

**Regulations and Syllabi  
Of  
Master of Computer Applications  
(Self-Financing)  
Offered from the academic year (2018-2019)**



**MCA DEPARTMENT**

**ETHIRAJCOLLEGE FOR WOMEN  
(AUTONOMOUS)**

**Re-Accredited with 'A' Grade Status by NAAC  
College with Potential for Excellence by the UGC**

**(Effective from the academic year 2018-2019)****1. OBJECTIVES OF THE MASTER'S PROGRAMME**

The Master's programme is designed to

- lay a strong foundation in Computer Applications and Information Technology.
- develop ingenuity in advanced programming languages.
- gain working knowledge with web technologies.
- provide hands on experience in IT applications.
- Motivate students to achieve lifelong learning and to do research in social

**2. ELIGIBILITY FOR ADMISSION**

Candidates who have passed the under-mentioned degree examinations under 10+ 2 +3 or 11+1+3 or 11+2+2 pattern or under the Open University System, shall be eligible for admission to the M.C.A Degree Course.

- (a) B.C.A / B.E.S / B.Sc. in Computer Science / Mathematics / Physics / Statistics / Applied Sciences.
- (b) B.Com / Bachelor of Bank Management / B.B.A / B.L.M / B.A Corporate Secretary-ship / B.A Economics / any other Bachelor's Degree in any discipline with Business Mathematics and Statistics or Mathematics / Statistics in Main / Allied level.
- (c) B.Sc Chemistry with Mathematics and Physics as allied subjects
- (d) B.E / B.Tech / M.B.A
- (e) A Bachelor's Degree in any discipline with Mathematics as one of the subjects at the Higher Secondary level (i.e in +2 level of the 10+2 pattern)

**3. DURATION OF THE COURSE**

The Course duration shall be three years consisting of six semesters. In order to be eligible for the award of the degree the candidate shall successfully complete the course in a maximum period of five years reckoned from the date of enrolment for the first semester of the course.

**4. ELIGIBILITY FOR THE AWARD OF DEGREE**

A candidate shall be eligible for the award of the Degree of Master of Computer Applications only if she has undergone the prescribed courses of study in the Ethiraj College for Women (Autonomous) affiliated to the University of Madras for a period of three academic years and passed the examinations of all the six semesters and fulfilled such conditions as have prescribed therefore.

**5. PROVISION FOR LATERAL ENTRY**

Students who have completed Bachelor's degree of minimum 3 years in B.C.A / B. Sc (Computer Science) with mathematics as a course at 10+2 level or at graduate level shall alone be eligible for admission to second year M.C.A course (Lateral Entry) up to a maximum of 20% of sanctioned intake which will be supernumerary of the approved intake.

## 6. PASSING MINIMUM

A minimum of 50% marks taken as an aggregate of CIA and EE of the course is prescribed for a **PASS**. A candidate who has not secured a minimum of 50% of the maximum marks (**aggregate of CIA: 40 and EE: 60**) in a course shall be deemed to have failed in that course. A candidate who successfully completes the course and passes the examinations of all the six semesters prescribed as per the syllabus earning a minimum of **144** credits shall be declared to have qualified for the degree, provided the whole course has been completed within a maximum period as prescribed and permissible by the College.

## 7. CLASSIFICATION AND RANKING OF SUCCESSFUL CANDIDATES

- a. Successful candidates securing not less than 75 % in the aggregate of the marks prescribed for the course shall be declared to have qualified for the Degree in **First Class with Distinction** provided they pass all the examinations prescribed for the course as well as the project work in the First appearance.
- b. Successful candidates securing not less than 60% in the aggregate of the marks prescribed for the course shall be declared to have qualified for the Degree in **First Class**.
- c. All other successful candidates shall declare to have passed the examination in the **Second Class**.
- d. Only those candidates who have passed all the papers including practical and project work in the first appearance shall be considered for the purpose of **RANKING**
- e. **The candidates admitted in the lateral entry system shall not be considered for Ranking. However, those candidates shall be considered for classification.**

## 8. COMPONENTS OF THE MASTERS PROGRAMME

The Master's Programme has three components. They are Core Courses, Extra Disciplinary Elective, Elective Courses and Soft Skill Courses. Each course carries a credit depending upon the content. Students have to earn **144** credits comprising of Core, Elective, Extra Disciplinary and Soft Skill Courses.

S.NO	Course	Credits
1	Core: Theory	4
	Practical	2
2	Elective and Extra Disciplinary	3
3	Summer Project	2
	Internship	2
4	Major Project and Viva-voce	15
5	Soft Skill	2

## 9. COURSE PROFILE

Course Code	Course Title	Hrs./ Week	Credits	CA	End Sem	Total
<b>SEMESTER I</b>						
MCA18/1C/DCF	Digital Computer Fundamentals	5	4	40	60	100
MCA18/1C/DSS	Data Structures	4	4	40	60	100
MCA18/1C/PSP	Problem Solving and Programming	4	4	40	60	100
MCA18/1C/SEG	Software Engineering	4	4	40	60	100
MCA18/1ED1/MFC	Mathematical Foundations of Computer Science	5	3	40	60	100
MCA18/1P1/DSS	Computer Laboratory- I: Data Structures Lab	5	2	40	60	100
MCA18/1S1/PET	Personality Enrichment	3	2	-	100	100
<b>SEMESTER II</b>						
MCA18/2C/CAM	Computer Architecture and Microprocessors	4	4	40	60	100
MCA18/2C/OSS	Operating Systems	4	4	40	60	100
MCA18/2C/DAA	Design and Analysis of Algorithms	4	4	40	60	100
MCA18/2C/PIC	Programming in C++	4	4	40	60	100
MCA18/2C/DMS	Database Management Systems	4	4	40	60	100
MCA18/2P2/DAA	Computer Laboratory – II: Design and Analysis of Algorithms Lab	5	2	40	60	100
MCA18/2P3/DMS	Computer Laboratory -III: Database Management Systems Lab	5	2	40	60	100
MCA18/2P4/SPT	Computer Laboratory -IV: Summer Project	-	2	40	60	100
MCA18/2S2/FFB	French for Beginners	3	2	-	-	100

## SEMESTER III

Course Code	Course Title	Hrs./Week	Credits	CA	End Sem	Total
MCA18/3C/CNS	Computer Networks	4	4	40	60	100
MCA18/3C/PIJ	Programming in Java	4	4	40	60	100
MCA18/3C/STG	Software Testing	4	4	40	60	100
MCA18/3E1/SAD	<b>Elective I:</b> <ul style="list-style-type: none"> <li>• System Analysis and Design</li> <li>• Software Project Management</li> <li>• Compiler Design</li> </ul>	3	3	40	60	100
MCA18/3E1/SPM						
MCA18/3E1/CDN						
MCA18/2ED2/MCE	M-Commerce	3	3	40	60	100
MCA18/3P5/PIJ	Computer Laboratory – V: Programming in Java Lab	5	2	40	60	100
MCA18/3P6/STG	Computer Laboratory – VI: Software Testing Lab	5	2	40	60	100
MCA18/3S3/BCNA MCA18/3S3/BCNB MCA18/3S3/BCNC	Business Communication - Vantage Business Communication - Preliminary Business Communication – Basic	2	2	-	-	100

## SEMESTER IV

MCA18/4C/DWM	Data Warehousing and Mining	4	4	40	60	100						
MCA18/4C/CNP	C# & .Net Programming	4	4	40	60	100						
MCA18/4C/CNS	Cryptography and Network Security	4	4	40	60	100						
MCA18/4C/PPG	Python Programming	4	4	40	60	100						
MCA18/4E2/AFM MCA18/4E2/STS MCA18/4E2/RMT	<b>Elective II:</b> <ul style="list-style-type: none"> <li>• Accounting and Financial Management</li> <li>• Statistical Methods</li> <li>• Resource Management Techniques</li> </ul>	3	3	40	60	100						
MCA18/4P7/CNP							Computer Laboratory – VII: C# & .Net Programming	5	2	40	60	100
MCA18/4P8/PPG							Computer Laboratory – VIII: Python Programming	5	2	40	60	100
MCA18/4P9/INP	Computer Laboratory – IX: Internship	-	2	-	-	100						
MCA18/4S4/TSR	Technical Seminar and Report Writing	3	2	-	-	100						

## SEMESTER V

Course Code	Course Title	Hrs./Week	Credits	CA	End Sem	Total
MCA18/5C/AJP	Advanced Java Programming	4	4	40	60	100
MCA18/5C/OSS	Open Source Systems	4	4	40	60	100
MCA18/5E3/CCG MCA18/5E3/MCG MCA18/5E3/SCG	<b>Elective III:</b> <ul style="list-style-type: none"> <li>• Cloud Computing</li> <li>• Mobile Computing</li> <li>• Soft Computing</li> </ul>	3	3	40	60	100
MCA18/5E4/DIP MCA18/5E4/BDA MCA18/5E4/IOT	<b>Elective IV:</b> <ul style="list-style-type: none"> <li>• Digital Image Processing</li> <li>• Big Data Analytics</li> <li>• Internet of Things</li> </ul>	3	3	40	60	100
MCA18/5ED3/OBR	Organizational Behaviour	4	3	40	60	100
MCA18/5P10/AJP	Computer Laboratory – X: Advanced Java Programming	5	2	40	60	100
MCA18/5P11/OSS	Computer Laboratory – XI: Open Source Systems Lab	5	2	40	60	100
MCA18/5P12/MPT	Computer Laboratory – XII: Mini Project	5	2	40	60	100
MCA18/5S5/QAE	Quantitative Aptitude	3	2	-	-	100
<b>SEMESTER VI</b>						
MCA18/6S6/ESD	Entrepreneurial Skill Development	3	2	-	-	100
MCA18/6P13/MPV	Computer Laboratory XIII: Major Project and Viva Voce	-	15	80	120	200

**(Summer Project and Internship were carried out during summer vacation for the period of 6 to 8 weeks and will be evaluated in the subsequent semesters)**

**ELECTIVE:****Elective I:**

- System Analysis and Design
- Software Project Management
- Compiler Design

**Elective II:**

- Accounting and Financial Management
- Statistical Methods
- Resource Management Techniques

**Elective III:**

- Cloud Computing
- Mobile Computing
- Soft Computing

**Elective IV:**

- Digital Image Processing
- Big Data Analytics
- Internet of Things

**SOFT SKILL COURSES**

1. Personality Enrichment
2. French for Beginners
3. Business Communication
4. Technical Seminar and Report Writing
5. Quantitative Aptitude
6. Entrepreneurial Skill Development

**10. EXAMINATION AND EVALUATION****10.1. Evaluation pattern of both Theory and Laboratory courses**

Evaluation shall be done on a continuous basis. There shall be **two Tests for two hours** duration (Continuous Internal Assessment Test) and **one External Examination for three hours** duration in each course during each semester. Continuous Assessment will be evaluated by one or more participatory tools such as Test, Assignment/Seminar, Participation Learning and Laboratory activities etc., whichever would be suitable to the course.

**Distribution of marks in the Continuous Internal Assessment for Theory Courses.**

Test	Duration	Max. Marks	CA Final Marks
I	2 Hours	40	10
II	2 Hours	40	10
Assignment/Seminar			10
Participatory Learning			10
<b>Total</b>			40

**Distribution of marks in the Continuous Internal Assessment for Practical**

Test	Duration	Max. Marks	CA Final Marks
I	2 Hours	40	10
II	2 Hours	40	10
Model Exam			10
Record			5
Lab Activities			5
<b>Total</b>			<b>40</b>

**DISTRIBUTION OF MARKS TO CIA AND EE****I. THEORY COURSES:**

Maximum Marks (CIA + EE)	: 100 Marks
Continuous Internal Assessment(CIA)	: 40 Marks
External Evaluation (EE)	: 60 marks

**II. COMPUTER LABORATORY EXAMINATION**

Duration	: 3 Hrs
Maximum for Lab Course	: 100 Marks
Continuous Internal Assessment(CIA)	: 40 Marks
Passing Minimum in CIA	: 20 Marks
External Examination	: 60 Marks
Passing Minimum in EE	: 30 Marks

**III. MINI PROJECT, SUMMER PROJECT AND INTERNSHIP**

Maximum Marks (CIA+EE)	: 100 Marks
Continuous Internal Assessment(CIA)	: 40 Marks
External Examination	: 60 Marks

**Final Marks: Internal + External Marks** : 100 Marks

**IV. MAJOR PROJECT**

Maximum Marks (CIA+EE)	: 200 Marks
Continuous Internal Assessment(CIA)	: 80 Marks
External Examination	: 120 Marks

**Final Marks: Internal + External Marks** : 200 Marks



## 10.2 Examiners for the conduct of Laboratory Examinations

For the conduct of Computer Laboratory Examinations, the Controller of Examinations of the College will appoint one external examiner, one internal examiner who shall normally be the Faculty-in-Charge of the Computer Laboratory Course. The examiners will conduct the examinations and award the marks on the same day and forward the Mark List to the Controller of Examinations of the College.

There will be one question with or without subsections to be asked for the practical examination. Every question should be chosen from the question bank prepared by the examiner(s). Every fourth student should get a new question i.e. each question may be used for at most three students

## 10.3 Distribution of Marks in the evaluation of Lab courses / Mini Project / Summer Project / Internship / Major Project during External Examination.

### 10.3.1 Distribution of Marks in the evaluation of Lab courses

Logical Thinking Skill (Flow chart / Algorithm)	: 12 Marks
Coding Skill ( writing syntax error free codes )	: 12 Marks
Debugging Skill (Entering, Debugging errors and Compilation)	: 12 Marks
Neatness in Presentation of the Output	: 12 Marks
Record Note Book	: 12 Marks

**TOTAL: 60 Marks**

### 10.3.2 DISTRIBUTION OF MARKS IN THE EVALUATION OF MINI PROJECT

<b>Dissertation</b>	<b>Internal</b>	<b>External</b>
Problem for study	4 Marks	4 Marks
Knowledge in the System Requirement Specification	4 Marks	4 Marks
Development of Extra skill in the chosen software	4 Marks	4 Marks
Scientific writing capability	4 Marks	4 Marks
Implementation of the developed System	4 Marks	4 Marks
<b>TOTAL</b>	<b>20 Marks</b>	<b>20 Marks</b>

<b>Viva-voce</b>	<b>Internal</b>	<b>External</b>
Preparation of the Presentation ( OHP/LCD etc)	10 Marks	20 Marks
Defense capability in oral examination	10 Marks	20 Marks
<b>TOTAL</b>	<b>20 Marks</b>	<b>40 Marks</b>

Total Internal Marks: 40; Total External Marks: 60;

**Final Marks: Internal + External Marks**

### 10.3.3 Distribution of Marks in the evaluation of Summer Project and Internship

DISSERTATION	INTERNAL	EXTERNAL
Problem for study	4 Marks	4 Marks
Knowledge in the System Requirement Specification	4 Marks	4 Marks
Development of Extra skill in the chosen software	4 Marks	4 Marks
Scientific writing capability	4 Marks	4 Marks
Implementation of the developed System	4 Marks	4 Marks
<b>TOTAL</b>	<b>20 Marks</b>	<b>20 Marks</b>

Viva-voce	Internal	External
Preparation of the Presentation ( OHP/LCD etc)	10 Marks	20 Marks
Defense capability in oral examination	10 Marks	20 Marks

**TOTAL 20 Marks 40 Marks**

Total Internal Marks: 40; Total External Marks: 60;

**Final Marks: Internal + External Marks**

### 10.3.4 DISTRIBUTION OF MARKS IN THE EVALUATION OF MAJOR PROJECT AND VIVA VOCE

Dissertation	Internal	External
Problem for study	8 Marks	16 Marks
Knowledge in the System Requirement Specification	8 Marks	16 Marks
Development of Extra skill in the chosen software	8 Marks	16 Marks
Scientific writing capability	8 Marks	16 Marks
Implementation of the developed System	8 Marks	16 Marks
<b>TOTAL</b>	<b>40 Marks</b>	<b>80 Marks</b>

Viva-voce	Internal	External
Preparation of the Presentation ( OHP/LCD etc)	20 Marks	20 Marks
Defense capability in oral examination	20 Marks	20 Marks
<b>TOTAL</b>	<b>40 Marks</b>	<b>40 Marks</b>

Total Internal Marks: 80; Total External Marks: 120;

**Final Marks: Internal +External Marks.**

**10.3.5 DISTRIBUTION OF MARKS IN THE EVALUATION OF TECHNICAL SEMINAR AND REPORT WRITING**

Every student should submit a final paper as per project specifications along with all short review reports (at least 5 internal reviews) and corresponding evaluation comments to the concerned staff members.

