**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES**

**RAJAMPET - 516126**

**(AUTONOMOUS)**

**DEPARTMENT OF COMPUTER APPLICATIONS**

**COURSE STRUCTURE & SYLLABI**

(For the batches admitted from the academic year 2017-18)

**MASTER OF COMPUTER APPLICATIONS**

# DEPARTMENT OF COMPUTER APPLICATIONS

## VISION

To become globally prominent and significant in the areas of academics and research keeping the aim of developing competitive professionals to serve the society and to light on the needs of ever changing software industry.

## MISSION

❖ To enable the students to be knowledgeable and creative by developing state-of-the-art innovative teaching methodologies.

❖ Providing training programs that bridges the gap between academia and industry to produce competitive software professionals.

❖ To inculcate values and ethics in the students enabling them to become socially committed professionals.

❖ To enhance the research quality and productivity, by providing required facilities and industry collaboration.

# ACADEMIC REGULATIONS
## Applicable for students admitted into
## MASTER OF COMPUTER APPLICATIONS Programme from 2017-18

The Jawaharlal Nehru Technological University Anantapur, Ananthapuramu shall confer Master of Computer Applications (M.C.A) Degree to candidates who are admitted to the M.C.A program and fulfill all the requirements for the award of the degree.

## 1. ELIGIBILITY FOR ADMISSION:

Admission to the MCA Degree programme shall be made subject to the eligibility, qualification prescribed by the competent authority from time to time.

Admissions shall be made on the basis of rank obtained by the qualifying candidates at the entrance test, subject to reservations or policies framed by the Government of Andhra Pradesh from time to time.

## 2. ADMISSION PROCEDURE

Admissions as per the existing stipulations of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year as follows:

(a) A - Category Seats are to be filled by the Convener, through ICET
(b) B - Category Seats will be filled by the Management as per the norms stipulated by Govt. of Andhra Pradesh.

## 3. COURSE WORK

3.1 A candidate after securing admission must pursue the MCA course of study for Six semesters duration
3.2 Each semester shall be of 90 instruction days.
3.3 A candidate admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

## 4. ATTENDANCE:

4.1 A candidate shall be deemed to have eligibility to write end semester examinations if he has put in at least 75% of attendance aggregate in all subjects/courses in the semester.
4.2 Condonation of shortage of attendance up to 10% i.e., between 65% and above and less than 75% may be granted by the Institute Academic committee.
4.3 Shortage of attendance below 65% in aggregate shall in no case be condoned.
4.4 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence.
4.5 A stipulated fee shall be payable towards Condonation of shortage of attendance to the institute as per following slab system
**1st Slab:** Less than 75% attendance but equal to or greater than 70% a normal Condonation fee can be collected from the student.
**2nd Slab**: Less than 70% but equal to or greater than 65%, double the Condonation fee can be collected from the student.
4.6 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled for that semester.
4.7 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable.
4.8 A student detained due to shortage of attendance, will have to repeat that semester when offered next.

## 5. CREDIT SYSTEM NORMS:

The credits are assigned according to the following pattern:

| Subject | Period(s)/Week | Credit(s) |
|---|---|---|
| Theory | 01 | 01 |
| Practical | 03 | 02 |
| Seminar | .. | 02 |
| Project Work | .. | 12 |

| Course Component | Curriculum content (% of total number of credits of the Programme) | Total Number of contact hours | Total number of Credits |
|---|---|---|---|
| Mathematics | 10 | 16 | 16 |
| Management | 5 | 8 | 8 |
| Humanities | 4 | 7 | 6 |
| Professional Core | 63 | 118 | 104 |
| Electives | 10 | 16 | 16 |
| Project work | 7 | - | 12 |
| Seminar | 1 | - | 2 |
| Total Credits | | | 164 |

6. **EXAMINATION SYSTEM:** All components in any programme of study will be evaluated continuously through internal evaluation and an external evaluation component conducted as semester-end examination.

6.1 Distribution of marks:

| S.No | Examination | Marks | Examination and Evaluation | | Scheme of Evaluation |
|------|-------------|-------|----------------------------|---|----------------------|
| 1. | Theory | 60 | Semester-end examination (External evaluation) | | The question paper shall be of descriptive type with 5 questions with internal choice are to be answered in 3hours duration of the examination. |
| | | 40 | Mid - Examination of 120 Min duration (Internal evaluation)<br><br>4 descriptive type questions with internal choice are to be answered and evaluated for 40 marks. | | Two mid-examinations are to be conducted for 40 marks each in a semester. 80% weightage for better performance and 20% for other shall be considered.<br><br>**Mid-I:** After first spell of instructions (I&II Units).<br>**Mid-II:** After second spell of instructions (III, IV &V Units)<br><br>The student who has missed both the Mid examinations will be permitted to appear for a substitute examination covering the total syllabus. This substitute examination will be given a weightage of 80%. This is to be conducted before the commencement of end semester exams, can be even outside the working hours, can be even two mid exams a day also. |
| 2 | Laboratory | 60 | Semester-end Lab Examination (External evaluation) | | For laboratory courses**: 3** hours duration.<br>One External and One Internal examiners. |
| | | 40 | 20 | Day to Day evaluation (Internal evaluation) | Performance is based on laboratory experiments. |

| S.No | Examination | Marks | Examination and Evaluation | | Scheme of Evaluation |
|---|---|---|---|---|---|
| | | | 20 | Internal evaluation | Practical Tests (one best out of two tests includes viva-voce) |
| 3 | Seminar | 100 | **Internal Evaluation**: 20 Marks for Report 20 Marks for subject content 40 Marks for presentation 20 Marks for Question and Answers | | Continuous evaluation during a semester by the Departmental Committee (DC) |
| 4 | Project work | Very Good (>90%) Good (60% to 90%) Not Satisfactory (<60%) | 12 credits | External evaluation | End Project Viva-Voce Examination by Committee as detailed under section 8.7 |
| | | | | Internal evaluation | Continuous evaluation by the DC. |

6.2 A candidate shall be deemed to have secured the minimum academic requirement in a subject/practical if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

6.3 A candidate has to secure a minimum of 50% to be declared successful.

6.4 In case the candidate does not secure the minimum academic requirement in any of the subjects/practical, he has to re-appear for the Examination either supplementary or regular in that subject/practical along with the next batch students. A separate supplementary examinations will be conducted for the I semester students at the end of II semester.

6.5 **Revaluation / Recounting:** Students shall be permitted to request for recounting/ revaluation of the end theory examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student will be issued a revised memorandum of marks. If there are no changes, the student shall be intimated the same through a letter or a notice.

## 7. RE-REGISTRATION FOR IMPROVEMENT OF INTERNAL EVALUATION MARKS FOR THEORY SUBJECTS

7.1 The candidate should have completed the course work for all five semesters pending project work submission.

7.2 Out of the subjects the candidate has failed in the examination due to internal evaluation marks secured being less than 50%, the candidate shall be given one chance for each theory subject and for a maximum of three theory subjects for improvement of internal evaluation marks.

7.3 The candidate has to re-register for the chosen subjects and fulfill the academic requirements. Re-registration shall not be permitted after the commencement of class work for that semester.

7.4 For each subject, the candidate has to pay a fee equivalent to one third of the semester tuition fee.

7.5 In the event of availing the improvement of internal evaluation marks, the internal evaluation marks as well as end examination marks secured in the previous attempt(s) for the re-registered subjects stand cancelled.

## 8. EVALUATION OF PROJECT WORK

8.1 Registration of Project work : A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses (theory and practical courses of I to V Semester)

8.2 A Departmental Committee (D.C) consisting of HOD, Supervisor and one internal senior faculty shall monitor the progress of the project work.

8.3 The work on the project shall be initiated in the penultimate semester and continued in the final semester. The candidate can submit Project thesis with the approval of D.C. at the end of the VI semester instruction as per the schedule. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institution.

8.4 The student must submit status report at least in two different phases during the project work period. These reports must be approved by the D.C before submission of the Project Work.

8.5 The viva-voce examination may be conducted for all the candidates as per the VI semester examination schedule.

8.6 Three copies of the Thesis / Dissertation are to be certified in the prescribed by the supervisor and HOD. The copies are to be submitted to the Head of the Department.

8.7 For carrying out project work, the students will be permitted to submit final report, only after securing grade of 'Very Good' or 'Good' in the internal evaluation. The student securing a grade of 'Not Satisfactory' will have to re-appear and face Internal Evaluation Committee (IEC) and secure 'Good' or 'Very Good'. Then he /she will be permitted to submit the project report. The internal project evaluation committee consisting of HOD, Supervisor and two other senior faculty members in the department. External viva voce examination shall be awarded 'Very Good', or 'Good' or 'Not Satisfactory' by a Board consisting of supervisor, HOD and an External Examiner.

## 9. CREDIT POINT AVERAGE (CPA) AND CUMULATIVE CREDIT POINT AVERAGE (CCPA)

**9.1 For a semester/year**

CREDIT POINT AVERAGE [CPA] $=\dfrac{1}{10}\dfrac{\sum_i C_i T_i}{\sum_i C_i}$

Where $C_i$ = Credits earned for Course $i$ in any semester/ year,

$T_i$ = Total marks obtained for course $i$ in any semester/year,

**9.2 For the entire programme**

CUMULATIVE CREDIT POINT AVERAGE [CCPA] $=\dfrac{1}{10}\dfrac{\sum_n \sum_i C_{ni} T_{ni}}{\sum_n \sum_i C_{ni}}$

n -refers to the semester in which such courses were credited

### 9.3 Overall Performance

| CCPA | Classification of Final Result |
|---|---|
| 7.0 and above | First Class with Distinction |
| 6.0 and above but below 7.0 | First Class |
| 5.0 and above but below 6.0 | Second Class |

### 10. TRANSCRIPTS:

After successful completion of the entire programme of study, a transcript consisting performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request.

### 11. ELIGIBILITY:

A student shall be eligible for the award of M.C.A Degree, if he fulfills all the following conditions:

(i) Registered and successfully completed all the components prescribed in the programme of study to which he is admitted.

(ii) Successfully acquired all the **164 credits** as specified in the curriculum corresponding to the branch of study within the stipulated time.

(iii) No disciplinary action is pending against him.

### 12. AWARD OF DEGREE:

The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Anantapur on the recommendations of the Principal of Annamacharya Institute of Technology and Sciences (Autonomous).

### 13. AMENDMENTS TO REGULATIONS:

The Chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

### 14. GENERAL:

Where the words "he", "him", "his", "himself" occur in the regulations, they include "she", "her", "herself".

### PROGRAM EDUCATIONAL OBJECTIVES (PEO)
MCA graduates will be able to:

**PEO1:** Practice software engineering principles and standards to develop software to meet customer requirements across verticals

**PEO2:** Contribute to build sustainable and inclusive applications using mathematical, simulation and meta-heuristic models

**PEO3:** Demonstrate entrepreneurial qualities through individual competence and team work

**PEO4:** Achieve successful professional career with integrity and societal commitments leading to lifelong learning

**PROGRAM OUTCOMES (PO)**

MCA graduates will be able to:

**PO1:Computational Knowledge:** Acquire in-depth computational knowledge and mathematics with an ability to abstract and conceptualize models from defined problems and requirements

**PO2:Problem Analysis:** Identify, formulate, conduct literature survey and solve complex computing problems through analysis as well as provide optimal solutions

**PO3:Design / Development of Solutions:** Design and evaluate solutions for complex problems, components or processes that meet specified needs after considering public health and safety, cultural, societal, and environmental factors

**PO4:Conduct investigations of complex Computing problems:** Conduct literature survey to analyze and extract information relevant to unfamiliar problems and synthesize information to provide valid conclusions and interpret data by applying appropriate research methods, tools and design experiments

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

**PO6:Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices

**PO7:Life-long Learning:** Engage in lifelong learning independently for continual development to improve knowledge and competence as a computing professional

**PO8:Project management and finance:** Demonstrate knowledge and understanding of management principles and apply these to multidisciplinary software development as a team member and manage projects efficiently as a leader considering economical and financial factors

**PO9:Communication Efficacy:** Understand and communicate effectively with the computing community and with society at large, regarding complex computing systems activities confidently and effectively by writing effective reports and design documentations by adhering to appropriate standards, make effective presentations and give / receive clear instructions

**PO10:Societal and Environmental Concern:** Understand responsibilities and consequences based on societal, environmental, health, safety, legal and cultural issues within local and global contexts relevant to professional computing practices

**PO11:Individual and Team Work:** Function effectively as an individual, as a member or leader in diverse teams in multidisciplinary environments

**PO12:Innovation and Entrepreneurship:** Identify a timely opportunity for entrepreneurship and use innovation to pursue and create value addition for the betterment of the individual and society at large

**PROGRAM SPECIFIC OUTCOMES (PSO)**

MCA graduates will be able to:

**PSO1:** Solve real world computing system problems of various industries by understanding and applying the principles of mathematics, computing techniques and business concepts

**PSO2:** Design, test, develop and maintain desktop, web, mobile and cross platform software applications using modern tools and technologies

# ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
## (AN AUTONOMOUS INSTITUTION)

## MCA COURSE STRUCTURE

| Curriculum for the Programme under Autonomous Scheme | |
|---|---|
| Regulation | AITS-R17 |
| Department | Department of Computer Applications |
| Programme Code & Name | P2, MCA |

### First Semester MCA

| Subject Code | Name of the Subject | Hrs. Per week | | | | C | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | L | P | T | S | | Internal | External | Total |
| 7P2B11 | Mathematical Foundations of Computer Science | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B12 | Problem solving with 'C' | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2C13 | Probability and Statistics | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2A14 | Accounting and Financial Management | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B15 | Object Oriented Programming with C++ | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2C16 | Technical Communication and Professional Ethics | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B17 | C Programming Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| 7P2B18 | Object Oriented Programming with C++ Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| 7P2C19 | English Language Communication Skills Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| **Total** | | 24 | 9 | | | 30 | 360 | 540 | 900 |

**Note**: L- Lecture; P-Practical; T- Tutorials; S- Self Study; C – Credits

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|---|---|
| Regulation | AITS-R17 |
| Department | Department of Computer Applications |
| Programme Code & Name | P2, MCA |

### Second Semester MCA

| Subject Code | Name of the Subject | Hrs. Per Week | | | | C | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | L | P | T | S | | Internal | External | Total |
| 7P2B21 | Computer Organization | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B22 | Introduction to Web Programming | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2C23 | Numerical Methods | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B24 | Operations Research | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B25 | Java Programming | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B26 | Data Structures | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B27 | Web Programming Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| 7P2B28 | Java Programming Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| 7P2B29 | Data Structures through C++ Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| **Total** | | 24 | 9 | | | 30 | 360 | 540 | 900 |

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## MCA COURSE STRUCTURE

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|---|---|
| Regulation | AITS-R17 |
| Department | Department of Computer Applications |
| Programme Code & Name | P2, MCA |

### Third Semester MCA

| Subject Code | Name of the Subject | Hrs. Per week | | | | C | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | L | P | T | S | | Internal | External | Total |
| 7P2B31 | Database Management Systems | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B32 | PHP with MySQL | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B33 | Management Information Systems | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B34 | Web Component Development with J2EE | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B35 | Design & Analysis of Algorithms | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B36 | Operating Systems | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B37 | DBMS Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| 7P2B38 | PHP with MySQLLab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| 7P2B39 | Web Component Development withJ2EE Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| **Total** | | 24 | 9 | | | 30 | 360 | 540 | 900 |

**Note**: L- Lecture; P-Practical; T- Tutorials; S- Self Study; C – Credits

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## MCA COURSE STRUCTURE

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|---|---|
| Regulation | AITS-R17 |
| Department | Department of Computer Applications |
| Programme Code & Name | P2, MCA |

### Fourth Semester MCA

| Subject Code | Name of the Subject | Hrs. Per Week | | | | C | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | L | P | T | S | | Internal | External | Total |
| 7P2B41 | Software Engineering | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B42 | Data Communication &Computer Networks | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B43 | Unix & Network Programming | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B44 | Data Mining | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| | Elective I | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| | Elective II | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B47 | Software Engineering Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| 7P2B48 | Unix & Network Programming Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| 7P2B49 | Data Mining Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| **Total** | | 24 | 9 | | | 30 | 360 | 540 | 900 |

**Note**: L- Lecture; P-Practical; T- Tutorials; S- Self Study; C – Credits

| Elective I | Elective II |
|---|---|
| 7P2B4A Cloud Computing<br>7P2B4B Computer Graphics with Open GL<br>7P2B4C Software Project Management | 7P2B4D Distributed Data bases<br>7P2B4E Artificial Intelligence<br>7P2B4F  System Software |

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## MCA COURSE STRUCTURE

| Curriculum for the Programme under Autonomous Scheme | |
|---|---|
| Regulation | AITS-R17 |
| Department | Department of Computer Applications |
| Programme Code & Name | P2, MCA |

### Fifth Semester MCA

| Subject Code | Name of the Subject | Hrs. Per Week | | | | C | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | L | P | T | S | | Internal | External | Total |
| 7P2B51 | Mobile Application Development | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B52 | .Net Technologies | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B53 | Object Oriented Modeling and Design with UML | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B54 | Business Analytics | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| | Elective III | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| | Elective IV | 4 | 0 | 0 | 0 | 4 | 40 | 60 | 100 |
| 7P2B57 | .Net Technologies Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| 7P2B58 | UML Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| 7P2B59 | Mobile Application Development Lab | 0 | 3 | 0 | 0 | 2 | 40 | 60 | 100 |
| **Total** | | 24 | 9 | | | 30 | 360 | 540 | 900 |

**Note**: L- Lecture; P-Practical; T- Tutorials; S- Self Study; C – Credits

| Elective III | Elective IV |
|---|---|
| 7P2B5A Big Data<br>7P2B5B Soft Computing<br>7P2B5C Software Architecture | 7P2B5D Information Security<br>7P2B5E Software Testing Methodologies<br>7P2B5F Internet of Things |

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## MCA COURSE STRUCTURE

| Curriculum for the Programme under Autonomous Scheme | |
|---|---|
| Regulation | AITS-R17 |
| Department | Department of Computer Applications |
| Programme Code & Name | P2, MCA |

**Sixth Semester MCA**

| Code | Subject | Credits |
|---|---|---|
| 7P2B61 | Seminar | 2 |
| 7P2B62 | Project Thesis / Dissertation | 12 |

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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**FIRST SEMESTER MCA**

**(7P2B11) MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

**COURSE PREREQUISITES:**
- Programming Abstractions or equivalent.
- Some programming is required.

**COURSE OBJECTIVES**
- Fundamental concepts and tools in discreet mathematics with emphasis on their applications to computer science.
- Topics include logic and Boolean circuits; sets, functions, relations, databases, and analysis techniques based on counting methods and recurrence equations; trees and more general graphs.

