



मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी

مولانا آزاد نیشنل اردو یونیورسٹی

**MAULANA AZAD NATIONAL URDU UNIVERSITY**

*(A Central University established by an Act of Parliament in 1998)*

*Accredited with 'A' grade by NAAC*

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**PROGRAMME: MASTER OF COMPUTER APPLICATION  
(MCA)**

**DURATION: 3 YEARS**

**REGULATIONS, CURRICULUM & SYLLABUS**

**Department of CS & IT**

**School of Computer Science & Information Technology**

**Maulana Azad National Urdu University, Hyderabad (India)**

1. **Definitions**

- a. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.
- b. **Choice Based Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).
  - a. **Course:** Usually referred to, as 'papers' is a component of a programme. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures, tutorials, laboratory work, field work, outreach activities, project work, vocational training, viva, seminars, term papers, assignments, presentations, self-study etc. or a combination of some of these.
  - b. **Credit Based Semester System (CBSS):** Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.
  - c. **Credit Point (CP):** The numerical value obtained by multiplying the grade point (GP) by the no. of credit(C) of the respective course i.e.  $CP = GP \times C$ .
  - d. **Credit(C):** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week, i.e. a course with assigned L-T-P: 3-0-2 or 3-1-0 will be equivalent to 4 credits weightage course.
  - e. **Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
  - f. **Grade Point (GP):** It is a numerical weight allotted to each letter grade on a 10 point scale.
  - g. **Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.
  - h. **Programme:** An educational programme leading to award of a degree, diploma or certificate.
  - i. **Semester Grade point Average (SGPA):** It is a measure of performance of work done in a semester. It is ratio of total credit points (CPs) secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed upto two decimal places.
  - j. **Semester:** Each semester will consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled from July to December and even semester from January to June.
  - k. **Transcript or Grade Card (GC) or Certificate:** Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester the grade certificate will display the course details (code, title, no. of credits, grades secured) along with SGPA of that semester and CGPA earned till date semester.
  - l. **Sessional:** The internal assessments in theory papers conducted normally through two-tests, assignments, seminar / demonstrations and attendance with **15%, 5%, 5% and 5%** marks respectively. Sessional weightage shall be uniformly 30% and shall be normally performed by the

concerned teacher.

- m. **Semester Examinations:** The comprehensive examinations conducted for summative evaluation of course. The duration of these examinations shall be 3 and 4 hours for theory and practical courses respectively; and the weightage shall be 70% for theory and 50% for practical uniformly for all the courses.
- n. **L-T-P:** The prescribed hours/week during a semester for Lecture-Tutorial-Practical to a particular course, in accordance with curriculum prescriptions based on respective nature.
- o. **Programme Span (PS):** The programme's maximum time for completion shall be additional two (2) years (4 semesters).

## 2. General

- a. An academic year will consist of two semesters; namely odd and even semesters commencing normally from July and January respectively.
- b. Promotion from odd-to-even semester shall be automatic for normal cases, otherwise shall be governed by Section 7 clauses.
- c. All the calculations of SGPA and CGPA shall be rounded to two decimal places.

## 3. Attendance

Attendance requirement for appearing in examination of each of the semesters shall be 75%. Otherwise the student will be detained in semester examination. However, students having attendance from 65% to 75% may be allowed by a special permission from competent authority after showing the certified proofs with valid reasons for medical, sports, extra-curricular activities etc.

## 4. Performance Evaluation

- a. **Sessional:** The laboratory course sessional evaluations shall be performed continuously based on practical performed by a student. Such evaluation may involve periodic assessment of documentation of the practical exercise/experiment, precision of experiment etc. In the case of Project /Dissertation the Internal Assessment may be based on periodical progress report.
- b. **Semester Examination:** The Semester Examination shall commence during the first week of December/May for the Odd semester/Even semester courses, respectively.
- c. **Appointment of Examiners:** Head of the department shall normally appoint the examiners for different courses, selecting at least two other than the concerned teachers, randomly for theory courses in each of the semesters. In case of Lab/Projects/Viva-Voce examinations there shall be one internal and one external examiner. A sizable panel of external examiners shall be approved by the BOS on annual basis to facilitate the appointment of external examiners.
- d. **Moderation:** A committee duly constituted by BOS as follows, shall moderate the examination papers and shall have the right to improve / change the questions to a considerable extent:
  - i. Dean (Chairman)
  - ii. Head of the department (Convener)
  - iii. Three Faculty Members nominated by the Dean
- e. **Evaluation:** All the evaluations shall be performed in terms of marks, adding finally for each

course out of 100 marks. The marks obtained by each student in courses shall be converted to Letter-Grades / Grade-Points using Grading Assignment Table, described in Section 5.

### 5. Grading System:

The grades and their description, along with equivalent numerical grade points are listed in the Grading Assignment Table as follows:

**Grade Assignment Table**

Range of Marks	Description	Grade	Grade Point
85 - 100	Outstanding	O	10
75 - 84	Excellent	A+	9
65 - 74	Very Good	A	8
55 - 64	Good	B+	7
50 - 54	Above Average	B	6
45 - 49	Average	C	5
40 - 44	Pass	P	4
0 - 39	Fail	F	0
Otherwise	Absent	Ab	0

- a. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.
- b. For non credit courses '**Satisfactory**' or '**Unsatisfactory**' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

### 6. Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

- a. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$\text{SGPA } (S_i) = \frac{\sum(\text{Earned Credits } C_i \times \text{Grade Point } G_i)}{\sum \text{Earned Credits } C_i};$$

Where  $C_i$  is the number of credits of the  $i$ th course and  $G_i$  is the Grade Point Scored by the student in the  $i$ th course.

- b. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\text{CGPA } (C_i) = \frac{\sum(\text{Earned Credits } C_i \times \text{SGPA } S_i)}{\sum C_i};$$

Where  $S_i$  is the SGPA of the  $i$ th semesters and  $C_i$  is the total number of credits in that semester.

- c. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

#### **Illustration of the computation of SGPA and CGPA and Format for Transcripts**

##### **i. Computation of SGPA and CGPA**

Illustration for SGPA

**REGULATIONS: CHOICE BASED CREDIT SYSTEM (CBCS)**

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Course	Credits	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			139

Thus, **SGPA = 139/20 = 6.95**

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4
Credit : 20 SGPA : 6.9	Credit : 22 SGPA : 7.8	Credit : 25 SGPA : 5.6	Credit : 26 SGPA : 6.0
Semester 5	Semester 6		
Credit : 26 SGPA : 6.3	Credit : 25 SGPA : 8.0		

Thus, **CGPA =  $\frac{20 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0}{144} = 6.73$**

**ii. Transcripts (Format):**

Based on the above recommendations on Letter grades, grade points, SGPA and CGPA, the Higher Education Institutions may issue the transcript for each semester and a consolidated transcript indicating the performance in all semesters.

**7. Programme Continuation / Discontinuation:**

The continuation / discontinuation and Exit with Degree shall be governed as follows:

- a) A candidate shall be allowed to continue the programme provided he/she maintains a CGPA of 5.0 both in all theory and lab courses at the end of the even semesters (e.g. 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> for the academic programmes). Otherwise, the candidate shall remain in the same year till he/she pass the back paper with minimum credits required to attain the CGPA as 5.0.
- b) A candidate shall have to re-appear in semester examination of the courses with Fail/Absent grade (as per Grade Assignment Table in section 5 clause), when the same course is offered next time in the department during the programme span. Such students shall retain their sessional marks.

**8. Division and Position:**

Division shall be awarded in the following manner, to the candidates on the basis of their respective CGPA:

CGPA ≥ 8	1 <sup>st</sup> Division with Distinction
6.5 ≤ CGPA < 8	1 <sup>st</sup> Division
Otherwise	2 <sup>nd</sup> Division

However, First, Second or Third position shall be awarded to the candidates, provided they meet the following conditions:

- a) Rank shall be solely decided on the final CGPA, on completion of degree credit requirement.
- b) The candidate has completed all the prescribed requirements, in the prescribed programme duration.
- c) The candidate has passed / secured valid grades in all the prescribed courses, in the first attempt.
- d) No disciplinary action is pending or has ever been lodged against him/her.
- e) In case of an exceptional tie, both candidates shall be awarded the same rank.

#### 9. Review and Re-evaluation:

Review and re-evaluation of the answer sheets shall be as per the university rules.

#### 10. Grade Card:

At the end of each semester, a student will be given a 'Grade Card' which will contain Course Code, Title, Credits, Grades Awarded, Earned Credits and Earned Point secured by him/her in each course, together with his/her SGPA in that semester. On the completion of the programme, a Final Grade Card will be issued to the student, giving full semester-wise details about the absolute marks and grades obtained by him/her in each course together with his/her SGPA and also the CGPA and Division awarded to him/her.

#### 11. Equivalence:

Percentage (P) equivalent to CGPA earned by a candidate may be calculated using the following formula:

$$P = 9.5 \times \text{CGPA}$$

#### 12. Conduct of Teaching

##### a. Course Co-ordinator

Every course will be taught by one or more teachers. The Head of the department with consultation of Dean will allocate the teaching load to the teacher(s) and will also designate a course co-ordinator for each course. If more than one department is involved in the teaching of the course, the course co-ordinator will be from the coordinating department. The course co-ordinator will coordinate all the work related to attendance, course work, examination and evaluation. It is necessary that the students are informed about the course co-ordinator so that they may contact him/her about any problems regarding the course.

##### b. Display of Attendance, Marks etc.

It is essential that the attendance should be displayed to the students twice in a semester, once in the middle and then at the end of a semester by the teacher(s) concerned. The sessional marks should be displayed to students normally within 15 days of the examination. The total Sessional marks should be displayed to the students before the beginning of the end-semester examinations. The course co-ordinator will ensure that the teachers associated with the course make such displays.

##### c. Offering Courses

Courses will be offered by the department concerned as per the schedule given in the relevant Curriculum. More choices in elective courses will be offered depending on the availability of the staff

and other facilities and therefore any particular elective course may not be offered even though it may exist in the list of possible elective courses. Department may also offer a course in both the semesters even though it may be shown in particular semesters.

**d. Syllabus**

Each course syllabus which will be distributed to the students. The teacher(s) concerned should ensure that some portion, beyond the syllabus, should also be covered in the class.

**13. Correction of Errors**

In case of any error is detected in the marks recorded on the award list, the examiner(s) concerned shall make a request to correct the mistake to the Dean, School of CS & IT through the Head of the department, and shall attach relevant documentary evidence. A committee consisting of the following members shall take suitable remedial measures depending upon the merit of the case.

- a. Dean (Chairman)
- b. Head of the department.
- c. Two Faculty Member nominated by the Dean

**14. Examinations**

**e. Sessional Examination**

Sessional examination(s) of each course is one hour duration and shall be conducted as per norms and schedule notified by the office of the Head of department in each semester.

**f. End-Semester Examination**

End-semester examination(s) of each theory course shall be of three hours duration and will be conducted as per norms and schedule notified by the Controller of Examination. The end semester examinations of laboratory/practical courses, and other courses such as seminar, colloquium, field work, project, dissertation etc. shall be conducted as notified by the HOD.

**15. Degree Requirement**

A student who earns total specified credits according to the curriculum and fulfills such other conditions as may be mentioned in the curriculum of the programme, shall be awarded the degree. He/she must also pay all University dues as per rules. Moreover, there should be no case of indiscipline pending against him/her.



# MASTER OF COMPUTER APPLICATION (MCA) PROGRAMME

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## CURRICULUM AND SYLLABUS OF MCA PROGRAMME

### 1. Programme Title:

Master of Computer Application

### 2. Duration and Mode:

Duration of the programme for a student shall be three (3) years with six consecutive semesters after admission. The mode of the programme is Regular (semester system).

### 3. Objective:

To produce, theoretically and practically well-equipped, skilled professionals to cater to the requirements of technical Assistance, software related maintenance and state-of-the-art software development practices in the fast changing IT-enabled systems.

### 4. Eligibility Criteria:

Any graduate (B. Sc/B.A/B.Com/BCA/BBA/B.Tech/B.E etc.) having mathematics subject at 10+2 level with 45% marks in aggregate. Knowledge of Urdu language is essential.