Choice of subject and Review of Literature	: 20 marks
Organization and Interpretation	: 20 marks
Report Writing	: 20 marks
Project Presentation	: 20 marks
Viva-Voce	: 20 marks
<b>Total</b>	<b>: 100 marks</b>

**10.3.4 SOFT SKILL COURSES**

Maximum Marks : 100 Marks

**Written Examination for 3 Hours duration at the end of the semester and only internal valuation applicable.**

## 11. QUESTION PAPER PATTERN

## A. WRITTEN EXAMINATION: CORE, ELECTIVE AND EXTRA DISCIPLINARY COURSES

<b>INTENDED LEARNING SKILLS</b>	<b>Maximum : 100 Marks;</b> <b>Passing Minimum : 50 Marks;</b> <b>Duration: 3 Hrs.</b>
Memory Recall / Definition	<p style="text-align: center;"><b>PART –A (10 X 2 = 20 Marks)</b>            Answer <b>ALL</b> Questions            (Each question carries <b>2 Marks</b>)</p> <ol style="list-style-type: none"> <li>1. Question from Unit I</li> <li>2. Question from Unit I</li> <li>3. Question from Unit II</li> <li>4. Question from Unit II</li> <li>5. Question from Unit III</li> <li>6. Question from Unit III</li> <li>7. Question from Unit IV</li> <li>8. Question from Unit IV</li> <li>9. Question from Unit V</li> <li>10. Question from Unit V</li> </ol>
Example/ / Knowledge about the Concepts/ Understanding/Descriptions	<p style="text-align: center;"><b>PART-B (5 X 6 = 30 Marks)</b>            Answer any <b>FIVE</b> questions out of <b>SEVEN</b> questions            (Each question carries <b>6 Marks</b>)</p> <ol style="list-style-type: none"> <li>11. Question from Unit I</li> <li>12. Question from Unit II</li> <li>13. Question from Unit III</li> <li>14. Question from Unit IV</li> <li>15. Question from Unit V</li> <li>16. Question from Unit I/II/III/IV/V</li> <li>17. Question from Unit I/II/III/IV/V</li> </ol>
Application / Analysis / Synthesis / Evaluation/	<p style="text-align: center;"><b>PART-C (5 X 10 = 50 Marks)</b>            Answer <b>ALL</b> Questions            (Each question carries <b>10 marks</b>)</p> <ol style="list-style-type: none"> <li>18. a. Question from Unit I (Or) b. Question from Unit I</li> <li>19. a. Question from Unit II (Or) b. Question from Unit II</li> <li>20. a. Question from Unit III (Or) b. Question from Unit III</li> <li>21. a. Question from Unit IV (Or) b. Question from Unit IV</li> <li>22. a. Question from Unit V (Or) b. Question from Unit V</li> </ol>

Question papers should be set with the maximum 100 marks and the answer scripts should be evaluated for 100 marks. The awarded marks should be converted to the maximum of 60 Marks.

**12. FORMAT FOR THE PREPARATION OF RECORD/PROJECT WORK****12.1 Record of Laboratory work in the case of Programming exercises**

- (a) Aim
- (b) Flowchart and/or Algorithm
- (c) Source Code
- (d) Input/output specification
- (e) Printout(s)
- (f) Remarks /Scope / Limitations of the Experiment.

**12.2 Format for the Project Work**

- (a) Title page
- (b) Bonafide Certificate
- (c) Acknowledgement
- (d) Table of contents
- (e) Summary of content
- (f) Chapter-wise report
- (g) References
- (h) Appendices, if any.

**12.3 Format of the Title Page**

<p style="text-align: center;"><b>TITLE OF THE PROJECT</b> <i>A project report</i> <i>Submitted in partial fulfillment for</i> <i>the award of the Degree of</i> Master of Computer Applications</p> <p style="text-align: center;">by</p> <p style="text-align: center;">Candidate's name (Register Number)</p> <p style="text-align: center;">Under the guidance of Guide's name</p> <p style="text-align: center;"><b>Name of the Department</b> <b>College Name</b> <b>Month and Year</b></p>
---

## 12.4 Format of the Certificate

For Dissertation	For Laboratory Records
<p style="text-align: center;"><b>CERTIFICATE</b></p> <p>This is to certify that the report entitled  <b>“TITLE OF THE PROJECT”</b>  being submitted to the Ethiraj College for  Women,(Autonomous).  affiliated to the University of Madras, Chennai</p> <p style="text-align: center;">by  Candidate’s name</p> <p>In partial fulfillment for the award of the Degree of</p> <p style="text-align: center;"><b>Master of Computer Applications</b></p> <p>is a bona fide record of work carried out by her under  my guidance and supervision</p> <p>Date:                      Signature                      Signature of the  Place:                      of the Guide                      HOD</p> <p>Submitted for the viva-voce examination  at..... on  .....</p> <p>Examiner-1: .....  (Signature and Name of the Examiner)  Examiner-2: .....  (Signature and Name of the Examiner)</p>	<p style="text-align: center;"><b>CERTIFICATE</b></p> <p>This is to certify that this is the bonafide record of  work carried out under my supervision in the  Computer Laboratory Course:  <b>“TITLE OF THE LABORATORY COURSE”</b>  submitted to the Ethiraj College for  Women,(Autonomous).  affiliated to the University of Madras, Chennai</p> <p style="text-align: center;">by  Candidate’s name</p> <p>as a part of Course work leading to the award of  the Degree of</p> <p style="text-align: center;"><b>Master of Computer Applications</b></p> <p>Date:                      Signature                      Signature of the  Place:                      of the Faculty                      HOD</p> <p>Submitted for Laboratory Examination  at..... on  .....</p> <p>Examiner-1: .....  (Signature and Name of the Examiner)  Examiner-2: .....  (Signature and Name of the Examiner)</p>

## 13.REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

Candidates shall register their names for the First Semester Examination after the admission in the Master’s Programme. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester examinations subject to the condition that the candidates should register for all the arrear courses of earlier semesters along with current (subsequent) semester courses. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the College from time to time.

**“Provided in the case of candidate earning not less than 50% of attendance in any one of the semesters due to any extraordinary circumstance such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the course of study. Such candidate shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the College from time to time”.**

**COMMENCEMENT OF THIS REGULATION**

These regulations shall take effect from the academic year 2018, for students who are admitted to the first year of the course during the academic year 2018 and thereafter.

**TRANSITORY PROVISION**

Candidates who were admitted to the course of study in 2018 under this Master's Programme shall be permitted to appear for the examinations under those regulations for a period of three years i.e., up to and inclusive of the examination of March/April 2018. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

## SEMESTER – I

### DIGITAL COMPUTER FUNDAMENTALS

PAPER NO – I

COURSE CODE : MCA18/1C/DCF

Teaching Hours: 15 x 4 = 60 Hrs

L T P C : 4 0 0 4

**OBJECTIVES:**

- To identify various number systems and work with Boolean Algebra
- To understand various logic gates
- To simplify the Boolean expression using K -Map and Tabulation techniques
- To analyze various types of flip flops used for designing registers and Counters.

**COURSE OUTLINE:**

- UNIT I** : Number system: converting numbers from one base to another-complements- Binary Codes -Binary storage and registers- Binary Logic- Integrated Circuits Boolean Algebra- Boolean Functions-Canonical and standard forms- Other Logic operations-Digital Logic gates. 12Hrs
- UNIT II** : Simplification of Boolean Functions: K-map method Simplification- Product of Sums- NAND NOR implementation- Don't Care Conditions- The Tabulation method. 12 Hrs
- UNIT III** : Combinational Logic: Introduction - Design Procedures - Adders-Sub tractors- Code Conversion- Multilevel NAND NOR circuits- XOR and Equivalence function- Binary Parallel Adder- Decimal Adder- Decoders- Multiplexers. 12Hrs
- UNIT IV** : Sequential Logic: Flip flops- Triggering of Flip Flops- Clocked Sequential Circuits- Design of Counters- Registers- Shift Registers- Ripple Counters and Synchronous Counters. 12Hrs
- UNIT V** : Register Transfer Logic: Introduction- Inter register Transfer- Shift Micro Operations- Conditional Control Statement- Fixed point binary Data- Overflow- Arithmetic Shifts- Decimal Data- Floating point Data- Non numeric Data- Instruction Codes- Design of Arithmetic and Logic Unit. 12Hrs

**COURSE OUTCOME:**

The students must be able to understand the

- Simplification of Boolean expressions using K-map and Tabulation method.
- Gaining of knowledge in designing Combinational and Sequential circuits.
- Acquirement of technical skills to elucidate Register Transfer Logic.
- Demonstrating Registers and Counters Implementation.

**BOOKS FOR REFERENCES:**

1. Morris Mano, Digital Logic and Computer Design, PHI, Sixth Edition 2013.
2. M.M. Mano and C. R. Kime, Logic and Design Fundamentals, Pearson Education, Fifth Edition, 2015.
3. Thomas Bartee, Digital Logic Fundamentals, 6<sup>th</sup> Edition, Tata McGraw Hill Education, 2015.
4. K. Shashidhar, Digital & Computer Fundamentals, Sapna Book House, 2014.
5. A. Anand Kumar, Fundamentals of Digital Circuits, PHI, Fourth Edition 2014.



**E-LEARNING RESOURCES:**

<https://learn.sparkfun.com/tutorials/digital-logic#boolean-logic-in-programming>

<http://scanlibs.com/logic-computer-design-fundamental>.

## SEMESTER – I DATA STRUCTURES

**PAPER NO – II**

Teaching Hours: 15 x 4 = 60 Hrs

**COURSE CODE: MCA18/1C/DSS****L T P C : 4 0 0 4****OBJECTIVES:**

- To extend the students' knowledge of data structures
- To enhance their expertise in various operations of data structures.
- To learn a variety of useful data structures and applications
- To extrapolate from them in order to apply those data structures to solve a problem

**COURSE OUTLINE:**

- UNIT I** : Introduction, Basic Terminology, Data Structures, Data Structure Operations, Preliminaries – Algorithmic Notation, Complexity of Algorithms 10 Hrs
- UNIT II** : Arrays, Records and Pointers – Introduction, Linear Arrays, Representation of Linear Arrays, Operations on Linear Arrays, Searching- Linear and Binary, Multidimensional Arrays, Pointer Arrays, Records, Representation of Records, Matrices and sparse Matrices. 10 Hrs
- UNIT III** : Linked List – Representation, Traversing, Searching, Memory Allocation, Insertion into and Deletion Stacks, Application of Stacks, Queues and Recursion, Towers of Hanoi. 14 Hrs
- UNIT IV** : Trees -Binary Trees, Representation of Binary Trees, Traversing, Binary Search Trees, Searching and Inserting and Deleting, Heap Sort, Huffman Algorithm. 13 Hrs
- UNIT V** : Graphs, Representation, Shortest paths, Operations and traversing of Graphs, Sorting and Searching – Insertion Sort, Selection Sort, Merge Sort, Radix sort 13 Hrs

**COURSE OUTCOMES:**

The students must be able to understand the

- Design data structures and algorithms to solve computing problems
- Design algorithms using graph structure and various string matching algorithms to solve real-life problems
- Apply suitable design strategy for problem solving

**BOOKS FOR REFERENCES:**

1. Seymour Lipschutz - Theory and Problems of Data Structures -Schaum's Outline Series.
2. E.Horowitz, S.Sahni and Mehta – Fundamentals of Data structures, Galgotia 1999
3. Gregory L.Heilmann – Data Structures, Algorithms and Object Oriented Programming, McGraw Hill International Edition – 1996
4. A.V.Aho, J.D.Ullman, J.E.Hopcraft, Data Structures and Algorithms, Addison Wesley Publications, 2006.
5. Jean Paul Tremblay, Paul G.Sorenson, An Introduction to Data Structures with Application, TMH,1995.

**E-LEARNING RESOURCES:**

[www.cee.hw.ac.uk](http://www.cee.hw.ac.uk),

[www.softpanorama.org/Algorithms](http://www.softpanorama.org/Algorithms)

## SEMESTER – I

### PROBLEM SOLVING AND PROGRAMMING

PAPER NO – III

COURSE CODE: MCA18/1C/PSP

Teaching Hours: 15 x 4 = 60 Hrs

L T P C : 4 0 0 4

**OBJECTIVES:**

- The Course provides the problem solving techniques.
- The Students can gain the knowledge of implementing problem solving techniques using programming languages.
- To understand the concepts of Programming language
- To learn the basics of C declarations, operators and expressions
- To learn on the manipulation of strings, functions and pointers
- To learn file and customizing I/O files.

**COURSE OUTLINE:**

- UNIT I** : Introduction – The Problem Solving aspect – Top down Design – Implementation of Algorithms – Program Verification – Efficiency of Algorithms – Analysis of Algorithms. 12Hrs
- UNIT II** : Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input/output Operations – Formatted I/O. 12Hrs
- UNIT III** : Decision Making - Branching – IF, Nested IF – Switch – goto - Looping- While, do, for statements. 12Hrs
- UNIT IV** : Arrays – dynamic and multi-dimensional arrays - Character arrays and Strings – String handling Functions - User defined Functions – Categories of Functions – Recursion - Structures and Unions – Array of Structures – Structures and Functions. 12Hrs
- UNIT V** : Pointers – Declaration, Accessing a variable, character strings, pointers to functions and structures - File Management in C – Dynamic Memory location – Preprocessors. Command Line Arguments 12Hrs

**COURSE OUTCOMES:**

The students must be able to understand the,

- Fundamentals of C programming.
- Loops and decision making statements to solve the problem.
- Implementation of different Operations on arrays.
- Usage of functions to solve the given problem.
- Pointers, Structures and Unions

**BOOKS FOR REFERENCES:**

1. R.G.Dromley "How to Solve it by Computer ", Pearson Education , 2006
2. Yashwant kanetkar “ Let Us C “ 15<sup>th</sup> Edition, BPB Publications. 2014
3. E.Balagurusamy, “Programming in ANSI C”, Tata McGraw Hill, 2015
4. VenuGopal and Prasad, “Mastering C”, Tata McGraw Hill, 2013.
5. Deitel and Deitel "C How to Program ", Addisson Wesley, 2001
6. Brian W.Kernighan& Dennis Ritchie "C Programming Language", PHI, 1990
7. Byron.S.Gottfried "Schaum's Outline of Programming with C", 2nd Edition, 1996

**E-LEARNING SOURCE:**

[www.nptel.iitm.ac.in](http://www.nptel.iitm.ac.in)

## SEMESTER – I

### SOFTWARE ENGINEERING

**PAPER NO – IV**

**COURSE CODE: MCA18/1C/SEG**

**Teaching Hours: 15 x 4 = 60 Hrs**

**L T P C : 4 0 0 4**

#### OBJECTIVES:

- To comprehend software development process and formal specifications
- To know advanced software development techniques and its applications in real world context.
- To understand how to manage complex projects
- To use advanced software testing techniques
- To understand process improvement and re-engineering

#### COURSE OUTLINE:

- UNIT I** : A Generic View of Process – Process Models-The Waterfall Model- Incremental Model-Evolutionary Model-Specialized Model-The Unified Process–Agile Process – Agile Models – Software Cost Estimation – Planning – Risk Analysis – Software Project Scheduling. 12 Hrs
- UNIT II** : System Engineering Hierarchy – System Modeling – Requirements Engineering: Tasks- Initiating the Process-Eliciting Requirements-Developing Use Cases- Negotiating Requirements-Validating Requirements. 12 Hrs
- UNIT III** : Building the Analysis Models: Concepts. Design Concepts – Design Models – Pattern Based Design – Architectural Design – – Class Based and Conventional Components Design – User Interface Design . 12 Hrs
- UNIT IV** : Software Testing – Strategies: Conventional - Object Oriented – Validation Testing – Criteria – Alpha – Beta Testing- System Testing – Recovery – Security – Stress – Performance - Testing Tactics – Testing Fundamentals-Black Box – While Box – Basis Path-Control Structure. 12 Hrs
- UNIT V** : Software Configuration And Management-Features-SCM Process - Software Quality Concepts – Quality Assurance – Software Review–Technical Reviews – Formal Approach To Software Quality Assurance – Reliability – Quality Standards – Software Quality Assurance Plan. 12 Hrs

**COURSE OUTCOMES:**

The students must be able to,

- Understand the advantages of various Software Development Lifecycle Models
- Gain knowledge on project management approaches as well as cost and schedule Estimation strategies
- Perform formal analysis on specifications
- Use UML diagrams for analysis and design
- Architect and design using architectural styles and design patterns
- Understand software testing approaches

**BOOKS FOR REFERENCES:**

1. Ian Sommerville, "Software Engineering", Addison-Wesley 9 th Edition, 2010
2. Bernd Bruegge, Allen H. Dutoit, "Object-Oriented Software Engineering", Prentice Hall, Third Edition, 2009.
3. R.S. Pressman, Software Engineering A practitioner's Approach , 8<sup>th</sup> Edition, MH,2005.
4. Roger S. Pressman, "Software Engineering – A Practioner's Approach", MCGraw Hill, 7th edition, 2009.
5. James Shore, Shane Warden "The Art of Agile Development - Pragmatic guide to agile software development", O'Reilly Media, October 2007.
6. Ken Schwaber, "Agile Project Management with SCRUM", Microsoft Press, 2004

**E-LEARNING SOURCE:**

[www.mhhe.com](http://www.mhhe.com),

[www.comp.lancs.ac.uk](http://www.comp.lancs.ac.uk)

**SEMESTER – I**  
**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

PAPER NO – V

COURSECODE : MCA18/1ED1/MFC

Teaching Hours: 15 x 4 = 60 Hrs

L T P C : 3 1 0 3

**OBJECTIVES:**

- To develop logical thinking.
- To learn basics of set & graph theory.
- To introduce basics of statistics and probability.