**EXPECTED COURSE OUTCOMES**

- Demonstrate the understanding of the fundamental concepts of discrete mathematical structures.
- Apply the knowledge and skills obtained to investigate and solve a variety of mathematical foundation problems.
- Analyze mathematical concepts like sets, reasoning, relational algebra and graph theory to solve the problems and optimize the solution.
- Justify the overall mathematical knowledge gained to interpret and analyze the problems in various fields

**UNIT-I**

**MATHEMATICAL LOGIC**: Statements and Notations, Connectives: AND, OR, Conditional, Bi-conditional, Negation, Truth Tables, Tautology, Contradiction, Well-formed Formulas, Logical Equivalence, Equivalence Implication, Normal Forms, **PREDICATES:** Predicative Logic, Quantifiers, Universal Quantifiers, Free & Bound Variables, Rules of Inference, Consistency, Proof of Contradiction.

**UNIT-II**

**RELATIONS:**
Operations on Relations, Properties of Binary Relations, Equivalence, Compatibility and Partial Ordering Relations, Lattices and its Properties, Hasse Diagram, Transitive Closure, Representing Relations, Diagraph of POSET

**UNIT-III**

**ELEMENTARY COMBINATORICS:** Basics of Counting, Enumerating Combinations & Permutations with Repetitions, Constrained Repetitions, Binomial Coefficients, Binomial Multinomial Theorems, The principles of Inclusion – Exclusion, Pigeon hole Principles and its Application.

**UNIT-IV**

**RECURRENCE RELATION:** Generating Functions & Sequences, Calculating Coefficient of Generating Function, Homogeneous Recurrence Relations: First Order, Second Order, Third and Higher Order Recurrence Relations, Inhomogeneous Recurrence Relation: First Order, Second and Higher Order.

**UNIT-V**

**GRAPH THEORY APPLICATIONS:** Representation of Graphs with Examples, Vertex, Degree, Sub Graph, Multi Graph, Simple Graph, Complete Graph, Bipartite Graph, Regular Graph, Digraph, Operations on Graphs, Euler Circuits, Hamiltonian Graphs, Chromatic Number, Planar Graphs, Trees, Spanning Trees: DFS, BFS, Minimal Spanning Trees: Prim's and Kruskal's Algorithms.

**TEXT BOOKS:**

1. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e, J.L.Mott, A. Kandel, T.P. Baker, PHI, 2008.
2. Mathematical Foundations of Computer Science, D. Chandra Sekharaiah, Prism Books.

**REFERENCE BOOKS:**

1. Discrete Mathematical Structures with Application to Computer Science, Tremblay, **Manohar.**McGraw Hill Publication.
2. Elements of Discrete Mathematics – A computer oriented approach, C.L.Liu, D.P. Mahopatra, Third Edition, TMH.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 3 | 2 | - | 1 | 1 | - | 1 | - | - | - | - | - |
| **CO2** | 3 | 2 | 1 | 2 | - | - | 1 | - | - | - | - | - |
| **CO3** | 3 | 2 | 1 | 3 | - | - | 1 | - | - | - | - | - |
| **CO4** | 3 | 3 | 1 | 3 | 1 | - | 1 | - | - | - | - | - |

 Correlation Levels 1,2 or 3 as defined below:
 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

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**First Semester MCA**

(**7P2B12) PROBLEM SOLVING WITH'C'**

## COURSE PREREQUISITES

There are no **prerequisites** to learn **C programming**. In fact **C** is considered as a **language** to start with for beginners.

## COURSE OBJECTIVES

- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To teach the issues in file organization and the usage of file systems.

## EXPECTED COURSE OUTCOMES:

- To understand the basic terminology used in computer programming.
- To write, compile and debug programs in C and C++ language.
- To use different data types in a computer program.
- Design programs involving decision structures, loops and functions.

## UNIT-I

**Algorithms and Flowcharts**: The meaning of algorithms, Flowcharts and their need, Writing algorithms and drawing flowcharts for simple exercises Data Types: Character set, C tokens, keywords & identifiers, structure of C program, executing a C program. Constants, variables, data types, declaration of variables, declaration of storage classes, assigning values to variables defining symbolic constants, declaring a variable as constant, declaring a variable as volatile, **Overflow and Underflow of DataOperators and Expressions:** Arithmetic operators, relational operators, logical operators, assignment operator, increment and decrement operator, conditional operator, bitwise operators, comma operator, special operators, arithmetic expressions, evaluation of expressions, precedence of arithmetic operators, type conversions in expressions, operator precedence and associativity, mathematical functions.

## UNIT-II

**Managing Input and Output Operations:** The scanf() and printf() functions for input and output operations, reading a character, writing a character, (the getchar() and putchar() functions) , the address operator(&), formatted input and output using format specifiers, Writing simple complete C programs Decision Making and Branching: Decision making with if statement, simple if statement, the if..else statement, nesting of if..else statements, the else..if ladder, the switch statement, the ?: operator, the goto statement, the break statement, programming examples.

**Decision Making and Looping:** The while statement, the do..while statement, the for statement, nested loops, jumps in loops, the continue statement, programming examples.

## UNIT III

**Arrays:** The meaning of an array, one dimensional and two dimensional arrays, declaration and initialization of arrays, reading , writing and manipulation of above types of arrays, multidimensional arrays, dynamic arrays, programming examples. **Strings:** Declaring and

initializing string variables, reading string from terminal, writing string to screen, arithmetic operations on characters, putting strings together, comparison of two strings, string Handling functions, table of strings, other features of strings, programming examples.

## UNIT IV

**User Defined Functions:** Need for user defined functions, a multi-function program, elements of User defined functions, defining functions, return values and their types, function calls, function declaration, category of functions, no arguments and no return values, arguments but no return values, arguments with return values, no arguments with return value, functions that return multiple values, nesting of functions, recursion, passing arrays to functions, passing string to functions, programming examples. **Structures and Unions:** Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members, array of structures, structures within structures, structures and functions, Unions, programming examples.

## UNIT V

**Pointers and Dynamic Memory Allocation:** Understanding pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, chain Of pointers, pointer expressions, pointers and arrays, pointer and character strings, array of pointers, pointer as function arguments, functions returning pointers, pointers to functions, pointers and structures, programming examples. **Dynamic memory allocation:**Allocating a block of memory: malloc, **allocating multiple blocks of memory:**calloc, **releasing the used space:** Free, altering the size of a block: realloc.

**File Management in C:** Defining and opening a file, closing a file, input/ output operations on files, error handling during I/O operations, and random access files, command line arguments, programming examples **The Pre-processor:** Macro substitution, files inclusion and Compiler Control Directives

### TEXT BOOKS:
1. Balagurusamy: Programming in ANSI C, 6th Edition, Tata McGraw Hill, 2010. Chapters: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13.1 to13.6, 14
2. V Rajaraman: Computer Programming in C, Prentice Hall India, 2000. Chapters: 1.1, 1.3, 2.1, 2.3, 3.1, 3.2, 3.3

### REFERENCE BOOKS:
1. R G Dromey: How to solve it by Computer, Prentice-Hall India, 1982.
2. K R Venugopal, S R Prasad: Mastering C, Prasad, Tata McGraw Hill, 2006.

### MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)
### CO-PO MAPPING

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | 2 | - | 1 | 1 | - | - | 1 | 1 | - | 3 | - |
| **CO2** | - | - | - | - | - | - | 3 | 2 | - | - | 1 | - |
| **CO3** | 3 | 1 | - | - | - | 1 | - | 3 | - | 1 | - | - |
| **CO4** | 3 | 2 | - | 3 | - | - | 2 | 3 | - | - | - | - |

- Correlation Level 1,2 or 3 as defined below:
- 1:Slight(Low), 2:Moderate(Medium), 3:Substantial(High), If there is no correlation, put " –"

**First Semester MCA**
### (7P2C13) PROBABILITY AND STATISTICS

**COURSE PREREQUISITES:** Differential and Difference Equations

**COURSE OBJECTIVE**
This course provides a solid undergraduate foundation in both probability theory and mathematical statistics and at the same time provides an indication of the relevance and importance of the theory in solving practical problems in the real world. Topics include: probability distributions, exploratory data analysis via various descriptive statistics, inferential statistical methods such as the various forms of the t-test, use of confidence intervals, sample size and ANOVA.

**EXPECTED COURSE OUTCOMES**
- Apply probability theory via Bayes' Rule
- Describe the properties of discrete and continuous distribution functions
- Assess the sampling distribution, efficiency and biasedness of estimators Use statistical tests in testing hypotheses on data
- Analyze goodness of fit, ANOVA for one-way and two-way classification data

**UNIT-I**
Probability: Sample space and events – Probability – The axioms of probability – Some Elementary theorems - Conditional probability – Baye's theorem. Random variables – Discrete and continuous – Distribution functions - mean and variance.

**Unit-II**
Binomial distribution –Poison distribution- Uniform distribution - Normal distribution.

**Unit-III**
Sampling distribution: Population and sample - Sampling distributions of means (σ known and unknown).
Estimation: Point estimation – interval estimation - one mean –two means (large sample) and one proportion – two proportions (large sample).

**Unit-IV**
Test of Hypothesis concerning one and two means, one and two proportions, two variances and goodness of fit.

**Unit-V**
Queueing theory: Pure birth and death process,(M/M/1) model and simple problems

**PRESCRIBED TEXT BOOKS**
1. Probability & Statistics for Engineers (Miller and John E. Freund's), Richard A Jhonson, seventh Edition,PHI.
2. Queueing Theory (a linear algebraic approach), second edition,LesterLipsky, Spinger

**REFERENCE BOOKS**

1. Probability, Statistic and Queueing Theory with Computer Science applications, $2^{nd}$ edition, Ornald O. Allen, Academic press.
2. Fundamentals of QueueingTheory, Donald Gross, Jhon F Shortle, James M.Thompson, Carl M. Harris $4^{th}$ Edition, Wiley
3. Fundamentals of Mathematical Statistics, S C Gupta and V K Kapoor, Sultan schand& sons.
4. Probability & Statistics for MCA, T.K.V .Iyenger, B.Krishna Gandhi, S.Ranganathan, M.V.S.S.N. Prasad, S.Chand and Company Ltd.
5. Probability &Statistics, B.V.Ramana, Tata McGraw Hill.

**MODE OF EVALUATION**

Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2 | 2 | - | 1 | 1 | - | - | 1 | 1 | - | 3 | - |
| CO2 | 1 | - | 2 | - | 2 | - | 3 | 2 | - | - | 1 | - |
| CO3 | 3 | 1 | - | - | 3 | 1 | - | 3 | - | 3 | - | - |
| CO4 | 3 | 2 | 2 | 3 | - | - | 2 | 3 | - | 2 | - | - |

Correlation Levels 1,2 or 3 as defined below:
1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

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**First Semester MCA**
**(7P2A14) ACCOUNTING  AND FINANCIAL MANAGEMENT**

**COURSE PREREQUISITES:** Basic principles of accounts

**COURSE OBJECTIVE**
The aim of this course is to understand how business use accounting and financial information for decision-making purpose.

**EXPECTED COURSE OUTCOMES:**
CO 1:  An ability to understand the basic concepts in accounting financial management and Identifying the appropriate managerial and business issues critical to analyzing accounting data and other information used for identifying and assessing opportunities and risks, developing organizational plans, allocating resources, and accomplishing objectives
CO2:  Demonstrate an understanding of the difference between accounting  and financial management as well as the relationship between the two
CO3: Demonstrate an understanding of cost behavior and analysis including the associated calculations break even analysis or Cost Volume Profit analysis.
CO4: Apply finance concepts and techniques within the larger organizational decision-making context.

**UNIT I**

**INTRODUCTION TO ACCOUNTING**: Principles, Concepts and Conventions, Basics of accounts, Double entry system of accounting, Classification of accounts and debit-credit rules. **Introduction to basic books of accounts:**Journal and Ledger – Trial balance –**Preparation of final accounts:**Trading account, Profit and Loss account and Balance sheet with adjustments (with simple illustrations)

**UNIT II**

**BREAK EVEN ANALYSIS** - Introduction, Definition, meaning and BEP analysis and BEP in units. Concept of Break Even Point, Cost-Volume-Profit Analysis, Determination of Break Even Point, Margin of Safety and P/V ratio,  Practical applications of Break Even Analysis, Simple problems.

**UNIT III**

**FINANCIAL ANALYSIS THROUGH RATIOS**: Ratio Analysis meaning –advantages and disadvantages, Classification of ratios – Analysis and interpretation of   financial statements through ratios of liquidity, Solvency and Profitability.

**UNIT IV**

**INTRODUCTION TO FINANCIAL MANAGEMENT**: Time value of money-Present Value of Money-Future Value of Money. Financial management Definition-scope, Objectives of financial management, Sources of finance.

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**UNIT V**

**CAPITAL BUDGETING**: Features, Proposals, Methods of capital budgeting, Payback method, AccountingRate of Return (ARR), Net Present Value Method (NPV) and Internal Rate of Return (IRR) -Simple problems.

**TEXT BOOKS:**
1. Financial Accounting: S.N.Maheshwari, Sultan Chand, 2009.
2. Management Accounting: Theory and Practice, Pandikumar M.P 1st edition, Excel Books, 2007.
3. Financial Management and Policy, Van Horne, James.C. Pearson, 2009.
4. Management Accounting, Khan My, Jain P.K, 4th Edition, Tata McGraw Hill, 2007.
5. Financial Accounting, Tulsian, S Chand, 2009.
6. Financial Statement Analysis, Khan and Jain, PHI, 2009
7. Financial Management, I.M.Pandey, Vikas Publications.
8. Financial Management, Prasanna Chandra, T.M.H, 2009.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 2 | - | 1 | 1 | - | - | 1 | 1 | - | 3 | - |
| CO2 | - | - | - | - | - | - | 3 | 2 | - | - | 1 | - |
| CO3 | 3 | 1 | - | - | - | 1 | - | 3 | - | 1 | - | - |
| CO4 | 3 | 2 | - | 3 | - | - | 2 | 3 | - | - | - | - |

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**First Semester MCA**
      **(7P2B15) OBJECT ORIENTED PROGRAMMING WITH C++**

**COURSE PREREQUISITES :**Basic knowledge of C language.

**COURSE OBJECTIVE**
To introduce object-oriented concepts such as data abstraction, encapsulation, inheritance, dynamic binding, and polymorphism and to apply the object-oriented paradigm in program design.

**EXPECTED COURSE OUTCOMES:**

- Identify data members, member functions and design classes for given problem statement.
- Apply different C++ programming techniques such as friend functions, inline functions,friend classes, static members and nested classes to develop programs and demonstrate the same.
- Apply concepts of arrays, pointers and dynamic memory allocation in creating objects and access class members for any given problem of this kind.
- Identify and apply concept of function overloading and operator overloading techniques for given problem statement and demonstrate the polymorphism feature of OOP.

**UNIT I**

**An Overview of C++:** The origins of C++, What is object oriented programming?, Some C++ fundamentals, Old-style Vs Modern C++, Introducing C++ classes, C++ keywords, The general form of a C++ program, Foundation of C++: Expressions, Statements, Arrays and strings, Pointers, Structures, Unions, Enumerations and user defined types

**UNIT II**

**Classes and Objects:** Classes, Friend functions, friend classes, Inline functions, parameterized constructors, static class members, when constructors and destructors are called, scope resolution operator, nested classes, passing objects to functions, returning objects, and Object assignment. Array, Pointers, References, and dynamic memory allocation operators: Array of objects, Pointers to objects, this pointer, pointers to derived types, pointers to class members, References, Dynamic allocation operators

**UNIT III**

**FunctionOverloading, Copy Constructors and Default Arguments:** Function overloading, overloading constructors, copy constructors, Default function arguments. **Operator overloading:** Creating a member operator function, operator overloading using friend function, overloading new and delete, overloading some special operators. Templates: Generic functions, Generic classes

**UNIT IV**

**Inheritance:** Base class access control, inheritance and protected members, inheriting multiple base classes, constructors, destructors and inheritance, granting access, virtual base classes.
**Virtual functions and polymorphism**: Virtual functions, the virtual attribute is inherited, virtual functions are hierarchical, pure virtual functions, using virtual functions, early Vs. late binding.

**UNIT V**

**I/O System basics,File I/0:** C++ Stream classes, Formatted I/O, overloading <>, fstream and the file classes, file operations,**Exception Handling:** Exception handling fundamentals, Exception handling options. **Introduction to Standard Template Library (STL):** STL - an overview, containers, vectors, lists, maps.

**TEXT BOOKS:**

1. Herbert Schildt: The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2003.

**REFERENCE BOOKS:**

1. Stanley B.Lippmann, JoseeLajore: C++ Primer, 4th Edition, Addison Wesley, 2005.
2. BjarneStroustrup: The C++ Programming Language, Pearson Education, 2000.
3. K R Venugopal, RajkumarBuyya, T Ravi Shankar: Mastering C++, Tata McGraw Hill, 1999.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)
**CO-PO MAPPING**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | 2 | - | 1 | 1 | - | - | 1 | 1 | - | 3 | - |
| **CO2** | - | - | - | - | - | - | 3 | 2 | - | - | 1 | - |
| **CO3** | 3 | 1 | - | - | - | 1 | - | 3 | - | 1 | - | - |
| **CO4** | 3 | 2 | - | 3 | - | - | 2 | 3 | - | - | - | - |

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**First Semester MCA**

## (7P2C16) TECHNICAL COMMUNICATION ANDPROFESSIONAL ETHICS

**COURSE PREREQUISITES:** Fundamentals of English grammar

**COURSE OBJECTIVE**
1. To develop and to create awareness regarding communication in organization.
2. To know various key issues and strategies in developing soft wares.
3. To learn team working and to attempt interviews successfully.
4. To explore moral responsibilities and ethical decision – making in IT sector.

**EXPECTED COURSE OUTCOMES**
1. Able to understand importance of communication and to practice different communication skills in organizational level by overcoming barriers.
2. Able to apply technology in communication and to practice different non-verbal communication skills.
3. Able to attend interviews, meetings and conferences with confidence
4. Able to follow ethics in business and professional life.
5. Able to study various issues and strategies of software development.

**UNIT I:**

**Basics of Technical Communication** -Introduction, Process of Communication, Language as a Tool, Levels of Communication, Communication Networks, Importance of Technical Communication.

**Active Listening:** Introduction, Types of Listening, Traits of good Listener, Active versus passive listening, implications of effective listening; Barriers to Communication: Definition of Noise, Classification of Barriers.