### 5. Intake:

The number of seats for the program is thirty (30).

### 6. Admission:

The admission to the MCA programme is based on the rank secured by the candidate in a written test conducted by the University. Minimum qualifying marks shall be 30% in Entrance Test. The written test will be of 100 marks.

### 7. MCA Exit Scheme (Minimum Degree Requirement):

- a) Student can exit the MCA course after one academic year with PGDIT diploma if he/she obtains the total number of 48 credits in one academic year.
- b) Student can exit the MCA course after two academic years with M.Sc. (IT) degree if he/she obtains the total number of 96 credits in two academic years. Such students shall inform his/her interest to exit with M.Sc. (IT) degree to the Head of Department at the beginning of the third (3<sup>rd</sup>) semester. Such student will follow the sixth (6<sup>th</sup>) semester curriculum in place of fourth (4<sup>th</sup>) semester.

The minimum degree requirement of the programme is as follows:

- a) **PGDIT** Total Credit = 48 & minimum CGPA = 5.0 after completing first 2 Semesters
- b) **M.Sc.(IT)** Total Credit = 96 & minimum CGPA = 5.0 after completing first 4 Semesters
- c) **MCA** Total Credit = 140 & minimum CGPA = 5.0 after completing all 6 Semesters

### 8. Syllabus: Each of the theory or lab courses shall have prescribed syllabus approved by BOS from time to time, as per following prescriptions:

- a. **Theory Courses:** Five (5) units largely based on ONE standard textbook and two Reference Books prescribed by the concerned teacher.
- b. **Lab Courses:** At least TEN (10) individual generic assignments and ONE Mini Project, to be prescribed by the concerned teacher and approved by HoD.

9. **Skill Set:** A student on completion of MCA programme shall be equipped with the following tentative skill sets.
- Operating Systems:** Windows OS, Linux, Unix etc.
  - Programming Languages:** C, C++, HTML, Java, VB.NET, ASP.NET & Prolog etc.
  - PC Softwares:** MS Office, Antivirus Tools etc.
  - Packages:** Oracle, OpenGL, WEKA etc.

### 10. Evaluation of Project:

Every candidate shall be required to submit Project as per the following details:-

- A Project Review Committee (PRC)** shall be constituted with Head of the Department as chair person and at-least two other faculty members from the department.
- Registration of Project Work:** A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects (theory and practical subjects).
- After satisfying clause 11.a (ii), a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the Project Review Committee for its approval. Only after obtaining the approval of Project Review Committee the student can initiate the Project work.
- Three copies of the Project Report certified by the supervisor shall be submitted to the Department.
- The project report shall be examined by one examiner selected by the University. For this, Head of the Department shall submit a panel of 3 examiners, who are eminent in that field with the help of the concerned guide.
- If the report of the examiner is not favorable, the candidate shall revise and resubmit the report, in the time frame as described by PRC. If the report of the examiner is unfavorable again, the report shall be rejected.
- If the report of the examiner is favorable, viva-voce examination shall be conducted by a board consisting of the supervisor, Head of the Department and the examiner. The Board shall jointly report candidates work as:
  - Excellent
  - Good
  - Satisfactory
  - UnsatisfactoryHead of the Department shall coordinate and make arrangements for the conduct of viva-voce examination.
- If the report of the viva-voce is unsatisfactory, the candidate will retake the viva-voce examination within three months.

## MASTER OF COMPUTER APPLICATION (MCA) PROGRAMME

COURSE	SEM	CODE	COURSE TITLE	L-T-P	Credits	Internal Marks	External Marks	Total Marks	
<b>PGDIT</b>	<b>I</b>	CS111	Probability & Statistics	3-1-0	4	30	70	100	
		CS112	Mathematical Foundation of Computer Science	3-1-0	4	30	70	100	
		CS113	Programming with C	3-1-0	4	30	70	100	
		CS114	E-Commerce	3-1-0	4	30	70	100	
		CS115	English Language Communication Skills	3-1-0	4	30	70	100	
		CS116	**Tarseel-e-Urdu	3-0-0	---	30	70	100	
		CSL17	Lab-I : Computer Programming Using C	0-0-3	2	50	50	100	
		CSL18	Lab-II: PC Software	0-0-3	2	50	50	100	
	<b>Total</b>					<b>24</b>			<b>700</b>
	<b>II</b>	CS121	Computer System Architecture	3-1-0	4	30	70	100	
		CS122	Object Oriented Programming Using C++	3-1-0	4	30	70	100	
		CS123	Data Structures	3-1-0	4	30	70	100	
		CS124	Operating Systems	3-1-0	4	30	70	100	
		<b>Elective-I</b>		3-1-0	4	30	70	100	
		CSL26	Lab III : OOPS Using C++	0-0-3	2	50	50	100	
		CSL27	Lab IV: Data structures Using C	0-0-3	2	50	50	100	
	<b>Total</b>					<b>24</b>			<b>700</b>
	<b>M. Sc IT</b>	<b>III</b>	CS231	Data Base Management System	3-1-0	4	30	70	100
CS232			Analysis & Design of Algorithms	3-1-0	4	30	70	100	
CS233			Computer Networks	3-1-0	4	30	70	100	
CS234			Java Programming	3-1-0	4	30	70	100	
<b>Elective-II</b>			3-1-0	4	30	70	100		
CSL36			Lab V: DBMS	0-0-3	2	50	50	100	
CSL37			Lab VI: Java Programming	0-0-3	2	50	50	100	
<b>Total</b>					<b>24</b>			<b>700</b>	
<b>IV</b>		CS241	Software Engineering	3-1-0	4	30	70	100	
		CS242	Data Warehousing and Data Mining	3-1-0	4	30	70	100	
		CS243	Formal Language & Automata Theory	3-1-0	4	30	70	100	
		CS244	Computer Graphics	3-1-0	4	30	70	100	
		<b>Elective-III</b>		3-1-0	4	30	70	100	
		CSL46	Lab VII: UML	0-0-3	2	50	50	100	
	CSL47	Lab VIII: Linux Programming	0-0-3	2	50	50	100		
<b>Total</b>					<b>24</b>			<b>700</b>	
<b>M.C.A</b>	<b>V</b>	CS351	Cloud Computing and Virtualization	3-1-0	4	30	70	100	
		CS352	Web Technology	3-1-0	4	30	70	100	
		CS353	Cryptography & Network Security	3-1-0	4	30	70	100	
		CS354	Artificial Intelligence	3-1-0	4	30	70	100	
		<b>Elective-IV</b>		3-1-0	4	30	70	100	
		CSL56	Lab IX: Web Technology	0-0-3	2	50	50	100	
		CSL57	Lab -X: Artificial Intelligence	0-0-3	2	50	50	100	
	<b>Total</b>					<b>24</b>			<b>700</b>
	<b>VI</b>	CSP61	Project	----	16	200	200	400	
		CSP62	Seminar	-----	4	50	50	100	
	<b>Total</b>					<b>20</b>			<b>500</b>
<b>Elective-I</b>			<b>Elective-II</b>		<b>Elective-III</b>		<b>Elective-IV</b>		
CSE21- Accounting and Financial Management CSE22- Multimedia Applications CSE23-Client Server Computing CSE24- Soft Computing CSE25- Information Security and Cyber Laws			CSE31- Mobile Computing CSE32- Advance Operating System CSE33-Componet Based Software Engineering CSE34- Information Retrieval Systems		CSE41- Distributed System CSE42- Software Testing and Quality Assurance CSE43- Software Project Management CSE44- Compiler Design		CSE51- Software Agent CSE52- Advance Computer Network CSE53- Software Quality Engineering CSE54- Distributed Database		
**Tarseel-E-Urdu is treated as a non credit course, hence the marks will not be added in the result. * For M.Sc (IT) degree, the student will follow the sixth semester in place of fourth semester.									
<b>PGDIT (Valid Credits: 48)</b>			<b>M. Sc.(IT) (Valid Credit: 96)</b>			<b>MCA (Valid Credits: 140)</b>			

## MASTER OF COMPUTER APPLICATION (MCA) PROGRAMME

### Semester - 1

S. No	Course Code	Course Name	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1.	CS111	Probability & Statistics	3	1	0	4	30	70	100
2.	CS112	Mathematical Foundation of Computer Science	3	1	0	4	30	70	100
3.	CS113	Programming with C	3	1	0	4	30	70	100
4.	CS114	E-Commerce	3	1	0	4	30	70	100
5.	CS115	English Language Communication Skills	3	0	2	4	30	70	100
6.	CS116	**Tarseel-E-Urdu	3	0	0	---	30	70	100
7.	CSL17	Lab-I : Computer Programming Using C	0	0	3	2	50	50	100
8.	CSL18	Lab-II: PC Software Laboratory	0	0	3	2	50	50	100
<b>TOTAL</b>						<b>24</b>			<b>700</b>

**UNIT I**

Probability: Sample space and events – Probability – The axioms of probability - Some elementary theorems –Addition theorem on probability & problems, Multiplication theorem &Conditional probability – Baye’s theorem and related problems.

**UNIT II**

Random variables – Discrete and continuous – Distribution – Distribution function. Distribution - Binomial, poisson and normal distribution – related properties, moments, central moments ,moment generating function and related problems.

**UNIT III**

Sampling distribution: Populations and samples - Sampling distributions of mean (known and unknown) proportions, sums and differences. Estimation: Point estimation – interval estimation - Bayesian estimation.

**UNIT IV**

Test of Hypothesis – Means and proportions – Hypothesis concerning one and two means – Type I and Type II errors. One tail, two-tail tests. Tests of significance – Student’s t-test, chi square –test of goodness of fit and test of independence.

**UNIT V**

Curve fitting: The method of least squares – Inferences based on the least squares estimations  
Curvilinear regression -- correlation coefficients-Karl persons and Spearman’s rank correlation coefficient

**TEXT BOOKS:**

1. Probability and statistics for engineers (Erwin Miller And John E.Freund), R A Johnson And C.B.Gupta.. 7th edition, Pearson Education / PHI.
2. Introduction to Probability and Statistics, 12th edition, W.Mendenhall, R.J.Beaver and B.M.Beaver, Thomson. (Indian edition).

**REFERENCE BOOKS:**

1. Probability and Statistics in Engineering, 4th Edition, William W.Hines, Dougla.
2. C.Montgomery, David M.Goldsman, Connie M.Borrer, Wiley Student Edition.
3. Probability, Statistics and Queuing Theory, 2nd Edition, Trivedi, John Wiley and Sons.
4. Introduction to Probability and Statistics, J.S.Milton, Jesse C.Arnold, 4th edition, TMH.
5. Probability,Statistics and Random Processes, Dr.K.Murugesan, P.Guruswamy, Anuradha.

**MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE**

**CS112**

**L-T-P: 3-1-0**

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**UNIT I**

Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers.

Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

**UNIT II**

Relations: Properties of binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram. Functions: Inverse Function, Composition of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

**UNIT III**

Elementary Combinatorics: Basics of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial and Multinomial theorem, the principles of Inclusion – Exclusion.

**UNIT IV**

Recurrence Relations: Generating Functions, Function of Sequences, Calculating Coefficients of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, solution of non-homogeneous Recurrence Relations.

**UNIT V**

Graph Theory: Representation of Graphs, DFS, BFS, Spanning Trees, Planar Graphs. Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

**TEXT BOOKS:**

1. Mathematical Foundation of Computer Science – Shahnaz Bathul, PHI.
2. Elements of Discrete Mathematics- A Computer Oriented Approach, C.L.Liu, D.P. Mohapatra, 3<sup>rd</sup> edition, TMH.

**REFERENCE BOOKS:**

1. Discrete Mathematics for Computer Scientists & Mathematicians, second edition, J.L.Mott, A. Kandel, T.P. Baker, PHI
2. Discrete and Combinatorial Mathematics- An Applied Introduction-5th Edition- Ralph. P.Grimaldi, Pearson Education.
3. Discrete Mathematics and its applications, 6th edition, K.H.Rosen, TMH.
4. Discrete Mathematical Structures, Mallik and Sen, CengageLearning.
5. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI/ Pearson Education.