**COURSE OUTLINE:**

- UNIT I** : Mathematical Logic: Introduction - Statements and Notation - Connectives :Negation, Conjunction, Disjunction, Conditional and Biconditional , Statement Formulas and Truth Tables. 8 Hrs
- UNIT II** : Statement and Predicate Calculus: The theory of Inference for the Statement Calculus : Validity Using Truth tables –Rules of inference-Consistency of Premises and Indirect Method of Proof- The Predicate Calculus :Predicates – Statement Function, Variables and Quantifiers – Theory of Inference for the Predicate Calculus . 16Hrs
- UNIT III** : Set And Graph Theory: Basic Concepts of Set Theory – Operations on Sets – Venn Diagrams – Basic Set Identities – Basic Concepts of Graph Theory : Basic Definitions–Paths, Reachability and connectedness. 12 Hrs
- UNIT IV** : Fundamentals Of Statistics :Classification And Tabulation of Data: Types of Classification – Types of Tables – Diagrammatic and Graphic Presentation – Measures of Central Value – Arithmetic Mean, Median, Mode. 12 Hrs
- UNIT V** : Probability: Calculation of Probability – Theorems of Probability: Addition theorem –Multiplication theorem-Conditional Probability – Bayes’ Theorem. ( Statements only ) ( Note : No Derivation Required ) 12 Hrs

**COURSE OUTCOME:**

The students must be able to,

- perform Logical operations and predicate calculus needed for computing skill
- develop basic knowledge of Set and Graph theory concepts needed for designing and solving problems.
- apply the acquired knowledge of Statistics and Probability



**BOOKS AND REFERENCES:**

1. J.P.Tremblay, R.Manohar, Discrete Mathematical Structures with applications to Computer Science, TM Hall Edition, 2008.
2. S.P.Gupta , Statistical Methods ,Sultan Chand & Sons, 2011.
3. D.C.Sancheti , V. K . Kapoor , Statistics ( Theory , Methods and Applications ),Sultan Chand &Sons, 201 .

**E-LEARNING RESOURCES:**

<http://nptel.ac.in/courses/106106094/>

<http://nptel.ac.in/courses/111107058/>

<http://nptel.ac.in/courses/111101004/>

**SEMESTER – I  
COMPUTER LABORATORY-I:  
DATA STRUCTURES LAB**

**PAPER NO – VI****COURSE CODE : MCA18/1P1/DSP****Teaching Hours : 15 x 5 = 75 Hrs****L T P C : 0 0 5 2**

1. Write a C programme to sort an array values using Insertion Sort.
2. Write a C programme to do stack operations.
3. Write a C programme to do queue operations.
4. Write a C programme to do the single linked list operations.
5. Write a C programme to do the doubly linked list operations.
6. Write a C programme to do the circular linked list operations.
7. Write a C programme to perform infix, prefix, postfix operations.
8. Write a C programme to perform Towers of Hanoi problem.
9. Write a C programme to construct binary search tree and to perform searching operation.
10. Write a C programme to construct binary tree and perform inorder, preorder and post order traversal.
11. Write a C programme to perform Floyd and Warshall algorithms.
12. Write a C programme to perform DFS and BFS for the given graph.

**SEMESTER – II**  
**COMPUTER ARCHITECTURE AND MICROPROCESSORS**

**PAPER NO – VIII****COURSE CODE : MCA18/2C/CAM****Teaching Hours: 15 x 4 = 60 Hrs****L T P C : 4 0 0 4****COURSE OBJECTIVES:**

- To understand of the basic structure and operation of a computer system and microprocessor.
- To study the ISA level including Instruction and data types.
- To study the different processors like 8085 and 8086.

**COURSE OUTLINE:**

- UNIT I** : Computer Systems Organization: The Micro Architecture Level: An example micro architecture – Design of Micro architecture level – Improving performance – Comparison of i7, OMAP4430, ATMEGA168 Micro controller. 12 Hrs
- UNIT II** : The Instruction Set Architecture Level: Overview of the ISA level – Data types – Instruction formats and addressing – Instruction types – Flow of Control. 12 Hrs
- UNIT III** : Operating System Machine Level: Virtual Memory – OSM level Instructions for parallel processing – Introduction to Assembly Language – Assembly Process. 12 Hrs
- UNIT IV** : Microprocessor: Detailed study over 8085 and 8086 processor – Addressing Modes – Assembler – Instruction Set of 8085 – Data Transfer schemes – Handshaking – Polling – DMA – I/O processor. 12 Hrs
- UNIT V** : Instruction Execution Mechanism – Machine Language Processor – Completeness of Instruction Set – Assembly Language programs for common application problems such as Sorting, Searching and Delay routines. 12 Hrs

**COURSE OUTCOME:**

The students must be able to,

- Simplify the micro architecture level and its design.
- Gain of knowledge in Assembly language and assembly process.
- Understand the basic principles of Microprocessors and Instruction Set.
- Demonstrate the exactness of the basic algorithms in assembly language.

**BOOKS FOR REFERENCES:**

1. Andrew S Tanenbaum, 6th Edition “Structured Computer Organization”, Pearson-Prentice Hall, 2013. ( Unit I, II, III)
2. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 6th Edition, Pearson Education, 2003.
3. Gaonkar, “Microprocessor Architecture Programming Applications with 8085/8080A”, Penram International Publishers, 2012. (Unit IV, V)
4. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The hardware / software interface”, 2nd Edition, Morgan Kaufmann, 2002.
5. Hayes, John P, “Digital System Design and Microprocessors”, TataMcGraw-Hill Publishers, 2012.

**E-LEARNING RESOURCES:**

[www.nptel.iitm.ac.in](http://www.nptel.iitm.ac.in)

## SEMESTER – II OPERATING SYSTEMS

PAPER NO – IX

COURSE CODE : MCA18/2C/OSS

Teaching Hours: 15 x 4 = 60 Hrs

L T P C : 4 0 0 4

**OBJECTIVES:**

- In this course students will learn the fundamental principles of modern operating systems.
- The principles that are used in practice by writing system software and complete components of an operating system, including the system call interface, user processes, virtual memory, and a file system.
- To know about file management and the memory management

**COURSE OUTLINE:**

- UNIT I** : Introduction – Types of Operating Systems – Operating Systems Structure – Systems Components – Operating System Services – system calls – system programs – processes – process concept- process scheduling- operation on processes – co-operating processes – inter process communication - - CPU Scheduling – scheduling criteria – scheduling algorithms- multiple processor scheduling. 12 Hrs
- UNIT II** : Process Synchronization – Critical Section Problem – Semaphores – Classical Problems of Synchronization – Critical Regions – Monitors – Deadlock Characterization – Deadlock Handling – Deadlock Prevention – Deadlock Avoidance- Deadlock Detection – Deadlock Recovery – Threads – Multithreading models. 12 Hrs
- UNIT III** : Memory Management – Swapping – Contiguous Memory Allocation – Paging – Segmentation – Virtual Memory – Demand Paging – Page Replacement – Thrashing. 12 Hrs
- UNIT IV** : Disk Scheduling and Distributed Systems – Disk Structures – Disk Scheduling – File System Interface – File Concepts – Access Methods – Directory Structures – File System Implementation – Allocation Methods – Free Space Management – Distributed File Systems – Naming and Transparency – Remote File Accesses – Stateful versus Stateless service – File Replication . 14 Hrs
- UNIT V** : Linux System – Design Principles – Process Management – File Systems. Windows 7 – History – Design Principles – System Components – Virtual Machine O.S. 10 Hrs

**COURSE OUTCOMES:**

The students must be

- able to understand the operating system components and its services

- able to implement the algorithms in process management and solving the issues of IPC and Disk Scheduling
- able to demonstrate the physical memory and virtual memory
- able to understand file handling concepts in OS perspective
- able to understand the operating system components and services with the recent OS

**BOOKS FOR REFERENCE:**

1. Silberschatz and Galvin, Operating System Concepts, 9th Edition, John Wiley & Sons, Inc., 2014.
2. Andrew S. Tanenbaum, "Modern Operating System", 3<sup>rd</sup> Edition, PHI Learning Pvt Ltd, 2008
2. P.C.Bhatt, An Introduction to Operating Systems-Concepts and Practice, Prentice Hall Of India, 2010.
3. Achyut S. Godbole , Operating Systems, Sixth Edition, TMH,2009.

**E-LEARNING RESOURCES:**

[www.awl.com/cseng/books](http://www.awl.com/cseng/books)

[www.ntpel.iitm.ac.in](http://www.ntpel.iitm.ac.in)

## SEMESTER – II

### DESIGN AND ANALYSIS OF ALGORITHMS

PAPER NO – X

COURSE CODE : MCA18/2C/DAA

Teaching Hours: 15 x 4 = 60 Hrs

L T P C : 4 0 0 4

**OBJECTIVES:**

- To learn the algorithm analysis techniques.
- To become familiar with the different algorithm design techniques.
- To understand the limitations of Algorithmic analysis.

**COURSE OUTLINE:**

**UNIT I** : Introduction: Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms. 12 Hrs

**UNIT II** : Brute Force And Divide-And-Conquer: Brute Force – Closest-Pair and Convex-Hull Problems-Exhaustive Search – Traveling Salesman Problem – Knapsack Problem – Assignment problem. Divide and conquer methodology – Merge sort – Quick sort – Binary search – Multiplication of Large Integers – Strassen’s Matrix Multiplication-Closest-Pair and Convex-Hull Problems. 12 Hrs

**UNIT III** : Dynamic Programming And Greedy Technique: Computing a Binomial Coefficient – Warshall’s and Floyd’ algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique– Prim’s algorithm- Kruskal’s Algorithm- Dijkstra’s Algorithm-Huffman Trees. 12 Hrs

**UNIT IV** : Iterative Improvement: The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs- The Stable marriage Problem. 12 Hrs

**UNIT V** : Coping With The Limitations Of Algorithm Power: Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees-P, NP and NP-Complete Problems–Coping with the Limitations – Backtracking – n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem-Branch and Bound – Assignment problem – Knapsack Problem – Traveling Salesman Problem- Approximation Algorithms for NP – Hard Problems – Traveling Salesman problem – Knapsack problem. 12Hrs

**COURSE OUTCOMES:**

The students must be able to,

- design and implement basic and advanced algorithms extensively.
- design algorithms using graph structures
- design and develop efficient algorithms with minimum complexity using design techniques.

**BOOKS FOR REFERENCES:**

1. AnanyLevitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012.
2. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.
3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”,Pearson Education,ReprinT 2006.
4. Donald E. Knuth, “The Art of Computer Programming”, Volumes 1& 3 Pearson Education, 2009. Steven S. Skiena,“The Algorithm Design Manual”,Second Edition, Springer, 2008.

**E-LEARNING RESOURCES:**

<http://nptel.ac.in/courses/106101059/>



## SEMESTER – II PROGRAMMING IN C++

PAPER NO – XI

COURSE CODE : MCA18/2C/PIC

Teaching Hours: 15 x 4 = 60 Hrs

L T P C : 4 0 0 4

**COURSE OBJECTIVES:**

- To understand the object oriented concepts.
- To learn the basic concepts like Object, Class and bottom-up approach.
- To understand and implement the principles like Abstraction, Data Hiding, Dynamic Binding, Polymorphism and Inheritance.
- To apply the generic programming features.
- Design and development of object oriented snippets to achieve reusability.

**COURSE OUTLINE:**

- UNIT I** : Introduction: Overview of C++ – Classes and Objects – Structures, Unions and Classes – Friend Functions – Friend Classes – Inline Functions – Parameterized Constructors – Static Class Members – Scope Resolution Operator - Nested Classes. 12Hrs
- UNIT II** : Arrays – Arrays of Objects – this pointer – Pointers to Class Members - References – Passing Reference to Objects – Returning References – Dynamic Allocation Parameters – Function Overloading – Constructor Overloading, Copy Constructor. 12 Hrs
- UNIT III** : Operator Overloading – Operator Overloading using Friend function – Overloading new and delete – Overloading special characters [ ], ( ), → and Comma. Inheritance – Protected Members – Inheriting Multiple Base Classes. 12Hrs
- UNIT IV** : Virtual Functions – Pure Virtual Functions – Abstract Classes – Early Vs Late Binding – Templates –Generic Functions – Generic Classes – Exception Handling. 12Hrs
- UNIT V** : C++ Streams – Formatted I/O – Unformatted and Binary I/O - C++ File I/O - <fstream> and the File Classes – Opening and Closing a file – Reading and Writing Text files – Namespace Fundamentals – using – Standard Template Library – Overview – Containers – Algorithms – Iterators. 12Hrs

**COURSE OUTCOME:**

The students must be,

- Developing solutions to real-time applications using object oriented concepts.
- Gaining knowledge in developing secured OO applications using protected members.
- Acquirement of technical skills to elucidate the overloading mechanism.
- Demonstration of I/O streams implementation.

**BOOKS FOR REFERENCES:**

1. Herbert Schildt ,C++ - The complete Reference, 5<sup>th</sup> Edition, TMH, 2014.
2. E.Balagurusamy, “Programming in ANSI C”, Tata McGraw Hill, 2015.
3. K. R. Venugopal and Raj Kumar Buyya, “Mastering C++” Tata McGraw Hill, 2013.
4. VenuGopal and Prasad, “Mastering C”, Tata McGraw Hill, 2013.

**E-LEARNING RESOURCES:**

[www.programiz.com](http://www.programiz.com)

[www.cplusplus.com](http://www.cplusplus.com)

[www.developers.net](http://www.developers.net)

## SEMESTER – III

### DATABASE MANAGEMENT SYSTEMS

PAPER NO – XII

COURSE CODE : MCA15/2C/DMS

Teaching Hours: 15 x 4 = 60 Hrs

L T P C : 4 0 0 4

**OBJECTIVES:**

- To understand the fundamentals of database and data models and ER Diagrams.
- To use SQL Queries and the fundamentals of relational database design
- To expose data storage techniques, Query processing and Query Optimization
- To impart knowledge in Transaction processing, Concurrency Control and Recovery System.

**COURSE OUTLINE:**

- UNIT I** : Introduction: Relational Model – Introduction to SQL – Intermediate SQL – Advanced SQL 12 Hrs
- UNIT II** : Database Design and ER model: Overview – E-R Model , Constraints – Removing Redundant Attributes – E-R Diagrams – Extended ER Features – Relational Database Design 12 Hrs
- UNIT III** : Storage and File Structure : Physical Storage media – Magnetic Disk and Flash Storage – RAID-Tertiary Storage – File Organization of Records in Files – Data Dictionary Storage – Database Buffer - Indexing and Hashing 12 Hrs
- UNIT IV** : Query Processing: overview – Measures of Query Cost – Selection Operation – Sorting – Join operations – Query Optimization – Transformation of Relational Expressions – Estimating Statistics – Choice of evaluation Plans - Transactions – Concepts – Transaction Model-Storage Structure – Atomicity and Durability – Transaction Isolation – Serializability. 12 Hrs
- UNIT V** : Concurrency Control: Lock Based Protocols – Timestamp Based protocols- Validation Based Protocols – Recovery System – Failure Classification – storage – Recovery and Atomicity – Recovery Algorithm – Buffer Management - Case Study – Oracle – Microsoft SQL Server 12 Hrs

**COURSE OUTCOMES:**

The student must be able to,

- Understand the basic concepts of the database and data models.
- design a database using ER diagrams and map ER into Relations and normalize the relations
- Acquire the knowledge of query evaluation to monitor the performance of the DBMS.
- Develop a simple database applications using normalization.
- Acquire the knowledge about different special purpose databases and to critique how they differ from traditional database systems.