**UNIT II:**

**Technology in Communication:** Impact of Technology, Software for Creating Messages, Software for Writing Documents, Software for Presenting Documents, Transmitting Documents, Effective use of Available Technology

**The Importance of Non-Verbal Communication:** Kinesics, Proxemics, Paralinguistics, and Chromatics

**Effective Presentation Strategies:** Introduction, defining purpose, Analyzing Audience and Locale, Organizing Contents, preparing outline, Usage of Visual Aids, Understanding Nuances of Delivery

**UNIT III:**

**Group Communication:** Introduction, Group Discussion, Organizational Group discussion. Group discussion as part of selection process Meetings, conferences

Interviews: Introduction, Objectives, Types of Interviews, Job Interviews. Resume Writing: Format and Style, Sample Resumes

## UNIT IV:

**Morals and Ethics:** Variety of moral issues, Types of inquiry, Moral dilemmas, Moral Autonomy, Kohlberg's theory, Gilligan's theory, Indian Theory, Consensus and Controversy, Professions and Professionalism, Professional Ideals and Virtues, Uses of Ethical Theories

## UNIT V:

**Responsibilities, Rights and Accountability:** Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

## TEXT BOOKS:

1. Technical Communication, Principles and Practices, Meenakshi Raman and Sangeeta Sharma, Oxford University Press, 2004
**2.** "Ethics in Engineering", Mike Martin and Roland Schinzinger, McGraw Hill, New York, 2005.

## REFERENCE BOOKS:

1. Effective Technical Communication, M Ashraf Rizvi, TMGH Publications
2. Ethics in Engineering, Mike W Martin and Ronal Schinzinger, 3rd edition, Tata McGraw Hill, 2003
3. Engineering Ethics Concepts and Cases, Charles E Harris, Michael S Pritchard and Michael J Rabins, Thompson Learning, 2000.
4. Professional Ethics, Jayashree Suresh, Raghavan, B.S., S. Chand & Company Ltd., 2005

## MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

### CO-PO MAPPING

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | - | - | - | - | - | - | 3 | - | 2 | - | 1 | - |
| **CO2** | - | - | - | - | 3 | - | 2 | - | 1 | - | - | - |
| **CO3** | - | - | - | - | - | - | 1 | - | 2 | - | 3 | - |
| **CO4** | - | - | - | - | - | 3 | 1 | - | - | - | 2 | - |
| **CO5** | - | - | - | - | 3 | - | 2 | - | 1 | - | - | - |

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**First Semester MCA**

### 7P2B17  C PROGRAMMING LAB

1. Write a C program that implement the expression, typecasting statements in the presence of decision statements and loop statements.
2. Write a C program that implement one dimensional array operations on integer and float data values.
3. Write a C program that implement library function to perform various String operations.
4. Write a C program that implement manipulation of string without library function.
5. Write a C program that implement function and parameters of array, string, float and integer data types and test different parameter passing mechanisms.
6. Implement a function to perform string operations.
7. Write a C program to find a factorial of a given number.
8. Write a C program to implement recursive function.
9. Write a C program that shows how to use a structure in a program.
10. Write a C program to process one dimensional array using pointer.
11. Write a C program to process two dimensional array using pointer.
12. Write a C program that implement file operations on text file.

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**First Semester MCA**

## 7P2B18 OBJECT ORIENTED PROGRAMMING WITH C++ LAB

1. Write a C++ program implements function with default argument and variable number of arguments.
2. Write a C++ program that contains all access control specifiers, Static members and copy constructor.
3. Write a C++ program that creates class objects dynamically and pass objects to a function.
4. Write a C ++ program that implement function overloading
5. Write a C++ program that demonstrates operator overloading and uses simple data types, string and manipulation of Objects.
6. Write a C++ program to implementBubble sort example.
7. Write a C++ program that demonstrates the purpose and usage of function template and class template.
8. Write a C++ program that demonstrates the dynamic binding through virtual functions.
9. Write a C++ program that demonstrates the
10. Multilevel inheritance
11. Hybrid inheritance
12. Hierarchical inheritance
13. Simple inheritance
14. Multipath inheritance
15. Write a C++ program that demonstrate the behavior of access specifiers in the presence of inheritance.
16. Write a C++ program that demonstrates Exception Handling.
17. Write a C++ program to perform file operations using file streams and error handling mechanism.

**First Semester MCA**

## 7P2C19 ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

**Syllabus:**
The following course content is prescribed for the English Language Laboratory Practice

1. **Phonetics- Introduction to the Sounds of English – vowels, Diphthongs and consonants**
2. **Situational Dialogues/Role play**
3. **Oral Presentations/Public speaking**
4. **Group Discussion**
5. **Interviews**
6. **Resume**
7. **Listening Comprehension**

Lab Manual cum Record: Manual cum Record prepared by the teachers will be used by the students during laboratory hours

**SUGGESTED SOFTWARE:**

- Sky Pronunciation Suite
- Clarity Pronunciation Power 1
- Active Listening from Clarity
- Active Reading from Clarity
- It's your Job from Clarity G
- Globarena Career Lab
- Cambridge Advanced Learners' Dictionary with exercises
- Oxford Advanced Learner's Compass, 7th Edition

**BOOKS SUGGESTED FOR ENGLISH LAB:**
- Developing Communication Skills by Krishna Mohan &MeeraBenerji (Macmillan)
- Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
- Oxford Practice Grammar with Answers, John Eastwood, Oxford
- Handbook of English Grammar and Usage, Mark Lester and Larry Beason, Tata McGraw-Hill
- A text book of English Phonetics for Indian Students by T.Balasubramanian (Macmillan)
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

Course Outcomes

- The student will be able to express himself fluently in social and professional contexts
- The student will enhance his skills to make a presentation effectively
- The student will learn how to face Interviews, to participate in meetings confidently
- The student will neutralize his accent and be able to speak intelligible English

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**Second Semester MCA**
## (7P2B21) COMPUTER ORGANIZATION

**COURSE PREREQUISITES**
- Introduction to Computer Science
- Introduction to Programming

**COURSE OBJECTIVE**
Graduates shall be able to
- Describe various data representations and explain how arithmetic and logical operations are performed by computers
- Explain the basic operation and relationship between the different components of computer.
- Understand the advanced architecture of microprocessors
- Write assembly programs for 8086 microprocessors

**EXPECTED COURSE OUTCOMES**
After going through this course the student will be able to:
CO1: Understand the organization and architecture of a computer system.
CO2: Design and implement programs using assembly language.
CO3: Analyze the need for Logic circuits in digital system.
CO4: Create logic circuits for real time applications.

**UNIT I**
**NUMBER SYSTEMS AND COMPUTER ARITHMETIC**: Signed and unsigned numbers, complements, Addition and subtraction, Multiplication, Division, Floating point representation, Gray code, BCD codes, Boolean algebra, Simplification of Boolean expressions, K-Maps. **Combinational and Sequential Circuits**: Decoders, Encoders, Multiplexers, Half and Full adders, Sequential circuits, Flip-flops.

**UNIT II**
**MEMORY ORGANIZATION**: Memory hierarchy, Main memory-RAM, ROM chips, Memory address map, Memory contention to CPU, Associative Memory-Hardware logic, Match, Read and Write logic, Cache Memory-Associative mapping, direct mapping, Set-associative mapping.

**UNIT III**
**BASIC CPU ORGANIZATION:** General Register Organization, Stack Organization, Instruction Formats- Zero, one, two, and three address instructions, Instruction formats-INTEL-8086 CPU Architecture, Addressing modes.

**UNIT IV**
**INTEL 8086 ASSEMBLY LANGUAGE INSTRUCTIONS:** Data transfer instructions, Input-Output instructions, Flag transfer, arithmetic, logical, shift and rotate instructions, Conditional and unconditional transfer, Iteration control, Interrupts, Assembler directives, Programming with assembly language instructions.

**UNIT V**
**MICRO PROGRAMMED CONTROL**: Control Memory, Address Sequencing, Micro program example, Design of Control Unit, **Input-Output Organization:** Peripheral devices, Modes of transfer, Priority interrupts - Daisy chaining, parallel priority, DMA- DMA control, DMA transfer, Input output processor-CPU-IOP communication.

**TEXT BOOKS:**

1. Computer System Architecture, M. Morris Mano, 3rd Edition, PHI/Pearson Education, 2008.
2. Fundamentals of Computer Organization and Design, SivaramaP.Dandamudi, Springer Int. Edition.
3. Assembly Language programming, Peter Abel, Fifth Edition IBM PC 1991.

**REFERENCE BOOKS:**

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5$^{th}$ Edition, McGraw Hill.
2. Computer Organization and Architecture, William Stallings, 7th Edition,
3. Pearson/PHI, 2007
4. Intel 8086 programming, V. Douglas Hall, Tata McGraw-Hill.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 3 | 3 | 1 | 3 | 1 | - | 2 | 2 | - | - | - | 2 |
| **CO2** | 3 | 2 | 1 | 2 | 1 | 1 | 2 | 3 | - | - | - | - |
| **CO3** | 3 | 3 | 1 | 3 | 2 | - | 2 | 2 | - | 1 | 2 | 1 |
| **CO4** | 3 | 3 | 1 | 3 | 2 | 1 | 1 | 1 | - | 1 | 1 | 1 |

Correlation Level 1,2 or 3 as defined below:
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**Second Semester MCA**

## (7P2B22) INTRODUCTION TO WEB PROGRAMMING

**COURSE PREREQUISITES:** Basic knowledge of computers and internet.

**COURSE OBJECTIVE**
The objective of course is to Introduce to the concepts, terms and technologies used in web site design and Highlighting the theories and principles underlying web site design.

**EXPECTED COURSE OUTCOMES**
- Create Web pages with leading edge skills like HTML5 and CSS3.
- Demonstrate the process of authoring web pages using HTML5 and CSS3.
- Demonstrate and implement the web pages based on XML And using DTD.
- Describe web pages using CSS as well as XSLT.

**UNIT I**
**Fundamentals:** A Brief Introduction to the Internet, The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet Mail Extensions, The Hypertext Transfer Protocol, Security, The Web Programmer's Toolbox, **Overview of HTML 5 and Working with HTML features-I:** HTML5 and its Essentials– Exploring new features of HTML5, Fundamentals of HTML.

**UNIT II**
**Working with HTML features-II :** Working with Text, Organizing Text in HTML, Working with Links and URLs, Creating Tables, Working with Images, Colors and Canvas, **Working with Forms, Working with HTML features-III:** Interactive Elements, Working with Multimedia.

**UNIT III**
**Cascading Style Sheets-I:** Overview of CSS, Backgrounds and Color Gradients in CSS, Fonts and Test Styles, Creating Boxes and Columns using CSS.

**UNIT IV**
**Cascading Style Sheets–II:** Displaying, Positioning, and floating an element, List styles, Table layouts, Pseudo-classes and Pseudo-elements, Effects, Frames, and Controls in CSS.

**UNIT V**
**Introduction to XML:** Introduction, The syntax of XML, XML document structure, Document type definitions, Namespaces, XML Schemas, Displaying Raw XML document, Displaying XML documents with CSS, XSLT Style sheets.

**TEXT BOOKS:**

1. KOGENT Learning Solutions Inc.: HTML5BLACK BOOK, Dream tech Press, 2011. Chapters: 2,3,4,5,6,7,8,9,10,18,19,20,21,22,23,24,25,26
2. Robert W. Sebesta: Programming the World Wide Web, 4<sup>th</sup> Edition, Pearson Education, 2008.

**REFERENCES:**
1. www.w3schools.com
2. www.tutorialpoint.com/html/

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 3   | 3   | -   | 3   | 3   | 3   | -   | 3   | -    | 3    | -    |
| CO2 | 3   | 3   | 3   | -   | 3   | 3   | 3   | -   | 3   | -    | 3    | -    |
| CO3 | 2   | 3   | 3   | -   | 2   | 3   | 3   | -   | 3   | -    | 2    | -    |
| CO4 | 1   | 2   | 3   | -   | 1   | 2   | 3   | -   | 1   | -    | 2    | -    |

Correlation Levels 1,2 or 3 as defined below:
1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

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**Second Semester MCA**
## (7P2C23) NUMERICAL METHODS

**COURSE PREREQUISITES:** Differential and Difference Equations

**COURSE OBJECTIVE**
The purpose of this module is to provide participants with the skills, knowledge and attitudes required to determine approximate numerical solutions to mathematical problems which cannot always be solved by conventional analytical techniques, and to demonstrate the importance of selecting the right numerical technique for a particular application, and carefully analyzing and interpreting the results obtained.

**EXPECTED COURSE OUTCOMES**
CO1: Analyze the errors obtained in the numerical solution of problems.
CO2: Using appropriate numerical methods, determine approximate solutions to systems of linear equations.
CO3: Using appropriate numerical methods, determine the best fit linear and non-linear curves.
CO4: Demonstrate the use of interpolation methods to find intermediate values in given graphical and/or tabulated data.
CO5: Using appropriate numerical methods, determine approximate solutions to ordinary differential equation.

**Unit-I**
**Solution of algebraic and transcendental equations:** Bisection method – method of false position – secant method – Newton Raphson method – Muller's method

**Unit-II**
**Solutions of linear simultaneous algebraic equations** – Gauss eliminating method – Factorization Method – Jacobi's method – Gauss Seidal method – relaxation method - Eigen values and Eigen vectors using power method.

**Unit-III**
**Curve fitting:** The method of least squares – fitting of linear and nonlinear curves - Coefficient of Correlation - Linear Regression– multiple regressions.

**Unit-IV**
**Interpolation:** Introduction – Newton's forward and backwards interpolation formulae – Gauss's forward and backwards interpolation formulae – Stirling's and Bessel's formulae.

**Unit-V**
**Numerical solution of Ordinary Differential equations** - Taylor's series - Euler's Method – Picard's Method - Runge-Kutta Fourth Order Method – Milne's Predictor-Corrector Method.

**Prescribed Text Books:**
1. Numerical Methods in engineering and science with programs in C &C++, B.S Grewal, 9th Edition, Khanna Publishers.

**Reference Books:**
1. M K Jain, S.R.K.Jain, R.K.Jain: Numerical Methods for Scientific and Engineering Computation, 5<sup>th</sup> edition, New Age International Publishers.
2. Veerarjan and Ramachandran, Numerical Methods with programs in C, Tata McGraw Hill.
3. Numerical Mathematics and Computing by Ward Cheney and David Kincaid, 5<sup>th</sup> edition, Thomson Publications.
4. Numerical Methods for Engineers and Scientists using MATLAB,RaminS.Esfandiari, CRC Press (Taylor and Francis Group).
5. Applied Numerical Methods with MATLAB for Engineers and Scientists, 2nd Edition, Steven C. Chapra, Tata McGraw-Hill

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | 2 | 1 | - | 2 | - | 1 | 1 | 1 | - | 1 | - |
| CO2 | 3 | 2 | - | - | - | - | 2 | 2 | - | - | 1 | - |
| CO3 | 3 | 3 | 1 | - | 3 | 1 | 1 | 1 | - | 1 | - | - |
| CO4 | 2 | 1 | - | - | 3 | - | 2 | 1 | - | - | - | - |
| CO5 | 2 | 2 | 2 | - | 2 | - | - | - | - | - | - | - |

 Correlation Levels 1,2 or 3 as defined below:
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**Second Semester MCA**

## (7P2B24) OPERATIONS RESEARCH

**COURSE PREREQUISITES:** Nil

**COURSE OBJECTIVE**
- Formulate a real-world problem as a mathematical programming model
- Understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand
- Understand the relationship between a linear program and its dual, including strong duality and complementary slackness
- To introduce the operations research techniques such as Linear Programming, Integer Programming

**EXPECTED COURSE OUTCOMES**
- Identify and develop operational research models from the verbal description of the real system.
- Understand the mathematical tools that are needed to solve optimisation problems.
- Use mathematical software to solve the proposed models.
- Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

**UNIT I**
**Introduction to Operations Research**-Basic definition, Scope, Objectives, Phases, Models and Limitations of Operations Research, Linear Programming Problem – Formulation of LPP, Simplex Method, Big-M method, Two-phase Method, Degeneracy and Unbound solutions, Revised simplex method, Duality, Dual simplex method.

**UNIT II**
**Transportation Problem** – Formulation, Unbalanced Transportation problem, Finding basic feasible solutions - Northwest corner rule, least cost method and Vogel's approximation method, Optimality test –MODI method, Assignment model – Formulation, Hungarian method for optimal solution, Solving unbalanced problem, Travelling salesman problem as assignment problem.

**UNIT III**
**Sequencing models :**Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines, Processing n Jobs through m Machines.

**UNIT IV**
**Replacement Models:** Individual replacement policy, Group replacement policy,Game Theory: Competitive games, Rectangular game, Saddle point, Minimax (Maximin) method of optimal strategies, Value of the game, Solution of games with saddle points, Dominance principle, Rectangular games without saddle point – mixed strategy for 2 X 2 games.

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**UNIT V**
**Inventory models**: Inventory costs, Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate non – uniform and production rate infinite, model (c) demand rate uniform and production rate finite.

**TEXT BOOKS:**
1. Operations Research, A.M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education, 2005.
2.

**REFERENCE BOOKS:**
1. Operations Research, R. Panneerselvam 2/e, PHI 2008
2. Operations Research, P.K. Gupta and D.S. Hira, S.Chand& CO., 2007

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | -   | 2   | 1   | -   | 2   | -   | 3   | 1   | 1   | -    | 3    | -    |
| CO2 | -   | 2   | -   | -   | -   | -   | 3   | 2   | -   | -    | 1    | -    |
| CO3 | -   | 2   | 1   | -   | 3   | 1   | 3   | 3   | -   | 1    | -    | -    |
| CO4 | -   | 2   | -   | -   | 3   | -   | 2   | 3   | -   | -    | -    | -    |

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**Second Semester MCA**
### (7P2B25) JAVA PROGRAMMING

**COURSE PREREQUISITES:**
- Java is related to C++, which is a direct descendant of C. Much of the character of Java is inherited from these two languages.
- From C, Java derives its syntax. Many of Java's object-oriented features were influenced by C++.
- In fact, several of Java's defining characteristics come from its predecessors (C and C++).

**COURSE OBJECTIVES**

- This course provides an introduction to object oriented programming (OOP) using the Java programming language.
- Its main objective is to teach the basic concepts and techniques which form the object oriented programming paradigm.
- Analyze a software development problem and express its essence succinctly and precisely.

**EXPECTED COURSE OUTCOMES**
- The model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism.
- Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections.
- How to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.
- Identify key entities and relationships in the problem domain; write succinct textual descriptions of problems in the style of a user manual.

**UNIT I**
**CLASSES AND OBJECTS :** Concepts of classes, objects, methods, access control, this keyword, garbage collection, simple java program, constructors, parameter passing, recursion, Enumeration, **Auto-boxing**: Enumeration, Type Wrappers, Auto boxing. **Generics:** What are Generics?, A Simple Generics Example, A Generics Class with two Type Parameters, The General Form of a Generic Class.
 **String Handling:** The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueof ( ), Changing the Case of Characters Within a String, Additional String Methods, String Buffer, String Builder.

**UNIT II**
**INHERITANCE** : Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance, Member access rules, super keyword and its uses, using final with inheritance, **polymorphism-** method overriding,

abstract classes, Method overloading, Inner Classes-Uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.