**UNIT I**

Introduction to programming – definitions and developing Algorithms and flowcharts for simple programs. Introduction to C Programming: Origin and history of c programming character set, Identifiers and keywords data types, constants, variables, operators, special operators, constants, Expressions, compound statements, structure of C program, Input and output function.

**UNIT II**

C Statements – selection statements – if nested if's, the if-else –if ladder the conditional expressions, switch statement nested switch statements, iteration statements – the for loop, for loop variations, the while loop, the do-while loop, declaring variable with in selection and iteration statements, jump statement, the return statement, the go to submit, break statement, exit ( ) function, the continue statement, expression statement. Block statements.

**UNIT III**

Arrays – Array what is an array? – Array Declaration, Array Initialization – Accessing individual elements of an array – Two Dimensional Arrays – Multi Dimensional Array, Passing an array element to a function – Rules of using an array. What are strings? String I/O, string Manipulation.

**UNIT IV**

Functions – The General Form of a Function, Math functions, elements of function, function categories, types of functions, Function Arguments Call by value, Call by Reference, return statement. Uses of functions. C pre – processor, storage classes – Automatic – Register, Static and external. **Pointers** – definition, pointer variables, pointer expressions, arithmetic pointers, pointers and arrays, initializing pointers and functions and problems with pointers.

**UNIT V**

**Structures** – definition, accessing structure members, structure assignments, array of structures, passing structures, structure pointers, uses of structures **Unions** – definitions, difference between structure and union, type def. **Files** – introduction to streams and files, basics of files – file pointer, opening and closing files, writing and reading character, file functions.

**TEXT BOOKS:**

1. Let Us C by Yashwanth Kanethar,
2. Programming in ANSI C" by E. Balaguruswamy.

**REFERENCE BOOKS:**

1. Complete Reference of C++ by Herbert Schilde.

**UNIT 1**

Introduction to Electronic Commerce – E-Commerce Framework- Anatomy of E-Commerce Applications – E-Commerce Consumer & Organization Applications- E- Commerce and World Wide Web – Internet Service Providers – Architectural Framework for Electronic Commerce – WWW as the Architecture- Hypertext publishing.

**UNIT II**

Electronic Payment Systems – Types of Electronic Payment Systems – Digital Token Based Electronic Payment System – Smart Cards – Credit Cards – Risk in Electronic Payment Systems – Designing Electronic Payment Systems

**UNIT III**

Electronic Data Interchange, EDI Applications in Business, EDI implementation, MIME, and value added networks Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

**UNIT IV**

Corporate Digital Library – Document Library, Digital Document Types, Corporate Data Warehouse, Advertising and Marketing – Information based Marketing, Advertising on Internet, On-Line Marketing Process, Market Research.

**UNIT V**

Consumer Search and Resource Discovery – Information Search and Retrieval, Commerce Catalogues, Information Filtering Multimedia – Key Multimedia Concepts, Digital Video and Electronic Commerce, Desktop Video Processing.

**TEXT BOOKS:**

1. Ravi Kalakota & A. B. Whinston - "Frontiers of Electronic Commerce", Pearson Education, India, 1999.
2. Daniel Minoli, Emma Minoli: "Web Commerce Technology Handbook", Tata McGraw Hill.

**REFERENCE BOOKS:**

1. Bajaj and Nag. "E-Commerce the cutting edge of Business". TMH.
2. E-Business & Commerce: Brahm Cazner, Wiley dreamtech.



COMMUNICATION SKILLS

CS115

L-T-P: 3-0-2

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**UNIT 1**

**Listening:** Hearing vs. Listening – Barriers - Listening behaviours - Types of listening - How to improve.

**Speaking:** Become a confident speaker - Presentation skills - Preparing a speech - Public speaking - Expressing techniques.

**UNIT 2**

**Reading:** Kinds of Reading – Causes of reading difficulties – Reading strategies.

**Writing:** Effective writing – Paragraph – Essay – Reports – Articles.

**PERSONALITY DEVELOPMENT AND SOFT SKILLS**

**UNIT 3**

**Communication :** Communication channels – Types of communication - Verbal communication - Non-Verbal communication – Interpersonal skills – Negotiation skills.

**UNIT 4**

**Group Dynamic skills:** Group Discussion – Team building and Team work – Be a manager or leader – Leadership - Decision making – creativity – Time and Stress management skills.

**UNIT 5**

**Interview skills:** Types of Interviews - Preparing for the interview – Preparing a CV - Structuring the interview – Mock Interview – Quick Tips.

**Text Books:**

1. Sanghi, Seema, Improve your communication skills. 2<sup>nd</sup> edition.
2. Burnard, Philip. Interpersonal skills Training: A source book of activities. 2005.

**Reference Books:**

1. Ashley, Roderic. How to enhance your employability. 1998.
2. Dr. Alex, K. Soft sill: know yourself & Know the world. 2010.
3. Cornerstone. Developing softskills. 4<sup>th</sup> edition 2005.
4. Jones, Daniel. An outline of English phonetics.
5. Aggarwal, Rohini. Business communication and Organization & Management.

## ترسیلِ اُردو

CS 116

L-T-P: 3-0-0

### یونٹ: 1

اردو حروف تہجی، حروف تہجی کی شکلیں، دو چشمی ہ، حروف کی تحریر، اعراب، دو حرفی الفاظ، تین حرفی الفاظ، چار حرفی الفاظ، دو لفظی جملے، چار لفظی جملے۔

### یونٹ: 2

دن اور مہینے، پھل اور سبزیاں، موسم اور آب و ہوا، گھر اور چیزیں۔

### یونٹ: 3

بازار، ڈاک گھر، ریلوے اسٹیشن، بینک، عام استعمال کے چند الفاظ، خاص موقعوں کے جملے، اعداد۔

### یونٹ: 4

اسم، ضمیر، فعل، صفت، اسم فعل اور صفت کی جمع، محاورے اور ضرب الامثال۔

### یونٹ: 5

عبارتیں، نظمیں، کہانیاں، مولانا آزاد نیشنل اردو یونیورسٹی کا ترانہ۔

1. Write C program to input and output the text message.
2. Write C Program to perform all arithmetic operations.
3. Write C Program to utilize the math function.
4. Write C Program to perform the mathematical expressions.
5. Write C Program for Local and Global Variables.
6. Write C Program for internal static and external static variables.
7. Write C Programs for all the Operators. (Arithmetical, Logical, Relational, Bitwise).
8. Write C Programs for Increment and Decrement Operators.
9. Write C Programs to implement the Ternary Operator.
10. Write C Programs for special Operators.
11. Write C Programs for all the Control Structures. (Sequential Control Structures, Conditional Control Structures, Iterative Control Structures).
12. Write C Programs to display the different types of patterns using nested for loop.
13. Write C Program for Statements. (switch, break, goto, continue etc.,).
14. Write a C Program to find the given integer number is even or odd number.
15. Write a C Program to calculate the factorial of a given number.
16. Write a C Program to swap the two numbers using temp variable and without using temp variable.
17. Reading and Printing a single dimensional array of elements.
18. Ascending and descending of an array.
19. Sum of all odd numbers and sum of all even numbers in a single dimensional array.
20. Mathematical operations on single dimensional arrays.
21. Reading and Printing a multi dimensional array of elements.
22. C Programs on String functions.
23. Write a C program to calculate string length by writing the user-define function.
24. Function declaration and initialization.
25. C Program to differentiate the parameters and arguments in functions.
26. Programs for different types of inbuilt functions.
27. Call by value and Call by reference programs in functions.
28. Write a program to swap the given 2 number using passing by reference.
29. Write C Programs to perform all valid arithmetic operations using pointers.
30. C programs on Structures and accessing of members of the structures.
31. Write a C program to print a book information (Book name, Book no, author name) by writing a structure.
32. Write a C program by passing structure elements to a function and display employee information (emp no, emp name, emp salary, and emp address).
33. C Programs on Reading a file from the secondary storage device.
34. C Program on writing and appending a file on the secondary storage device.
35. C Program on Opening and closing a file.

**TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications.
2. Let Us C by Yashwanth Kanethar.

**REFERENCE BOOKS:**

1. "Programming in ANSI C" by E. Balaguruswamy.
2. Programming in C, 2<sup>nd</sup> Edition, Oxford by Pradip Dey, Mannas Ghosh.

**MS-WORD**

**Week1-Task1:** Creation of a document, saving a document in desire location by using SAVE AS option, editing the document, usage of SAVE option, Usage of functions like Cut, Copy, Paste.

1. Write steps for creating a document and save that document in D drive?
2. Edit the existing document and save the changes?
3. Write steps for copying the text and pasting it on next page?
4. Write steps for cutting the unwanted text?

**Week 2-Task 2:** Highlighting the text, changing the color of text. Changing text attributes, Applying different types of bullets and numberings to text.

1. Write steps for highlighting the text?
2. Write steps for making text Bold, Underline and Italic?
3. Write steps for applying different types of numbering?
4. Write steps for applying different customized Bullets; use any picture as a bullet?

**Week3-Task3:** Creating tables, altering the table by adding additional rows and columns.

Deleting a particular row or column, splitting the cells and merging the cells. Applying different types of Table Auto Formats to tables.

1. Write steps for creating a table with 10 rows and 7 columns?
2. Write steps for aligning the text in the center of the cell and apply the different?
3. Write steps for adding one row below 5<sup>th</sup> row and add one column in between 5<sup>th</sup> and 6<sup>th</sup> column?
4. Write steps for merging the 6 columns of a last row and split the 2<sup>nd</sup> column in to 2 sub columns?
5. Write steps for applying Table Auto format to the above table?

**Week4-Task4:** Mail Merge, Inserting page numbers. Adding Header and Footer to each page in a document .Using Spell check function to check the spellings of text. Finding the synonyms of a particular word. Printing the document

1. Write steps for inserting page numbers on each page?
2. Write complete steps for Mail Merge?
3. Write steps for adding header and footer to each page of a document?
4. What do you mean by spell check? How the spell check will be used in a document?
5. What is the process for finding the synonyms of a given word?

**MS- EXCEL:**

**Week5-Task5:** Creating the worksheet, Entering text in to cells, renaming the worksheet, Adding a new worksheet and deleting a worksheet from a workbook. Saving the workbook by using SAVE option. Using formula function to calculate mathematical operations like SUM, AVG...

1. write the no of rows and columns in worksheet
2. Steps for renaming a work sheet?
3. Steps for adding new work sheet?
4. Create a worksheet for calculating marks of 10 students, perform total of marks by using Sum formula.
5. Find the average of a number from the list of 20 numbers.

**Week6-Task6:** Highlighting the cells, changing the color of text in cells. Giving borders to cells. Sorting the given data in Ascending or Descending order.

1. Write steps for highlighting the cells.
2. Write steps for changing the color of text in cells.
3. Write steps for giving borders to cells.
4. Sort the given data in ascending order and descending order.

**Week7-Task7:** Using Logical functions. Inserting charts like Line chart, Pie chart, Bar chart to convert the information in graphical representation. Statistical functions.

## MASTER OF COMPUTER APPLICATION (MCA) PROGRAMME

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1. Create a mark sheet of 10 students and perform Sum, average, result.
2. Calculate the rank and division of above students.
3. Convert the given mark sheet into different types of charts.
4. Use statistical functions to calculate Mean, Median, Mode, Standard Deviation, Variance, and Co-relation.

### MS-POWERPOINT:

**Week 8-Task 8:** Creating power point presentation by using slides, inserting a new slide in a presentation, Applying different slide Layouts, deleting a particular slide, saving the presentation

1. Write steps for inserting a new slide into presentation.
2. Write steps for applying different slide layouts to each slides.
3. Create a PPT with minimum of 5 slides by applying different layouts to each slide.
4. How will you delete the unwanted slide from your presentation?

**Week 9-Task 9:** Inserting of text boxes and Word Art option for entering the text into a slide, Inserting pictures, charts and Tables in a slide, viewing the presentation in Slide show.

1. Insert the text into slide by taking one text box.
2. Write headings or Titles by using Word Art.
3. Insert different pictures and charts into your presentation.
4. Create a PPT of min 5 slides insert some pictures and text boxes in slides and view this presentation by Slide show, and write steps to do this.