**BOOKS FOR REFERENCES:**

1. Abraham Silberschatz , Henry F. Korth , S. Sudarshan “ Database System concepts, 6<sup>th</sup> Edition, McGraw Hill Education, 2013.
2. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
3. Raghu Ramakrishnan , “Database Management Systems”, 4<sup>th</sup> Edition, Tata Mcgraw Hill 2011.

**E-LEARNING RESOURCES:**

<http://codex.cs.yale.edu/avi/db-book/db6/slide-dir/>

<https://www.cse.iitb.ac.in/~sudarsha/db-book/slide-dir/>

**SEMESTER – II**  
**COMPUTER LABORATORY II: DESIGN AND ANALYSIS OF**  
**ALGORITHMS LAB**

**PAPER NO – XIII****COURSE CODE : MCA18/2P2/DAA****Teaching Hours: 15 x 5 = 75Hrs****L T P C : 0 0 5 2**

**LIST OF PROGRAMS**

1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2. Using open, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3. a) Obtain the Topological ordering of vertices in a given digraph.  
b) Compute the transitive closure of a given directed graph using Warshall's algorithm.
4. Implement 0/1 Knapsack problem using Dynamic Programming.
5. From a given vertex in a weighted connected graph, find shortest paths to other vertices Using Dijkstra's algorithm.
6. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
7. a) Print all the nodes reachable from a given starting node in a digraph using BFS method.  
b) Check whether a given graph is connected or not using DFS method.
8. Find a subset of a given set  $S = \{s_1, s_2, \dots, s_n\}$  of n positive integers whose sum is equal to a given positive integer d. For example, if  $S = \{1, 2, 5, 6, 8\}$  and  $d = 9$  there are two solutions  $\{1,2,6\}$  and  $\{1,8\}$ . A suitable message is to be displayed if the given problem instance doesn't have a solution.
9. Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.
10. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
11. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using Open and determine the speed-up achieved.
12. Implement N Queen's problem using Back Tracking.

**SEMESTER – II  
COMPUTER LABORATORY-III:  
DATABASE MANAGEMENT SYSTEMS LAB**

**PAPER NO – XIV**

**COURSE CODE: MCA18/2P3/DMS**

**Teaching Hours: 5 X15=75 Hrs**

**L T P C : 5 0 0 2**

Students have to undertake individual / Group Projects and submit the Project Report based on the application area.

**SEMESTER – II  
COMPUTER LABORATORY-IV:  
SUMMER PROJECT**

**PAPER NO – XV**

**COURSE CODE: MCA18/2P4/SPT**

**L T P C : 0 0 5 2**

Students have to undertake individual Projects during the summer vacation and duly submit the Project Report based on the application area.

**SEMESTER – III  
COMPUTER NETWORKS****PAPER NO – XVII****Teaching Hours: 15 x 4 = 60 Hrs****COURSE CODE: MCA18/3C/CNS****L P T C : 4 0 0 4****OBJECTIVES:**

- To understand fundamental underlying principles of computer networking
- To understand details and functionality of layered network architecture.
- To understand ethical, legal, security, and social issues related to computer Networking.
- To understand the technologies associated and corresponding potential impact of networking.

**COURSE OUTLINE:**

- UNIT I** : Introduction: The uses of Computer Networks - Network Hardware - Reference Models - Example of Networks. The Physical Layer: Guided Transmission Media - Wireless Transmission – Public Switched Telephone Network - Mobile telephone System. 12Hrs
- UNIT II** : The Data Link Layer: Data link layer design issues - Error detection and correction - Elementary Data Link Protocols - Sliding Window Protocols - Example of data Link Protocols- ETHERNET – 802.11 – Bluetooth. 12Hrs
- UNIT III** : The Network Layer: Network Layer Design Issues - Routing Algorithms - Congestion Control Algorithms - Internetworking- Network layer in the Internet. 12Hrs
- UNIT IV** : The Transport Layer: Transport Service - Transport Protocols –(what is this) Simple Transport Protocol - Internet Transport protocols: UDP, TCP. 12Hrs
- UNIT V** : The Application Layer: Domain Name System - Electronic mail - World wide web – Multimedia - Communication Security. 12Hrs

**COURSE OUTCOME:**

The student must be able to,

- describe and analyze the hardware, software, components of a network and the inter relations.
- explain networking protocols and their hierarchical relationship hardware and software. Compare protocol models and select appropriate protocols for a particular design.

**BOOKS FOR REFERENCES:**

1. Andrew S. Tanenbaum and David J. Wetherall, “Computer Networks”, Fifth Edition, Pearson Education 2012.
2. Behrouz A. Forouzan and Firouz Mosharraf, “Data Communications and Networking”, McGraw Hill, Special Indian Edition 2012.
3. William Stallings, Data and Computer Communications, Sixth Edition, PHI, 2013.

**E-LEARNING RESOURCES:**

[www.cse.iitk.ac.in](http://www.cse.iitk.ac.in)

[www.svecw.edu.in](http://www.svecw.edu.in)



## SEMESTER – III PROGRAMMING IN JAVA

**PAPER NO –XVIII**

**Teaching Hours: 15 x 4 = 60 Hrs**

**COURSE CODE : MCA18/3C/PIJ**

**L T P C : 3 1 0 4**

### OBJECTIVES:

- To understand the OOPS concept and how to apply in programming.
- To realize and apply the fundamentals core java, Packages, Event Handling for computing.
- To enhance the knowledge to Server side programming.

### COURSE OUTLINE:

- UNIT I** : Introduction to Java : The History and Evolution of Java- An Overview of Java- Object Oriented Programming - Lexical Issues - Data Types - Variables - Arrays - Operators - Control Statements. 10 Hrs
- UNIT II** : Classes: Class Fundamentals- Declaring Objects – Introducing Methods- Constructors – this Keyword- Garbage Collection-The finalize method-Overloading methods - Access Control - Static and final – Nested and Inner Classes - String Class - Inheritance – Using Super- Overriding methods - Abstract class- Using final with Inheritance. 10 Hrs
- UNIT III** : Packages: Access Protection – Importing Packages- Interfaces - Exception Handling - Thread - Synchronization - Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads – Multithreading. 15 Hrs
- UNIT IV** : Event Handling: Basics of Event Handling-Mouse and Keyboard Events-AWT Classes – AWT Controls-Labels-buttons-Check Boxes-Lists-Scroll Bars-TextField – TextArea-Layout Managers-Flow Layout-Border Layout-Grid Layout-Card Layout- GridBag Layout- Menus. 15 Hrs
- UNIT V** : Input/Output: The I/O Classes and Interfaces- File – The Applet Class - Networking basics- TCP/IP Sockets - INet Address – URL-Datagrams. 10 Hrs

### COURSE OUTCOMES:

The students will be able to:

- Implement Java Programs.
- Make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API.
- Design and implement Server side Programs.

### BOOKS FOR REFERENCES:

1. Herbert Schildt, Java The Complete Reference , Ninth Edition,McGraw Hill Edition, 2014.
2. P. Radha Krishna, “Object Oriented Programming through Java”, Universities Press 2014.
3. Xavier, “JAVA Programming – A Practical Approach”, Tata McGraw Hill Edition, 2014.
4. K.Arnold and J.Gosling, The Java Programming Language, Second Edition, Addison Wesley, 2014.

**E-LEARNING RESOURCES:**

<http://www.javatpoint.com>

<http://java.sun.com/developer/onlineTraining>

<http://www.dickbaldwin.com/tocadv.htm>

## SEMESTER – III SOFTWARE TESTING

**PAPER NO – XIX**

**Teaching Hours: 15 x 4 = 60 Hrs**

**COURSE CODE: MCA18/3C/ STG**

**L T P C : 4 0 0 4**

### OBJECTIVES:

- To know the behavior of the testing techniques and to design test cases to detect the errors in the software
- To get insight into the levels of testing in the user environment
- To understand standard principles to check the occurrence of defects and its removal.
- To learn the functionality of automated testing tools to apply in the specialized environment.
- To understand the models and metrics of software quality and reliability.

### COURSE OUTLINE:

- UNIT I** : White Box Approach to Test design - Test Adequacy Criteria – Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White box Based Test Design – Code Complexity Testing – Evaluating Test Adequacy Criteria. Test Case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Requirements based testing – Boundary Value Analysis –Decision tables – Equivalence Class Partitioning – State based testing – Cause-effect graphing – Error guessing – Compatibility testing – User documentation testing – Domain testing .  
12 Hrs
- UNIT II** : The Need for Levels of Testing- Unit Test Planning –Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording Results – Integration Tests – Designing Integration Tests – Integration Test Planning – Scenario Testing – Defect Bash Elimination. System Testing – Acceptance testing – Performance testing – Regression Testing - Internationalization testing - Ad-hoc testing – Alpha, Beta Tests- Testing OO systems – Usability and Accessibility Testing – Configuration Testing - Compatibility Testing – Testing the documentation – Website Testing - Case Study for Unit and Integration Testing  
12 Hrs
- UNIT III** : Testing Client / Server Systems – Testing in a Multiplatform Environment - Testing ObjectOriented Software – Object Oriented Testing – Testing Web based systems – Web based system – Web Technology Evolution – Traditional Software and Web based Software – Challenges in Testing for Web-based Software – Quality Aspects – Web Engineering – Testing of Web based Systems. Case Study for Web Application Testing  
12 Hrs
- UNIT IV** : Selecting and Installing Software Testing Tools - Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Tracking the Bug – Debugging – Case study using Bug Tracking Tool..  
12 Hrs

**UNIT V** : Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics - Availability Metrics - Defect Removal Effectiveness - FMEA - Quality Function Deployment – Taguchi Quality Loss Function – Cost of Quality. Case Study for Complexity and Object Oriented Metrics. 12 Hrs

**COURSE OUTCOMES:**

The students must be,

- able to test the software by applying various testing techniques.
- able to debug the project and to test the entire computer based systems at all levels.
- able to test the applications in the specialized environment using various automation tools.
- able to evaluate the web applications using bug tracking tools.
- able to apply quality and reliability metrics to ensure the performance of the software

**BOOKS FOR REFERENCES:**

1. Adithya P. Mathur, “ Foundations of Software Testing – Fundamentals algorithms and techniques”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008
2. Boris Beizer, “ Software Testing Techniques” , Dream Tech Press, 2009
3. Dale H. Besterfield , “Total Quality Management”, Pearson Education Asia, Third Edition, Indian Reprint (2011).
4. Edward Kit, “ Software Testing in the Real World – Improving the Process”, Pearson Education, 1995
5. Glenford J. Myers, Tom Badgett, Corey Sandler, “The Art of Software Testing”, 3rd Edition, John Wiley & Sons Publication, 2012
6. Illene Burnstein, “ Practical Software Testing”, Springer International Edition, Chennai, 2003.
7. Naresh Chauhan , “Software Testing Principles and Practices ” Oxford University Press , New Delhi ,2010
8. Ron Patton, “Software Testing”, Second Edition, Pearson Education, 2009 51
9. Renu Rajani, Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004
10. Srinivasan Desikan and Gopalaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2009
11. Stephan Kan, “Metrics and Models in Software Quality”, Addison – Wesley, Second Edition, 2004
12. William Perry, “Effective Methods of Software Testing”, Third Edition, Wiley

**WEBSITE AND E-LEARNING SOURCE:**

[www.mhhe.com](http://www.mhhe.com),

[www.comp.lancs.ac.uk](http://www.comp.lancs.ac.uk)

**SEMESTER – III**

**ELECTIVE I: PAPER XX**

- 1. System Analysis and Design**
- 2. Software Project Management**
- 3. Compiler Design**

**SEMESTER – III**  
**M-COMMERCE**

**PAPER NO – XXI****COURSE CODE: MCA18/2ED2/MCE****Teaching Hours: 15 x 3 = 45 Hrs****L T P C : 4 0 0 3****OBJECTIVES:**

- To understand the E – commerce strategies and value chains
- To understand the M-commerce services
- To understand M – commerce infrastructure and applications.
- To know the availability of latest technology and applications of M- commerce in various domains.
- To apply mobile commerce in business-to-business application.

**COURSE OUTLINE:**

- UNIT I :** Electronic Commerce: Introduction - The e-commerce environment - The E-commerce marketplace -Focus on portals, Location of trading in the Marketplace - Commercial arrangement for transactions - Focus on auctions - Business models for e-commerce - Revenue models - Focus on internet start-up companies. 9Hrs
- UNIT II :** Mobile Commerce: Introduction – Infrastructure of M– Commerce – Types of Mobile commerce services – Technologies of wireless business – benefits and limitations, support, mobile marketing & advertisement, Non– internet applications in M– Commerce –wireless/wired commerce comparisons. 9Hrs
- UNIT III:** Mobile Commerce: Technology: A Framework for the study of Mobile Commerce – NTT Docomo’s I – Mode – Wireless Devices For Mobile Commerce – Towards a classification framework for mobile location based services – Wireless Personal and Local Area Networks –The Impact of technology advances on Strategy Formulation in Mobile Communications Networks. 9Hrs
- UNIT IV:** Mobile Commerce: Theory and applications :The Wireless Application Protocol – Mobile Portal – Factors Influencing The Adoption of Mobile Gaming Services – Mobile Data Technologies and Small Business Adoption and Diffusion – M–Commerce in the Automotive Industry – Location– Based Services: Criteria For Adoption and solution deployment – The Role of Mobile advertising in building a brand– M– Commerce Business Models. 9Hrs
- UNIT V:** Business– To– Business Mobile E-Commerce : Enterprise Enablement – Email and Messaging – Field force automation (insurance, real estate, maintenance, healthcare) – Field sales support (Content access, Inventory) – Asset tracking and maintenance/management – remote IT support – Customer Retention (B2C Services, Financial, Special Deals) – Warehouse Automation Security. 9Hrs

**COURSE OUTCOME:**

The student must be able to

- Understand the fundamentals and infrastructure of M-commerce
- Understand the business to business mobile e-commerce
- The technology behind M-Commerce

**BOOKS AND REFERENCES:**

1. Dave Chaffey, “E-Business and E-Commerce Management”, Third Edition, 2009, Pearson Education.
2. Brian E. Mennecke, Troy J. Strader, “Mobile Commerce: Technology, Theory and Applications”, Idea Group Inc., IIR press, 2003.
3. P. J. Louis, “ M-Commerce Crash Course”, McGraw- Hill Companies February 2001.
4. Paul May, “Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business” Cambridge University Press March 2001.
5. Michael P. Papazoglou, Peter M.A. Ribbers, ‘e-business organizational and Technical foundation’, Wiley India 2009.
6. Dr.Pandey ,SaurabhShukla E-commerce and Mobile commerce Technologies , Sultan chand ,2011.

**E-LEARNING RESOURCES:**

[www.ntpel.iitm.ac.in](http://www.ntpel.iitm.ac.in)  
[www.courseera.org](http://www.courseera.org)

**SEMESTER – III  
COMPUTER LABORATORY-V:  
PROGRAMMING IN JAVA LAB**

**PAPER NO – XXII**

**Lab Hours: 15 x 5 = 75Hrs**

**COURSE CODE : MCA18/3P5/ PIJ**

**L T P C : 0 0 5 2**

**OBJECTIVES :**

- To understand the OOPS concept and how to apply in programming.
- To realize and apply the fundamentals core java, Packages, Event Handling for computing.
- To develop Java based web programming.