## UNIT III
**PACKAGES AND INTERFACES**: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, Interfaces vs Abstract classes, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring packages –java.util.

## UNIT IV
**EXCEPTION HANDLING AND MULTITHREADING**: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups

## UNIT V
**FILES-STREAMS:** Byte Streams, Character Streams, text Input/output, Binary input/output, random access file operations, File management using file class, using java.io**, NETWORKING**: Basics of network programming, addresses, ports, sockets, Socket connection and simple client server program, multiple clients, Java .net package.

**TEXT BOOKS:**

1.  Herbert Schildt, Java. The complete reference. TMH, 2010, 7th Ed.
2.  T. Budd. Understanding OOP with Java. Pearson education, 2008, Updated Ed.

**REFERENCE BOOKS:**

1.  J.Nino and F.A. Hosch. An Introduction to programming and OO design using Java. John Wiley and sons, 2004.
2.  T. Budd. An Introduction to OOP. Pearson education, 2009, 2nd Ed.
3.  Y. Daniel Liang. Introduction to Java programming. Pearson education, 2010, 6th Ed.
4.  R.A. Johnson. An introduction to Java programming and object oriented application development. Thomson, 2009.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 3 | 3 | 3 | - | 3 | 3 | 3 | - | 3 | - | 3 | - |
| **CO2** | 3 | 3 | 3 | - | 3 | 3 | 3 | - | 3 | - | 3 | - |
| **CO3** | 2 | 3 | 3 | - | 2 | 3 | 3 | - | 3 | - | 2 | - |
| **CO4** | 1 | 2 | 3 | - | 1 | 2 | 3 | - | 1 | - | 2 | - |

Correlation Levels 1,2 or 3 as defined below:
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**Second Semester MCA**
(**7P2B26) DATA STRUCTURES**

**COURSE PREREQUISITES:** Programming Fundamentals

**COURSE OBJECTIVE**
1. To teach efficient storage mechanisms of data for an easy access.
2. To design and implementation of various basic and advanced data structures.
3. To introduce various techniques for representation of the data in the real world.
4. To develop application using data structures.
5. To teach the concept of protection and management of data.
6. To improve the logical ability

**EXPECTED COURSE OUTCOMES**
  I.   Student will be able to choose appropriate data structure as applied to specified problem definition.
 II.   Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
III.   Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
IV.   Students will be able to use linear and non-linear data structures like stacks, queues, linked list etc.

**UNIT I**
**INTRODUCTION TO DATA STRUCTURES:** Fundamentals of Data Structures, classification of data structures, Algorithm Analysis – Asymptotic notation –Efficiency classes – Mathematical analysis of Non recursive algorithm - Mathematical analysis of recursive algorithm.

**UNIT II**
**ARRAYS, LISTS, STACKS AND QUEUES:** Arrays: Implementation – Operations- Applications, **Linked List**: Implementation – Operations- Applications, **Stack:** Implementation – Operations - Applications, **Queues:** Implementation – Operations – Applications.

**UNIT III**
**SORTING, SEARCHING:** Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Radix Sort and Quick Sort, **Searching:** Linear Search, Binary Search, and Fibonacci Search.

**UNIT IV**
**NON LINEAR DATA STRUCTURES AND HASH TABLES**
Introduction- Definition and Basic terminologies of trees and binary trees- Representation of trees, Binary tree Traversals- Threaded binary trees- **Hash Tables:** Introduction- Hash Tables- Hash Functions and its applications, Closed hashing, comparison of collision resolution techniques.

**UNIT V**
**ADVANCED TREES**: Graphs- basic concepts –- representation and traversals. Introduction-
Binary Search Trees: Definition- Operations and applications. **Height Balanced Trees or
AVL Trees:** Definition- Operations and applications**, B Trees:** Definition- Operations and
applications, Red – Black Trees- Splay Trees and its applications.

**TEXT BOOKS:**

1. Samanta.D, "Classic Data Structures", Prentice Hall of India (PHI), $2^{nd}$ Edition.

**REFERENCE BOOKS:**

1. Mark Allen Weiss, "Data Structures and Problem Solving using C++", The
2. Benjamin Cummings / Addison Wesley Publishing Company, 2002
3. Pai G.A.V., "Data Structures and Algorithms", TMH, 2009,
4. Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran "Fundamentals of
5. Computer Algorithms", 2nd edition, University Press, 1996

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 3 | 2 | 2 | 1 | 1 | - | - | - | - | - | - | 1 |
| **CO2** | 3 | 1 | 2 | 1 | 1 | 1 | 1 | - | 2 | - | - | 1 |
| **CO3** | 3 | 2 | 1 | 1 | 2 | 1 | 2 | - | 1 | - | 1 | 1 |
| **CO4** | 2 | 1 | 1 | 2 | 1 | 1 | 2 | - | - | - | 2 | 1 |

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**Second Semester MCA**

**7P2B27 WEB PROGRAMMING LAB**

1. Design a web page which will display your information i.e. Bio-Data.
    2. Create Hyperlinks in home page i.e. Educational details, Hobbies, Achievement, My Ideals etc.
3. Design a time-table and display it in tabular format.
4. Design a Registration form in HTML using all Form Controls.
5. Design a webpage i.e. Bio-data using CSS.
6. Develop static pages of an online Bookstore. The pages should resemble www.amazon.com. The web site should consist the following pages:
   - Home Page
   - Registration Page
   - Login Page
   - Books Catalogue
   - Shopping Cart
   - Payment By Credit Card
   - Order Confirmation
7. Embedding JavaScript's in HTML pages.
8. Design a Bio-data page whose contents can be changed using JavaScript like Events.
9. Design a Signup form with all validations.
10. Write XML file which will display the Book Information which includes
    1) Title of the Book
    2) Author Name
    3) ISBN Number
    4) Publisher Name
    5) Edition
    6) Price
11. Write a simple XSLT Program to display XML Data in HTML document.
12. Write a simple Document Object Model program to create XML document.

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**Second Semester MCA**

## 7P2B28 JAVA PROGRAMMING LAB

1. Write a Java Program to find the area of a box by using Class and Object.
2. Write a Java Program for passing Objects using Call by Value and Call by Reference.
3. Write a Java Program using constructor.
4. Write a Java Program for creation of classes and use of different types of functions.
5. Write a Java Program to count the number of objects created for a class using static member function.
6. Write a Java Program on interfaces.
7. Write a Java Program on packages.
8. Write a Java Program using function overloading and overriding.
9. Write a Java Program using inheritance.
10. Write a Java Program using IO streams.
11. Write a Java Program using files.
12. Write a Java Program using exception handling mechanism.

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**Second Semester MCA**

## 7P2B29 DATA STRUCTURES THROUGH C++ LAB

1. Write a Program to perform the operations on Arrays.
2. Write a Program to perform the operations on single linked list
3. Write a Program to perform the operations of Double linked list
4. Write a Program that demonstrates the polynomial manipulation using linked list.
5. Write a Program to implement stack data structure using array representation.
6. Write a Program to perform the operations of simple Queue. Use linked list representation.
7. Write a Program to convert given infix expression to post fix expression.
8. Write a Program to demonstrate the following Sorting techniques.
    a. Bubble Sort
    b. Insertion Sort and Quick Sort
9. Write a Program to demonstrate the following Searching techniques using integer or float or string or structure data.
    a. Binary search
    b. Fibonacci search
10. Write a Program to evaluate the given post fix expression.
11. Write a Program to perform the operations insert a node, delete a node, search and traverse using Binary Search Tree.
12. Write a Program to perform the operations insert a node, delete a node, search and traverse using Height Balanced Tree.

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**Third Semester MCA**

**(7P2B31) DATABASE MANAGEMENT SYSTEMS**

**COURSE PREREQUISITES**
Data structures and Algorithms, Algorithm Design and Analysis

**COURSE OBJECTIVES**
Graduates shall be able to
1. Explain database concepts and structures and terms related to database design, transactions and management
2. Demonstrate data modeling, normalization and development of the database
3. Formulate SQL statements for data definition, modification and retrieval of Data
4. Analyze how databases are affected by real-world transactions
5. Design and build a simple database system

**EXPECTED COURSE OUTCOMES:**
After going through this course the student will be able to:
    **CO1:** Explain the basic concepts of data models, database design for transaction processing and Query language
    **CO2**: Analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram
    **CO3**: Transform high-level conceptual model to relational data model, populate database and formulate queries based on principles of normalization
    **CO4:** Design and Implement a Database for any given problem

**UNIT I**
**INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS:** Data Vs Information, Purpose of databases, Views of data, Database languages, Data models, Database architecture - users and administrators. E-R Model, Entity-Relationship diagrams, E-R diagrams design issues, Extended E-R features, Specialization, Generalization, Aggregation.

**UNIT II**
**RELATIONAL MODEL**: Structure of Relational database, Relational Algebra, Tuple relational calculus, Domain relational calculus, QBE (Query-by-Example).

## UNIT III

**STRUCTURED QUERY LANGUAGE (SQL):** Introduction to SQL, SQL Operators, SQL Functions, Join queries, Sub queries, Nested queries, Views, Integrity constraints, Functional Dependencies, Database design - **Normalization:** Normal Forms-1st, 2nd, 3rd and BCNF, Multi - Valued Dependency-4th Normal Form, 5th NF/Projection-Join Normal form and De-Normalization.

## UNIT IV

**TRANSACTION MANAGEMENT:** Transaction concept, ACID properties, Transaction state, concurrent execution. **Recovery System:** Storage structure, Recovery and atomicity, Log-Based Recovery, ARIES Recovery Technique and Remote Back systems.

## UNIT V

**STORAGE AND FILE STRUCTURE:** Overview of Physical Storage media, Magnetic Disks, RAID, File Organization, Organization of Records in Files and Data-Dictionary Storage. **Indexing and Hashing:** Ordered Indices, B+-Tree Index Files, B-Tree Index files, Multiple-key access, Static and Dynamic Hashing.

## TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan. Database system Concepts. McGraw Hill International Edition, 2006, 5th Ed.
2. Elmasri, Navate, Fundamentals of Database Systems, Person Education, 2008.

## REFERENCE BOOKS:

1. C.J Date,Introduction to Database Systems, Pearson Education, 2009.
2. S.Shah and V. Shah SPD,Oracle for Professionals, The X team, 2010.
3. PS Deshpande, SQL/PLSQL for Oracle 9i ,dreamtec Press, 2007.
4. Raghurama Krishna, Johannes Gehrke, Database management systems, TMH.

## MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination  (60%)

## CO-PO MAPPING

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | -   | 2   | 3   | -   | 1   | 2   | 2   | 2   | -    | 1    | 2    |
| CO2 | 2   | -   | -   | 2   | -   | -   | 3   | 1   | 2   | -    | -    | -    |
| CO3 | 1   | -   | -   | 1   | -   | 1   | 1   | -   | 1   | -    | 1    | -    |
| CO4 | 3   | -   | 2   | 3   | -   | -   | 2   | 2   | 2   | -    | 1    | 1    |

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If there is no correlation, put " –"

**Third Semester MCA**

## (7P2B32) PHP WITH MYSQL

**COURSE PREREQUISITES:**
Basic knowledge of web programming, HTML, CSS, Java Script

**COURSE OBJECTIVE**
The objective of this course is to gain the PHP programming skills needed to successfully build interactive, data-driven sites, use the MVC pattern to organize code, test and debug a PHP application, work with form data, use cookies and sessions, work with regular expressions, handle exceptions, and validate data.

**EXPECTED COURSE OUTCOMES**
1. To understand the basics of programming in PHP.
2. To write and debug procedural PHP scripts.
3. To understand fundamental relational database concepts.
4. To design a relational database suitable for a blog.

## UNIT I

**PHP, MYSQL, LAMP:** what they are and what they do. Static Vs dynamic pages, Client-side Vs Server-side scripting, obtaining PHP and MYSQL software, resources and tools, XAMPP as a development environment.

## UNIT II

**Basics of programming with PHP** - variables, constants, data types, operators, expressions, control structures & decision making, functions, type casting, program flow. Documenting your code, Simple templating with PHP, organizing your application, finding and fixing bugs in your code.
**HTTP client-server communication:** HTTP headers, server response codes.

## UNIT III

**MYSQL:** Relational databases vs spreadsheets. MYSQL in the terminal, relational database design, MYSQL's data types, **CRUD operations:** create, read, update and delete data, primary, foreign and unique keys. **Getting results from more than one table:** joins. One-to-one, one-to-many, many-to-many relationships, Column and table aliases, changing table structure, table types and aggregate queries.

## UNIT IV

**PHP, MYSQL and Apache admin:**php.ini, my.ini &httpd.conf, dealing with the legacy settings,register_globals and magic_quotes, how to handle and log PHP errors.

## UNIT V

PHP and MYSQL on the web: Connecting to MYSQL using PHP. Querying the database and using the results, Dynamic templating, Single and multiple article templates. PHP's superglobals, accepting user input through the URL and forms. **Forms:** validation and giving user feedback. Dynamic navigation, **Building a simple CMS:** Database CRUD operations through a web frontend, defensive programming, security considerations, working as a web developer.

## TEXT BOOKS :

1. Steven Holzner, "PHP : the Complete Reference, 1$^{st}$ Edition, McGraw Hills, PHP 5.2, 2015.

2. VikramVaswani , "MySQL: The complete Reference. 1$^{st}$ Edition, McGraw Hills, 2015.

## MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination  (60%)

## CO-PO MAPPING

|       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1   | 3   | -   | 2   | 3   | -   | 1   | 2   | 2   | 2   | -    | 1    | 2    |
| CO2   | 2   | -   | -   | 2   | -   | -   | 3   | 1   | 2   | -    | -    | -    |
| CO3   | 1   | -   | -   | 1   | -   | 1   | 1   | -   | 1   | -    | 1    | -    |
| CO4   | 3   | -   | 2   | 3   | -   | -   | 2   | 2   | 2   | -    | 1    | 1    |

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1:Slight(Low), 2:Moderate(Medium), 3:Substantial(High),
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**Third Semester MCA**

**(7P2B33) MANAGEMENT INFORMATION SYSTEMS**

**COURSE PREREQUISITES**
- Qualified systems and management staff
- Control and maintenance of MIS
- Common data base
- Evolution of MIS
- Support of top management

**COURSE OBJECTIVES**
Graduates shall be able to
- Understand the basic working principles of information systems and enterprises
- Equip the students with preliminaries of technologies used in business information systems
- Familiarize students with the Business applications
- Enable the students to build decision support systems
- Enhance the knowledge of the student about the management Security challenges in IT sector

**EXPECTED COURSE OUTCOMES**
After going through this course the student will be able to:
CO1: Understand the fundamentals of a computer based information systems and enterprises
CO2: Analyze the technologies associated with business information systems
CO3: Evaluate significance of support systems in enterprises and align to security control measures in IT sector

**UNIT I**
**The meaning and role of MIS:** What is a Management Information System?, Note on Decision support systems, The systems view of business, MIS Organization within the company.
**Management and organizational theory**: Development of organizational theory, Management and organizational behavior.

**UNIT II**
**Information systems in Global business today**: Strategic business objectives of Information systems, What is an information system?, Dimensions of information systems, Contemporary Approaches to Information Systems.
**Information systems, organizations, and strategy:** Organizations and Information Systems, How information systems impact organizations and business firms, Using Information Systems to achieve competitive advantage,

## UNIT III

**Information Systems for decision making**: Evolution of an information system, Decision making and MIS, MIS as a technique for making programmed decisions.

**Conceptual system design:** Define the problems, set system objectives, Establish system constraints, Determine information needs, Determine information sources, develop alternative conceptual designs and select one, document the system concept.

## UNIT IV

**Detail System design:** Inform and involve the organization, Aim of detailed design, Project management of MIS detailed design, Identify dominant and trade-off criteria, Define the subsystems, Determine the degree of automation of each operation, Inputs, outputs and processing, Early system testing, Software, hardware and tools, Propose an organization to operate the system, Document the detailed design.

## UNIT V

**Implementation, evaluation and maintenance of the MIS**: Plan the implementation, Acquire floor space and plan space layouts, Organize for implementation, Develop procedures for implementation, Train the operating personnel, Computer related acquisitions, Develop forms for data collection and information dissemination, Develop the files, Test the system, Cut over, Document the system, Evaluate the MIS.

## TEXT BOOKS:

1. R.G. Murdick, J.E. Ross and J.R Claggett. Information Systems for Modern Management. PHI, 2011, 3$^{rd}$ Ed,.
2. Kenneth C. Laudon, Jane P. Laudon. Management Information Systems, Managing the Digital Firm, Pearson Education, 2013, 12$^{th}$ Ed.

## REFERENCE BOOKS:

1. Waman S Jawadekar. Management Information Systems Text and Cases, MGH, Jun 2009.
2. Robert schultberis, Mary sumner. Management information systems. PHI,1999
3. C.S.V Murthy. Management information systems text and applications,.HPH, 2011, 3$^{rd}$Edreprint.

## MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination  (60%)

## CO-PO MAPPING

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | -   | -   | -   | 1   | 2   | -   | 3   | 1   | 1   | -    | 3    | -    |
| CO2 | -   | -   | -   | -   | -   | -   | -   | -   | -   | -    | 1    | -    |
| CO3 | -   | -   | -   | 2   | 3   | 1   | -   | -   | -   | 1    | -    | -    |
| CO4 | -   | -   | -   | 3   | 3   | -   | 2   | -   | -   | -    | -    | -    |

 Correlation Levels 1,2 or 3 as defined below:
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**Third Semester MCA**

<p align="center">**(7P2B34)  WEB COMPONENT DEVELOPMENT WITH J2EE**</p>

**COURSE PREREQUISITES:** Computer Networks

**COURSE OBJECTIVES**
- Explain the history of the internet and related internet concepts that are vital in understanding web development.
- Discuss the insights of internet programming and implement complete application over the web.
- Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
- Utilize the concepts of JavaScript and Java.
- Use Web application development software tools i.e, AJAX and XML etc, and identify the environments currently available on the market to design web sites.

**EXPECTED COURSE OUTCOMES**
- Understand Mark-Up and Scripting language concepts and their applications.
- Demonstrate the working of dynamic documents in web designing.
- Analyze appropriate content layout design and event handling techniques.
- Implement static web document using HTML5, CSS, JavaScript and XML.

**UNIT I**
**J2EE Multi-Tier Architecture:** The Tier, J2EE Multi-tier Architecture, **JDBC Objects:** The Concept of JDBC, JDBC Driver Types, JDBC Packages, A Brief Overview of JDBC Process, Database Connection, Associating the JDBC/ODBC Bridge with the Database, Statement Objects, ResultSet, Transaction Processing, Metadata, Data Types, Exceptions, **JDBC and Embedded SQL**: Model Programs, Tables, Indexing, Inserting Datainto Tables, Selecting Data from a Table.