**Week 10-Task 10:** Applying different slide design to slides, Applying different slide color schemes and Animation Schemes to a presentation, applying the effects to the text and Images of a slide by using custom animation, applying the effects to the slides by using slide transition schemes.

1. Write steps for applying different slide designs to each slide.
2. Write steps for applying different slide Color scheme to each slide.
3. Write steps for applying different slide animation scheme to each slide.
4. Apply custom animation to text and images.
5. Create a PPT of minimum 10 slides and apply different attributes to your presentation.

### MS-ACCESS:

#### Week 11-Task 11:

1. Write steps for opening Ms-Access
2. Write steps for saving Database and Table
3. Create a Student Database with the following details:  
Student Name  
Number  
Total Marks  
Address.

#### Week 11-Task 11:

Create an employee database with your own fields and prepare reports:

### TEXT BOOKS:

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications.
2. Let Us C by Yashwanth Kanethar.

### REFERENCE BOOKS:

3. "Programming in ANSI C" by E. Balaguruswamy.
4. Programming in C, 2<sup>nd</sup> Edition, Oxford by Pradip Dey, Mannas Ghosh.

## MASTER OF COMPUTER APPLICATION (MCA) PROGRAMME

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### Semester - 2

S. No	Course Code	Course Name	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1.	CS121	Computer System Architecture	3	1	0	4	30	70	100
2.	CS122	Object Oriented Programming Using C++	3	1	0	4	30	70	100
3.	CS123	Data Structures	3	1	0	4	30	70	100
4.	CS124	Operating Systems	3	1	0	4	30	70	100
5.		<b>Elective-I</b>	3	0	2	4	30	70	100
6.	CSL26	Lab III : OOPS Using C++	0	0	3	2	50	50	100
7.	CSL27	Lab IV: Data structures Using C	0	0	3	2	50	50	100
<b>TOTAL</b>						<b>24</b>			<b>700</b>
<b>Elective-I</b>									
CSE 21 Accounting and Financial Management									
CSE 22 Multimedia Applications									
CSE23 Client Server Computing									
CSE 24 Soft Computing									
CSE 25 Information Security and Cyber Laws									

**UNIT I**

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip Flops, Sequential Circuits. Digital Components: Integrated Circuits, Decoder, Multiplexers, Registers, Shift Registers, Binary counter, Memory unit. Data Representation: Data types, Complements, Fixed and Floating Point Representation, Other binary codes and error Detection codes.

**UNIT II**

Register Transfer and Micro operations: Register Transfer language, Register transfer, Bus and Memory Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations and Arithmetic logic shift unit. Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycles, Memory Reference Instructions, Input, Output and Interrupts, Design of Accumulator logic.

**UNIT III**

Programming the Basic Computer: Introduction, Machine Language, Assembly Language, The Assembler, Programming Arithmetic and Logic Operations, Subroutines, and input -output ,Programming. Micro programmed Control: Control Memory, Address Sequencing, Micro program Example, Design of Control Unit.

**UNIT IV**

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC. Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline. Computer Arithmetic: Addition and Subtraction, Multiplication algorithms, Division Algorithms, Floating point arithmetic operations, decimal arithmetic unit, and decimal arithmetic operations.

**UNIT V**

Input -Output organization: Peripheral Devices, I/O output interface, Asynchronous data transfer, Modes of transfer, Priority Interrupt, DMA, Input output Processor, Serial Communication. Memory Organization: Memory Hierarchy, Main Memory, Cache Memory.

**TEXT BOOKS:**

1. M. Morris Mano, "Computer System Architecture", Pearson Asia / Prentice Hall, Third edition, 1993.
2. Sivarama P Dandamudi "Fundamentals of Computer Organization and Design" , Springer/ Dream tech Publishers, 2003.

**REFERENCE BOOKS:**

1. William Stallings, "Computer Organization & Architecture", Pearson Education, Sixth, Edition, 2003.

**UNIT I**

Principles of OOP: Programming paradigms, basic concepts, benefits of OOP, applications of OOP  
Introduction to C++: History of C++, structure of C++, basic data types, type casting, type modifiers, operators and control structures, input and output statements in C++. Classes and objects: class specification, member function specification, scope resolution operator, access qualifiers, instance creation.

**UNIT II**

Functions: Function prototyping, function components, passing parameters, call by reference, return by reference, inline functions, default arguments, overloaded function. Pointers: Array of objects, pointers to objects, this pointer, dynamic allocation operators, dynamic objects.

**UNIT III**

Constructors: Constructors, parameterized constructors, overloaded constructors, constructors with default arguments, copy constructors, static class members and static objects. Operator overloading: Overloading unary and binary operator, overloading the operator using friend function, stream operator overloading and data conversion.

**UNIT IV**

Inheritance: Defining derived classes, single inheritance, protected data with private inheritance, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance, multi path inheritance, constructors in derived and base class, abstract classes, virtual function and dynamic polymorphism, virtual destructor.

**UNIT V**

Exception Handling: Principle of Exception handling, exception handling mechanism, multiple catch, nested try, rethrowing the exception. Streams in C++: Stream classes, formatted and unformatted data, manipulators, user defined manipulators, file streams, file pointer manipulation, file open and close. Templates: Template functions and Template classes.

**TEXT BOOKS:**

1. Complete Reference of C++ by Herbert Schildt
2. Object Oriented Programming with C++ By E.Balaguruswamy

**REFERENCE BOOKS:**

1. Object Oriented Turbo C Plus Plus by Robert Lafore
2. Programming with C Plus Plus by D.RaviChandra
3. Object Oriented Turbo C Plus Plus by Balaguruswamy
4. C Plus Plus Premier Plus by Stephen Prata



**UNIT I**

Introduction: Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off. Abstract Data Types (ADT) Arrays: Definition, Single and Multidimensional Arrays. Linked lists: Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition, Generalized Linked List.

**UNIT II**

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.

**UNIT III**

Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

**UNIT IV**

Graphs: Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal : Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Shortest Path algorithm: Warshal Algorithm and Dijkstra Algorithm.

**UNIT V**

Searching : Sequential search, Binary Search, Comparison and Analysis Internal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort, Radix Sort. Search Trees: Binary Search Trees (BST), Insertion and Deletion in BST, AVL trees, ntroduction to m-way Search Trees, B Trees & B+ Trees Hashing: Hash Function, Linear probing.

**TEXT BOOKS:**

1. Aaron M. Tenenbaum, Yedidiah Langsam and Moshe J. Augenstein “Data Structures Using C and C++”, PHI
2. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publication
3. Jean Paul Trembley and Paul G. Sorenson, “An Introduction to Data Structures with applications”, McGraw Hill

**REFERENCE BOOKS:**

1. R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education.
2. Lipschutz, “Data Structures” Schaum’s Outline Series, TMH.
3. G A V Pai, “Data Structures and Algorithms”, TM.H

**UNIT I**

Introduction : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.

**UNIT II**

Concurrent Processes: Process Concept, Principle of Concurrency, Producer /Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation

**UNIT III**

CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

**UNIT IV**

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

**UNIT V**

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, Filesystem implementation issues, File system protection and security.

**Text Books:-**

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education

**References**

3. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
4. D M Dhamdhere, "Operating Systems :A Concept based Approach", McGraw Hill.
5. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education".
6. Stuart E. Madnick & John J. Donovan. Operating Systems. McGraw Hill

OBJECT ORIENTED PROGRAMMING USING C++ LAB

CSL26

L-T-P: 0-0-4

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1. Inline Function.
2. Function Overloading.
3. Programs on Classes.
4. Constructors, Destructors
5. Static Members.
6. Friend Function, Friend Class
7. Dynamic Memory Allocation using new and delete.
8. Pointer to object.
9. Overloading unary operator, Overloading binary Operators
10. Overloading binary operators using Friend function.
11. Single and Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance.
12. Constructors and Destructors in derived classes.
13. Virtual Function.
14. Programs on file handling using classes.

DATA STRUCTURE USING C LAB

CSL27

L-T-P: 0-0-4

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**List of Data Structure Programs:**

1. To implement addition and multiplication of two 2D arrays.
2. To transpose a 2D array.
3. To implement stack using array.
4. To implement queue using array.
5. To implement circular queue using array.
6. To implement stack using linked list.
7. To implement queue using linked list.
8. To implement circular queue using linked list.
9. To implement binary tree using linked list.
10. To implement binary search tree using linked list.
11. To implement tree traversals using linked list.
12. To implement BFS using linked list.
13. To implement DFS using linked list.
14. To implement Linear Search.
15. To implement Binary Search.
16. To implement Bubble Sorting.
17. To implement Selection Sorting.
18. To implement Insertion Sorting.
19. To implement Merge Sorting.
20. To implement Heap Sorting.

**ACCOUNTING & FINANCIAL MANAGEMENT**

**CSE21**

**L-T-P: 3-1-0**

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**Unit I**

**Overview:** Accounting concepts, conventions and principles; Accounting Equation, International Accounting principles and standards; Matching of Indian Accounting Standards with International Accounting Standards.

**Unit II**

**Mechanics of Accounting:** Double entry system of accounting, journalizing of transactions; preparation of final accounts, Profit & Loss Account, Profit & Loss Appropriation account and Balance Sheet, Policies related with depreciation, inventory and intangible assets like copyright, trademark, patents and goodwill.

**Unit III**

**Analysis of financial statement:** Ratio Analysis- solvency ratios, profitability ratios, activity ratios, liquidity ratios, market capitalization ratios ; Common Size Statement ; Comparative Balance Sheet and Trend Analysis of manufacturing, service & banking organizations.

**Unit IV**

**Funds Flow Statement:** Meaning, Concept of Gross and Net Working Capital, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis; Cash Flow Statement: Various cash and noncash transactions, flow of cash, preparation of Cash Flow Statement and its analysis.

**Unit IV**

**Budgeting:** budgets, purpose, budgetary control, preparation of budgets, master budget, fixed and flexible budgeting.

**Text Books:-**

1. Narayanswami - Financial Accounting: A Managerial Perspective (PHI, 2nd Edition).
2. Mukherjee - Financial Accounting for Management (TMH, 1st Edition).

**Reference Books:-**

1. Ramchandran & Kakani - Financial Accounting for Management (TMH, 2nd Edition).
2. Ghosh T P - Accounting and Finance for Managers (Taxman, 1st Edition).
3. Maheshwari S.N & Maheshwari S K – An Introduction to Accountancy (Vikas, 9th Edition)
4. Ashish K. Bhattacharya- Essentials of Financial Accounting (PHI, New Delhi)
5. Ghosh T.P- Financial Accounting for Managers (Taxman, 3rd Edition)
6. Maheshwari S.N & Maheshwari S K – A text book of Accounting for Management (Vikas, 1st Edition)
7. Gupta Ambrish - Financial Accounting for Management (Pearson Education, 2nd Edition)
8. Chowdhary Anil - Fundamentals of Accounting and Financial Analysis (Pearson Education, 1st Edition).

**UNIT I**

Multimedia Fundamentals: Define the concept of multimedia, fundamental criteria for the design of a multimedia presentation, multimedia application goals & objectives, opportunities in multimedia production, Role of multimedia development team members, avoiding problems in planning a multimedia application.

**UNIT II**

Multimedia Building Blocks: Text, Graphics, video capturing, Sound capturing, editing. Animation (Design, types of animation, using different functions) Basic design principle: proximity, visual hierarchy, Symmetry / Asymmetry, Repetition, unity, Contrast, dynamics, Emphasis, Multimedia Authoring tools.

**UNIT III**

Design, Development and evaluation of multimedia a system: The development of user interface design, Design Process,

**UNIT IV**

Multimedia & the Internet, Multimedia conferencing, Multimedia file sharing, Multimedia broadcasting, Multimedia file handling: Compression & Decompression, Data & file formats standard.

**UNIT V**

Uses of Multimedia, Introduction to making multimedia – The stage of Project, hardware & software requirements to make good multimedia skills and Training opportunities in Multimedia Motivation for Multimedia usage

**TEXT BOOKS:**

1. John Villamil-Casanova, Louis Molina, An introduction to multimedia.
2. Mohammad Dastbaz, Designing Interactive Multimedia System.