**LIST OF EXPERIMENTS**

1. IMPLEMENTATION OF ARRAYS
2. IMPLEMENTATION OF CONTROL STRUCTURES
3. IMPLEMENTATION OF OVERLOADING AND OVERRIDING METHODS
4. IMPLEMENTATION OF INHERITANCE
5. IMPLEMENTATION OF INTERFACES
6. IMPLEMENTATION OF MULTITHREADING
7. IMPLEMENTATION OF EVENT HANDLING
8. IMPLEMENTATION OF MENUS
9. IMPLEMENTATION OF STRING OBJECTS
10. IMPLEMENTATION OF APPLETS



**SEMESTER – III  
COMPUTER LABORATORY-VI:  
SOFTWARE TESTING LAB**

**PAPER NO – XXIII**

**COURSE CODE: MCA18/3P6/STG**

**Teaching Hours: 5X15=75 Hrs**

**L T P C : 0 0 5 2**

**OBJECTIVES:**

- To apply various testing techniques and to detect the errors in the software.
- To generate and apply the test cases using the automated testing tool.
- To learn the functionality of automated testing tools to apply in the specialized environment

**LIST OF EXPERIMENTS**

1. Using Selenium IDE, Write a test suite containing minimum 4 test cases.
2. Install Selenium server and demonstrate it using a script in Java/PHP.
3. Write and test a program to login a specific web page.
4. Write and test a program to update 10 student records into table into Excel file.
5. Write and test a program to select the number of students who have scored more than 60 in any one subject (or all subjects)
6. Write and test a program to provide total number of objects present / available on the page
7. Write and test a program to get the number of list items in a list / combo box.
8. Write and test a program to count number of check boxes on the page checked and unchecked count

**SEMESTER – IV**  
**DATA WAREHOUSING AND MINING**

PAPER NO – XXV

COURSE CODE:MCA18/4C/ DWM

Teaching Hours: 15 x 4 = 60Hrs

L T P C : 4 0 0 4

**OBJECTIVES:**

- To introduce the concept of data mining which covers the basic tasks, metrics, issues and implication. Core topics like classification, clustering and association rules are exhaustively dealt with.
- To introduce the concept of data warehousing that covers special emphasis on architecture and design.

**COURSE OUTLINE:**

- UNIT I** : **Introduction** – Why Data Mining? What is Data Mining? What kinds of Data can be mined? What kinds of Patterns can be Mined? Technologies used- Kinds of applications targeted – major issues - Know your Data – Data Objects and Attribute Types - Basic Descriptions of Data – Data Visualization – Measuring Data Similarity and Dissimilarity 9Hrs
- UNIT II** : DATA PREPROCESSING – Overview- Data Cleaning – Data Integration – Data Reduction – Data Transformation and Data Discretization - Data Warehousing and Online Analytical Processing – Basic Concepts – Data Warehouse Modeling – Data Warehouse Design and Usage – Data Warehouse Implementation – Data Generalization 9 Hrs
- UNIT III** : Data Cube Technology – Data Cube Computation and Methods – Exploring Cube Technology – Multidimensional Data Analysis - Mining Frequent Patterns – Basic concepts – Frequent Itemset Mining Methods – Pattern Evaluation Methods 9 Hrs
- UNIT IV** : CLASSIFICATION - Basic concepts – Decision Tree Induction – Bayes Classification Methods – Rule Based Classification – Advanced Methods – Bayesian Belief Networks – Back Propagation – Support Vector Machines 9 Hrs
- UNIT V** : Cluster Analysis - Partitioning methods –Advanced Cluster Analysis – Clustering High Dimensional Data – Network Data - Outlier Detection – Outlier Detection Methods – Data Mining Trends and Research Frontiers 9 Hrs

**COURSE OUTCOME:**

The student must be able to

- Understand the fundamentals of Data warehousing and mining.
- Understand the technology, classification and clustering algorithms.

**BOOKS FOR REFERENCES:**

1. J. Han, M. Kamber, “Data Mining: Concepts and Techniques”, Morgan Kauffman, 2011.
2. Margaret H.Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education 2004.
3. Sam Anahory, Dennis Murry, “Data Warehousing in the real world”, Pearson Education 2003.
4. David Hand, Heikki Manila, PadhraicSymth, “Principles of Data Mining”, PHI 2004.
5. Alex Bezon, Stephen J.Smith, “Data Warehousing, Data Mining & OLAP”, McGraw-Hill Edition, 2001.

**E-LEARNING SOURCE:**

[www.mhhe.com](http://www.mhhe.com),  
[www.comp.lancs.ac.uk](http://www.comp.lancs.ac.uk)  
[www.ntpel.iitm.ac.in](http://www.ntpel.iitm.ac.in)

## SEMESTER – IV C# AND .NET PROGRAMMING

PAPER NO – XXVI

COURSE CODE: MCA18/4C/CNP

Teaching Hours: 15 x 4 = 60 Hrs

L T P C : 3 1 0 4

**OBJECTIVES:**

- modeled based on a distributed computing model where applications collaborate to provide services and expose functionality to each other.
- Essentially, the basic role of software is changing from providing discrete functionality to providing services.

**COURSE OUTLINE:**

- UNIT I** : Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures and Enumerations. 10 Hrs
- UNIT II** : Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions. 14 Hrs
- UNIT III** : Building Windows Applications, Accessing Data with ADO.NET. Data Binding, Input Validation. 12 Hrs
- UNIT IV** : Programming Web Applications with Web Forms and Controls, Programming Web Services. 12 Hrs
- UNIT V** : Assemblies, Versioning, Attributes, Reflection, Viewing MetaData, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using SingleCall, Threads. 12Hrs

**COURSE OUTCOMES**

The student must be able to

- Understand the fundamentals and infrastructure of .NET framework
- Understand the development of web applications
- Know about assemblies, versioning and threads

**BOOKS FOR REFERENCES:**

1. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2004. (Unit I, II)
2. J. Liberty, "Programming C#", 2<sup>nd</sup> ed., O'Reilly, 2002. (Unit III, IV, V)  
Jesse Liberty, Programming Visual C# .NET (3<sup>rd</sup> Edn) Shroff Publishers and Distributors Pvt.Ltd. New Delhi, 2003.
3. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 2004.
4. Robinson et al, "Professional C#", 2<sup>nd</sup> ed., Wrox Press, 2002.
5. Andrew Troelsen, "C# and the .NET Platform", A! Press, 2003.
6. ThamaraiSelvi, R. Murugesan, "A Textbook on C#", Pearson Education, 2003.

**E-LEARNING SOURCE**

[www.hungryminds.com](http://www.hungryminds.com)

**SEMESTER – IV**  
**CRYPTOGRAPHY AND NETWORK SECURITY**

**PAPER NO – XXVII****COURSE CODE: MCA15/4C/CNS****Teaching Hours: 15 x 4 = 60 Hrs****L T P C : 4 0 0 4****OBJECTIVES:**

- To know the methods of conventional encryption and to understand the concepts of public key encryption and Key exchange Algorithms.
- To understand authentication and to know the network security tools and applications and to understand the system level security used.

**COURSE OUTLINE:**

- UNIT I** : Introduction : Symmetric Ciphers: Classical Encryption Techniques, Block Ciphers and the Data Encryption Standard 12 Hrs
- UNIT II** : AES: Transformation Functions – Key Expansions - Block Cipher Operation – Multiple Encryption and Triple DES – ECB – CBC – CFM – OFM – Counter Mode. 12 Hrs
- UNIT III** : Public Key Encryption: Principles of Public Key Cryptosystems - RSA Algorithm – Diffie - Hellman Key Exchange Protocol. 12 Hrs
- UNIT IV** : Key Management and Distribution – Distribution of Public keys – X.509 Authentication Service – User Authentication – Kerberos Authentication – Federated Identity Management – Personal Identity Verification 12Hrs
- UNIT V** : Electronic Mail Security: PGP – S/MIME - IP Security – Overview – IP Security Policy – Encapsulating Security Payload. 12 Hrs

**COURSE OUTCOME:**

Students who complete this course will be able to

- Impart knowledge on Encryption techniques, Design Principles and Modes of Operation
- Design a security solution for a given application
- Devise the Key Management techniques
- Create an understanding of Authentication functions the manner in which Message Authentication Codes and Hash Functions works.
- Examine the issues and structure of Authentication Service and Electronic Mail Security

**BOOKS FOR REFERENCES:**

1. William Stallings, “Cryptography And Network Security – Principles and Practices”, Pearson, Sixth Edition, 2015.
2. AtulKahate, “Cryptography and Network Security”, Tata McGraw-Hill, 2013.
3. Bruce Schneier, “Applied Cryptography”, John Wiley & Sons Inc, 2011.
4. Charles B. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Third Edition, Pearson Education, 2013.

**E-LEARNING RESOURCES:**

[www.nptel.iitm.ac.in](http://www.nptel.iitm.ac.in)

## SEMESTER – IV PYTHON PROGRAMMING

PAPER NO : XXVIII

CODE : MCA18/4C/PPG

Teaching Hours: 15 x 4 = 60 Hrs

L T P C : 4 0 0 4

**OBJECTIVES**

- To understand why Python is a useful scripting language for developers.
- To learn how to design and program Python applications.
- To learn how to use lists, tuples, and dictionaries in Python programs.
- To learn how to identify Python object types.
- To learn how to use indexing and slicing to access data in Python programs.
- To define the structure and components of a Python program.

**UNIT I** : Welcome to Python – What is Python? – Origins – Features – Downloading and Installing Python – Running Python – Python Documentation. Getting Started – Program Output statement – Program Input function – Python Basics – Statements and syntax – Variable Assignment – Identifiers – Numbers – Introduction – Integers – Double Precision Floating Point Numbers – Complex Numbers – Operators – Built-in functions for all numeric types. 12 Hrs

**UNIT II** : Sequences: Strings, Lists and Tuples – Sequences – Strings – Strings and Operators – String-Only Operators – Built-in Functions – String Built-in Methods – Lists – Operators - Built-in Functions – List Type Built-in Methods – Tuples – Tuple Operators and Built-in Functions - Mapping and Set Types: Dictionaries – Mapping Type Operators – Mapping Type Built-in Functions and Built-in Methods – Dictionary Keys. 12 Hrs

**UNIT III** : Conditionals and Loops – If statement – else statement – elif statement – Conditional expressions – while statement – for statement – break statement – continue statement – pass statement - Functions and Functional Programming – What are functions? – Calling Functions – Creating Functions – Passing Functions – Formal Arguments – Variable-Length Arguments. 12 Hrs

**UNIT IV** : Errors and Exceptions – What are Exceptions? – Exceptions in Python – Detecting and Handling Exceptions – Context Management – with statement – Raising Exceptions – Modules – What are Modules? – Modules and Files – Namespaces – Importing Modules – Features of Module Import – Module Built-in Functions – Packages – Other Features of Modules. 12 Hrs

**UNIT V** : Files and Input / Output: File Objects – File Built-in Functions – File Built-in Methods – File Built in Attributes – Command-Line Arguments - File System – Object-oriented Programming – Introduction – Classes – Class Attributes – Instances – Instance Attributes – Binding and Method Invocation – Sub classing – Inheritance. 12 Hrs



**BOOK FOR REFERENCES:**

1. Wesley J. Chun, “Core Python Programming”, 2nd Edition, Pearson Education LPE, New Delhi, 2007.
2. Mark Summer field, Programming in Python 3, Pearson Education LPE, New Delhi, 1996.

**COURSE OUTCOME:**

The student will be able to:

- Implement methods and functions to improve readability of programs
- Demonstrate the use of Python lists and dictionaries
- Describe and apply object-oriented programming methodology.
- Apply top-down concepts in algorithm design.
- Write Python programs to illustrate concise and efficient algorithms

**SEMESTER – IV**

**ELECTIVE II: PAPER XXIX**

- 1. Accounting and Financial Management**
- 2. Statistical Methods**
- 3. Resource Management Techniques**

**SEMESTER IV**  
**COMPUTER LABORATORY-VII:**  
**C# & .NET PROGRAMMING**

**PAPER NO – XXX**

**COURSE CODE : MCA18/4P7/CNP**

**Teaching Hours : 15 x 5 = 75 Hrs**

**L T P C : 0 0 5 2**

1. Jagged Array
2. Implementation of Banking
3. Income Tax Calculation
4. EB Calculation
5. Operator Overloading
6. Interfaces
7. Events
8. Exception Handling
9. Thread
  - a) Single Thread
  - b) Multiple Thread
10. Web Page creation using ADO.NET
11. Web Services program
12. Assemblies
13. Reflection
14. Attributes

**SEMESTER-IV**  
**COMPUTER LABORATORY-VIII**  
**PYTHON PROGRAMMING**

**PAPER NO – XXXI****COURSE CODE : MCA18/4P8/ PPG****Teaching Hours : 15 x 5 = 75 Hrs****L T P C : 0 0 5 2****SIMPLE PROGRAMS**

1. Write a Python program to reverse the digits of an integer.
2. Write a Python program to Multiply matrices.

**PYTHON NumPy:**

3. Python NumPy: Sort an along the first, last axis of an array.
4. Python NumPy: Collapse a 3-D array into one dimension array.

**PYTHON Matplotlib**

5. Write a Python program to draw a line using given axis values with suitable label in the x axis, y axis and a title. test.txt
6. Write a Python program to draw line charts of the financial data of Alphabet Inc. between October 3, 2016 to October 7, 2016. Sample financial data (fdata.csv):

**FILES PROGRAM**

7. Python Program to Read the Contents of a File and Count the Number of Words in a Text File.
8. Python Program to Read a Text File and Print all the Numbers Present in the Text File

**GRAPHICS PROGRAM**

9. Simulate elliptical orbits in Pygame.
10. Simulate bouncing ball in Pygame.

**CLASSES AND OBJECTS**

11. Python Program to Create a Class in which One Method Accepts a String from the User and another Prints it.
12. Python Program to Create a Class and Get All Possible Subsets from a Set of Distinct Integers

**SEMESTER IV  
COMPUTER LABORATORY-IX:  
INTERNSHIP**

**PAPER NO – XXXII**

**COURSE CODE : MCA18/4P9/ INP**

**L T P C : 0 0 0 2**

**SEMESTER V**

**ADVANCED JAVA PROGRAMMING****PAPER NO – XXXIV****COURSE CODE: MCA18/5C/AJP****Teaching Hours: 15 x 3 = 45 Hrs****L T P C: 4 0 0 4****OBJECTIVES:**

- To know the importance of Java based Enterprise level application development
- To train the students to acquire knowledge in various frameworks
- To gain skill to develop enterprise applications using Java based technologies

**COURSE OUTLINE:**

**UNIT I** : Enterprise Edition- J2EE – Multi-tier Architecture – J2EE Design Pattern- exploring java based web Application – Web Architecture models-MVC Architecture-Developing applications with JDBC. 9 Hrs.

**UNIT II** : Introduction to Servlets - Servlet Life cycle – Using the servlet config, Servlet Context Objects-Session tracking with servlets-cookies-URL rewriting-Hidden fields-The session tracking API with Http Session object- Introduction to Java Server Pages (JSP) – JSP Life Cycle-JSP Pages-JSP Basic Tags –Implicit JSP Objects –Java Beans –scope of JavaBeans- JSP Standard Tag Library. 9 Hrs

**UNIT III** : Working with Java Mail-Java Mail-Protocols-JavaMail Components-sending & retrieving the Java Mail -Introducing Java Messaging Service-Message structure-Major JMS Components-Java Transactions- Local and Distributed Transactions-Introducing Isolation-Transaction Models-Explaining Naming services and Directory Services-JNDI structure 9 Hrs

**UNIT IV** : EJB Architecture -Features-classification EJB-Introducing the session bean- implementing a Session beans-choosing between Stateless and Stateful Beans- Message Driven beans- Managing transactions in Java EE Applications 12 Hrs

**UNIT V** : Frameworks-frameworks versus class libraries- Examining the Struts framework-understanding framework objectives and Benefits 6 Hrs

**BOOKS FOR REFERENCES:**

1. Kogent Learning Solutions Inc., " Java6 and J2EE1.5: Black Book", Dream Tech Press, 2014.
2. Herbert Schildt "J2EE- The complete Reference"
3. Ed Roman, Rima Patel Sriganesh, Gerald Brose, Mastering Enterprise JavaBeans, 3rd Edition, WILEY publication,2005.
4. Jim Keogh, J2EE: The Complete Reference, TATA Mc-Graw Hill, 2002.
5. James Holmes, Struts: The Complete Reference, 2nd Edition, TATA McGraw Hill, 2007.
6. Martin Bond,DanHaywood,Debbie Law and Longshaw and Peter Roxburgh, Teach Yourself J2EE in 21 Days Second Edition,Pearson Education 2005.