**UNIT II**
**JDBC and Embedded SQL:** Metadata, Updating Tables, Deleting Data from a Table, Joining Tables, Calculating Data, Grouping and Ordering Data, Subqueries, VIEW SERVLETS: Introduction, Advantages of Servlets over CGI, Installing Servlets, The Servlets Life Cycle, Servlet API, Handling HTTP GET and HTTP POST Request.

**UNIT III**
**SERVLETS:** Servlet Context, Servlet Config, Request Dispatcher, Send Redirect, Cookies, Session Tracking, Filter API, Single Thread Model, Multi-tier Applications Using Database Connectivity.

**UNIT IV**
**JAVA SERVER PAGES (JSP):** Introduction, Advantages of JSP, Developing First JSP, JSP Scripting Elements- (Directives, Declaratives, Scriplets, Expressions, Implicit Variables), Page Directives, JSTL, Standard Action, Custom Tags.

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**UNIT V**
**JAVA BEANS:** What is a Java Bean? Advantages of Java Beans, The Java Beans API –
Introspector, property Descriptor, Event Descriptor, Method Descriptor, A Bean Example,
JSP with Java Beans.

**TEXT BOOKS:**

1. Jim Keogh: The complete Reference J2EE, 1stEdition, Tata McGraw Hill, 2002.
2. Web Technologies Black Book, Kogent Learning solutions Inc sol., Dreamtech Press, 2012.

**REFERENCE BOOKS:**

1. James McGovern, Rahim
   Adatia,YakovFain,JasonGordon,EthanHenry,WalterHurst,AshishJain,MarkLittle,Vaid
   yanathanNagarajan,HarshadOak,Lee Anne Phillips: Java 2 Enterprise Edition 1.4
   (J2EE 1.4) Bible, Wiley, 2003.
2. Bond, Law, Longshaw, Haywood, Roxburgh: Teach Yourself J2EE (J2EE 1.4),
   2ndEdition, Pearson Education, 2005.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | - | 1 | 1 | 2 |
| **CO2** | 3 | 3 | 2 | 2 | 3 | - | 2 | 2 | - | - | - | 1 |
| **CO3** | 3 | 2 | 3 | 2 | 3 | 1 | 1 | 1 | 1 | - | 1 | - |
| **CO4** | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 1 | - | 1 | 1 |

 Correlation Levels 1,2 or 3 as defined below:
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**Third Semester MCA**
**(7P2B35) DESIGN AND ANALYSIS OF ALGORITHMS**

**COURSE PREREQUISITES:** Data Structures and Algorithms

**COURSE OBJECTIVE**

1. To analyze the asymptotic performance of algorithms.
2. To demonstrate a familiarity with major algorithms and data structures.
3. To apply important algorithmic design paradigms and methods of analysis.
4. To synthesize efficient algorithms in common engineering design situations.
5. To understand the difference between tractable and intractable problems, and be familiar with strategies to deal with intractability.

**EXPECTED COURSE OUTCOMES**
1. Ability to Understand, Analyze the performance of recursive and non recursive algorithms and use of asymptotic notations to measure the performance of algorithms.
2. Identify and analyze various algorithm design techniques
3. Understand and evaluate algorithms using various algorithm design techniques
4. Solve problems by applying appropriate algorithm design techniques and analyze the efficiency of various algorithms including parallel algorithms.
5. Ability to understand the limitations of Algorithm power and identify algorithm design techniques to cope up with the limitations.

**UNIT I**
**INTRODUCTION:** Algorithm, Pseudo code for expressing algorithm, Fundamentals of algorithmic problem solving, asymptotic notations, Recurrence equations – Solving recurrence equations –Analysis of linear search.

**UNIT II**
**DIVIDE AND CONQUER:** General Method, Merge sort, Quick sort, Binary search, Binary tree traversals and related properties.

**UNIT III**
**DYNAMIC PROGRAMMING:** General Method – Multistage Graphs – All-Pair shortest paths –Optimal binary search trees – 0/1 Knapsack – Travelling salesperson problem, **Greedy Technique**: General Method, Prim's algorithm, Kruskal's algorithm, Dijkstra's algorithm, single Source shortest paths.

**UNIT IV**
**BACK TRACKING:** General Method, 8-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles, Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problem.

**UNIT V**          '

**Graph Traversals** – Connected Components – Spanning Trees – Bi-connected components, NP-Hard and NP-Complete Problems: NP-Hard, NP-Complete classes, COOKS theorem.

**TEXT BOOKS:**
1. T. H. Corman, C Leiserson, Rivest, Ronald and stein Clifford. Introduction to algorithms. MGH, New York, 2001, $2^{nd}$ Ed.
2. AnanyLevitin. Introduction to the design and analysis of algorithms. Pearson education, 2003, $2^{nd}$ Ed.
3. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007. (For Units II to V)

**REFERENCE BOOKS:**

1. E Horowitz, S Sahni, S Rajasekaran, Fundamentals of computer algorithms. Universities press, 2008, $2^{nd}$ Ed.
2. Richard Neopolitan, KumarssNaimipour, Foundations of algorithms using C++ pseudo code, Jones and Bartlett Learning, 1998, $2^{nd}$ Ed.
3. K.S. Easwarakumar, Object Oriented Data Structures using C++, Vikas
4. Publishing House pvt. Ltd., 2000 (For Unit I)

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **1** | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 |
| **2** | 3 | 3 | - | - | - | 3 | - | - | 2 | - | - | 2 |
| **3** | 3 | 2 | 2 | - | - | 3 | 2 | - | 2 | - | 2 | 3 |
| **4** | 3 | 3 | 3 | 3 | - | 2 | 3 | - | - | - | 2 | 2 |
| **5** | 3 | 3 | 3 | 2 | - | 3 | 2 | - | 2 | - | 2 | 3 |

Correlation Level 1,2 or 3 as defined below:
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**Third Semester MCA**

## (7P2B36) OPERATING SYSTEMS

**COURSE PREREQUISITES:** Computer Architecture and Organization

**COURSE OBJECTIVES**
1. Identify the concepts, principles and services of operating system
2. Understand the operating system functionalities managing with hardware
3. Analyze the structure and design decisions involved in the implementation of an operating System
4. Evaluate different algorithms related to different operating system components
5. Explore various operating system utility commands to manage operating system
6. Implement various operating system algorithms and its evaluation

**EXPECTED COURSE OUTCOMES**
After going through this course the student will be able to:
    CO1: Explain the fundamentals of operating system components and its functionalities
    CO2: Analyze the basic operating system resources and its management techniques
    CO3: Apply algorithms to handle the operations of an operating system
    CO4: Implement solutions for classical problems in managing the computer resources

**UNIT I**
**OPERATING SYSTEM INTRODUCTION:** Operating System Definition, Evolution of Operating Systems- Simple, Batch, Multi Programmed, Time-Shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System Calls, Types of System Calls.

**UNIT II**
**PROCESS AND CPU SCHEDULING:** Process Concepts- The Process, Process State, Process Control Block, **Process Scheduling**- Scheduling Queues, Schedulers, Context Switch, Preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling Algorithms, **PROCESS COORDINATION**: Process Synchronization, the Critical-Section Problem, Peterson's Solution, Semaphores, Classic Problems of Synchronization.

**UNIT III**
**DEADLOCKS**: System model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

**UNIT IV**
**MEMORYMANAGEMENT:** Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Segmentation with Paging, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms,
**FILE SYSTEM INTERFACE:** The Concept of a File, Access methods, Directory Structure, File System Structure, Allocation methods, Disk Scheduling algorithms.

**UNIT V**
**PROTECTION:** System Protection- Goals of Protection, Principles of Protection, Access Matrix, **Security:** - The Security Problem, Program Threats, System and Network Threats, Firewalls.

**TEXT BOOKS:**

1. Abraham Silberchatz, Peter B. Galvin. Operating System Principles. Wiley Student Edition, 2010, 8th Ed.
2. Andrew S Tanenbaum. Modern Operating Systems. Pearson/ PHI, 2011, 3rd Ed.

**REFERENCE BOOKS:**

1. R. Elmasri, A.G.Carrick and D.Levine. Operating Systems. MGH, 2010.
2. A.S. Godbole. Operating Systems. TMH, 2009, 2nd Ed.
3. W. Stallings. Operating Systems-Internal and Design Principles, Pearson Education, 2009, 6th Ed.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2   | 2   | 1   | 1   | 2   | -   | 3   | 1   | 1   | -    | 3    | -    |
| CO2 | 3   | 2   | 1   | 2   | 2   | -   | 3   | 2   | -   | -    | 1    | -    |
| CO3 | 3   | 2   | 1   | 2   | 3   | 1   | 3   | 3   | -   | 1    | -    | -    |
| CO4 | 3   | 2   | 1   | 3   | 3   | -   | 2   | 3   | -   | -    | -    | -    |

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**Third Semester MCA**

**7P2B37  DBMS LAB**

**List of Sample Problems/Experiments**

1. Creation, altering and drop of tables and inserting, deleting and update the rows into a table using SELECT Command.
2. Queries using integrity constraints.
3. Queries using SQL operators like, relational, logical and set operators.
4. Queries using Aggregate and SQL functions.
5. Queries using join conditions.
6. Create Views, Sequences.
7. Write a Simple PL/SQL Program to display student's details.
8. Create PL/SQL block using IF/ELSE IF/NESTED IF statement.
9. Create PL/SQL block using WHILE/FOR Loops.
10. Create PL/SQL block using CURSORS.
11. Create PL/SQL block using EXCEPTION handling.
12. Create PL/SQL block using FUNCTION, PROCEDURE, TRIGGER and PACKAGE.

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**Third Semester MCA**

## 7P2B38  PHP WITH MYSQL LAB

**List of Sample Problems/Experiments**

1. Write a HTML file to create a simple form with 5 input fieldsviz. Name, Password, Email, Pin Code, Phone No. and a Submit button.
2. Write a PHP program to demonstrate required field validations to validate that all input fields are required.
3. Write a PHP program to validate Name, Email and Password.
4. Write a PHP program to display error messages if the above validations do not hold.
5. Create a form for your college library entering student details for each student in the college. Validate the form using PHP validates and display error messages.
6. Read the User id and Passwords entered in the Login form and authenticate with the values (User_Id and Passwords) available in the cookies. If he is a valid user (i.e., User_Name and Password match) you should welcome him by name (User_Name) else you should display "You are not an authenticated user"
7. Write a PHP which does the following job: Insert the details of 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the User_Name and Password from the database (instead of cookies).
8. Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP.
9. Create and delete MYSQL database using PHP.

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**Third Semester MCA**

### 7P2B39  WEB COMPONENT DEVELOPMENT WITH J2EE LAB

**List of Sample Problems/Experiments**

Case Study 1: Library Case Study
Case Study 2:  Retail Domain
Case Study 3: Bank Domain
Case Study 4: Insurance Domain
Case Study 5: Any Internet Application

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**Fourth Semester MCA**
### (7P2B41) SOFTWARE ENGINEERING

**COURSE PREREQUISITES:** Database Systems

**COURSE OBJECTIVE**
1. To explain the basic terminologies and implement systems effectively using various system models
2. To comprehend the testing Process and software evolution in order to meet dynamic changing requirements
3. To develop understanding of advanced concepts and methods required for construction of large software systems
4. To apply project management strategies for effective software development

**EXPECTED COURSE OUTCOMES**
After going through this course the student will be able to:

CO1: Understand the basic terminologies and various Process models associated with software engineering
CO2: Comprehend the testing Process and software evolution
CO3: Analyze and Apply advanced software engineering concepts and methods for construction of large software systems
CO4: Evaluate project management strategies for effective software development

**UNIT – I**
**Software, Software Engineering, and Process**: The nature of Software, The unique nature of WebApps, Software engineering- A layered technology, General principles of software engineering practice, Software myths, Agile development: What is an Agile Process?, Capability Maturity Model Integration (CMMI).

**UNIT – II**
**Process Models:** A Generic process model (framework), Process assessment and improvement, Prescriptive process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process, **Software Requirements**: Functional and Non-functional requirements; User requirements; The software requirements document, **Requirements Engineering Processes**: Requirements elicitation and analysis; Requirements validation; Requirements management, **System Modeling**: Context models; Behavioral models; Data models; Object models; Structured Methods.

**UNIT – III**
**Design concepts**: Design Concepts, **Architectural Design**: Architectural design decisions; System organization; Modular decomposition styles;
**Object-Oriented design:** Objects and Object Classes; An Object-Oriented design process; Design Evolution

## UNIT – IV
**Verification and Validation:** Planning verification and validation; Software inspections; automated static analysis; Verification and formal methods.
**Software testing:** System testing; Component testing; Test case design; Test automation,
**Quality management:** Software Quality Assurance.

## UNIT – V
**Project Management**: Management activities; Project planning; Project scheduling; Risk management.
**Software Cost Estimation:** Software Productivity; Estimation techniques; The COCOMO II Model, Project duration and staffing.

## TEXT BOOKS:
1. Roger S. Pressman. Software Engineering - A Practitioners approach. McGraw-Hill, 2007, 7th Ed.
2. Ian Sommerville. Software Engineering. Pearson Education Publications, 2007,8th Ed.

## REFERENCE BOOKS:
1. Shari Lawrence Pfleeger, Joanne M. Atlee. Software Engineering Theory and Practice. Pearson Education, 2006, 3rd Ed.
2. Waman S Jawadekar. Software Engineering Principles and Practice, Tata McGraw Hill, 2004.

## MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

## CO-PO MAPPING

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2   | -   | 2   | 2   | 3   | 1   | 1   | 2   | 3   | 1    | 1    | -    |
| CO2 | 1   | -   | 1   | 2   | 2   | 1   | 1   | 2   | 2   | -    | 2    | 1    |
| CO3 | 1   | 1   | 3   | 2   | 2   | 1   | 1   | 1   | 3   | 1    | 1    | 1    |
| CO4 | 2   | -   | 2   | 1   | 2   | 2   | 1   | 3   | 2   | 1    | 1    | 2    |

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**Fourth Semester MCA**

## (7P2B42) DATA COMMUNICATION &COMPUTER NETWORKS

**COURSE PREREQUISITES:** Operating Systems and its lab

**COURSE OBJECTIVE**
1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

**EXPECTED COURSE OUTCOMES**
CO1 Independently understand basic computer network technology.
CO2. Understand and explain Data Communications System and its components.
CO3. Identify the different types of network topologies and protocols.
CO4. Enumerate the layers of the OSI model and TCP/IP. Explain the functions of each layer.
CO5. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

**UNIT I**
**INTRODUCTION:** Uses of Computer Networks, Network Topologies, Network hardware, Network Software, **Reference Models**- The OSI Reference model, The TCP/IP Reference Model, A comparison of the OSI and TCP/IP Reference Models; Metric units,
**THE PHYSICAL LAYER: Multiplexing-** Frequency division Multiplexing, Synchronous Time division multiplexing, Code division multiplexing; **Switching-**Packet switching, Circuit switching.

**UNIT II**
**THE DATA LINK LAYER**: **Data Link layer design issues**-Framing, Error control, Flow control; Error Detection and Correction, Elementary data link protocols, Sliding Window protocols.
**THE MEDIUM ACCESS CONTROLSUBLAYER**: The Channel allocation problem, **Multiple access protocols**-ALOHA, Carrier Sense Multiple Access Protocols (CSMA), Collision-Free protocols, Limited-Contention Protocols, Wireless LAN Protocols.

**UNIT III**
**THE NETWORK LAYER:** Network layer design issues; **Routing Algorithms**-The Optimality Principle, Shortest path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcasting routing, **Internetworking-**How Networks Differ, Tunneling, Internetwork Routing, Packet Fragmentation; The IP Version 4 Protocol, IP Addresses, The IP Version 6 Protocol. Internet multicasting.

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**UNIT IV**
**THE TRANSPORT LAYER:** The Transport Service, The Internet transport protocols: UDP, The Internet transport protocols: TCP, Performance Issues;
**THE APPLICATION LAYER:** The Domain Name System(DNS), Electronic Mail;

**UNIT V**
**NETWORK SECURITY**: Cryptography, Symmetric-key cryptography algorithms- Data Encryption Standard (DES), Advanced Encryption Standard (AES); Asymmetric-Key Cryptography algorithms- Rivest, Shamir, and Adleman (RSA); Digital Signature, Entity Authentication.

**TEXT BOOKS:**

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Pearson education, 2018, 5th Ed.
2. Behrouz A. Forouzan, Data Communications and Networking, 4[th]Ed.,McGraw-Hill, 2007.

**REFERENCE BOOKS:**

1. James F. Kurose, Keith W. Rose. Computer Networks- A Top-Down Approach Featuring the internet, Pearson education, 2009.
2. S. Keshav. An engineering Approach to Computer Networking, ATM Networks, the Internet and the Telephone Network. Pearson education, 2009.
3. Williams Stallings. Data and Computer Communication. PEA, 2003, 7th Ed.
4. Nadir F. Mir, Computer and Communication Networks. Pearson Education, 2009.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2 | - | 3 | - | - | 3 | | 1 | - | - | 3 | - |
| CO2 | 3 | - | 2 | - | 3 | | 1 | 2 | - | - | - | - |
| CO3 | 1 | - | - | - | 1 | - | - | - | - | - | 2 | 2 |
| CO4 | 3 | - | - | - | - | - | - | - | - | - | 1 | 1 |
| CO5 | 3 | - | - | - | - | - | - | - | - | - | 2 | 2 |

 Correlation Levels 1,2 or 3 as defined below:
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**Fourth Semester MCA**

## (7P2B43) UNIX & NETWORK PROGRAMMING

**COURSE PREREQUISITES:** Basic knowledge about operating system.

**COURSE OBJECTIVE**
- The Client/Server programming paradigm
- To make the students know about UNIX and LINUX environment
- Berkeley 'sockets' application programming interface

**EXPECTED COURSE OUTCOMES:**
- You will be acquainted with major internet applications and transport protocols
- You will understand the functional layering of network software architectures
- You will be able to write your own socket-based network application programs
- You will gain experience with using software tools for network troubleshooting

**UNIT I**
**INTRODUCTION**: Linux/UNIX Operating System; The Linux/UNIX Architecture; Features of Linux/UNIX; POSIX standard; Locating Commands: ; General Purpose Utilities; Unix file system; Navigating the File System and Relative pathnames; Handling Ordinary Files; The Process basics, , time commands;  Filters: grep, Regular Expression, egrep, fgrep.

**UNIT II**
**ESSENTIAL SHELL PROGRAMMING AND FILE PROCESSING:** shell variables; shell constants; command substitution; parameter substitution; shell meta characters; shell commands: test, control structures, arithmetic in shell, shell functions, input and output redirection, pipes and tee; **FILE PROCESSING:** File types, FILE stream, Standard I/O, file descriptor, system calls for file processing; File permissions and Security, System calls (chmod, chown), Directory management system calls.