**REFERENCE BOOKS:**

1. Bohdan O. Szuprowicz, Multimedia Networking.
2. Stephen McGloughlin, Multimedia on the web.

**UNIT I**

**Client/Server Computing:** DBMS concept and architecture, Single system image, Client Server architecture, mainframe-centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development tools, advantages of client server computing.

**UNIT II**

**Components of Client/Server application:** The client: services, request for services, RPC, windows services, fax, print services, remote boot services, other remote services, Utility Services & Other Services, Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), Common Object Request Broker Architecture (CORBA).

The server: Detailed server functionality, the network operating system, available platforms, the network operating system, available platform, the server operating system.

**UNIT III**

**Client/Server Network:** connectivity, communication interface technology, Interposes communication, wide area network technologies, network topologies (Token Ring, Ethernet, FDDI, CDDI) network management, Client-server system development: Software, Client-Server System Hardware: Network Acquisition, PC-level processing unit, Macintosh, notebooks, pen, UNIX workstation, x-terminals, server hardware.

**UNIT IV**

**Client Server Systems Development:** Services and Support, system administration, Availability, Reliability, Serviceability, Software Distribution, Performance, Network management, Help Disk, Remote Systems Management Security, LAN and Network Management issues. Training, Training advantages of GUI Application, System Administrator training, Database Administrator training, End-user training.

**UNIT V**

**Data Storage:** magnetic disk, magnetic tape, CD-ROM, WORM, Optical disk, mirrored disk, fault tolerance, RAID, RAID-Disk network interface cards. Network protection devices, Power Protection Devices, UPS, Surge protectors. The future of client server Computing Enabling Technologies, The transformational system.

**TEXT BOOKS:**

1. Patrick Smith & Steave Guengerich, "Client / Server Computing", PHI
2. Dawna Travis Dewire, "Client/Server Computing", TMH

**REFERENCE BOOKS:**

1. Majumdar & Bhattacharya, "Database management System", TMH
2. Korth, Silberchatz, Sudarshan, "Database Concepts", McGraw Hill
3. Elmasri, Navathe, S.B, "Fundamentals of Data Base System", Addison Wesley

**Unit- 1**

**Neural Networks-1(Introduction & Architecture)**

Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.

**Unit 2**

**Neural Networks-II (Back propogation networks)**

Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.

**Unit 3**

**Fuzzy Logic-I (Introduction)**

Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

**Unit 4**

**Fuzzy Logic -II (Fuzzy Membership, Rules)**

Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

**Unit 5**

**Genetic Algorithm (GA)**

Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

**Text Books:**

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.
2. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press.

**Reference Books:**

1. Siman Haykin,"Neural Netowrks"Prentice Hall of India
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
3. Kumar Satish, "Neural Networks" Tata Mc Graw Hill
4. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

**UNIT-I**

History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damage. Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles.

**UNIT-II**

Security Threats to E Commerce, Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards. Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges.

**UNIT-III**

Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls: Design and Implementation Issues, Policies.

**UNIT-IV**

Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN.

**UNIT-V**

Security metrics- Classification and their benefits Information Security & Law, IPR, Patent Law, Copyright Law, Legal Issues in Data Mining Security, Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy Cyber Crime Types & overview of Cyber Crimes.

**TEXT BOOKS:**

1. Godbole, "Information Systems Security", Willey
2. Merkov, Breithaupt, "Information Security", Pearson Education

**REFERENCE BOOKS:**

1. Yadav, "Foundations of Information Technology", New Age, Delhi
2. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill
3. Sood, "Cyber Laws Simplified", Mc Graw Hill
4. Furnell, "Computer Insecurity", Springer
5. IT Act 2000



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**MASTER OF COMPUTER APPLICATION (MCA) PROGRAMME**

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**SEMESTER 3**

S. No	Course Code	Course Name	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1.	CS231	Data Base Management Systems	3	1	0	4	30	70	100
2.	CS232	Analysis & Design of Algorithms	3	1	0	4	30	70	100
3.	CS233	Computer Networks	3	1	0	4	30	70	100
4.	CS234	Java Programming	3	1	0	4	30	70	100
5.		<b>Elective-II</b>	3	1	0	4	30	70	100
6.	CSL36	Lab V: DBMS	0	0	3	2	50	50	100
7.	CSL37	Lab VI : Java Programming	0	0	3	2	50	50	100
<b>TOTAL</b>						<b>24</b>			<b>700</b>
<b>Elective-II</b>									

## MASTER OF COMPUTER APPLICATION (MCA) PROGRAMME

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CSE 31 Mobile Computing
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CSE 34 Information Retrieval System
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CSE 33 Component Based Software Engineering
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CSE32 Advance Operating System
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**UNIT I**

Introduction to Database Systems: Overview – Data Models – Database System Architecture – History of Database Systems. Entity-Relationship Model: Basic Concepts – Constraints – Keys – Design Issues – Entity Relationship Diagram – Weak Entity Sets – Extended E-R Features – Design of an E-R Database Schema – Reduction of E-R Schema to Tables

**UNIT II**

Relational Model: Structure of Relational Databases – Relational Algebra – Extended Relational Algebra Operations – Modification of Database – Views – Tuple Relational Calculus – Domain Relational Calculus. SQL: Background – Basic Structure – Set Operations – Aggregate Functions – Null Values – Nested Subqueries – Views – Complex Queries – Modification of the database – Joined Relations – Data-Definition Language – Embedded SQL – Dynamic SQL – Other SQL Features. Other Relational Languages.

**UNIT III**

Integrity and Security: Domain Constraints – Referential Integrity – Assertions – Triggers – Security and Authorization – Authorization in SQL – Encryption and Authentication. Relational-Database Design(Text Book sl.no:02): First Normal Form – Second normal form- Boyce-Codd Normal Form – Third Normal Form – Fourth Normal Form.

**UNIT IV**

Storage and File Structures: Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary Storage – Storage Access – File Organization – Organization of Records in Files – Data-Dictionary Storage. Indexing and Hashing: Basic Concepts – Ordered Indices – B+-Tree Index Files – B-Tree Index Files – Static Hashing – Dynamic Hashing Index Definition in SQL – Multiple-Key Access

**UNIT V**

Transactions: Transaction concept – Transaction State – Implementation of Atomicity and Durability – Concurrent Executions – Serializability – Recoverability – Implementation of Isolation – Transaction Definition in SQL – Testing for Serializability Concurrency Control: Lock-Based Protocols – Timestamp-Based Protocols – Validation-Based Protocols – Multiple Granularity– Deadlock Handling – Insert and Delete Operations. Recovery System: Failure Classification – Storage Structure – Recovery and Atomicity – Log-Based Recovery .

**TEXT BOOKS:**

1. Silberschatz, Korth, Sudarshan, "Database System Concepts", 4th Edition – McGraw-Hill Higher Education, International Edition 2002. Chapters: 1 to 7, 11, 12, 15 to 17.
2. Modern Database Management by Fred R.MC.Fadden,Jeffrey A.Hoffer,Mary B.Prescott

**REFERENCE BOOKS:**

1. Fred R McFadden, Jeffery A Hoffer, Mary B. Prescott, "Moden Database Management:, Fifth Edition, Addison Wesley, 2000.
2. Elmasri, Navathe, "Fundamentals of database Systems", Third Edition, Addison Wesley, 2000.
3. Jefrey D.Ulman, Jenifer Widom, "A First Course in Database Systems:, Pearson Education Asia, 2001.

**UNIT- I**

INTRODUCTION: Algorithm – pseudo code for expressing algorithms – analysis – time complexity and space complexity – efficiency of algorithms – O-notation – Omega notation and Theta notation.

DIVIDE AND CONQUER: General method – binary search – merge sort – quick sort.

**UNIT II**

GREEDY METHOD: General method- Knapsack problem – job sequencing with deadlines minimum-cost spanning trees: Prim’s and Kruskal’s algorithms – Single source shortest paths : Dijkstra’s algorithm.

**UNIT III**

DYNAMIC PROGRAMMING: General method – Multistage Graphs – All pairs shortest paths, Single source shortest paths – optimal binary search trees – 0/1 Knapsack problem – Traveling sales person problem.

**UNIT IV**

BACK TRACKING: General method – n-queen problem – sum of subsets problem – graph colouring – Hamiltonian cycles.

**UNIT V**

BRANCH AND BOUND: Least Cost (LC) search, Bounding – LC branch and bound – FIFO branch and bound – Travelling sales person problem.

**REFERENCE BOOKS:**

1. E. Howrowitz and Sahni, Fundamentals of computer algorithms, Galgotia Publications, 1998.
2. Coreman, Rivest, Lisserson, : "Algorithm", PHI.

**REFERENCE BOOKS:**

1. Basse, "Computer Algorithms: Introduction to Design & Analysis", Addison Wesley.
2. Gilles Brassard and Paul Bratley, Fundamentals of Algorithm, Prentice Hall of India Pvt.Ltd. 1997.
3. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Addition-wesley, Third Indian Reprint, 2000.

### UNIT I

**Introduction To Networks And Communication Media:** Uses – Network Hardware – Network Software – Reference Models – Example Networks – Network Standardization. Basis for data communication - Transmission media – Wireless Transmission – Telephone Systems – Satellite Communication.

### UNIT II

**Physical Layer :** Bit Rate, Data rate, Frequency, Bandwidth, Baud Rate, Harmonics, Maximum data rate of a channel.

**The Data Link Layer :** Data Link Layer design issues – Error Detection and Correction Methods - Elementary Data Link Protocols – Sliding Window Protocols – Protocol Verification Methods – Channel Allocation – Multiple Access protocols – IEEE 802 Standards.

### UNIT III

**The Network Layer:** Network Layer design issues – Routing algorithms – Congestion Control algorithms – Internetworking – Network Layer in Internet.

### UNIT IV

**The Transport Protocols:** Transport Service – Transport Protocols – Internet Transport Protocols UDP – TCP - Performance issues.

### UNIT V

**The Application Layer:** Application Layer design issues – Domain Name System - Electronic Mail – World Wide Web – Multimedia - Other Applications – Network Security - Basic Cryptography

### TEXT BOOKS:

1. Andrews S. Tanenbaum, "Computer Networks", Prentice Hall of India Private Limited, (4<sup>th</sup> Edition), 2003.
2. Leon Garcia and Widjaja, "Communication Networks - Fundamental concepts and key architecture", Tata McGraw Hill, 2001.

### REFERENCE BOOKS:

1. Internetworking with TCP/IP Volume 1: Principles Protocols, and Architecture, Douglas Comer and Prentice Hall, fifth edition, 2006.
3. TCP/IP Protocol Suite, B.A. Forouzan, TMH, 3rd edition, 2006.
2. Network Protocols: Signature Edition, Matthew G. Naugle. Mcgraw-Hill Signature Series.

**UNIT I**

**Java Basics** - Review of OOP concepts, History of Java, Java buzzwords, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow-block scope, conditional statements, loops, break and continue statements, simple java program, arrays, input and output, formatting output, encapsulation, inheritance, polymorphism, classes, objects, constructors, methods, parameter passing, static fields and methods, access control, this keyword, overloading methods and constructors, recursion, garbage collection, String Handling, Enumerations.

**UNIT II**

**Inheritance** – Inheritance concept, benefits of inheritance ,Super classes and Sub classes, Member access rules, Inheritance hierarchies, super keyword, preventing inheritance: final classes and methods, casting, polymorphism - dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

**UNIT III**

**Interfaces** – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface. **Inner classes** – Uses of inner classes, local inner classes, anonymous inner classes, static inner classes. **Packages**-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

**UNIT IV**

**Exception handling** – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally , re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes, Guide lines for proper use of exceptions. **Multi-threading** - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, thread groups, daemon threads.

**UNIT V**

**APPLETS, JAVA GUI AND DATABASE CONNECTIVITY, Networking** - Applets – Applet life cycle methods – Applets based GUI – AWT Introduction - GUI components – Basics of Swings – Accessing database with JDBC basics- Types of Drivers – Basics of Network Programming, Addresses, Ports, Sockets, Simple Client and Server Program, Multiple Clients and Single Server

**TEXT BOOKS:**

1. E.Balaguruswamy, Programming with Java, A primer, 3e, TATA McGraw-Hill Company (2008).(Chapters : 1 to 14 )
2. Robert Lafore, Data Structures & Algorithms in Java, Second Edition, Pearson Education(2008)

**REFERENCE BOOKS:**

1. John R. Hubbard, Programming with Java, Second Edition, Schaum's outline Series, Tata McGrawhill (2007).
2. Timothy Budd, Understanding Object Oriented Programming with Java, Pearson Education (2007).
3. Adam Drozdek, Data Structures and Algorithms in Java, Second Edition, Cengage Learning(2008).
4. John R. Hubbard, Anita Hurry, Data Structures with Java, Pearson Education (2008).
5. Jana, Java and Object Oriented Programming Paradigm, PHI (2007).