**E-LEARNING SOURCE**

<http://java.sun.com/developer/onlineTraining>

<https://docs.oracle.com/javaee/7/JEETT.pdf>

**COURSE OUTCOME:**

The students should be able to

- develop complex real world web applications
- develop complex real world enterprise applications
- differentiate the importance of various application development frameworks

**SEMESTER – V**  
**OPEN SOURCE SYSTEMS****PAPER NO – XXXV****COURSE CODE : MCA18/5C/OSS****Teaching Hours: 15 x 4 = 60 Hrs****L T P C : 3 1 0 4****OBJECTIVES:**

- To expose students to FOSS environment and introduce them to use open source packages
- Provide the knowledge to select appropriate licenses
- Capable of selecting which OSS applications to use
- Able to recognize and plan for risks that are unique to OSS applications
- Choose their own information technology infrastructure for development of applications.

**COURSE OUTLINE:**

- UNIT I** : Open Source Software: Overview – Definition- History - Advantages – FOSS Usage. Open source operating systems: LINUX: Installation- Basic Shell Commands – Process Management- User and Group Management. 12 Hrs
- UNIT II** : Open source Programming Languages : PHP : Essential PHP – Operators and Flow Control – Strings and Arrays – Functions- Reading Data in Web Pages . 12 Hrs
- UNIT III** : Open source Database : MySQL : Working with databases – Create Database – Create Table – Insert Data – Access the Database in PHP . 12 Hrs
- UNIT IV** : Python: Program I/O- Comments- Operators– Variables and Assignment-Numbers – Strings – Lists and Tuples – Dictionaries – Conditionals and Loops . 12 Hrs
- UNIT V** : Perl : Introduction – Variables – Operators – Flow Control Constructs. 12 Hrs

**COURSE OUTCOME:**

- Understand the basic concepts of Open Source Software .
- Acquire the knowledge of Open Source Programming Languages like PHP Python , PERL.
- To understand the database connectivity using MySQL.

**BOOKS FOR REFERENCES:**

1. S.Narmadha, V. Raajakumar, “Open Source systems “ , Eswar Press, 2010.
2. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003



3. Steve Suchring, "MySQL Bible", John Wiley, 2002
4. RasmusLerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002
5. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2001
6. Peter Wainwright, "Professional Apache", Wrox Press, 2002

**E-LEARNING RESOURCES:**

<http://www.w3.org>

<http://www.php.net>

<http://www.phpbuilder.com>

**SEMESTER – V**

**ELECTIVE III: PAPER XXXVI**

- 1. Cloud Computing**
- 2. Mobile Computing**
- 3. Soft Computing**

**SEMESTER – V**

**ELECTIVE III: PAPER XXXVII**

- 1. Digital Image Processing**
- 2. Big Data Analytics**
- 3. Internet of Things**

**SEMESTER – V**  
**ORGANIZATIONAL BEHAVIOUR**

PAPER NO – XXXVIII

COURSE CODE : MCA18/5ED3/OBR

Teaching Hours: 15 x 3 = 45 Hrs

L T P C : 4 0 0 3

**OBJECTIVES:**

- To provide an overview of theories and practices in organizations
- To enable the students to learn the behavior in individual, group and organizational behavior

**COURSE OUTLINE:**

**UNIT I** : Focus and Purpose :Definition - need and importance of organizational behavior – Nature and Scope- Frame Work – Organizational Behaviour models. 12 Hrs

**UNIT II** : Individual Behaviour : Personality – types – factores influencing personality – Theories – Learning – Types of learners – The learning process- Learning theories – Organizational behaviour modification – Misbehaviour – Types – Managment intervention – Emotions – Emotional Labour – Emotional Intelligence - Theories – Attitudes – Characteristics - Components – Formation – Measurement – Values – Perceptions – Importance – Factors influencing perception- Interpersonal Perception – Impression Management – Motivaiton – Importance – Types – Effects on Work Behaviour. 12 Hrs

**UNIT III** : Group Behaviour : Organizational Structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group Decision making techniques - Team Building – interpersonal relations – Communication – Control. 12 Hrs

**UNIT IV** : Leadership and power : Meaning – Inportance – Leadership styles – Theories – Leaders Vs – Managers - Sources of power - Power Centers – Power and Politics 12 Hrs

**UNIT V** : Dynamics of Orgnizational Behaviour : Organizational Culture and climate – Factors affecting organizational climate – Importance – Job Satisfaction – Determinants – Measurements – Influence on Behaviour – Organizational change – Importance – Stability vs Change – Proactive vs Reactive Change – the change process – Resistance to change – Managing Change – Stress – Work Stressors – Prevention and Management of Stress – Balancing Work and Life – Organizational Development – Characteristics – objectives – Organizational Effectiveness – Developing Gender sensitive work place 12 Hrs

**COURSE OUTCOME:**

The student must be able to

- Understand human behaviour in organization
- Able to work and manage as individual and group
- Able to manage with stress, Change and Job Satisfaction

**BOOKS FOR REFERENCES:**

1. Stephen P. Robins , Organizational Behaviour , PHI Learning/ Pearson Education 11<sup>th</sup> edition 2008
2. Fred Luthans , Organizational Behaviour , McGraw Hill 11<sup>th</sup> edition 2001
3. Nelsonm Quick, Khandelwal ORGB - An Innovative approach to learning and teaching, Cengage learning , 2<sup>nd</sup> edition 2012
4. Mc Shane & Von Glinov , Organisational Behaviour – 4<sup>th</sup> edition – Tata Mc Graw Hill 2007

**SEMESTER – V**  
**COMPUTER LABORATORY-X**  
**ADVANCED JAVA PROGRAMMING**

**PAPER NO – XXXIX****COURSE CODE: MCA18/5P10 /AJP****Teaching Hours: 5X15=75 Hrs****L T P C : 0 0 5 2****PROGRAMS:**

1. Program to prompt the user for a hostname and then looks up the IP address for the hostname and displays the results.
2. Program to read the webpage from a website and display the contents of the webpage.
3. Programs for TCP server and Client interaction as per given below.
  - i. Program to create TCP server to send a message to client.
  - ii. Program to create TCP client to receive the message sent by the server.
4. Programs for Datagram server and Client interaction as per given below.
  - i. Program to create Datagram server to send a message to client.
  - ii. Program to create Datagram client to receive the message sent by the server.
5. Program by using JDBC to execute a SQL query for a database and display the results.
6. Program by using JDBC to execute an update query by using Prepared Statement and display the results.
7. Program to execute a stored procedure in the database by using Callable Statement and display the results.
8. Program to display a greeting message in the browser by using HttpServlet.
9. Program to receive two numbers from a HTML form and display their sum in the browser by using HttpServlet.
10. Program to display a list of five websites in a HTML form and visit to the selected website by using Response redirection.
11. Program to store the user information into Cookies. Write another program to display the above stored information by retrieving from Cookies.
12. Program in Java Beans to add a Button to the Bean and display the number of times the button has been clicked.
13. Program for Java Bean with Simple property by using SimpleBeanInfo class.
14. Program for Java Bean with Indexed Property by using SimpleBeanInfo class.
15. Program to develop a Enterprise Java Bean of "Session Bean" type.
16. Program to develop a Enterprise Java Bean of "Entity Session Bean" type.
17. Program to develop a Enterprise Java Bean of "Message Driven Bean" type.
18. Program to develop an application using RMI.
19. Program to send a e-mail.

**SEMESTER – V**  
**COMPUTER LABORATORY-XI**  
**OPEN SOURCE SYSTEMS**

**PAPER NO – XL**

**Teaching Hours: 5x15=75 Hrs**

**COURSE CODE: MCA18/5P11/OSS**

**L T P C : 0 0 5 2**

1. Basic Linux Commands
2. Student Details using Shell program
3. Electricity Bill using shell program
4. Implementation of Arrays in PHP
5. Implementation of Strings in PHP
6. Implementation of Functions in PHP
7. Program to read data in web page using PHP.
8. MySQL Commands
9. PHP and MySQL database connectivity
10. Implementation of Strings in Python
11. Implementation of Lists in Python
12. Implementation of Control structures in Python.
13. PERL programs.

**SEMESTER – V  
COMPUTER LABORATORY-XII  
MINI PROJECT**

**SEMESTER – VI  
COMPUTER LABORATORY-XIII  
MAJOR PROJECT**



# **ELECTIVES**

## SEMESTER – III SYSTEM ANALYSIS AND DESIGN

PAPER NO – XX

COURSE CODE: MCA18/3E1/SAD

Teaching Hours: 15 x 3 = 45Hrs

L T P C : 3 0 0 3

**COURSE OBJECTIVES:**

- To identify various development strategies for building a system.
- To understand numerous methods to gather system pre and post specification.
- To simplify the design phase using DFDs and Data storage mechanisms.
- To analyze several techniques related to Database Management.

**COURSE OUTLINE:**

- UNIT I** : Systems, Roles and Development Methodologies – Types of Systems - Integrating Technologies for Systems – Need for System Analysis and Design – Roles of System Analyst – SDLC - Understanding and Modeling Organizational Systems – Project Management. 9Hrs
- UNIT II** : Information Gathering and Interactive Methods – Interviewing – Joint Application Design – Using Questionnaires - Unobtrusive Methods – Sampling - Investigation– Agile Modeling and Prototyping – Prototyping – Developing a prototype - Rapid Application Development – Agile Modeling. 9Hrs
- UNIT III** : Using Data Flow diagrams –Developing data flow diagrams – Logical and Physical Data flow diagrams – A data flow diagram example - Analyzing systems using Data dictionaries – The Data Dictionary – The Data Repository – Creating the data dictionary - Process Specifications and structured decisions – Overview of Process Specifications – Structured English – Decision Tables. 9Hrs
- UNIT IV** : Object Oriented Analysis and Design using UML – Objected Oriented Concepts – UML Modeling concepts and Diagrams – Use case Modeling – Activity Diagrams – Sequence and Communication Diagram - Class Diagram – State Chart Diagram - Designing Output & Input. 9 Hrs
- UNIT V** : Human Computer Interaction – Usability – Types of UI – Guidelines for Dialog and Design – Feedback for users - Designing Accurate Data Entry Procedures - Effective Coding – Effective and Efficient Data Capture – Ensure Data Quality Through Input Validation - Quality Assurance and Implementation – Total Quality Management approach – Documentation Approaches – Testing, Maintenance and Auditing – Implementing Distributed Systems. 9 Hrs

**COURSE OUTCOME:**

- Building a robust system by means of incorporating project management.
- Exposure in developing DFDs and decision tables for efficient system development.
- Acquirement of technical skills to elucidate OOAD using UML.
- Ensure the Quality Assurance of the developed product.

**BOOKS FOR REFERENCES:**

6. Kendall & Kendall, Systems Analysis and Design, Pearson Education, Eighth Edition, 2011.
7. Dennis, Wixom and Roth, Systems Analysis and Design, John Wiley & Sons Publications, Fifth Edition, 2011.

**E-LEARNING RESOURCES:**

<http://www.ddegjust.ac.in/studymaterial/mca-3/ms-04.pdf>  
<http://download.nos.org/cca/cca1.pdf>

**SEMESTER III**  
**SOFTWARE PROJECT MANAGEMENT**

PAPER NO – XX

COURSE CODE : MCA18/3E1/ SPM

Teaching Hours : 15 x3 = 45 Hrs

L T P C

: 3 0 0 3

**OBJECTIVES:**

- To know of how to do project planning for the software process.
- To learn the cost estimation techniques during the analysis of the project.
- To understand the quality concepts for ensuring the functionality of the software

**UNIT I : SOFTWARE PROJECT MANAGEMENT CONCEPTS**

Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, Identify activity risks, and allocate resources- TQM, Six Sigma, Software Quality: defining software quality, ISO9126, External Standards. 9 Hrs

**UNIT II : SOFTWARE EVALUATION AND COSTING**

Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting, cost-benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach: Choosing technologies, choice of process models, structured methods. 9 Hrs

**UNIT III : SOFTWARE ESTIMATION TECHNIQUES**

Software Effort Estimation: Problems with over and under estimations, Basis of software Estimation, Software estimation techniques, expert Judgment, Estimating by analogy. Activity Planning: Project schedules, projects and activities, sequencing and scheduling Activities, networks planning models, formulating a network model. 9 Hrs

**UNIT IV : RISK MANAGEMENT**

Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring. 9 Hrs

**COURSE OUTCOME:**

The student must be able to

- Understand the activities during the project scheduling of any software application.
- Learn the risk management activities and the resource allocation for the projects.
- Can apply the software estimation and recent quality standards for evaluation of the software projects
- Acquire knowledge and skills needed for the construction of highly reliable software project
- Able to create reliable, replicable cost estimation that links to the requirements of project planning and managing.

**REFERENCES:**

1. Bob Hughes & Mike Cotterell, “Software Project Management”, Tata McGraw- Hill Publications, Fifth Edition 2012
2. Futrell , “Quality Software Project Management”, Pearson Education India, 2008
3. Gobalswamy Ramesh, “Managing Global Software Projects”, Tata McGraw Hill Publishing Company, 2003
4. Richard H.Thayer “Software Engineering Project Management”, IEEE Computer Society
5. S. A. Kelkar,” Software Project Management” PHI, New Delhi, Third Edition ,2013

**E-LEARNING RESOURCE**

[http://en.wikipedia.org/wiki/Comparison\\_of\\_project\\_management\\_software](http://en.wikipedia.org/wiki/Comparison_of_project_management_software)

[http://www.ogc.gov.uk/methods\\_prince\\_2.asp](http://www.ogc.gov.uk/methods_prince_2.asp)

**SEMESTER III  
COMPILER DESIGN****PAPER NO – XX****COURSECODE: MCA18/3E1/CDN****Teaching Hours: 15 x 3 = 45 Hrs****L T P C : 3 0 0 3****OBJECTIVES:**

- to introduce the major concept areas of language translation and compiler design
- to develop an awareness of the function and complexity of modern compilers
- to understand the phases of the compilation process and be able to describe the purpose and implementation approach of each phase.
- to give students practical exposure to aspects of theoretical Computer Science including Languages, Grammars, and Machines.
- to exercise and reinforce prior programming knowledge with a non-trivial programming project to construct a compiler.

**COURSE OUTLINE:**

**UNIT I** : Introduction: Basic concepts - Grammar - Language - Parts of a compiler – Grouping of phases - Compiler construction tools.

9 Hrs

**UNIT II** : Lexical Analyzer : Role of a lexical analyzer – Input buffering - Specification and recognition of tokens - Finite automata - Regular expression to finite automation – Optimization of DFA-based pattern matchers-Use of a tool for generating lexical analyzer.

9 Hrs

**UNIT III** : Syntax Analyzer: Role of a parser - Context-free grammars - Top-down parsing – Bottom up parsing - Use of a tool to generate parsers.

9 Hrs

**UNIT IV** : Intermediate Code Generation: Intermediate languages - Declaration - Assignment statements – Boolean expressions - Flow control statements – Back patching.

9 Hrs

**UNIT V** : Code Generation: Introduction to optimization techniques - Issues in the design of a code generator - Run-time storage management - Design of a simple code generator.

9 Hrs

**COURSE OUTCOME:**

The students will be able to

- demonstrate a working understanding of the process of semantic analysis through the construction of semantic records based on parse trees, the construction of symbol tables, the organization of run time memory and the writing of a semantic analyzer for a compiler.
- design, analyze, implement and test a working compiler for a small language
- develop a compiler with all the phases

**BOOKS FOR REFERENCES:**

1. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman , "Compilers Principles, Techniques and Tools", 2nd Edition, Pearson Education, 2011.
2. Des Watson, "A Practical Approach to Compiler Construction", Springer, 2nd Edition, ISBN: 3319527894, 9783319527895, 2017
3. Dick Grune, Kees van Reeuwijk, Henri E. Bal, Cerial J.H. Jacobs, Koen Langendoen, "Modern Compiler design", Springer Science & Business Media, 2012, 2nd Edition, ISBN : 1461446996, 9781461446996,2012.

**E-LEARNING RESOURCES:**

[www.ntpel.iitm.ac.in](http://www.ntpel.iitm.ac.in)

**SEMESTER IV  
ELECTIVE II**

**ACCOUNTING AND FINANCIAL MANAGEMENT**

**PAPER NO – XXIX**

**COURSECODE: MCA15/4E2/AFM**

**Teaching Hours: 15 x 3 = 45Hrs**

**L T P C : 3 0 0 3**

**OBJECTIVE:**

- To know the result of the business over a period of time. The result of a business may be profit or loss.
- To know the financial position of business at a point of time. This can be known by presenting all assets and liabilities in the form of a statement known as a Balance Sheet.
- To maintain all records for a given period to serve as permanent reference in future.
- To know the amount which a business owes to others for having bought goods on credit basis.
- To know the amount due to business by others on account of goods sold on credit basis.