**UNIT III**
**LINUX / UNIX PROCESSES I:**The Environment of a Process, main function, Process Termination, Memory Layout of a C Program, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions.
**LINUX / UNIX PROCESSES II:**Process Identifiers, fork, vfork, exit, wait, waitpid, waitid, wait3, wait4 functions, Race Conditions, exec functions, system Function, Process Accounting, User Identification, Process Times, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp, tcsetpgrp, and tcgetsid Functions.

**UNIT IV**
**SIGNALS:** Signal types, Kernel Support for Signals, Signal function, signal mask, sigaction function, The sigsetjmp and siglongjmp Functions, kill, alarm, raise, pause, sigpause functions.

**UNIT V**
**INTERPROCESS COMMUNICATION**: Introduction; Pipes, pipe, popen Functions, Co-processes; FIFOs; XSI IPC; Message Queues; Semaphores, shared memory, **Sockets:**Introduction; Socket Descriptors; Addressing; Connection establishment; Data transfer system calls; Implementation of TCP/IP and UDP.

**TEXT BOOKS:**

1. W.Richard Stevens, Stephen A. Rago. Advanced Programming in the UNIX Environment, Pearson Education / Prentice-Hall of India, 2005, 2$^{nd}$ Ed.
2. Sumitabha Das, UNIX concepts and applications –2010.

**REFERENCE BOOKS:**

1. Terrence Chan. UNIX System Programming Using C++. Prentice-Hall of India / Pearson Education, 1999.
2. Marc J. Rochkind. Advanced UNIX Programming. Pearson Education, 2005, 2$^{nd}$ Ed.
3. Maurice. J. Bach. The Design of the UNIX Operating System. Pearson Education / PHI, 1987.
4. UreshVahalia. UNIX Internals. Pearson Education, 2001.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | - | - | 1 | 1 | - | - | - | 1 | 1 | - | 3 | - |
| CO2 | - | - | 1 | - | - | - | - | 2 | - | - | 1 | - |
| CO3 | - | - | 1 | 2 | - | 1 | - | - | - | 1 | - | - |
| CO4 | - | - | 1 | 3 | - | - | - | 3 | - | - | - | - |

Correlation Level 1,2 or 3 as defined below:
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**Fourth Semester MCA**

**(7P2B44) DATA MINING**

**COURSE PREREQUISITES:** Database Systems

**COURSE OBJECTIVE**
The student should be made to
1. Understand the concept of building a data warehouse and to analyze the mapping concepts.
2. Be familiar with the OLAP tools, application and its categories of application.
3. Understand the concept of data mining techniques, process and about its query languages.
4. Analyze the various mining association rules and understand the concept of classifications.
5. Be familiar with the cluster analysis and categorization of clustering methods.

**EXPECTED COURSE OUTCOMES**
CO1:Student able to design a data mart or data warehouse for any organization
CO2:Student able to asses raw input data and preprocess it to provide suitable input for range of data mining algorithms
CO3:Student able to extract association rules and classification model
CO4: Student able to identify the similar objects using clustering techniques
CO5:Student able to explore recent trends in data mining such as web mining, spatial-temporal mining

**UNIT I**
**Introduction:** What is Data Mining?, Motivating Challenges, The Origins of Data Mining, and Data Mining Tasks. **Data:** Types of Data, Data Quality, Data Preprocessing, Measures of Similarity and Dissimilarity of data,
**Exploring Data:** Summary Statistics.

**UNIT II**
**Classification:** Preliminaries, General Approach to Solving a Classification Problem, Decision tree Induction, **Classification Alternative Techniques:** Rule-Based Classifiers, Bayesian Classifiers.
**UNIT III**
**Association Analysis**: Basic Concepts and Algorithms, Basics of association analysis, Frequent Item set Generation using Apriori algorithm, Rule Generation; Compact Representation of Frequent Item sets, Alternative methods for generating frequent item sets, FP-Growth Algorithm and construction of FP-Growth tree.
**UNIT IV**
**Cluster Analysis:** Basic Concepts and Algorithms: Overview of clustering algorithms, Explains the K-Means, Agglomerative Hierarchical Clustering and DBSCAN algorithms for clustering, an overview of Cluster Evaluation.

**UNIT V**
**Anomaly Detection:** Preliminaries, statistical approaches, proximity based outlier detection, density based outlier detection, clustering based technique.

**TEXT BOOKS:**

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, 2nd Edition, Pearson Education, 2014. Chapters: 1,2,3.2,4.1,4.2,4.3,5.1,5.3,6.1 to 6.6,8.1 to 8.5.1,10

**REFERENCE BOOKS:**

1. Jiawei Han and Micheline Kamber: Data Mining – Concepts and Techniques, 3rd Edition, Morgan Kaufmann, 2011

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 3   | 3   | 3   | -   | 3   |     | 1   | -   | -    | 3    | -    |
| CO2 | 3   | 3   | 2   | 3   | 3   |     | 1   | 1   | -   | -    | -    | -    |
| CO3 | 3   | 3   | -   | 3   | 3   | -   | -   | -   | -   | -    | 2    | 2    |
| CO4 | 3   | 3   | -   | 3   | -   | -   | -   | -   | -   | -    | 2    | 2    |
| CO5 | 3   | 3   | -   | 3   | -   | -   | -   | -   | -   | -    | 2    | 2    |

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## (AN AUTONOMOUS INSTITUTION)

**Fourth Semester MCA**

## (7P2B4A) CLOUD COMPUTING
(Elective I)

**COURSE PREREQUISITES**
- Student must know about different computing models
- A basic knowledge of Virtualization Technologies and Operating Systems

**COURSE OBJECTIVE**

1. The objective of this course is establishing the definition of cloud computing,
2. Describing the various service delivery models of a cloud computing architecture
3. Explaining the ways in which clouds can be deployed as public, private, hybrid, and community clouds.

**EXPECTED COURSE OUTCOMES**

1. Ability to identify various cloud services.
2. Assess cloud characteristics and service attributes, for compliance with enterprise objectives.
3. Explain the four primary cloud category "types".
4. Evaluate various cloud delivery models.
5. Contrast the risks and benefits of implementing cloud computing.

**UNIT I**
**Cloud Computing**: Introduction, History of Cloud Computing, uses, services, types of cloud computing. Applications of Cloud Computing, feature perspective and developments of cloud computing.

**UNIT II**
Working of cloud computing and Collaboration of Cloud computing, Centralizing email communication, cloud computing for community, collaboration on schedules, collaborating on group projects and events, cloud computing for corporation and mapping scheduling & managing projects.

**UNIT III**
Collaborating on calendars, schedulers and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets and databases

**UNIT IV**
Evaluating web mail services, evaluating instant messaging, evaluating web conference tools, Creating groups on social networks, evaluating on line groupware, collaborating via blogs and wikis.

**UNIT V**

Understanding cloud Storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web bases desktops.

**TEXT BOOK:**

1.  Michael Miller. Cloud computing. Pearson Education, New Delhi, 2009.

**MODE OF EVALUATION**

Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 2 | 3 | - | 1 | 1 | - | 1 | - | 1 | - | - | 1 |
| **CO2** | 3 | 2 | 1 | 2 | - | - | 1 | - | 1 | - | 1 | - |
| **CO3** | 3 | 2 | 1 | 3 | - | - | 1 | - | - | 2 | - | - |
| **CO4** | - | 2 | - | 1 | - | - | 2 | - | 3 | - | - | 2 |
| **CO5** | - | 1 | 1 | - |   | - | - | 2 | - | 1 | - | - |

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**Fourth Semester MCA**

**(7P2B4B) COMPUTER GRAPHICS WITH OPEN GL**
(Elective – I)

**COURSE PREREQUISITES:** Linear Algebra, Programming Fundamentals

**COURSE OBJECTIVE**
- Understand how linear Algebra is important in the context of Computer Graphics.
- Demonstrate foundational knowledge of modelling and representations of 3D shapes.
- Understand how real time shading and lighting is implemented.
- Implement an interactive application using ThreeJS and WebGL.
- Communicate their design ideas, models, implementations and outcomes.

**EXPECTED COURSE OUTCOMES**
CO1: Understand the basic principles of implementing copmputer graphics primitives
CO2: Familiarity with key algorithms for modelling and rendering graphical data
CO3: Develop design and problem solving skills with application to computer graphics
CO4: Gain experience in constructing interactive computer graphics programs using OpenGL

**UNIT I**
**Introduction and Output Primitives** -Introduction – Applications - Overview of Graphics System – Introduction to OpenGL – Output Primitives – Line, Circle and Ellipse Generating Algorithms – Interactive Input Methods.

**UNIT II**
**2D - Graphics**- Two Dimensional Transformations -Basic Transformations, Reflection – Shear- 2D Viewing Pipeline – Window to Viewport Mapping - Clipping – Polygons - Splines - Bezier Curves.

**UNIT III**
**3D - Graphics -** 3D Transformations - Viewing a 3D scene - Visible Surface Detection Methods – Visualization and polygon rendering – Color Models – Computer Animation – General Animation Functions - Key Frame systems - Morphing.

**UNIT IV**
**Overview of Multimedia** - Definition - Multimedia Elements Overview - Multimedia Hardware and software – Compression and Decompression - Components of multimedia – Text, Image – Graphics – Audio – Video – Animation – Authoring.

**UNIT V**
**Multimedia Systems and Applications:** Multimedia Communication systems – Synchronization Issues – Presentation requirements – Applications – Video conferencing – Virtual reality – Interactive video – Video on Demand –Introduction to VRML.

**TEXT BOOKS:**
1. Donald Hearn and M. Pauline Baker, "Computer Graphics with OpenGL", Third Edition, 2004,Prentice Hall.
2. Ranjan Parekh, "Principles of Multimedia", 1st Edition, 2006, Tata McGraw-Hill Education.

**REFERENCE BOOKS:**
1. Hearn D and Baker M.P, "Computer graphics – C Version", 2004, 2nd Edition,Pearson Education
2. Angel Edward," Interactive Computer Graphics - A Top-down Approach With Opengl", 2000, 2nd Edition
3. Andries van Dam, F. Hughes John, James D. Foley, Steven K. Feiner, "Computer Graphics: Principles and Practice in C", 2nd Edition, 2002, Pearson Education.
4. Ralf Steinmetz, Klarasteinmetz, "Multimedia Computing, Communications andApplications", 2004, Pearson education

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2   | 3   | -   | 1   | -   | -   | 2   | -   | 1   | -    | -    | 1    |
| CO2 | -   | 2   | -   | 2   | -   | -   | -   | -   | 1   | -    | -    | -    |
| CO3 | -   | 2   | -   | 3   | -   | -   | 3   | -   | -   | -    | -    | -    |
| CO4 | -   | 2   | -   | 1   | -   | -   | 1   | -   | 1   | -    | -    | 2    |

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**Fourth Semester MCA**

**(7P2B4C) SOFTWARE PROJECT MANAGEMENT**
**(Elective I)**

**COURSE PREREQUISITES**
Student must know about Project planning, execution, monitoring and controlling

**COURSE OBJECTIVE**
1. The objective of this course is to study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2. To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software
3. To understand the software project management process and successful software projects that support organization's strategic goals.
4. To implement the project plans through managing people, communications and change

**UNIT I**
**FUNDAMENTALS:** Conventional software management - Evolution of software economics - Improving software economics - Conventional versus modern software project management.

**UNIT II**
**SOFTWARE MANAGEMENT PROCESS FRAMEWORK**: Lifecycle phases - Artifacts of the process - Model based software architectures - Workflows of the process - Checkpoints of the process.

**UNIT III**
**SOFTWARE MANAGEMENT DISCIPLINES:** Iterative process plans - Organization and responsibilities - Process automation - Process control and process instrumentation - Tailoring the process.

**UNIT IV**
**MANAGED AND OPTIMIZED PROCESS**: Data gathering and analysis - Principles of data gathering - Data gathering process - Software measures - Data analysis - Managing software quality - Defect prevention.

**UNIT V**
**CASE STUDIES**: COCOMO cost estimation model - Change metrics - CCPDS-R.

**TEXT BOOKS:**

1. Walker Royce, "Software Project Management - A Unified Framework", Pearson Education, 2004.
2. Humphrey Watts, "Managing the Software Process", Addison Wesley, 1989

**REFERENCE BOOKS:**

1. Ramesh Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001
2. Bob Hughes and Mikecotterell, "Software Project Management", 3rd Edition, Tata McGraw Hill, 2004.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 2 | 3 | - | 1 | 1 | - | 1 | - | 1 | - | - | 1 |
| **CO2** |   | 2 | 1 | 2 | - | - | 1 | - | 1 | - | 1 | - |
| **CO3** |   | 2 | 1 | 3 | - | 1 | 1 | - | - | 2 | - | - |
| **CO4** | - | 2 | - | 1 | - | - | 1 | - | 1 | - | - | 2 |
| **CO5** | - | 1 | 1 | - |   | - | - | 2 | - | 1 | - | - |

Correlation Levels 1,2 or 3 as defined below:1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

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**Fourth Semester MCA**
**(7P2B4D) DISTRIBUTED DATABASES**
(Elective II)
**COURSE PREREQUISITES:** Database systems

**COURSE OBJECTIVE**
This **course** will introduce principles and foundations of **distributed databases**, including architecture, design issues, integrity control, query processing and optimization, transactions, and concurrency control.

**EXPECTED COURSE OUTCOMES**
1.  Explain the techniques used for data fragmentation, replication, and allocation during the distributed database design process.
2.  Evaluate simple strategies for executing a distributed query to select the strategy that minimizes the amount of data transfer.
3.  Explain how the two-phase commit protocol is used to deal with committing a transaction that accesses databases stored on multiple nodes.
4.  Describe distributed concurrency control based on the distinguished copy techniques and the voting methods.

**UNIT I**
**DISTRIBUTED DATABASES:** An overview, Features of Distributed versus Centralized Databases, Why Distributed Databases? Distributed Database Management Systems (DDBMSs), Architecture for Distributed Databases, Types of Data Fragmentation, Distributed Database Access Primitives.

**UNIT II**
**LEVELS OF DISTRIBUTION TRANSPARENCY:** Distribution Transparency for Read-Only Applications, Distribution Transparency for Update Applications, and Integrity Constraints in Distributed Databases, **Distributed Database Design:** A Framework for Distributed Database Design.

**UNIT III**
**OPTIMIZATION OF ACCESS STRATEGIES: Translation of Global Queries into Fragment Queries:** Equivalence Transformations for Queries, Transforming global queries into fragment Queries, Distributed grouping and aggregate function Evaluation, parametric Queries. A Framework for Query Optimization, **The Management of Distributed Transaction:** A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions.

**UNIT IV**
**CONCURRENCY CONTROL:** Foundations of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control Based on Timestamps. **Reliability:** Basic Concepts, Non-blocking Commit Protocols, Checkpoints and Cold Restart.

**UNIT V**
**DISTRIBUTED DATABASE ADMINISTRATION:** Catalog Management in Distributed Databases, Authorization and Protection, Commercial Systems: Tandem's Encompass Distributed database system.

**TEXT BOOK:**
1. Stefano ceri, Giuseppe Pelagatti. Distributed Databases Principles and System.MGH, Aug 2008.

**REFERENCE BOOK:**
2. M.Tamerozsu, Patrick Valduriez. Principles of Distributed database systems. July 2007, 3$^{rd}$ Edition.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | - | - | - | 1 | 2 | - | 3 | 1 | 1 | - | 3 | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | 1 | - |
| **CO3** | - | - | - | 2 | 3 | 1 | - | - | - | 1 | - | - |
| **CO4** | - | - | - | 3 | 3 | - | 2 | - | - | - | - | - |

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## (AN AUTONOMOUS INSTITUTION)
**Fourth Semester MCA**

## (7P2B4E) ARTIFICIAL INTELLIGENCE

**COURSE PREREQUISITES:** Data Structures and Algorithms

**COURSE OBJECTIVE**
To familiarize students with Artificial Intelligence techniques for building well-engineered and efficient intelligent systems. Pattern-directed inference systems and different types of truth maintenance systems will be discussed in length from both theoretical and applied point of view. Some cutting edge applications of these systems will also be discussed. Introduction to Artificial Intelligence Programming using LISP will be provided to help students with the programming part of the course.

**EXPECTED COURSE OUTCOMES:**
CO1 understand the history, development and various applications of artificial intelligence;
CO2 familiarize with propositional and predicate logic and their roles in logic programming;
CO3 learn the knowledge representation and reasoning techniques in rule based systems, case-based systems, and model-based systems;
CO4 appreciate how uncertainty is being tackled in the knowledge representation and reasoning process, in particular, techniques based on probability theory and possibility theory (fuzzy logic);

**UNIT-I**
**Introduction**: What is Artificial Intelligence?, **Intelligent Agents**: Performance Measures, Rationality, The Structure of Agents, **Problem-solving**: Problem-Solving Agents, Formulating Problems, Uninformed Search Strategies.

**UNIT-II**
**Informed Search and Exploration**: Informed (Heuristic) Search strategies, Greedy best-first search, A* search, Memory-bounded heuristic search, Heuristic functions, Inventing admissible heuristic functions, **Local Search algorithms:** Hill-climbing search, Simulated annealing search, Local beam search, Genetic Algorithms.

**UNIT-III**
**Constraint Satisfaction Problems**: Backtracking Search for constraint satisfaction problems, variable and value ordering, Propagating information through constraints, Intelligent backtracking, local search for constraint satisfaction problems, **Adversarial Search**: Games, The minimax algorithm, Alpha-Beta pruning, Imperfect Real-Time Decisions, Games that include an Element of Chance

**UNIT-IV**
**Knowledge and reasoning:** Knowledge-Based Agents, Logic, Propositional Logic, Inference, Equivalence, validity and satisfiability, Resolution, Forward and backward Chaining, Local-search algorithms,
**First-Order Logic:** Syntax and Semantics of First-Order Logic, **Inference in FOL:** Unification and Lifting, Forward Chaining, Backward Chaining.

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**UNIT-V**
**Planning**: Language of planning problems, Planning with state-space search, Partial-order planning, Planning graphs, Planning with propositional logic, **Uncertain Knowledge and reasoning:** Uncertainty, Handling uncertain knowledge, Uncertain and rational decisions, Basic probability notation, The axioms of probability, Inference using full joint distributions.

**TEXT BOOKS:**

1. Artificial Intelligence: A Modern Approach: Stuart Russel and Peter Norving, Prentice Hall Series in AI
2. Artificial Intelligence: Winston P.H., Addison Wesley
3. Artificial Intelligence: E.Rich and Knight, Tata McGraw Hill.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|       | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | -   | -   | -   | 1   | 2   | -   | 3   | 1   | 1   | -    | 3    | -    |
| **CO2** | -   | -   | -   | -   | -   | -   | -   | -   | -   | -    | 1    | -    |
| **CO3** | -   | -   | -   | 2   | 3   | 1   | -   | -   | -   | 1    | -    | -    |
| **CO4** | -   | -   | -   | 3   | 3   | -   | 2   | -   | -   | -    | -    | -    |

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**Fourth Semester MCA**

## (7P2B4F) SYSTEM SOFTWARE
### (Elective – II)
**COURSE PREREQUISITES:** Computer Architecture and Organization

### COURSE OBJECTIVE
The objective of this course is to explore the design and development of interrupt-driven and event-driven software. And also examine the components of sophisticated multilayer software systems, including device drivers, systems software, applications interfaces, and user interfaces.