**LIST OF PROGRAMS**

1. Introduction
2. SQL Commands
  - 2.1 DDL Commands
  - 2.2.DML Commands.
  - 2.3.DCL Commands.
  - 2.4.TCL Commands.
  - 2.5.DQL Command.
3. Applying Integrity Constraints.
  - 3.1. Primary key
  - 3.2. Foreign key
  - 3.3. Default
  - 3.4. Check
  - 3.5. Index
  - 3.6. Unique key
4. Functions
  - 4.1. Aggregate functions
    - 4.1.1 . Sum()
    - 4.1.2. AVG()
    - 4.1.3.Min()
    - 4.1.4.Max()
    - 4.1.5.Count()
  - 4.2. String functions
  - 4.3. Date Functions
5. SQL Alias
6. Clauses
  - 6.1. Distinct
  - 6.2. In
  - 6.3. Between
  - 6.4. Like
  - 6.5. Order By
  - 6.6. Group by
  - 6.7. Count
  - 6.8. Having
7. Sub Queries
8. Joins
  - 8.1. Inner join
    - 8.1.1. Right inner
    - 8.1.2. Left inner
  - 8.2. Outer Join
    - 8.2.1. Left outer join
    - 8.2.2. Right outer join
9. Views
10. Data base Normalization
11. PL/SQL (Procedural Language using High level language concepts).
  - 11.1. Introduction
  - 11.2. Simple programs
  - 11.3. Using conditional statements.
  - 11.4. Using loops
  - 11.5. Procedures
  - 11.6. Cursors
  - 11.7. Triggers.

- 1) Write a program to find a maximum of two numbers ?
- 2) Write a program to describe Math class and its methods ?
- 3) Write a program to generate random numbers sequence in Java?
- 4) Write a program to demonstrate the operation of switch case?
- 5) Write a program to describe Scanner class in Java?
- 6) Write a program to reverse string in Java?
- 7) Write a program to demonstrate Date & Time utility classes in Java?
- 8) Write a program on abstract class & method?
- 9) Write a program on final variable, final method and final class ?
- 10) Write a program to demonstrate interface concept?

**ABSTRACT WINDOW TOOL KITS(AWT)**

- 11) Write a program to implement counter using AWT ?
- 12) Write a program to implement Accumulator using AWT ?
- 13) Write a program to demonstrate mouse events in java using AWT?

**SWING**

- 14) Write a program to implement counter using swings ?

**APPLET**

- 15) Write a program to display a message using applet concept ?
- 16) Write a program for demonstrating the parameter passing mechanism in applets?

**JAVA DATABASE CONNECTIVITY**

- 17) A JDBC Program to connect and read MS Access table with DSN without DSN?
- 18) Write a program to connect and read data from MYSQL table ?
- 19) Write a JDBC program to test any type of JDBC driver whether it installed or not ?
- 20) Write a JDBC program to demonstrate PreparedStatement interface in accessing Oracle table?



**UNIT I**

Introduction: PCS Architecture, Cellular Telephony, Cordless Telephony and Low-Tier PCS, Handoff, Roaming Management under SS7, Strategies for Handoff Detection, Channel Assignment, IS-41 Networking Signalling.

**UNIT II**

GSM System overview, GSM Architecture, Location Tracking and call setup, GSM Network signalling, GSM Mobility management, GSM location update, failure restoration.

**UNIT III**

SMS Architecture, SMS Protocol Hierarchy, Mobile-Originated Message, Mobile Terminated Message, DTE-DCE-Interface.

**UNIT IV**

Mobile Number Portability, fixed network number portability, mobile number portability mechanism.

**UNIT V**

GPRS, Wireless Access Protocol (WAP), 3G Mobile Services, W-CDMS and cdma2000, QoS in 3G, Wireless Local Loop (WLL), Wireless Enterprise Network.

**TEXT BOOKS:**

1. Yi-Bing Lin & Imrich Chlamtac, "Wireless and Mobile Networks Architectures", John Wiley & Sons, 2001.
2. Raj Pandya, "Mobile and Personal Communication systems and services", Prentice Hall of India, 2001.

**REFERENCE BOOKS:**

1. Hansmann, "Principles of Mobile Computing", Wiley Dreamtech, 2004.
2. Mark Ciampa, "Guide to Designing and Implementing wireless LANs", Thomson learning, Vikas Publishing House, 2001.
3. Ray Rischpater, "Wireless Web Development", Springer Publishing, 2000.
4. Sandeep Singhal, "The Wireless Application Protocol", Pearson Education Asia, 2000.
5. P.Stavronlakis, "Third Generation Mobile Telecommunication systems", Springer Publishers, 2001.

**UNIT I**

**Process Synchronization:** Concepts of processes, Concurrent processes, Threads, Overview of different classical synchronization problems, Monitors, Communicating Sequential processes(CSP). Process deadlocks: Introduction, causes of deadlocks, Deadlock handling strategies, Models of deadlock.

**UNIT II**

**Distributed operating system:** Architectures, Issues in Distributed operating systems, Limitations of Distributed Systems, Lamport's logical clock, Global states, Chandy-Lampert's global state recording algorithm, Basic concepts of Distributed Mutual Exclusion, Lamport's Algorithm, Ricart -Agrawala Algorithm; Basic concepts of Distributed deadlock detection, Distributed File system, Architecture, Design issues, SUN Network File system. Basic concepts of Distributed shared memory, Basic concepts of Distributed Scheduling, Load balancing, Load sharing.

**UNIT III**

**Distributed OS Implementation:** Models, Naming, Process migration, Remote Procedure Calls. Multiprocessor System: Motivation, Classification, Multiprocessor Interconnections, Types, Multiprocessor OS functions & requirements; Design & Implementation Issue; Introduction to parallel programming; Multiprocessor Synchronization.

**UNIT IV**

**Performance, Coprocessors, RISC & data flow:** Introduction, Necessity, Measures, Techniques, Bottlenecks & Saturation, Feedback loops, Coprocessors, RISC. Analytic Modeling: Introductions, Queing Theory, Markov Process

**UNIT V**

**Security & Protection:** Security-threats & goals, Penetration attempts, Security Policies & mechanisms, Authentication, Protections & access control Formal models of protection, Cryptography, worms & viruses.

**TEXT BOOKS:**

1. Operating Systems Concepts & design - Milan Milenkovic, TMH
2. Operating System - H.M. Deitel, Pearsons .
3. Advanced Concepts in operating Systems - Mukesh Singhal and Niranjana G. Shivaratri, TMH

**REFERENCE BOOKS:**

1. A. Silberschatz - Applied Operating System Concepts, Wiley, 2000.
2. Lubemir F Bic and Alan C. Shaw - Operating System Principles, Pearson Education, 2003.
3. Doreen L Galli, Distributed Operating System- Concepts and Practice, Prentice-Hall, 2000.
4. Operating Systems : Internal and Design Principles - Stallings, 6th ed., PE
5. Modern Operating Systems, Andrew S Tanenbaum 3rd ed., PE.
6. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th ed., John Wiley

**UNIT I****INTRODUCTION TO CBSE**

Component-Based Software Engineering (CBSE), CBSE vs. Object-Oriented Software Engineering, CBSE methodology, CBSE processes, domain engineering, component engineering, component-based software life cycle, component vs. object, CBSE project management, measurement and metrics for CBSE, challenge CBSE, advantages and disadvantages of CBSE, economics of CBSE.

**UNIT II****COMPONENT-ORIENTED PROGRAMMING**

Component-oriented programming, object-oriented programming to component-oriented programming, component-oriented programming vs. object-oriented programming, principle and infrastructure of component-oriented programming.

**UNIT III****COMPONENT AND COMPONENT MODEL**

Component, component technology, software component, specification of software component, component architecture, component framework, component interface, component abstraction, component services, components model, component selection, component adaptability, component certification, component composition, component and interface modeling, domain modeling, patterns and frameworks.

**UNIT IV****COMPONENT-BASED DESIGN AND REUSE**

Principles of component design and reuse, design prototyping, design production, design refactoring, design documentation, component-based software reuse, reusable component, component-based reuse metrics.

**UNIT V****COMPONENT TECHNOLOGIES**

Component technologies: Component Object Model (COM), Distributed Component Object Model (DCOM), Common Object Requesting Broker Architecture (CORBA), Enterprise Java Beans (EJB) .

**TEXT BOOKS:**

1. George T. Heineman, William T. Councill, Component-Based Software Engineering: Putting the Pieces Together, Addison Wesley, 2001.
2. Andy Ju An Wang, Kai Qian, Component-Oriented Programming, Wiley Interscience, 2005

**REFERENCE BOOKS:**

1. Clemens Szyperski, Component Software: Beyond Object-Oriented Programming, Addison Wesley, 1997.
2. Alan W. Brown, Component-Based Software Engineering, Wiley-IEEE Computer Society, 1996.

**UNIT I**

Information Storage and Retrieval (IR) Systems: Concept, components, IR tools. Information Analysis, repackaging and consolidation: Concept, purpose. Content Creation / Content Development. Indexing: Concept. Principles / general theory of indexing. Content Analysis : Meaning, Purpose. Application in LICs.

**UNIT II**

Indexing Languages, types, Characteristics. Vocabulary control – natural and controlled languages. Semantics and Syntax. Library Classification Schemes: UDC and CC. Thesaurus – Structure and functions. Design / Construction of Thesaurus. Subject Headings – LCSH and SLSH – Structure and Functions.

**UNIT III**

Indexing Techniques: Syntactical problems. Pre and post-coordinate indexing. Chain Indexing, PRECIS. Uniterm, Keyword and Citation Indexing. Computer based indexing systems and methods (Automatic Indexing).

**UNIT IV**

Bibliographic Description: Standards for bibliographic Description: ISBDs, MARC, CCF and MARC 21. METADATA: Concept, Formats – Features of MARC, IAFA, Templates, Dublin Core, TELURC, FGDC --- Detailed Study of any two formats. Protocols – Features – SODA, SMARTS. Metadata vis-à-vis Internet. DIGITAL OBJECT IDENTIFIER (DOI): Concept, Origin, application, principles for issuance of DOI. Principles for the application of DOI. DOI Foundation, procedure for registration.

**UNIT V**

Information Retrieval: Retrieval methods – manual and automated. Search processes, and strategies. Boolean Logic. Preparation of query, steps in search strategy. Search tools – search engines, meta-search engines. Subject directories, subject guides, specialized data bases, etc.,. Criteria for evaluation of IR Systems. Computerized Information Services: Machine Translation. Automatic Indexing. Computerized Abstracting. Natural Language Processing.

**TEXT BOOKS:**

1. Unesco. CCF. Paris : Unesco. 1988.
2. Jean Atchison & Alan Gilchrist. Thesaurus construction: a practical manual. London: Aslib. 1972.

**REFERENCE BOOKS:**

1. A. C. Foskett. The subject approach to information. 4th ed. London : Bingley, 1982.
2. F. Wilfrid Lancaster. Information retrieval systems: Characteristics, testing and evaluation. 2nd ed. New York: Wiley, 1979.
3. F. W. Lancaster & L. C. Smith. Compatibility issues affecting information systems and services. Paris: Unesco, 1983.
4. Jennifer E. Rowledy. Organising knowledge: an introduction to information retrieval. Aldorshot: Gower, 1987.
5. P. Simmons & A. Hopkins. CCF: The Common communication format. Paris: Unesco, 1984.