**COURSE OUTLINE:**

- UNIT I** : Principles Of Accounting : Principles of double entry-Assets and liabilities-Accounting records and systems-Trial balance and preparation of financial statements-Trading - Manufacturing, profit and loss accounts- Balance sheet including adjustments(simple problems only). 9 Hrs
- UNIT II** : Analysis And Interpreting Accounts And Financial Statements: Ratio analysis-Use of ratios in interpreting the final accounts (trading accounts and loss a/c and balance sheet)-final a/c to ratio as well as ratios to final accounts. 9 Hrs
- UNIT III** : Break Even Analysis And Marginal Costing: Meaning of variable cost and fixed cost-Cost-Volume – profit analysis-Calculation of breakeven point-profit planning- sales planning and other decision-making analysis involving break-even analysis-Computer Accounting and algorithm.(differential cost analysis to be omitted) 9 Hrs
- UNIT IV** : Budget/Forecasting - Preparation of and characteristics of functional budgets-production- sales- purchases- cash and flexible budgets. 9 Hrs
- UNIT V** : Project Appraisal - Method of capital investment decision making-Payback method- APR method-Discounted cash flows-Net present values-internal rate of return-sensitivity analysis-cost of capital. 9 Hrs



**COURSE OUTCOME:**

The student must be able to

- Understand the impact of business over a period of time i.e the result of a business is profit or loss.
- Understand the financial position of business at a point of time.
- Know the credit debit basics , budget forecasting and project appraisal.

**BOOKS FOR REFERENCES:**

1. Shukla M.C and T.S.Grewal,“AdvancedAccounts”,NewDelhi,S.Chand& Co. , 1991.
2. Gupta R.L &M.Radhaswamy,“Advanced Accounts(Vol II)”,New Delhi,S.Chand& sons,1991.
3. Man Mohan & S.N. Goyal,“Principles of Management Accounting”,AryaSahitya Bhawan,1987.
4. Kuchhal S.C. “Financial Management”,chaitanya,1980.
5. A.Murthy“Financial Management”Margham Publication.
6. Prof T.S.Reddy&Dr. Y.HariprasadReddy,“Management Accounting”

**E-LEARNING RESOURCES:**

## SEMESTER IV STATISTICAL METHODS

PAPER NO – XXIX

COURSECODE: MCA18/4E2/STS

Teaching Hours: 15 x 3 = 45 Hrs

L T P C : 3 0 0 3

**Objectives:**

- Understand basic principles of statistical inference.
- Become an informed consumer of statistical information.
- Prepare for further coursework or on-the-job study.

**UNIT – I:**

Concepts of Statistical Population and Sample. Measurement of Scale: Nominal, Ordinal, interval, ratio. Collection and sources of statistical data – Formation of frequency distribution – discrete and continuous – cumulative frequency distribution (O'gives) – Classification and tabulation.

Graphs and Diagrams – Bar diagrams, Histogram, Pie diagram.

**UNIT – II:**

Univariate data – Measures of Central Tendency – Arithmetic Mean, Median, Mode, Geometric mean, Harmonic mean – Inter Relationship between A.M, G.M and H. M – Weighted A.M – properties of a good Average.

**UNIT – III:**

Measures of dispersion (absolute & relative) – Range, Quartile Deviation, Mean Deviation and Standard Deviation – Inter Relationship between Q.D., M.D., and S.D. Co-efficient of Variation – Lorenz curve

**UNIT – IV:**

Moments – Raw moments, Central moments – Relation between raw and central moments  
Measures of skewness – Karl Pearson's coefficient of skewness – Bowley's co-efficient of Skewness – Measures of Kurtosis.

**UNIT – V:**

Correlation – types of correlation – Scatter diagram — Karl Person's co-efficient of correlation – properties – Spearman's Rank correlation co-efficient – Concurrent deviation Method - Correlation co-efficient for grouped data.

**COURSE OUTCOME:**

The student must be able to

- evaluate the strengths and weaknesses of study designs and can select a study design that is appropriate for addressing a specific research question.
- use statistical reasoning, formulate a problem in statistical terms, perform exploratory analysis of data by graphical and other means, and carry out a variety of formal inference procedures

**BOOKS FOR REFERENCES:**

1. Gupta, S.C, and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics(11<sup>th</sup> edition),Sultan Chand & Sons, New Delhi.

2. Goon Gupta A.M and Das Gupta, (1994). Fundamentals of Statistics, The World Press Private Limited, Calcutta.
3. S.P.Gupta, (2001). Statistical Methods, Sultan Chand & Sons, New Delhi.

**SEMESTER IV**  
**RESOURCE MANAGEMENT TECHNIQUES**

PAPER NO – XXIX

COURSECODE: MCA18/4E2/RMT

Teaching Hours: 15 x 3 = 45Hrs

L T P C : 3 0 0 3

**OBJECTIVES:**

- To develop Computational Skills
- To develop Logical thinking in formulating industry oriented problems.
- To apply these techniques in real life situations.

**COURSE OUTLINE:**

- UNIT I** : Linear Programming: Formulation – Solution to LPP by Graphical & Simplex Method – Artificial Variable Technique – Big M Method. 9 Hrs
- UNIT II** : Transportation Problem – Assignment Problem – Travelling Salesman Problem. 9 Hrs
- UNIT III** : Sequencing: Sequence Problem: Processing N Jobs on 2 machines & 3 machines – Game theory: Introduction – 2 persons zero – sum game – Max & Min Max principle – saddle point & value of game – Games without saddle points. 12 Hrs
- UNIT IV** : Construction of Network: Types of floats – Project Scheduling by Critical Path Method - Project Evaluation and Review Techniques – Difference between CPM and PERT. 10 Hrs
- UNIT V** : Interpolation: Definition: Newton Forward & Backward formulae for equally spaced arguments – Lagrange Formula for unequally spaced arguments. 5 Hrs

(\*Note: No Derivation required for All UNITS.)

**COURSE OUTCOME:**

The students will be able to

- construct a real world problem into a mathematical problem.
- identify the appropriate model to solve the problem.
- explore the alternative models and justify on the selected model for representation.
- analyze and provide a optimal solution
- construct the network and analyze the resources in network scheduling

**BOOKS FOR REFERENCES:**

1. V.Sundaresan , K. Ganesan , K.S. Ganapathy Subramanian , “ Resource Management Techniques Operation Research “ , New Delhi , India , A.R. Publications 2009.
2. P.Kandasamy, K. Thilagavathy ,” Calculus of Finite differences and Numerical Analysis “ , S.Chand ,2012.
3. S.D.Sharma , “ Operations Research – Theory , Methods & Applications” , Kedarnath, 2012.
4. KantiSwarup , P.K. Gupta , Man Mohan , “ Operations Research “ , Sultanchand ,2010.
5. R.K.Gupta , “ Operations Research “ , Krishnan Prakashan, 33 edition,2014.
6. S.G. Venkatachalapathy, “Calculus of Finite differences and Numerical Analysis “ , Margham Publications , 2012.

**E – LEARNING RESOURCES**

<http://nptel.ac.in/syllabus/syllabus.php?subjectId=111107064>

**SEMESTER V  
CLOUD COMPUTING****PAPER NO – XXXVI****COURSECODE: MCA15/5E3/CCG****Teaching Hours: 15 x 3 = 45Hrs****L T P C : 3 0 0 3****OBJECTIVES:**

- This course provides a comprehensive and in-depth knowledge of CloudComputing concepts, technologies, architecture and applications.
- This Course Provides introduction and research to the state-of-the-art in Cloud Computing fundamental issues, Research technologies, applications and implementations.

**COURSE OUTLINE:**

**UNIT I** : Cloud Computing: Introduction – Components of Cloud – Cloud Types – Impact of Cloud Computing on Businesses.

12 Hrs

**UNIT II** : Virtualization: Introduction – Benefits – Virtualization Structure – Virtualization mechanism – Virtualization of CPU, Memory and I/O Devices.

12 Hrs

**UNIT III** : Types of Cloud Services: Software as a Service - Platform as a Service - Infrastructure as a Service – Database as a Service – Specialized Cloud Services.

12 Hrs

**UNIT IV** : Cloud Types and Models: Private Cloud – Community Cloud – Public cloud – Case Study – Hybrid clouds – Comparisons.

12 Hrs

**UNIT V** : SLA with Cloud Service Providers: Concept of SLA – SLA Aspects and Requirements – Service Availability – Sample – Amazon S3 SLA, Google Apps SLA – Regulations for Clouds – PCI-DSS, ECPA

12 Hrs

**COURSE OUTCOMES:**

Students who complete this course will be able to

- Demonstrate the different taxonomy of parallel and distributed computing.
- Articulate the main concepts, key technologies, strengths and limitations of Virtualization and Cloud computing
- Compare and contrast the delivery and deployment models of cloud computing
- Analyze the core issues of cloud computing such as energy efficiency, security, privacy and interoperability
- Recognize the cloud file systems and their applications in industry.
- Identify problems, explain, analyze, and evaluate various cloud computing solutions.

**BOOKS FOR REFERENCES:**

1. Kailash Jayaswal, Jagannath, Donald J. Houde, Deven Shah, “ Cloud Computing – Black Book”, Dreamtech Press, 2015.
2. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, “Cloud Computing –A Practical Approach”, Tata McGraw Hill Education Pvt. Ltd, 2013.
3. RajkumarBuyya, James Broberg, AndrzejGoscinski, “ Cloud Computing – Principles and Paradigms” , Wiley Publications, 2014.
4. Michael Miller, “ Cloud Computing – Web-Based Applications that change the way you work and Collaborate Online” , Pearson Education, 2013.

**E-LEARNING RESOURCES:**

[www.ntpel.iitm.ac.in](http://www.ntpel.iitm.ac.in)

## SEMESTER – V MOBILE COMPUTING

PAPER NO – XXXVI

COURSE CODE: MCA18/5E3/MCG

Teaching Hours: 15 x 3 = 45Hrs

L T P C : 3 0 0 3

**COURSE OBJECTIVES:**

- To learn wireless transmission techniques like Modulation, Multiplexing and MAC.
- To acquire the awareness over telecommunication systems.
- To apply the wireless communication standards IEEE 802.11, HiperLAN and WATM
- To analyze several routing algorithms such as DSDV and DSR.

**COURSE OUTLINE:**

- UNIT I** : Introduction: Wireless transmission–Frequencies for radio transmission–Signals – Antennas–Signal Propagation–Multiplexing–Modulations–Spread spectrum – DHSS - FHSS –Medium Access Control –SDMA–FDMA–TDMA – Fixed TDM – Classical Aloha – Slotted Aloha – CDMA – Comparative Study. 9Hrs
- UNIT II** : Telecommunication Systems: GSM– Mobile Services - System Architecture – Protocols – Localization and Calling –Hand over – Security – New Data Services - Case Study: DECTand TETRA. 9Hrs
- UNIT III** : Satellite Systems: Applications – GEO-LEO-MEO- Wireless LAN–IEEE802.11 – System Architecture – HIPERLAN – WATM – BlueTooth – Architecture - Security. 9Hrs
- UNIT IV** : Mobile Network Layer: Mobile IP–Dynamic Host Configuration Protocol–MANET – Routing – DSDV – DSR. 9 Hrs
- UNIT V** : Mobile Transport Layer and Mobility Support: Traditional TCP – Indirect TCP– Snooping TCP – Mobile TCP–Fast Retransmit / Fast Recovery –Transmission/ Timeout Freezing -Selective Retransmission–Transaction Oriented TCP– WAP – WAP Architecture – WML Script– WAP 2.0. 9 Hrs

**COURSE OUTCOME:**

- Understanding the wireless communication strategies.
- Gaining knowledge about the telecommunication systems.
- Acquirement of technical skills to elucidate WAP and WML.

**BOOKS FOR REFERENCES:**

1. Jochen Schiller, “Mobile Communications”, Pearson Education, 2014.
2. William Stallings, “Wireless Communications & Networks”, Pearson Education, 2014.
3. Asoke Talukder, Hasa Ahmed and Roopa R Yavagal, “Mobile Computing”, Tata McGraw



Hill Edition, 2013.

4. KavehPahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, second Edition,  
2003, Pearson Education.

**E-LEARNING RESOURCES:**

[www.en.wikipedia.org](http://www.en.wikipedia.org)

<https://www.mi.fu-berlin.de>

## SEMESTER – V SOFT COMPUTING

**PAPER NO – XXXVI**

**COURSE CODE: MCA18/5E3/SCG**

**Teaching Hours: 15 x 3 = 45Hrs**

**L T P C : 3 0 0 3**

### OBJECTIVES:

The student should be made to:

- Learn the various soft computing frame works
- Be familiar with design of various neural networks
- Be exposed to fuzzy logic
- Learn genetic programming.

### COURSE OUTLINE:

**UNIT I : INTRODUCTION** Artificial neural network: Introduction, Fundamental concepts – Evolution of neural networks- basic models – important terminologies – McCulloch-Pitts neuron – linear separability – hebb network – supervised learning network: perceptron networks – adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, Time Delay Neural Networks.applications. Fuzzy logic: Introduction – crisp sets- fuzzy sets – crisp relations and fuzzy relations: cartesian product of relation – classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction – biological background – traditional optimization and search techniques – Genetic basic concepts. 9 Hrs

**UNIT II: ASSOCIATIVE NEURAL NETWORKS** Associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative autoassociative memory network & iterative associative memory network – Temporal Associative Memory Network. 9 Hrs

**UNIT III: UNSUPERVISED LEARNING NETWORKS:** Kohonen self organizing feature maps, LVQ – Counterpropagation Networks - ART network- Boltzmann Machine 9 Hrs

**UNIT IV : FUZZY LOGIC** : Introduction – Classical sets-Fuzzy sets-cartesian product of Relation-Classical Relation-Fuzzy Relations-Membership functions: features, fuzzification, methods of membership value assignments-Defuzzification: lambda cuts – methods – fuzzy arithmetic and fuzzy measures: fuzzy arithmetic – extension principle – fuzzy measures – measures of fuzziness -fuzzy integrals – fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning 9 Hrs

**UNIT V : GENETIC ALGORITHM:** Genetic algorithm and search space – general genetic algorithm – operators –Hybrid Soft Computing Techniques-Neuro-fuzzy hybrid systems — Applications of soft computing:A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, 9 Hrs

**COURSE OUTCOMES:**

Upon completion of the course, the student should be able to:

- Apply various soft computing frame works.
- Design of various neural networks.
- Use fuzzy logic.
- Apply genetic programming.
- Discuss hybrid soft computing.

**BOOKS FOR REFERENCES:**

1. S.N.Sivanandam and S.N.Deepa, “Principles of Soft Computing”, Wiley India Pvt Ltd, 2011.
2. J.S.R.Jang, C.T. Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI / Pearson Education 2004.
3. S.Rajasekaran and G.A.Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications”, Prentice-Hall of India Pvt. Ltd., 2006.George J. Klir, Ute St. Clair, Bo Yuan, “Fuzzy Set Theory: Foundations Applications” Prentice Hall, 1997.
4. David E. Goldberg, “Genetic Algorithm in Search Optimization and Machine Learning” Pearson Education India, 2013.
5. James A. Freeman, David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.
6. Simon Haykin, “Neural Networks Comprehensive Foundation” Second Edition, Pearson Education, 2005.

**E-LEARNING RESOURCES:**

## SEMESTER V

### DIGITAL IMAGE PROCESSING

**PAPER NO – XXXVII**

**COURSECODE: MCA15/5E4/DIP**

**Teaching Hours: 15 x 3 = 45Hrs**

**L T P C : 3 0 0 3**

#### OBJECTIVE:

- To introduce basic concepts in acquiring, storage and Process of images
- To introduce for enhancing the quality of images.
- To introduce techniques for extraction and processing of region of interest

#### COURSE OUTLINE:

- UNIT I:** Introduction To Image Processing: Digital image processing – fundamental steps in digital image processing-components of an image processing system-elements of visual perception-light and the electromagnetic spectrum-image sensing and acquisition-image sampling and quantization-some basic relationships between pixels.  
9 Hrs
- UNIT II:** Intensity Transformations And Spatial Filtering: Intensity Transformation functions – Histogram processing – Fundamentals of Spatial filtering-smoothing spatial filters.  
9 Hrs
- UNIT III:** Geometric Transformations And Image Registration: Transforming points-Affine transformations-projective transformations-applying geometric transformations to images-image coordinate systems in MATLAB-image interpolation-image registration. 9  
Hrs
- UNIT IV:** Wavelets And Multiresolution Processing: Background-multi resolution expansions-wavelet transforms in one dimension-The fast wavelet transform-wavelet transforms in two dimensions-image compression-fundamentals- some basic compression methods.  
9 Hrs
- UNIT V:** Image Segmentation: Fundamentals-Point, Line and Edge Detection-Thresholding –Region-Based segmentation-segmentation using morphological watersheds.  
9 Hr

**COURSE****OUTCOMES:**

Understand image formation and the role human visual system plays in perception of gray and color image data.