### EXPECTED COURSE OUTCOMES
CO1: To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger
CO2: Describe the various concepts of assemblers and microprocessors
CO3: To understand the various phases of compiler and compare its working with assembler
CO4: To understand how linker and loader create an executable program from an object module created by assembler and compiler.

### UNIT-I
**INTRODUCTION TO SYSTEMS PROGRAMMING:** Evolution of the Components of a programming System, Foundation of System Software Programming, Machine Architecture – SIC, SIC/XE, Machine language and Assembly language.

### UNIT-II
**INTRODUCTION TO ASSEMBLER**: Introduction to Assembler, Basic Functions of Assembler, Features of Assembler, Assembler Design Options - one Pass and two Pass Assembler, Implementation Example.

### UNIT-III
**INTRODUCTION TO MACROS**: Basic Macro Processor Functions, Features of Macros, Design of Macro processor – Recursive macro expansion, General purpose Macro Processors, Macro processor within language translator, Implementation Example.

### UNIT-IV
**INTRODUCTION TO LOADERS**: Basic Functions of a loader, Features of Loaders, Design of Loaders – Absolute and DLL, Implementation Example.

### UNIT-V
**INTRODUCTION TO COMPILERS:** A brief discussion on various phases of compilers, Applications of FSM and grammars in compiler design.

**TEXT BOOK:**
1. Donovan. Systems Programming, Tata McGraw Hill, 2001.

**REFERENCE BOOKS:**
1. Dhamdhere. System Programming. Tata McGraw Hill. Aug 1999, (2<sup>nd</sup> Revised Ed).
2. Leland, L.Beck. System Software. Pearson Education, Aug, 1996.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2   | -   | 2   | 2   | 3   | 1   | -   | 2   | 3   | 1    | 1    | -    |
| CO2 | 1   | -   | 1   | -   | 2   | -   | 1   | -   | 2   | -    | -    | 1    |
| CO3 | 1   | 1   | 3   | 2   | -   | 1   | 1   | -   | 3   | 1    | -    | 1    |
| CO4 | 2   | -   | 2   | -   | 2   | 2   | -   | -   | -   | 1    | 1    | 2    |

Correlation Level 1,2 or 3 as defined below:
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**Fourth Semester MCA**

### 7P2B47  SOFTWARE ENGINEERING LAB

**Design and Develop following applications:**

1. Online Railway Reservation System
2. Payroll processing application
3. Inventory system
4. Automating the banking process
5. Software for game
6. Library management system
7. Create a dictionary
8. Text editor
9. Telephone directory
10. Create an E-Book of your choice

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**Fourth Semester MCA**
### 7P2B48 UNIX & NETWORK PROGRAMMING LAB

**List of Sample Problems/Experiments:**

## Experiment - 1:
A) The objective of this exercise is to give experience in using telnet to connect to the Linux host, login using the user id and password provided, and then to logout.
1. Fire up the telnet client specifying Lab system as the host.
2. When prompted provide your user id and password.
3. Logout or exit from the session.

B) The objectives of this exercise are to
 * Familiarize yourself with a couple of commonly used commands, and,
 * Let you explore the system a little.
1. Get help on the ls command, and then use the ls command to display the files and directories.
2. Find out who else is on the system.
3. What is your current directory (present working directory)?
4. Pipe the output of the ls –l / command to ls.output and see what you get.

C) The objectives of these exercises are to find out how you can see what a system is running and what resources the system is using.
1. Use the ps –ef | more command to locate what daemons are running on the system.
2. Use the top command to display the system activity.

## Experiment - 2:
A) The objectives of these exercises are to:
 See how Linux can handle multiple file systems
 Examine the /proc file system which Linux uses to provide information about its internal operation
1. Find out what devices are mounted and what file systems are in use.
2. Examine a couple of the /proc files using the more command (hint, use the ls command to see what files exist within the /proc system).

The objective of this exercise is to familiarize you with the hierarchy of files within a file system.
1. Use the cd command to go to the "root" of the file system.
2. Use the cd command to go to your home directory.
3. Create a directory 'test' under your home directory.
4. Create a file 'real.file' within this directory.
5. Create a symbolic link in your home directory to 'real.file' called 'symbolic.link'.

B) The objective of this exercise is to work with files, directories and links.
Explore your file system:
 Identify 1st level directories
 Locate a symbolic link
 Use the umask command to display current default
Create 3 files ('all', 'group', 'owner') and assign permissions:
 All - r/w to owner, group, and others
 Group - r/w to owner and group, r/o to others
 Owner - r/w to owner, r/o to group, none to others

## Experiment - 3:
Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.

## Experiment - 4:
Write a shell script that deletes all lines containing a specific word in one or more files which are supplied as argument to it.

## Experiment - 5:
1. Write a shell script to find factorial of the given integer.
2. Write a shell script to print prime numbers upto given limit.

## Experiment - 6:
Write an awk script to find number of characters, words, and lines in a file.

## Experiment-7:
Write a C program to implement the "cat" utility (file creation, display, file appending, etc.)

## Experiment - 8:
Write a C program that accepts one or more file/directory names as command line input and reports the information such as file type, file permissions, access times, etc.,

## Experiment - 9:
Write a C program to list for every file in a directory, its inode number, size and file name.

## Experiment - 10:
Write a C program that permits a parent process to accept an integer from standard input and communicate to child process. The child process then computes the factors up to that integer and print.

## Experiment - 11:
Write C programs that illustrate communication between two unrelated processes using a named pipe (FIFO).

## Experiment - 12:
Write C programs that illustrate the communication between two unrelated processes using MessageQueues/SharedMemory.

## REFERENCE BOOKS:
1. A practical guide to Linux commands, editors and shell programming: Mark G.sobell-2nd edition-Prentice hall, 2005.
2. W.Richard Stevens, Stephen A. Rago: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education / Prentice-Hall of India, 2005.
3. Terrence Chan: UNIX System Programming Using C++, Prentice-Hall of India / Pearson Education, 1999.

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**Fourth Semester MCA**

## 7P2B49  DATA MINING LAB

The objective of the lab exercises is to use data mining techniques to identify customer segments and understand their buying behavior and to use standard databases available to understand DM processes using WEKA/R (or any other DM tool)

1. Perform credit risk assessment Task using WEKA Tool.
2. Build Multidimensional data models for Bank Management System.
a. Implement the following Multidimensional Data Models for Bank Management System.
    a. Star Schema
    b. Snowflake Schema
    c. Fact Constellation
3. Implement Apriori algorithm to generate frequent Item Sets
4. Implement the following clustering algorithms
    a. K-means
    b. K-mediods
5. Implement the following classification algorithms
    a.  Decision Tree Induction
    b. KNN
6. Perform data Preprocessing using WEKA
7. Perform Discretization of data using WEKA
8. Classification algorithms using WEKA
9. Apriori algorithm using WEKA

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**Fifth Semester MCA**

## (7P2B51) MOBILE APPLICATION DEVELOPMENT

### COURSE PREREQUISITES
- Student must know about the different operating system in mobile
- Basic knowledge of hardware and software of the mobiles

### COURSE OBJECTIVE
- Learning about mobile devices types
- Learning about modern mobile operating systems
- Learning about data transmission standards
- Learning about systems for mobile application distribution
- Preparing for mobile application development

### EXPECTED COURSE OUTCOMES:
CO1:Student knows mobile devices and mobile platforms
CO2:Student has knowledge concerning mobile operating systems and their architecture
CO3: Student is familiar with wireless communications standards and data transmission standards
CO4: Student knows how to prepare a mobile application for distribution

### UNIT I
**Hello, Android:** A Little Background, What Android isn't, Android: An Open Platform for Mobile Development, Native Android Applications, Android SDK Features, Introducing the Open Handset Alliance, What Does Android Run On?, Why Develop for Mobile?, Why Develop for Android?, Introducing the Development Framework, **Getting Started:** Developing for Android, Developing for Mobile and Embedded Devices, Android Development Tools.

### UNIT II
**Creating Applications and Activities:** What Makes an Android Application?, Using the Manifest Editor, Externalizing Resources, The Android Application Lifecycle, Understanding an Application's Priority and Its Process' States, Introducing the Android Application Class, A Closer Look at Android Activities.
**Building User Interfaces:** Fundamental Android UI Design, Android User Interface Fundamentals, Introducing Layouts, Introducing Fragments, The Android Widget Toolbox, Creating New Views, Introducing Adapters.

### UNIT III
**Databases and Content Providers:** Introducing Android Databases, Introducing SQLite, Content Values and Cursors, Working with SQLite Databases, Creating Content Providers, Using Content Providers, Adding Search to Your Application, Creating a Searchable Earthquake Content Provider, Native Android Content Providers, **Working In The Background:** Introducing Services, Using Background Threads, Using Alarms.

### UNIT IV

**Advanced User Experience:** Designing for Every Screen Size and Density, Ensuring Accessibility, Introducing Android Text-to-Speech, Using Speech Recognition, Controlling Device Vibration, Working with Animations, Enhancing Your Views, Advanced Drawable Resources, Copy, Paste, and the Clipboard.

**Hardware Sensors:** Using Sensors and the Sensor Manager, Monitoring a Device's Movement and Orientation, Introducing the Environmental Sensors.

## UNIT V

**Maps, Geo-coding, and Location-Based Services**: Using Location-Based Services, Using the Emulator with Location-Based Services, Selecting a Location Provider, Finding Your Current Location, Best Practice for Location Updates, Using Proximity Alerts, Using the Geo-coder.

**Creating Map-Based Activities, Audio, Video, and Using The Camera:** Playing Audio and Video, Manipulating Raw Audio, Creating a Sound Pool, Using Audio Effects, Using the Camera for Taking Pictures, Recording Video, Using Media Effects, Adding Media to the Media Store.

## TEXT BOOK:

1. Reto Meier: Professional Android 4 Application Development. Wiley India Edition, 2012.  Chapters: 1, 2, 3, 4, 8, 9, 11, 12, 13, 15

## REFERENCE BOOKS:

1. Jerome (J.F.) DiMarzio: Android A Programmer's Guide, Tata McGraw-Hill, 2010
2. B.M. Harwani: Android Programming, Pearson, 2013
3. Jason Ostrander: Android UI Fundamentals Develop and Design, Pearson, 2014

## MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination  (60%)

## CO-PO MAPPING

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 2 | - | - | - | 1 | - | - | - | 2 | - | - | 1 |
| **CO2** |   | - | 1 | 2 | 2 | - | - | - | 3 | - | 1 | - |
| **CO3** | 1 | - | 3 | 3 | - | 1 | - | - | - | 2 | - | 3 |
| **CO4** | - | - | - | 1 | - | 1 | - | - | 1 | - | - | 2 |

 Correlation Levels 1,2 or 3 as defined below:
 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

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**Fifth Semester MCA**

## (7P2B52)    .NET TECHNOLOGIES

### COURSE PREREQUISITES
- As .Net can be used in development for both desktop as well as web applications, first you need to start from C language.
- Understanding/ Graduation with knowledge of any programming language.

### COURSE OBJECTIVES
- Design and Develop professional console and window based .NET application.
- Construct classes, methods and assessors and instantiate objects.
- Create and manipulate GUI components in C#.
- Design and Implement database connectivity using ADO.NET in window based application.
- Identify industry defined problem and suggesting solution(s) using .NET applications.

### EXPECTED COURSE OUTCOMES
- Understand, analyze and explain .NET Framework and C#.
- Understand, analyze and use basic C# constructs, delegates and events and  use language interfaces, and inheritance.
- Understand, analyze and exposed to the Common Language Runtime (CLR), garbage collection, and assemblies.
- Understand, analyze and use exceptions, Windows Forms, .NET Remoting and Serialization.
- Build interactive web applications using ASP.NET and C#.

### UNIT I
**INRODUCTION TO .NET FRAMEWORK**: .NET Overview, Behind Microsoft .NET, The .NET Platform, .NET Framework Design Goals, Common Language Runtime, CLR Environments and Executables , Metadata-JIT Compilation, Automatic Memory Management, Assemblies and Manifests, Intermediate Language(IL),  CTS and CLS-, CLR Execution.

### UNIT II
**INTRODUCTION TO  C# .NET PROGRAMMING**: Introduction to C#, Common Elements in Visual C, C# Core Language Features, Types, Classes, Structures, Enumeration, Inheritance, Interfaces, Polymorphism, Arrays and Collections, Generics, Operator Overloading, Delegates and Events, Introduction to LINQ Programming, Exception Handling, MSIL Programming.

### UNIT III
**APPLICATION DEVELOPMENT USING ADO .NET:** Features of ADO .NET- Architecture of ADO .NET, ADO .NET Providers, Accessing Database using ADO .NET, Connection Opening and Closing- Command Object, Data Adapter, Dataset, Data Tables, Controlling table views with Data Views and Data Relation Objects, Data-binding in Windows Forms and Web Forms.

## UNIT IV
**INTRODUCTION TO ASP.NET**: Introduction, Working in ASP.NET Controls, Session and Cookies, Caching, Authentication and Authorization, Web User Controls, Working with Web Configure file, Implementing Security, Crystal Reports, Creating Setup and Deployment.

## UNIT V
**WEB SERVICES:** Introduction to Web Services, Web Services Protocol and Standards, WSDL, Overview of UDDI, Calling a Web Service from a Browser, Calling a Web Service by using a proxy, Creating a Simple Web Service-AJAX.

## TEXT BOOKS:

1. Thuan L. Thai. .NET Framework Essentials. O'Reilly, 2003, 3<sup>rd</sup> Ed.
2. Donis Marshall. Programming Microsoft Visual C# 2008. Microsoft Press 2008.
3. Francesco Balena. Programming Microsoft Visual Basic .NET. Microsoft Press 2006.

## REFERENCE BOOKS:

1. Rebecca M. Riordan. Microsoft ADO.NET Step by Step. Microsoft Press      2002.
2. Kogent, ASP.NET 3.5 Black Book, Dream Tech Publications, 2010.
3. Andy Wigley, Peter Roxburgh. Building Microsoft ASP.NET Applications for Mobile Devices. Microsoft Press 2003, 2<sup>nd</sup> Ed.

## MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination  (60%)

## CO-PO MAPPING

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 3 | 3 | 3 | - | 3 | 3 | 3 | - | 3 | - | 3 | - |
| **CO2** | 2 | 3 | 3 | - | 3 | 2 | 3 | - | 3 | - | 3 | - |
| **CO3** | 3 | 3 | 3 | - | 3 | 2 | 3 | - | 3 | - | 3 | - |
| **CO4** | 2 | 3 | 3 | - | 3 | 1 | 3 | - | 3 | - | 3 | - |
| **CO5** | 1 | 2 | 2 | - | 1 | 1 | 3 | - | 1 | - | 2 | - |

 Correlation Levels 1,2 or 3 as defined below:
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**Fifth Semester MCA**

### (7P2B53) Object Oriented Modeling and Design with UML

**COURSE PREREQUISITES:** The object-oriented concepts

**COURSE OBJECTIVE**
1. Specify, analyze and design the use case driven requirements for a particular system.
2. Model the event driven state of object and transform them into implementation specific layouts.
3. Identify, Analyze the subsystems, various components and collaborate them interchangeably

**EXPECTED COURSE OUTCOMES**
CO1. Analyze, design, document the requirements through use case driven approach.
CO2. Identify analyses, and model structural and behavioral concepts of the system.
CO3. Develop explore the conceptual model into various scenarios and applications.
CO4. Apply the concepts of architectural design for deploying the code for software.

**UNIT I**
INTRODUCTION: Object Orientation, importance of modeling, principles of modeling, UML architecture and Conceptual model of UML.

**UNIT II**
STRUCTURAL MODELING: Classes, Relationships, Common Mechanisms, Advanced classes, advanced relationships, Interfaces, Packages, modeling Class and Object Diagrams.

**UNIT III**
BEHAVIORAL MODELING: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Collaborations and Activity Diagrams.

**UNIT IV**
ADVANCED BEHAVIORAL MODELING: Events and signals, state machines, processes and Threads, time and space, state chart diagrams

**UNIT V**
ARCHITECTURAL MODELING: Component, Deployment, Component diagrams and Deployment diagrams

**TEXT BOOKS:**
1. Grady Booch, James Rumbaugh, Ivar Jacobson. The Unified Modeling Language User Guide. Pearson Education.1998.
2. Michael Blaha and James Rumbaugh. Object Oriented Modeling and Design with UML, 2005.

**REFERENCE BOOKS:**
1. Craig Larman. Appling UML and Patterns: An introduction to Object - Oriented Analysis and Design and Unified Process. Pearson Education, 2008.
2. Bernd Oestereich. Developing software with UML- Addision-Wesley, June 2002.
3. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado. UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.2004.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | -   | -   | -   | -   | 2   | -   | 3   | 1   | 1   | -    | 3    | -    |
| CO2 | -   | -   | -   | -   | -   | -   | -   | 2   | -   | -    | 1    | -    |
| CO3 | -   | -   | -   | -   | 3   | 1   | -   | -   | -   | 1    | -    | -    |
| CO4 | -   | -   | -   | -   | 3   | -   | 2   | 3   | -   | -    | -    | -    |

Correlation Level 1,2 or 3 as defined below:
1:Slight(Low), 2:Moderate(Medium), 3:Substantial(High), If there is no correlation, put " –"

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**Fifth Semester MCA**

## (7P2B54) BUSINESS ANALYTICS

**COURSE PREREQUISITES:**

Establish the objectives and scope of business and IT systems.

**COURSE OBJECTIVE**

The objective of this course is to explore the data gathered from various domains and apply the preprocessing techniques in case of data tend to be incomplete, noisy and inconsistent and provide analytic solutions to the real world problems using popular statistical tool R.

**EXPECTED COURSE OUTCOMES**

- Analyze and interpret the characteristics of the data using statistics for the given data set.
- Identify the suitable probability approach from the given data set and generate the required size of data set and provide analytic solutions for the given scenario.
- Analyze the relationships among the selected attributes using the regression techniques .
- Generate time series models from the time series data based on the model specifications.

**UNIT I**

Introduction, data, Identifying Data Problems - Eliciting needs and data problems from business users, basics for data analytics, Manipulating data – challenges of analytical data processing, methods for reading in smaller dataset sizes, data exploration.

**UNIT II**

Statistics and Probability – Review of Terminology and concepts, probability theory, distributions.