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**SEMESTER 4**

S. No	Course Code	Course Name	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1.	CS241	Software Engineering	3	1	0	4	30	70	100
2.	CS242	Data Warehousing and Data Mining	3	1	0	4	30	70	100
3.	CS243	Formal Language & Automata Theory	3	1	0	4	30	70	100
4.	CS244	Computer Graphics	3	1	0	4	30	70	100
5.		<b>Elective-III</b>	3	1	0	4	30	70	100
6.	CSL46	Lab VII: UML	0	0	3	2	50	50	100
7.	CSL47	Lab VIII: Linux Programming	0	0	3	2	50	50	100
<b>TOTAL</b>						<b>24</b>			<b>700</b>
<b>Elective-III</b>									
CSE 41 Distributed System									
CSE 42 Software Testing and Quality Assurance									
CSE 43 Software Project Management									
CSE 44 Compiler Design									

**UNIT I**

**Introduction:** Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

**UNIT II**

**Software Requirement Specifications (SRS):** Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

**UNIT-III**

**Software Design:** Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halstead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

**UNIT IV**

**Software Testing:** Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

**UNIT V**

**Unified Modeling Language (UML):** UML diagrams such as use case diagrams, class diagram, sequence diagrams, state transition diagrams. **Software Maintenance** Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance.

**TEXT BOOKS:**

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.

**REFERENCE BOOKS:**

1. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
2. Pankaj Jalote, Software Engineering, Wiley.
3. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
4. Ian Sommerville, Software Engineering, Addison Wesley.

**UNIT I**

Introduction: What is Data Mining, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining. Data Preprocessing: Needs Preprocessing, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

**UNIT II**

Data Warehouse and OLAP Technology: What is Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture and Implementation, from Data Warehousing to Data Mining. Mining Frequent Patterns, Associations Rules: Basic Concepts, Efficient and Scalable Frequent Item Set Mining Methods, Mining Various kinds of Association Rules.

**UNIT III**

Classification and Prediction: Introduction, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule based Classification, Classification by Back Propagation, Support Vector Machines, Prediction, Accuracy and Error Measures

**UNIT IV**

Cluster Analysis: Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid Based Methods, Model Based Clustering Methods, Outlier Analysis.

**UNIT V**

Mining Object, Spatial, Multimedia, Text, and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

**TEXT BOOKS:**

1. Han J &Kamber M, "Data Mining: Concepts and Techniques", Harcourt India, Elsevier India, Second Edition.
2. Pang-NingTan. MichaelSteinback,VipinKumar, "Introduction to Data Mining", Pearson Education, 2008.

**REFERENCE BOOKS:**

1. Margaret H Dunham,S.Sridhar, "Data mining: Introductory and Advanced Topics", Pearson Education, 2008.
2. Humphires,hawkins,Dy, "Data Warehousing: Architecture and Implementation", Pearson Education, 2009.
3. Anahory, Murray, "Data Warehousing in the Real World", PearsonEçucation, 2008.
4. Kargupta,Joshi,etc., "Data Mining: Next Generation Challenges and Future Directions" Prentice Hall of IndiaPvtLtd, 2007.

**UNIT I**

Introduction to formal proof – Additional forms of proof – Inductive proofs – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

**UNIT II**

Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

**UNIT III**

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG – Deterministic Pushdown Automata.

**UNIT IV**

Normal forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

**UNIT V**

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem – The classes P and NP.

**TEXT BOOKS:**

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.
2. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.

**REFERENCE BOOKS:**

1. Thomas A. Sudkamp, "An Introduction to the Theory of Computer Science, Languages and Machines", Third Edition, Pearson Education, 2007.
2. Raymond Greenlaw and H. James Hoover, "Fundamentals of Theory of Computation, Principles and Practice", Morgan Kaufmann Publishers, 1998.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.



**UNIT I**

Overview of Graphics Systems – Video display devices, raster-scan systems. Random-scan system, graphics monitors and workstations. Input devices, Hardcopy devices, Graphics software. Output primitives: Line drawing algorithms, Circle generation algorithms, ellipse generating algorithms, pixel addressing, Filled area primitives, Fill area functions, cell array, character generations.

**UNIT II**

Attributes of output primitives: Line attributes, curve attributes color and Gray-scale level, Area fill attributes, character attributes, and Bundled attributes Enquiry functions. Two dimensional Geometric transformations: Basic transformations, Homogenous co-ordinates, affine transformations, transformation functions. Raster methods for transformations.

**UNIT III**

Two dimensional viewing: Viewing pipeline, viewing transformation, viewing functions, line clipping – Cohen Sutherland line clipping, Liang Barsky line clipping, polygon clipping: Sutherland – Hodgman polygon clipping, Wiler Athertion polygon clipping.

**UNIT IV**

Structures and Hierarchical Modeling: Structure concepts, editing structures, Basic modeling concepts, hierarchical modeling with structures. Graphical user interfaces and Interactive input methods: The user Dialogue, logical classification of input devices, Input functions and Models Interactive picture construction techniques.

**UNIT V**

Three – Dimensional object representations: Poly-surfaces curved lines and surfaces, spline representation, Bezier curves and surfaces, B-Spline curves and surface, CSG Methods: Octrees, BSP Trees. Three Dimensional Transformation : Three dimensional viewing: Viewing coordinates, projections, Visible surface detection methods: Back-face Detection, Depth-buffer methods, scan line methods, Depth-sorting methods, BSP – Tree Methods, Arc sub division methods, Basic illuminations models – Gourand shading phong shading.

**TEXT BOOKS:**

1. Heanry Donald, Pauline Baker M: Computer Graphics, PIH 2nd edn., 1995.
2. Harrington S: Computer Graphics A Programming Approach 2nd Edn. McGraw Hill,1987.

**REFERENCE BOOKS:**

1. Computer Graphics Second edition”, Zhigand xiang, Roy Plastock, Schaum’s outlines, Tata Mc- Graw hill edition.
2. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
3. “Principles of Interactive Computer Graphics”, Neuman and Sproul, TMH.
4. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

**UML LAB**

**CSL46**

**L-T-P: 0-0-4**

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1. Identify Use Cases and develop the Use Case model.
  2. Identify the business activities and develop an UML Activity diagram.
  3. Identify the conceptual classes and develop a domain model with UML Class diagram.
  4. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
  5. Draw the State Chart diagram.
  6. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
  7. Implement the Technical services layer.
  8. Implement the Domain objects layer.
  9. Implement the User Interface layer.
  10. Draw Component and Deployment diagrams.

**Suggested domains for Mini-project/Case Studies.**

1. Library management system
2. Hospital management system
3. ATM system
4. Transport System
5. Passport automation system.
6. Book bank System
7. Exam Registration System
8. Stock maintenance system.
9. Online course reservation system
10. E-ticketing System
11. Software personnel management system
12. Credit card processing
13. e-book management system
14. Recruitment system
15. Foreign trading system
16. Conference Management System
17. BPO Management System

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. . Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files
6. Write a shell script to list all of the directory files in a directory.
7. Write a shell script to find factorial of a given integer.
8. Write an awk script to count the number of lines in a file that do not contain vowels.
9. Write an awk script to find the number of characters, words and lines in a file.
10. Write a c program that makes a copy of a file using standard I/O and system calls
11. Implement in C the following UNIX commands using System calls  
A. cat      B. ls      C. mv
12. Write a program that takes one or more file/directory names as command line input and reports the following information on the file.  
A. File type.    B. Number of links.      C. Time of last access.  
D. Read, Write and Execute permissions.
13. Write a C program to emulate the UNIX ls -l command.
14. Write a C program to list for every file in a directory, its inode number and file name.
15. Write a C program that demonstrates redirection of standard output to a file.  
Ex: ls > f1.
16. Write a C program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.
17. Write a C program to create a Zombie process.
18. Write a C program that illustrates how an orphan is created.
19. Write a C program that illustrates how to execute two commands concurrently with a command pipe.  
Ex: - ls -l | sort
20. Write C programs that illustrate communication between two unrelated processes using named pipe

**UNIT I**

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. Architectural models, Fundamental Models.

Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks. Concepts in Message Passing Systems: causal order, total order, total causal order, Techniques for Message Ordering, Causal ordering of messages, global state, and termination detection.

**UNIT II**

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of Mutual exclusion theorem, Token based and non token based algorithms, performance metric for Distributed mutual exclusion algorithms. Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

**UNIT III**

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system. Distributed Resource Management: Issues in distributed File Systems, Mechanism for building distributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory.

**UNIT IV**

Failure Recovery in Distributed Systems: Concepts in Backward and Forward recovery, Recovery in Concurrent systems, obtaining consistent Checkpoints, Recovery in Distributed Database Systems. Fault Tolerance: Issues in Fault Tolerance, Commit Protocols, Voting protocols, Dynamic voting protocols.

**UNIT V**

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

**TEXT BOOKS:**

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Ramakrishna,Gehrke," Database Management Systems", Mc Grawhill

**REFERENCE BOOKS:**

1. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson

**UNIT I**

Introduction: Software Quality, Role of testing, v & v, objectives and issues of testing, Testing activities and levels, Sources of Information for Test Case Selection, White-Box and Black-Box Testing , Test Planning and Design, Monitoring and Measuring Test Execution, Test Tools and Automation, Test Team Organization and Management. Unit Testing: Concept, Static Unit Testing, Defect Prevention, Dynamic Unit Testing, Mutation Testing, Debugging.

**UNIT II**

Control Flow & Data Flow Testing: Outline of CFT, CF Graph, and Paths in a Control Flow Graph, Path Selection Criteria, Generating Test Input, and Examples of Test Data Selection. Overview of Dynamic Data Flow Testing, Data Flow Graph, Data Flow Testing Criteria, Comparison of Testing Techniques.

**UNIT III**

System Integration Testing & Test Design: Concept of Integration Testing, Different Types of Interfaces and Interface Errors, Granularity of System Integration Testing, System Integration Techniques, Test Plan for System Integration, Off-the-Shelf Component Testing, System Test Categories.

**UNIT IV**

System Test Planning, Automation & Execution: Structure of a System Test Plan, Test Approach, Test Suite Structure, Test Environment, Test Execution Strategy, Test Effort Estimation, Scheduling and Test Milestones, System Test Automation, Selection of Test Automation Tools, Test Selection Guidelines for Automation, Structure of an Automated Test Case, Test Automation Infrastructure Metrics for Tracking System Test, Metrics for Monitoring Test Execution, Beta Testing, System Test Report, Measuring Test Effectiveness. Acceptance Testing:

**UNIT V**

Software Quality: Five Views of Software Quality, McCall's Quality Factors and Criteria, Quality Factors Quality Criteria, Relationship between Quality Factors and Criteria, Quality Metrics, ISO 9126 Quality Characteristics, ISO 9000:2000 Software Quality Standard ISO 9000:2000 Fundamentals, ISO 9001:2000 Requirements

**TEXT BOOKS:**

1. Software Testing and Quality Assurance theory and practice by KshiraSagar Naik and Priyadarshi Tripathy
2. Stephen H.Khan ,Metrics and Models in Software Quality Engineering Pearson Education, India

**REFERENCE BOOKS:**

3. Shari Lawrence Pfleeger,"Software Engineering Theory and Practice Pearson Education, India

**UNIT I**

**Introduction:** Project Management concepts, Process Framework, Project Planning Software Life Cycle Models, Artifacts of the Project Management Process.

**UNIT II**

**Cost and Scheduling Estimation Models:** Various Levels of COCOMO for Cost, Effort, Schedule and Productivity Estimation. Approaches to Effort, Cost Estimation, and Schedule Estimation factors through COCOMO II, Putnam Estimation Model, Algorithmic models.

**UNIT III**

**Project Management Techniques:** Project Organizations and Responsibilities, Establishing Project Environment, Risk Management Process, Project Tracking and Control Defect Tracking Concepts such as Process monitoring and audit, Reviews, Inspections and Walkthroughs.

**UNIT IV**

**Activity Planning including CPM and PERT:** Network planning model; Activity-on-arrow network; Precedence network; Forward pass; Backward pass; Critical path; Slack and float.

**UNIT V**

**Risk Estimation:** What is Risk?, Framework for Managing Risks, Risk Identification, Risk Analysis and Prioritization, Risk Avoidance and Mitigation Strategies, Risk Monitoring, Estimating.

**TEXT BOOKS:**

1. Watts S. Humphrey, "Managing the Software Process", Pearson Education
2. Walker Royce, "Software Project Management", Pearson Education.