Get broad exposure to and understanding of various applications of image processing in industry, medicine, and defense.

Learn the signal processing algorithms and techniques in image enhancement and image restoration.

Acquire an appreciation for the image processing issues and techniques and be able to apply these techniques to real world problems.

Be able to conduct independent study and analysis of image processing problems and techniques.

**BOOKS FOR REFERENCES:**

1. Rafael C. Gonzalez ,Richard E. Woods, Digital Image Processing , Pearson Prentice Hall,Third Edition,2013.
2. Rafael C.Gonzalez, Richard E.Woods, Steven L.Eddins, Digital Image Processing Using MATLAB, McGraw Hill Education (India) Private Limited., 2014.
- 3.Chanda.B., DuttaMajumder .D.,Digital Image Processing and Analysis, Prentice Hall of India, New Delhi, 2007.
4. Scott E.Umbaug, Computer Vision and Image Processing, Prentice Hall International, New Delhi, 1998.
5. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Second Edition, Thomson Learning, 2001

**E-LEARNING RESOURCES:**

<http://nptel.ac.in/courses/106105032/>

## SEMESTER –V BIG DATA ANALYTICS

PAPER NO – XXXVII

COURSECODE: MCA15/5E4/BDA

Teaching Hours: 15 x 3 = 45Hrs

L T P C

: 3 0 0 3

**OBJECTIVE:**

- To explore the fundamental concepts of big data analytics
- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques.
- To learn to use various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts

**COURSE OUTLINE :**

- UNIT I** : Introduction to Big Data Platform: Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools 9 Hrs
- UNIT II** : Introduction To Streams Concepts: Stream Data Model and Architecture - Stream Computing -Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions 9 Hrs
- UNIT III** : History of Hadoop: The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFSBasics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling- Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features.9 Hrs
- UNIT IV** : Setting up a Hadoop Cluster: Cluster specification - Cluster Setup and Installation – HadoopConfiguration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud. 9 Hrs
- UNIT V** : Applications on Big Data Using Pig and Hive: Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphereBigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques-Systems and applications. 9 Hrs

**COURSE OUTCOMES:****The Students are able to**

- Explore the fundamental concepts of big data analytics
- Analyze the big data using intelligent techniques.
- Understand the various search methods and visualization techniques.

- Learn to use various techniques for mining data stream.
- Understand the applications using Map Reduce Concepts

**BOOKS FOR REFERENCES:**

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Tom White “ Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding BigData: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012
4. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
5. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
6. Glenn J. Myatt, “Making Sense of Data”, John Wiley & Sons, 2007

**E-LEARNING RESOURCES:**

[www.tutorialspoint.com/hadoop/](http://www.tutorialspoint.com/hadoop/)

## SEMESTER V INTERNET OF THINGS

PAPER NO – XXXVII

COURSECODE: MCA15/5E4/IOT

Teaching Hours: 15 x 3 = 45Hrs

L T P C : 3 0 0 3

**OBJECTIVES:**

- To learn the concepts about Internet of things
- To understand and implement smart systems
- To Understand the Architectural Overview of IoT
- To Understand the IoT Reference Architecture and Real World Design Constraints
- To deploy the resources into business

**COURSE OUTLINE:**

- UNIT I :** Introduction : Definition & Characteristics of IoT - Physical Design of IoT : Things in IoT , IoT Protocols - Logical Design of IoT : IoT Functional Blocks , IoT Communication Models , Communication APIs - IoT Enabling Technologies : Wireless Sensor Networks , Cloud Computing , Big Data Analytics , Communication Protocols , Embedded Systems. 9 Hrs
- UNIT II :** Programming The Microcontroller For IOT: Basics of Sensors and actuators – examples and working principles of sensors and actuators –Arduino/Equivalent Microcontroller platform – Setting up the board -Programming for IOT – Reading from Sensors Communication:Connecting microcontroller with mobile devices – communication through Bluetooth and USB – connection with the internet using Wi-Fi / Ethernet. 9 Hrs
- UNIT III :** M2M to IOT the vision – Local and wide area networking – Data management – Business process in IOT – Everything as a service(XaaS) – M2M and IOT analytics – Knowledge Management . 9 Hrs
- UNIT IV :** Architecture Reference Model:Introduction, Reference Model and architecture, IoT reference Model .IOT reference architecture :Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. 9 Hrs
- UNIT V :** Real-World Design Constraints : Introduction, Technical Design constraints-Data representation and visualization, Interaction and remote control. Industrial Automation – Commercial Building Automation – Smart cities. 9 Hrs

**OUTCOMES:**

- Analyze various protocols for IoT
- Develop web services to access/control IoT devices.
- Design a portable IoT using Arduino
  
- Analyze applications of IoT in real time scenario

**BOOKS FOR REFERENCES:**

1. Arshdeep Bahga, Vijay Madiseti, —Internet of Things – A hands - on approach, Universities Press, 2015 - Unit 1



2. Arduino Microcontroller Guide W. Durfee, University of Minnesota ver. oct-2011 for UNIT 2
3. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatios Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014. for UNIT 3,4,5
4. Charalampos Doukas, Building Internet of Things with the Arduino, Create space, April 2002
5. Dieter Uckelmann et.al, "Architecting the Internet of Things", Springer, 2011
6. Luigi Atzori et.al, "The Internet of Things: A survey", Journal on Networks, Elsevier Publications, October, 2010
7. <http://postscapes.com/>
8. <http://www.theinternetofthings.eu/what-is-the-internet-of-things>

**E-LEARNING RESOURCES:**

[www.me.umn.edu/courses/me2011/arduino/](http://www.me.umn.edu/courses/me2011/arduino/)

# **SOFT SKILL COURSES**

**SEMESTER – I**  
**PERSONALITY ENRICHMENT**

PAPER NO – VII

COURSE CODE: MCA18/IS1/PET

Teaching Hours: 15 x 2 = 30 Hrs

L T P C : 0 2 0 2

**OBJECTIVES:**

- To make students understand the concept and components of personality, thereby to apply the acquired knowledge to themselves and to march towards excellence in their respective academic careers.
- To enable students to keep themselves abreast of general knowledge and current information.
- To bring out creativity and other latent talents with proper goal setting so that self-esteem gets enhanced

**COURSE OUTLINE:**

- UNIT I** : Introduction: Definition of Personality, Determinants of Personality- biological, psychological and socio- cultural factors, Misconceptions and clarifications ,Need for personality development
- UNIT II** : Self-Awareness and Self Motivation:Self analysis through SWOT and Johari window , Elements of motivation, Seven rules of motivation,Techniques and strategies for self motivation, Motivation checklist and Goal setting based on principle of SMART, Self motivation and life, Importance of self-esteem and enhancementof self-esteem.
- UNIT III** : Memory and study skills: Definition and importance of memory, Causes of Forgetting , How to forget (thought stopping), how to remember (techniques for Improving memory) The technique of passing exams-management of examination fear.
- UNIT IV** : Power of positive thinking : Nurturing creativity, decision-making and problem solving. Thinking power- seven steps for dealing with doubt ,Traits of positive thinkers and high achievers , Goals and techniques for positive thinking , Enhancement of concentration through positive thinking ,Practicing a positive life style.
- UNIT V** : General knowledge and current affairs, Regional, national and international events, Geographical, political and historical facts, Information on sports and other recreational activities, Basic knowledge With regard to health and health promotion

**BOOKS FOR REFERENCES:**

1. Mile, D.J (2004). Power of positive thinking. Delhi: Rohan Book Company.
2. Pravesh Kumar (2005). All about self- Motivation. New Delhi: Goodwill Publishing House.
3. Dudley, G.A. (2004). Double your learning power. Delhi: Konark Press. Thomas Publishing Group Ltd.
4. Lorayne, H. (2004). How to develop a super power memory. Delhi: Konark Press. Thomas Publishing Group Ltd.

**SEMESTER – II  
FRENCH FOR BEGINNERS****PAPER NO: XVI****COURSE CODE : MCA18/2S2/FFB****Teaching Hours: 15 x 2 = 30 Hrs****L T P C : 0 2 0 2****PREREQUISITES:** Complete beginners with no prior knowledge of the language.**OBJECTIVES :**

- At a time when the knowledge of a foreign language has become an indispensable tool.
- This course in French will give an opportunity for students of other disciplines to get a basic knowledge of a widely used European language.
- The course is based on a minimum vocabulary necessary and sufficient to develop elementary language skills in French.

**COURSE OUTLINE:****UNIT I** : Alphabets and numbers- Simple Grammar: Basics of French conversation (To greet a person- Introducing oneself- Asking basic information)**UNIT II** : Simple Grammar: Name and locate objects-colours and simple description of people.**UNIT III** : Simple Grammar: Asking for directions- Giving suggestions**UNIT IV** : Simple Grammar: Indicate date and time. Asking and giving information on one's profession and activities.**UNIT V** : Simple Grammar: Use of past tense. Narrating past events. Giving one's opinion.**BOOKS FOR REFERENCES:**

1. "Taxi" – Guy Cappelle and Robert Menand.

**E-LEARNING RESOURCES:**[www.fle.fr](http://www.fle.fr)[www.bonjourdefrance.com](http://www.bonjourdefrance.com)

**SEMESTER – III**  
**BUSINESS COMMUNICATION**

PAPER NO:XXIV

Teaching Hours: 15 x 3 = 45Hrs

COURSE CODE:MCA18/3S3/BCN

L T P C : 0 0 4 2

**OBJECTIVES:**

- It is a skill based qualification. It gives the students the opportunity to learn practical language skills in four key areas: reading, writing, listening and speaking

**COURSEOUTLINE:**

	<b>BEC Preliminary</b>	<b>BEC Vantage</b>	<b>BEC Higher</b>
<b>Reading</b>	7 parts / 45 items	5 parts / 45 items  1 hour	6 parts/2 items  1 hour
<b>Writing</b>	2 tasks  1 hour 30 minutes  (NB reading and writing)	2 tasks  45 minutes	2 tasks  1 hour 10 minutes
<b>Listening</b>	4 parts/30 items  about 40 minutes  including transfer time	3 parts / 30 items  about 40 minutes  including transfer time	3 parts / 30 items  about 40 minutes  including transfer time
<b>Speaking</b>	3 parts  12 minutes	3 parts  14 minutes	3 parts  16 minutes

**BOOKS FOR REFERENCE:**

Materials from University of Cambridge

**SEMESTER – IV**  
**TECHNICAL SEMINAR AND REPORT WRITING**

**PAPER NO – XXXIII****COURSECODE: MCA18/4S4/TSR****Teaching Hours: 15 x 2 = 30Hrs****L T P C : 0 2 0 2****OBJECTIVE:**

- To provide a brief outline about any one field in information technology.
- To elaborate literature survey of the domain opted.
- To reveal and apply any technique to obtained the desired output.
- To present the paper in the review and write a technical paper.

The goal of this course is to train the students to critically evaluate a well-defined set of research subjects and to recapitulate the conclusion concisely in a paper of scientific quality. The paper will be evaluated based on the ability to understand a topic, communicate it and identify the issues. Results and Evaluation from this term paper will be presented to fellow students and a committee of faculty members of the department.

1. Every student selects a topic related to current trends and the same should be approved by the respective committee. This selection should have at least 5 distinct prime sources.
2. Every student must write a short analysis of the topic and present it to fellow Students and faculty (discuss the topic – expose the flaws – scrutinize the issues) Every week.
3. The faculty should assess the short review and award marks with respect to the following:
  - a. Has the student analyzed – not merely quoted – the most significant portions of the major sources employed?
  - b. Has the student presented original and convincing insights?
  - c. Plagiarism to be checked.
4. Every student should re-submit and present the review article including issues/ Comments / conclusions which had arisen during the previous discussion.
5. Every student should submit a final paper as per project specifications along with all short review reports (at least 5 internal reviews) and corresponding evaluation comments to the concerned staff members.
6. Every student should appear for a final external review exam to defend themselves.

**COURSE OUTCOMES:**

1. Obtain a thorough knowledge about a particular domain.
2. Initiate the research process.
3. Expertise in the field.
4. Able to recognize the issues of any particular field.

**TOPICS:**

1. Information Security 2. Digital Image Processing 3. Computer Networks
4. Cloud Computing 5. Cryptography and Network Security

**SEMESTER V**  
**QUANTITATIVE APTITUDE**

PAPER NO – XLII

COURSE CODE: MCA18/5S5/QAE

Teaching Hours: 15 x 2 = 30 Hrs

L T P C : 0 2 0 2

**OBJECTIVES:**

- This course prepares the students in areas like Quantitative Aptitude (including Data Interpretation & Data Sufficiency), Reasoning & Logical Ability (including Non-Verbal Reasoning), English Language & Grammar,
- To test the reasoning abilities and mental aptitude of the students.
- Designed to test the language abilities and understanding of English grammar

**COURSE OUTLINE:****Quantitative Aptitude:**

- Time-Speed-Distance- Work and time
- Number system: HCF- LCM- Geometric Progression, Arithmetic progression- Arithmetic mean- Geometric mean- Harmonic mean- Median- Mode- Number Base System- BODMAS
- Geometry- (Lines- angles- Triangles- Spheres- Rectangles- Cube- Cone etc) visit tutorial
- Averages- Percentages- Partnership
- Menstruation- Allegation & Mixtures- Work- Pipes and Cisterns visit tutorial
- Simple Interest & Compound Interest
- Set Theory- Venn diagram Ratios and Proportion- Ratios- Percentages- In-equations visit tutorial
- Installment Payments- Partnership- Clocks
- Probability- Permutations & Combination visit tutorial
- Quadratic and linear equations visit tutorial
- Algebra
- Profit & Loss

**Reasoning:**

- Critical reasoning- Visual reasoning- Assumption-Premise- Conclusion- Assertion and reasons- Statements and assumptions- identifying valid inferences - identifying Strong arguments and Weak arguments
- Statements and conclusions- Cause and Effect- Identifying Probably true- Probably false- definitely true- definitely false kind of statement- Linear arrangements- Matrix arrangements.
- Graphs can be Column graphs- Bar Graphs-gram- etc.



- Symbol Based problems- Coding and decoding- Sequencing - identifying next number in series- Puzzles- Syllogisms- Functions- Family tree - identifying relationship among group of people and etc.

**SEMESTER – IV**  
**ENTREPRENEURIAL SKILL DEVELOPMENT**

**PAPER NO – XXIV****COURSE CODE: MCA18/6S6/ESD****Teaching Hours: 15 x 2 = 30 Hrs****L T P : 0 2 0 2****OBJECTIVES:**

- This course enables the students to enhance their Entrepreneurial skills
- To develop the knowledge of Project Preparation & Marketing analysis..
- To understand the support of Institutions and Investment Procurement

**COURSE OUTLINE:**

**Concept of Entrepreneurship** : Entrepreneur -Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs.management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.

**Project Preparation & Marketing analysis:** Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.

**Institutions Support** : Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme

**Investment Procurement** : Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure –Loan procurement –Banking Processes.

**BOOKS FOR REFERENCES**

1. Buame, S, (2000) Entrepreneurial And Innovative Management, School of Administration
2. Dwomo-Fokuo, E. (2003) Entrepreneurship Theory And Practice, Kumasi Polytechnic
3. Hisrich,R.D., Peters, M.P. (1995) Entrepreneurship Starting, Developing And Managing A New Enterprise, 3rd edition, Richard Dirwin Inc.
4. Kuratko, D.F., hodgetts, R.M, (1992) Entrepreneurship, A Contemporary Approach, 2nd edition, the Dryden Press
5. Entrepreneurial Development and Small Business Management” by Dr P T Vijayashree & M Alagammai

