------|----------------------------|
| 1             | Computers Today The Internet: The Basics | Jason Whittaker | 1 <sup>st</sup> | 2002                       |
| 2             | The internet Fundamentals                | Hossein Bidgoli | 1 <sup>st</sup> | 2011                       |

## FIRST YEAR – SEMESTER - II

| Course Title            | WEB DESIGNING   |             |               |            |       |          |     |
|-------------------------|---|-------------|---------------|------------|-------|----------|-----|
| Course Type             | Soft Core- Theory   | Total Hours | 64            | Hours/Week | 04    | Credits  | 04  |
| Course Code             | Evaluation  | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                         |   | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| COURSE OBJECTIVES (COs) |   |             |               |            |       |          |     |
| CO No.                  | Course Objectives   |             |               |            |       |          |     |
|                         | On completion of the course the student will be able  |             |               |            |       |          |     |
| CO-1                    | To have knowledge and skills to build creative, interactive and well-designed websites.   |             |               |            |       |          |     |
| CO-2                    | To attempt to balance technical skills with artistic skills to create web pages that are conceptually interesting, easily navigable, visually pleasing and functioning. |             |               |            |       |          |     |

| Mapping of CLOs with PSOs & CDLs |   |                |            |
|----------------------------------|---|----------------|------------|
| CLOs No.                         | Course Learning Outcomes(CLOs)<br>On completion of the course the student will learn to | PSOs Addressed | CLDs       |
| CLO- 1                           | Employ fundamental computer theory to basic programming techniques                      | PSO-1          | Understand |
| CLO-2                            | Create and manipulate web media objects   | PSO-3          | Create     |
| CLO-3                            | Select and apply mark-up languages  | PSO-6          | Evaluate   |
| CLO-1                            | Use fundamental skills to maintain web server services                                  | PSO-2          | Create     |

| Units | Course Content/ Syllabus   | Duration |
|-------|--|----------|
| 1.0   | <b>HTML:</b><br>HTML fundamental tags: HTML document structure, Using paragraph tags, Aligning paragraphs, block-level and inline tags, Controlling line breaks and spaces, Formatting text with phrase element tags, Formatting text with font markup elements<br><b>Keywords:</b> Understanding different concepts in HTML   | 20Hrs    |
| 2.0   | <b>FUNCTIONS:</b><br>Adding document structure with headings, Formatting quotations and quote marks, Preserving pre-formatted text, Selecting a typeface, Selecting a type size, using ordered and n-ordered lists, Using inline images, Flowing text around an image, Breaking lines around an image<br><b>Keywords:</b> Working with different functions available in HTML | 24Hrs    |
| 3.0   | <b>WORKING WITH HYPERLINKS:</b><br>Using relative URLs, Specifying a base URL , Linking within a page using fragments, Creating image links, table tags, Formatting tables with CSS, Aligning  | 20Hrs    |

|   |  |
|---|--|
| images with tables, frame tags, Hiding frame borders .inserting Graphics, Image Mapping<br><b>Keywords:</b> Understanding and working with URLs, CSS. |  |
|---|--|

## REFERENCES

| Sl. No | Title of the book                                     | Authors                          | Edition         | Year of publication |
|--------|---|----------------------------------|-----------------|---------------------|
| 1      | HTML programmers reference                            | Thomas a Powell / Dan Whitworth  | 2 <sup>nd</sup> | 2001                |
| 2      | HTML & JAVA script programming concepts               | Shane turner e / Karl Barksdale  | 1 <sup>st</sup> | 1999                |
| 3      | HTML Introduction to web page design & Development    | David mercer                     | -               | 2001                |
| 4      | HTML & XML an Introduction                            | NIIT                             | -               | 2003                |
| 5      | HTML & JavaScript for Visual Learners                 | Chris Charuhas                   | -               | 2008                |
| 6      | Magic with HTML, DHTML & JavaScript                   | Dr. Ravinder Singh<br>Amit Gupta | 1 <sup>st</sup> | 2009                |
| 7      | HTML, XHTML, CSS and XML by Example A Practical Guide | Teodoru Gugoiu                   | -               | 2007                |
| 8      | Internet and its Applications with HTML & VB-Script   | Prof. Shashi Banzal              | 1 <sup>st</sup> | 2009                |

**FIRST YEAR – SEMESTER - III**

|                                |  |             |               |            |       |          |     |
|--------------------------------|--|-------------|---------------|------------|-------|----------|-----|
| Course Title                   | <b>INFORMATION TECHNOLOGY AND OFFICE AUTOMATION</b>  |             |               |            |       |          |     |
| Course Type                    | Soft Core- Theory  | Total Hours | 64            | Hours/Week | 04    | Credits  | 04  |
| Course Code                    | Evaluation   | Internal    | C1+C2 = 15+15 |            |       | 30 Marks | 100 |
|                                |  | External    | Duration      | C3         | 03Hrs | 70 Marks |     |
| <b>COURSE OBJECTIVES (COs)</b> |  |             |               |            |       |          |     |
| <b>CO No.</b>                  | <b>Course Objectives</b>   |             |               |            |       |          |     |
|                                | On completion of the course the student will be able   |             |               |            |       |          |     |
| CO-1                           | To understand the basic functionality of Computer.   |             |               |            |       |          |     |
| CO-2                           | To understand the concept of Operating System  |             |               |            |       |          |     |
| CO-3                           | To understand basic concept of data communication  |             |               |            |       |          |     |
| CO-4                           | To craft professional word documents, excel spread sheets, power point presentations using the Microsoft suit of office tools. |             |               |            |       |          |     |