**UNIT III**

Regression models, Linear Regression, Discrete choice models – Logistic Regression, Multinomial Logistic Regression.

**UNIT IV**

Time series models, Survival and duration analysis.

**UNIT V**

Classification Techniques, Association analysis, Clustering Techniques.

**TEXT BOOKS:**

1. Department of Computer Applications, "Business Analytics with R", Monograph, 2015
2. Jerry Banks, John S Carson II, Barry L Nelson, David M Nicol, "Discrete Event System Simulation", 5th Edition, Pearson Education, 2010
3. Johannes Ledolter, "Data Mining and Business Analytics with R", Wiley, 2013

**MODE OF EVALUATION**

Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | - | - | - | - | 2 | - | 3 | 1 | 1 | - | 3 | - |
| **CO2** | - | - | - | - | - | - | - | 2 | - | - | 1 | - |
| **CO3** | - | - | - | - | 3 | 1 | - | - | - | 1 | - | - |
| **CO4** | - | - | - | - | 3 | - | 2 | 3 | - | - | - | - |

Correlation Level 1,2 or 3 as defined below:

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**Fifth Semester MCA**

# (7P2B5A) BIG DATA
(Elective III)

**COURSE PREREQUISITES:** Database systems

**COURSE OBJECTIVE**
1. Introduce students the concept and challenge of big data (3 V's:volume, velocity, and variety).
2. Teach students in applying skills and tools to manage and analyze the big data.

**EXPECTED COURSE OUTCOMES:**
CO1 : Understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data;
CO2 : Know how to collect, manage, store, query, and analyze various form of big data.
CO3: Gain knowledge on large-scale analytics tools like Hadoop to solve some open big data problems
CO4: Understand the impact of big data for business decisions and strategy.

## UNIT I

INTRODUCTION TO BIG DATA : What is Big Data and why is it important?, Four V"s of Big Data, Drivers for Big Data, Building the big data team, Big data sources, Big Data Analytics applications.

## UNIT II

BIG DATA TECHNOLOGIES : Hadoop's Parallel World, Data discovery, Open-source technology for Big Data Analytics, The cloud and Big Data, Predictive Analytics, Mobile Business Intelligence, Crowd Sourcing Analytics, Inter- and Trans-Firewall Analytics, Information Management.

## UNIT III

THE PEOPLE PART OF THE EQUATION: Rise of the data scientist, Using deep math, science, and computer science, Holistic view of analytics, Creating talent for decision sciences, Setting up the right organizational structure for institutionalizing analytics, Best practices for big data analytics.

## UNIT IV

ADVANCED ANALYTICS PLATFORM: Real-Time Architecture for conversations, Orchestration and Synthesis Using Analytics Engines, Discovery using Data at Rest, Implementation of Big Data Analytics: Big Data Governance, Analytics Business Maturity Model

**UNIT V**

PROCESSING BIG DATA USING HADOOP: What is Hadoop MapReduce?, Hadoop MapReduce components, Advantages of Hadoop MapReduce, Hadoop MapReduce Example, Building blocks of hadoop MapReduce, Design of HDFS, HDFS Concepts, Data flow. Anatomy of a MapReduce job run.

**TEXT BOOKS:**

1. Michael Minelli, Michehe Chambers, AmbigaDhiraj "Big Data, Big Analytics: EmergingBusiness Intelligence and Analytic Trends for Today''s Businesses", 1$^{st}$ Edition, Wiely CIO Series, 2016.
2. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing theGame", 1st Edition, IBM Corporation, 2012.

**REFERENCES:**

1. Frank J. Ohlhorst, "Big data analytics: Turning big data into big money", 1$^{st}$ Edition, Wiley, 2015.
2. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS BusinessSeries, 2012.
3. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O''reilly, 2012.

**MODE OF EVALUATION**

Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | - | - | - | - | - | - | - | 3 | 1 | - | - |
| **CO2** | 1 | - | - | - | - | - | - | - | 2 | - | 2 | 1 |
| **CO3** | 1 | - | - | - | - | - | - | - | - | 1 | - | 1 |
| **CO4** | - | - | - | - | - | - | - | - | 2 | 1 | 1 | 2 |

Correlation Levels 1,2 or 3 as defined below:
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**Fifth Semester MCA**

**(7P2B5B)  SOFT COMPUTING**
(Elective III)

**COURSE PREREQUISITES**
- Algorithms Design and Analysis
- Theory of Computation

**COURSE OBJECTIVE**

The objective of this course is to expose the students to soft computing, various types of soft computing techniques, and applications of soft computing.

**EXPECTED COURSE OUTCOMES:**
- To learn about soft computing techniques and their applications.
- To analyze various neural network architectures .
- To understand perceptron's and counter propagation networks.
- To define the fuzzy systems.
- To analyze the genetic algorithms and their applications.

**UNIT I**
**INTRODUCTION TO SOFT COMPUTING**: Evolution of Computing – Soft Computing Constituents – From Conventional AI to Computational Intelligence – Machine Learning Basics.

**UNIT II**
**GENETIC ALGORITHMS**: Introduction, Building block hypothesis, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion,  mutation operator, Bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem),Differences & similarities between GA & other traditional methods, Applications of GA.

**UNIT III**
**NEURAL NETWORKS :**Machine Learning using Neural Network, Adaptive Networks – Feed Forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks – Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in Neural Networks.

**UNIT IV**
**FUZZY LOGIC:** Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions – Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

**UNIT V**

**NEURO – FUZZY MODELING :** Adaptive Neuro – Fuzzy Inference Systems – Coactive Neuro – Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro – Fuzzy Control – Case Studies.

**TEXT BOOKS:**
1. Jyh – Shing Roger Jang, Chuen – Tsai Sun, EijiMizutani, "Neuro – Fuzzy and Soft Computing", Prentice – Hall of India, 2003
2. KwangH.Lee, "First course on Fuzzy Theory and Applications", Springer – Verlag Berlin Heidelberg, 2005.
3. S.Rajasekaran and G.A.V.Pai. Neural Networks, Fuzzy Logic and Genetic Algorithms. PHI.2003.

**REFERENCE BOOKS:**
1. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic – Theory and Applications", Prentice Hall, 1995.
2. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.
3. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 2007.
4. Mitsuo Gen and RunweiCheng,"Genetic Algorithms and Engineering Optimization", Wiley Publishers 2000.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination (60%)

**CO-PO MAPPING**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | - | - | - | - | - | - | - | - | 3 | 1 | - | - |
| **CO2** | 1 | - | - | - | - | - | - | - | 2 | - | 2 | 1 |
| **CO3** | 1 | - | - | - | - | - | - | - | - | 1 | - | 1 |
| **CO4** | - | - | - | - | - | - | - | - | 2 | 1 | 1 | 2 |
| **CO5** | 3 | - | - | - | - | - | - | - | 1 | 1 | 2 | 2 |

Correlation Levels 1,2 or 3 as defined below:
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**Fifth Semester MCA**

**(7P2B5C)  SOFTWARE ARCHITECTURE**
(Elective III)

**COURSE PREREQUISITES:**  Software Engineering

**COURSE OBJECTIVE**
- The objective of the course is to introduce the fundamentals of software architecture.
- Software architecture and quality requirements of a software system.
- Fundamental principles and guidelines for software architecture design, architectural styles, patterns and frameworks.

**EXPECTED COURSE OUTCOMES**

CO1: Argue the importance and role of software architecture in large- scale software systems
CO2: Design and  motivate  software  architecture for large-scale software systems
CO3: Recognize major software architectural styles, design patterns, and frameworks
CO4: Describe a software architecture using various documentation approaches and architectural description languages

**UNIT I**
**INTRODUCTION TO SOFTWARE ARCHITECTURE**: An Engineering Discipline for Software, Status of Software Architecture, Architecture Business Cycle, Importance of Architectures, Software Processes and the Architecture Business Cycle, Features of Good Architecture.

**UNIT II**
**ARCHITECTURE STYLES:** Pipes and Filters, Data Abstraction and Object Oriented organization, Even-based Implicit Invocation, Layered Systems, Repositories, Interpreters, Process Control, Heterogeneous Architectures.
**Formal models and Specifications:** Formalizing the Architectural of a Specific System, Architectural Style, and Architectural Design Space.

**UNIT III**
**SHARED INFORMATION SYSTEMS:** Database Integration, Interpretation in Software Development Environments, Architectural Structures for Shared Information Systems.

**UNIT IV**
**ARCHITECTURAL PATTERNS:** Structured Patterns, Patterns for Distribution, and Patterns for Interactive Systems.

**UNIT V**
**ARCHITECTURAL  DESCRIPTION  LANGUAGES:** Capturing Architectural Information in an ADL, Application of ADL's in system Development, Example of ADL.

**TEXT BOOKS:**

1. Mary Shaw, David Garlan. "S/W Arch. Perspective: on an Emerging Discipline". PHI, 1996.
2. Len Bass, Paul Elements, Rick Kazman. Software Architecture in Practice. PEA, 1998.

**REFERENCE BOOK:**

   **1.** Buschmann. Pattern Oriented Software Architecture. Wiley, 1996.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1  | 2   | -   | -   | -   | 3   | -   | -   | -   | -   | -    | -    | -    |
| CO2  | 1   | -   | 1   | -   | -   | -   | -   | -   | -   | -    | 2    | 1    |
| CO3  | 1   | 1   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO4  | 2   | -   | 2   | 1   | 2   | -   | -   | -   | -   | -    | 1    | 2    |

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**Fifth Semester MCA**

**(7P2B5D) INFORMATION SECURITY**
(Elective – IV)

## COURSE PREREQUISITES
- Student must have a basic knowledge of how to apply System security techniques
- Different types of attacks and how to overcome those attacks from hackers

## COURSE OBJECTIVE
1. To explore a comprehensive study of the principles and practices of computer system security
2. To continually strengthen and improve the overall capabilities of the information security management system
3. To increase professional skills in terms of information security management and technology
4. To establish quantified information security goals annually through management and review meetings

## EXPECTED COURSE OUTCOMES
1. To strengthen internal control and prevent unauthorized and improper access to data, thereby ensuring the appropriate protection of information assets
2. To appropriately protect the confidentiality and integrity of information assets
3. To ensure that information is not revealed to unauthorized third parties during the process of transmission or as a result of unintentional actions
4. To ensure that all information security accidents or suspected security flaws have appropriate reporting mechanisms so that superiors are notified and these incidents are appropriately investigated and handled

## UNIT I
Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs.

## UNIT II
Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

## UNIT III
Public key cryptography principles, public key cryptography algorithms, digital signatures, Kerberos, X.509 Directory Authentication Service, EMAIL PRIVACY: Pretty Good Privacy (PGP) and S/MIME.

## UNIT IV
IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

**UNIT V**

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats, Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

**TEXT BOOKS:**
1. William Stallings. Network Security Essentials (Applications and Standards). Pearson Education.
2. Bruce Schneier. Applied Cryptography. Toha Wiley and Sons, 1996, 2<sup>nd</sup> Ed.
3. Stallings. Cryptography and Network Security - Principles and Practice. Prentice Hall, 2002, 3<sup>rd</sup> Ed.

**REFERENCE BOOKS:**
1. Eric Maiwald. Fundamentals of Network Security. Dreamtech press, 2003.
2. Charlie Kaufman, Radia Perlman and Mike Speciner.  Network Security - Private Communication in a Public World. Pearson/PHI, 2002.
3. Whitman. Principles of Information Security. Thomson, 2008, 3<sup>rd</sup> Ed.

**MODE OF EVALUATION**

Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 2 | 2 | - | 1 | 1 | - | 1 | - | 1 | - | - | 1 |
| **CO2** |   | 2 | 1 | 2 | 2 | - | 1 | - | 1 | - | 1 | - |
| **CO3** | 1 | 2 | 1 | 3 | - | 1 | 1 | - | - | 2 | - | 3 |
| **CO4** | - | 2 | - | 1 | - | 1 | 1 | - | 1 | - | - | 2 |

        Correlation Levels 1,2 or 3 as defined below:
 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

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**Fifth Semester MCA**

**(7P2B5E) SOFTWARE TESTING METHODOLOGIES**
**ELECTIVE-IV**

**COURSE PREREQUISITES:** Software Engineering

**COURSE OBJECTIVE**
The objective of this course is to explore a clear understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry.

**EXPECTED COURSE OUTCOMES**
- Perform the tests reliably precisely the same operations each time they run, thereby eliminating human error.
- Test how the software reacts under repeated execution of the same operations.
- Do sophisticated tests that bring out hidden information from the application.
- Build a suite of tests that covers every feature in an application.

**UNIT I**
**INTRODUCTION:** The Purpose of testing, Some Dichotomies, Model for testing, Consequences of bugs, Taxonomy of bugs.

**UNIT II**
**FLOW GRAPHS AND PATH TESTING:** Basic Concepts of path-testing, Predicates, path predicates and achievable paths, Path sensitizing, Path instrumentation, Application of path testing,
**TRANSACTION-FLOW TESTING:** Transaction flows, transaction-flow testing techniques.

**UNIT III**
**DATA FLOW TESTING:** Basics of Dataflow testing, Strategies in dataflow testing, Application of dataflow testing.
**DOMAIN TESTING:** Domains and paths, Nice and Ugly domains, Domain testing, Domains and interface testing, Domains and testability.
**UNIT IV**
**PATH, PATH PRODUCTS AND REGULAR EXPRESSIONS:** Path products and path expressions, A Reduction procedure, Applications.
**LOGIC BASED TESTING:** Motivational Overview, Decision tables, Path expressions.

**UNIT V**
**STATE, STATE GRAPHS AND TRANSITION TESTING**: State graphs, Good and bad state graphs, State testing.
**GRAPH MATRICES AND APPLICATIONS:** The Matrix of a graph, Relations, The powers of a matrix, Node-reduction algorithm, Building tools.

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**TEXT BOOK:**
1. Boris Beizer. Software testing techniques. Dreamtech, 2009, 2$^{nd}$ Ed.

**REFERENCE BOOKS:**
1. Edward kit. Software testing in the real world.Addison-Wesley professional, July 1995.
2. Dr.K.V.K.K.Prasad. Software Testing Tools. Dreamtech press, New Delhi, 2007, Reviewed.

**MODE OF EVALUATION**
Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 2 | 2 | - | 1 | 1 | - | 1 | - | 1 | - | - | 1 |
| **CO2** |   | 2 | 1 | 2 | 2 | - | 1 | - | 1 | - | 1 | - |
| **CO3** | 1 | 2 | 1 | 3 | - | 1 | 1 | - | - | 2 | - | 3 |
| **CO4** | - | 2 | - | 1 | - | 1 | 1 | - | 1 | - | - | 2 |

Correlation Levels 1,2 or 3 as defined below:
 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

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**Fifth Semester MCA**

**(7P2B5F) INTERNET OF THINGS**
**ELECTIVE-IV**

**COURSE PREREQUISITES:** Computer Networks
**COURSE OBJECTIVE**

The objective of this course is to explore usage and performance of Internet of Things in real-world applications.

- **EXPECTED COURSE OUTCOMES**
- Explain in a concise manner how the general Internet as well as Internet of Things work.
- Understand constraints and opportunities of wireless and mobile networks for Internet of Things.
- Use basic measurement tools to determine the real-time performance of packet based networks.
- Analyze trade-offs in interconnected wireless embedded sensor networks.

**UNIT I**

**IoT definitions**: overview, applications, potential & challenges, and architecture.
**IoT examples**: Case studies, e.g. sensor body-area-network and control of a smart home.

**UNIT II**

**Introduction to Internet of things**: Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies .

**UNIT III**

**Domain Specific IoTs**: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry.

**UNIT IV**

**IoT Platform Design Methodology**: Purpose & requirements Specification , Process specification, Domain model specification, Information model specification, IoT level specification , Operation view specification , Application Development.

**UNIT V**

**Raspberry PI Interface:** Serial, Serial Peripheral Interface (SPI) and I2C protocol address and Interface.
**Apache Hadoop:** MapReduce Programming Model and HandoopMAP Reduce Job Execution.

**TEXT BOOK :**

1. ArshdeepBahga and Vijay Madisetti. " Internet of Things: a hands-on Approach" , copyright @ 2014.

**MODE OF EVALUATION**

Internal Assessment (40 %) and Term End Examination  (60%)

**CO-PO MAPPING**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2   | -   | -   | -   | 3   | -   | -   | -   | -   | -    | -    | -    |
| CO2 | 1   | -   | 1   | -   | -   | -   | -   | -   | -   | -    | 2    | 1    |
| CO3 | 1   | 1   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO4 | 2   | -   | 2   | 1   | 2   | -   | -   | -   | -   | -    | 1    | 2    |

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### 7P2B57 .NET TECHNOLOGIES LAB

1.  a) Write a Simple Program in C# to write a String on the Screen
    b) Write a Program in C# to prompt the user for some input and then take some action.
2.  Write a Program in C# to demonstrate different kinds of arrays including jagged arrays.
3.  Write a Program in C# to demonstrate boxing.
4.  Write a Program in C# to override a method which calculates pay of employees to take bonus into account.
5.  Write a Program in C# to implement an Interface.
6.  Write a Program in C# to create a base class shape and derived classes i.e., Rectangle, Circle, and Triangle. Invoke the method from base class shape using polymorphism.
7.  Develop a database application to store the details of students using ADO.NET.
8.  Create a Simple ASP.NET page application.
9.  Develop a database application using ADO.NET to insert,modify, update and delete operations.
10. Develop a menu based VB.NET application to implement a text editor with cut, copy, paste, save and close operations.
11. Develop a VB.NET Application using the File, Directory and Directory Controls to implement a Common Dialog Box.
12. Develop a VB.Net application using Data-Grid to display records.

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## 7P2B58 UML LAB

**Select 5 Projects from the following and design UML Diagrams**
1. Online Library System
2. Airlines  Reservation System
3. ATM Model
4. Online Gas Booking System
5. Personal Computer Model
6. Point of Sale
7. Simulated Company
8. Student Model

**REFERENCE BOOKS:**
1. Bernd Oestereich. Developing software with UML. Addision-Wesley, June 2002.
2. Mark Priestley. Practical Object-Oriented Design with UML. Tata Mc-Graw Hill, 2005.
3. Craig Larman. Appling UML and Patterns: An introduction to Object - Oriented Analysis and Design and Unified Process. Pearson Education, 2008.
4. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado. UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.2004.

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**Fifth Semester MCA**

### 7P2B59  MOBILE APPLICATION DEVELOPMENT LAB

1. Developing Simple Applications for Android.
2. Creating Applications with Multiple Activities and a Simple Menu using List View.
3. Creating Activities for Menu Items and Parsing XML Files.
4. Writing Multi-Threaded Applications.
5. Using Web View and Using the Network.
6. Using Audio Functions in Android.
7. Graphics Support in Android.
8. Media Store.
9. Location Services and Google Maps in Android.
10. Simulating Sensors.