| <b>Mapping of CLOs with PSOs &amp;CDLs</b> |   |                       |                   |
|--|---|-----------------------|-------------------|
| <b>CLOs No.</b>                            | <b>Course Learning Outcomes(CLOs)<br/>On completion of the course the student will learn to</b> | <b>PSOs Addressed</b> | <b>CLDs</b>       |
| CLO- 1                                     | Understand basic components, its functionality and working of computer                          | <b>PSO-1</b>          | <b>Understand</b> |
| CLO-2                                      | Understand concept of OS and application  | <b>PSO-4</b>          | <b>Understand</b> |
| CLO-3                                      | Understand concept of Data Communication  | <b>PSO-8</b>          | <b>Understand</b> |
| CLO-4                                      | Perform documentation   | <b>PSO-2</b>          | <b>Create</b>     |
| CLO-5                                      | Working in Excel spread sheets  | <b>PSO-6,7</b>        | <b>Understand</b> |
| CLO-6                                      | Perform presentation skills   | <b>PSO-4,5</b>        | <b>Create</b>     |

| <b>Units</b> | <b>Course Content/ Syllabus</b>  | <b>Duration</b> |
|--------------|--|-----------------|
| <b>1.0</b>   | <b>INTRODUCTION TO COMPUTER:</b><br>Block Diagram of elements of digital computer-their functions. Memory, CPU, I-O devices, Secondary storages, Magnetic Tape, Disk, CD-ROM. Other recent developments -Scanners, Digitizer, Plotters.<br><i>Keywords:</i> Understanding different components of computer | <b>16Hrs</b>    |
| <b>2.0</b>   | <b>COMPUTER SOFTWARE:</b><br>Operating System (Windows) and different applications (MS Paint, Notepad).<br><i>Keywords:</i> Understanding concepts of software   | <b>16Hrs</b>    |
| <b>3.0</b>   | <b>BASIC CONCEPT OF NETWORKING AND DATA COMMUNICATIONS:</b><br>Introduction to LAN and basic communication concepts Introduction Internet, E-  | <b>16Hrs</b>    |

|            |  |              |
|------------|--|--------------|
|            | Mail<br><b>Keywords:</b> Understanding concept of data communication   |              |
| <b>4.0</b> | <b>OFFICE APPLICATIONS:</b><br>Word, Excel and Power Point<br><b>Keywords:</b> Understanding Microsoft office automation tools | <b>16Hrs</b> |

## REFERENCES

| Sl. No | Title of the book         | Authors                      | Edition         | Year of publication |
|--------|---------------------------|------------------------------|-----------------|---------------------|
| 1      | Computers Today           | Sanders                      | 3 <sup>rd</sup> | 1990                |
| 2      | Computers:                | Trainor & Krasnewich         | -               | 1989                |
| 3      | Fundamentals of Computers | Rajaraman & NeeharikaAdabala | 6 <sup>th</sup> | 2015                |
| 4      | Know your PC              | Peter Norton                 | -               | 2002                |
| 5      | Computer Science          | C.S. French                  | 5 <sup>th</sup> | 1996                |

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ST.PHILOMENA'S COLLEGE (AUTONOMOUS), MYSURU

QUESTION PAPER BLUEPRINT

MSc C3 COMPONENT

TOTAL MARKS:70

| <b>Section A</b>                           |                |
|--|----------------|
| <b>1. Answer any five of the following</b> | <b>2×5=10</b>  |
| a)   |                |
| b)   |                |
| c)   |                |
| d)   |                |
| e)   |                |
| f)   |                |
| g)   |                |
| <b>Section B</b>                           |                |
| <b>Answer the following questions</b>      | <b>15×4=60</b> |
| <b>2.</b>                                  | <b>(15m)</b>   |
| a)   |                |
| b)   |                |
| c)   |                |
| OR   |                |
| <b>3.</b>                                  | <b>(15m)</b>   |
| a)   |                |
| b)   |                |
| c)   |                |
| <b>4.</b>                                  |                |
| a)   |                |
| b)   |                |
| c)   |                |
| OR   |                |
| <b>5.</b>                                  | <b>(15m)</b>   |
| a)   |                |
| b)   |                |
| c)   |                |
| <b>6.</b>                                  | <b>(15m)</b>   |
| a)   |                |
| b)   |                |
| c)   |                |
| OR   |                |
| <b>7.</b>                                  | <b>(15m)</b>   |
| a)   |                |

|                 |
|-----------------|
| b)              |
| c)              |
| <b>8.</b> (15m) |
| a)              |
| b)              |
| c)              |
| OR              |
| <b>9.</b> (15m) |
| a)              |
| b)              |
| c)              |

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