**REFERENCE BOOKS:**

1. Pankaj Jalote, "Software Project Management in Practice", Pearson Education.
2. Bob Hughes, "Software Project Management", TMH.
3. Chris Kemerer, "Software Project Management Readings and Cases".regards

**UNIT I**

Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to Compiler Construction- lexical analysis, Construction of lexical analyze using LEX tool. Phases of Compilation and A simple One-Pass Compiler.

**UNIT II**

Context Free grammars and parsing: Context free grammars, derivation, parse trees, ambiguity, Application CFG in compilation-Preprocessing steps in Parsing, LL(1) parsing. Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.

**UNIT III**

Semantics: Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements. Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.

**UNIT IV**

Run time storage: Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation. Code optimization: Principal sources of optimization, optimization of basic blocks, peephole optimization.

**UNIT V**

Global optimizations-flow graphs, Data flow analysis of flow graphs. Code generation: Machine Dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Blocks.

**TEXT BOOKS:**

1. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.
2. Introduction to Automata Theory, Languages and Computation - Hopcroft, Rajeev Motwani and Ullman, 3rd Edition, Pearson Education.

**REFERENCE BOOKS:**

1. Introduction to Theory of computation.Sipser, 2nd Edition, Cengage Learning.
2. Introduction to Formal Languages and Automata Theory and Computation – Kamala Krithivasan and Rama R, Pearson.
3. Modern Compiler Construction in C, Andrew W.Appel Cambridge University Press.

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**MASTER OF COMPUTER APPLICATION (MCA) PROGRAMME**

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**SEMESTER 5**

S. No	Course Code	Course Name	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1.	CS351	Cloud Computing and Virtualization	3	1	0	4	30	70	100
2.	CS352	Web Technology	3	1	0	4	30	70	100
3.	CS353	Cryptography & Network Security	3	1	0	4	30	70	100
4.	CS354	Artificial Intelligence	3	1	0	4	30	70	100
5.		<b>Elective-IV</b>	3	1	0	4	30	70	100
6.	CSL56	Lab IX: Web Technology	0	0	3	2	50	50	100
7.	CSL57	Lab -X: Artificial Intelligence	0	0	3	2	50	50	100
<b>TOTAL</b>						<b>24</b>			<b>700</b>
<b>Elective-IV</b>									
CSE 51 Software Agents									
CSE52 Advance Computer Network									
CSE 53 Software Quality Assurance and Engineering									
CSE 54 Distributed Database									



**UNIT I**

Cloud Computing Fundamentals:

Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , Applications cloud computing, Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim.

**UNIT II**

Cluster Computing, Grid Computing, Grid Computing Versus Cloud Computing, Key Characteristics of Cloud Computing. Cloud Models: Benefits of Cloud Models, Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud, Shared Private Cloud, Dedicated Private Cloud, and Dynamic Private Cloud.

**UNIT III**

Cloud Services and File System:

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service- Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force.

**UNIT IV**

Virtualization:

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

**UNIT V**

Security in the Cloud:

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

**TEXT BOOKS:**

1. Cloud Computing "A Practical Approach" Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGraw-Hill.
2. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

**REFERENCE BOOKS:**

1. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.

**UNIT I**

**HTML** – What is HTML – Basic Structure of HTML Page – Basic Tags – Types of Tags – Lists – Tables – Images – Forms – Frames.

**UNIT II**

Dynamic HTML with Java Script: Data validation, Opening a new window, Messages and Confirmations, The status bar, writing to a different frame, Rollover buttons, Moving images, multiple pages in a single download, A text-only menu system, Floating logos.

**UNIT III**

**Cascading Style Sheet** – Introduction – A Simple Specification – Types of Style Sheets – Inline Style Sheets – Internal or embedded style sheets – External Style Sheets – Style Classes – Font Properties – Background properties – Border properties – text properties – margin properties – padding properties – table properties – positioning properties – line/marker properties – outlines – classification.

**UNIT IV**

**JAVA SCRIPT** – Introduction – Usage of variables – operations – control structures – looping structures – predefined keywords – arrays – predefined functions – user defined functions – arrays and functions – mathematical functions – string functions – objects – expressions – pattern matching using RegEXp Class – String Class – Exception Handling – Built-in objects – Bgcolor/Fgcolor – Date Object – Events and Event Handling – Validations – Window – Confirmation, alert messages.

**UNIT V**

**XML** –Introduction –Document Type Definition or DTD – uses of DTD – Tags – Elements – Attributes – PCDATA – CDATA – Basics of entities – XML Elements – Elements Declaration –usage of #REQUIRED – usage of #IMPLIED – usage of #FIXED – Internal Entities – External Entities – XML Schema – Defining, Accessing XML Document.

**TEXT BOOKS:**

1. Paul S.Wang Sanda S. Katila, An Introduction to Web Design Plus Programming, Thomson(2007).
2. Robert W.Sebesta, Programming the World Wide Web, Third Edition, Pearson Education (2007).

**REFERENCE BOOKS:**

1. Thomas A.Powell, The Complete Reference HTML & XHTML, Fourth Edition, Tata McGraw Hill (2006).
2. Abders Moller and Michael Schwartzbach, An Introduction to XML and Web Technologies, Addison Wesley (2006).
3. Joel Sklar, Principles of Web Design, Thomson (2007).

**CRYPTOGRAPHY AND NETWORK SECURITY**

**CS353**

**L-T-P: 3-1-0**

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**UNIT I**

Introduction to security attacks, services and mechanism, introduction to cryptography. Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stenography, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear cryptanalysis of DES, block cipher modes of operations, triple DES.

**UNIT II**

Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, primality testing, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffe-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elgamel encryption.

**UNIT III**

Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm.

**UNIT IV**

Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.

**UNIT V**

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management.

Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET). System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

**TEXT BOOKS:**

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Prentice Hall, New Jersey.
2. Johannes A. Buchmann, "Introduction to Cryptography", Springer-Verlag.

**REFERENCE BOOKS:**

1. Bruce Schiener, "Applied Cryptography".
2. Behrouz A. Forouzan, "Cryptography and Network Security",

**UNIT I**

**AI History and Applications:** Defining AI: Acting Humanly (Turing Test Approach), Thinking Humanly (Cognitive Modeling Approach), Thinking Rationally (laws of thought approach), Acting Rationally (Rational Agent Approach); Foundations of Artificial Intelligence; History of AI, AI techniques, Expert Systems.

**UNIT II**

**Problem Solving by Search:** Defining the problem as a State Space Search Strategies: Breadth – first Search, Depth- first search, Depth limited search , Iterative Deepening depth first search. **Heuristic Search Techniques:** Hill Climbing, Simulated Annealing, Best First Search: OR Graphs, Heuristic Functions, A\* Algorithm, AND –OR graphs, AO\* Algorithm.

**UNIT III**

**Knowledge Representation:** Representations and mappings, Approaches to knowledge Representation, Procedural versus Declarative knowledge; **Predictive Logic:** Representing Simple facts, Instance and Isa relationships in Logic, Proposition versus Predicate Logic, Computable Functions and Predicates- not, Rules of Inferences and Resolution-not, Forward versus Backward Reasoning, Logic Programming and Horn Clauses. **Weak slot and Filler Structure:** Semantic Nets, Frames. **Strong slot Filler Structures:** Conceptual Dependency, scripts.

**UNIT IV**

**AI Programming Languages (PROLOG):** Introduction, How Prolog works, Backtracking, CUT and FAIL operators, Built –in Goals, Lists, Search in Prolog.

**UNIT V**

**Connectionist Models / ANN:** Foundations for Connectionist Networks, Biological Inspiration; Different Architectures and output functions: Feed forward, Feedback, Recurrent Networks, step, Sigmoid and different functions.

**TEXT BOOKS:**

1. Stuart Russel and Peter Norvig: Artificial Intelligence – A Modern Approach, 2<sup>nd</sup> Edition Pearson Education
2. Elaine Rich and Kevin Knight: Artificial Intelligence, Tata McGraw Hill 2<sup>nd</sup> Ed.

**REFERENCE BOOKS:**

1. N.P. padhy: Artificial Intelligence and Intelligent Systems, Oxford Higher Education, Oxford University Press
2. George F Luger: Artificial Intelligence- Structures and Strategies for complex Problem Solving, 4<sup>th</sup> Ed. Pearson Education
3. Ivan Bratko :PROLOG Programming 2<sup>nd</sup> Ed., Pearson Education

**List of Practicals**

1. Write HTML code to use the tags like caption, title, body etc.
2. Write HTML code to divide the screen into multiple frames.
3. Write HTML code to link the pages and display the images.
4. Write HTML code to create a table
5. Write HTML code for form and place some text boxes, command box, selection box etc on the form.
6. Write a small program using XML.
7. Write a Java Script for displaying message, time and date etc using document write method.
8. Write a Java Script for displaying different buttons (Ex: ok, cancel etc), different icons (ex: question, critical etc) and different boxes (input box, message box etc)
9. Write a Java Script Script to extract month, year, day from current date.
10. Write a Java Script Script to extract hour, minute and seconds from current time.
11. Write a Java Script to calculate simple interest and compound interest using arithmetic operators.
12. Write programs on string. (Ex: Accepting a string, calculating the position of the character in the string, Length of the string etc)
13. Write programs to work with radio buttons and checkbox.
14. Write ASP code to display current date and time.
15. Write a program to pass the values to the next page using Submit button in ASP.
16. Write a program to establish the connection with the database and populating values in the combo box.
17. Write a program to display all the records in the table.
18. Write a program to insert the record into the table.
19. Write a program to display a registration form.
20. Write a program to store the data in the table.
21. Write PHP code to display date and time.
22. Write PHP code to create a form through which data can be uploaded into automated system.
23. Write PHP code to create a cookie.
24. Write PHP code to create a table and insert records into it.
25. Design your CS and IT website, install it and maintain it.

**TEXT BOOKS:**

1. Internet & World Wide Web – Dietel and Dietel Pearson education Asia Sklar TMH
2. HTML complete reference Powell – THH.

**REFERENCES BOOKS:**

1. WWW Design with HTML Xavier (TMH)
2. Basics of Web Site Design NIIT – PHI
3. Web Technology & Design, C Xavier, New Age Inter.

1. Write a program to demonstrate Inference Concept in Prolog.
2. Write a program to implement and check Car Database system.
3. Write a program on External Goal.
4. Write a program on internal Goal.
5. Write a program for testing the Graph.
6. Write a program on FAIL predicate to find all Solutions.
7. Write a program on Recursion to print a set of numbers.
8. Write a program to process List with Header.
9. Write a program on Exclusion using FAIL predicate.
10. Write a program on List processing with fail predicate.
11. Write a program to implement Login mechanism without recursion.
12. Write a program to implement Login mechanism with Repeat Predicate.
13. Write a program to implement Login mechanism without repeat predicate with recursion.
14. Write a program to test whether an element is a member of list or not.
15. Write a program on CUT predicate to prevent backtracking.
16. Write a program addition of two integers using built-in predicates.
17. Write a program to find square root of a number.
18. Write a program comparison operators.
19. Write a program to implement simple Counter.
20. Write a program to generate Random Numbers.

**UNIT I**

**SOFTWARE AGENTS PARADIAGM**

Software agent, history, theoretical foundations for software agents, agent programming, agent programming paradigms, agent vs. object, aglet, mobile agents, agent frameworks, agent reasoning, agent applications.

**UNIT II**

**AGENT TOPOLOGY**

Software agents: collaborative agents, interface agents, mobile agents, information agents, reactive agents, hybrid agents, heterogeneous agent system, smart agents.

**UNIT III**

**MULTIAGENT SYSTEMS**

Multiagent system, interaction between agents, reactive agents, cognitive agents, interaction protocols, agent coordination, agent negotiation, agent cooperation, agent organization, self- interested agents in ecommerce applications.

**UNIT IV**

**INTELLIGENT SOFTWARE AGENTS**

Design and implementation of intelligent agents: reactive, deliberative, planning, interface agents, agent communication languages, agent knowledge representation, agent adaptability, mobile agent applications, languages & tools for design, implementation of intelligent agents.

**UNIT V**

**AGENTS AND SECURITY**

Agent security issues, mobile agents security, protecting agents against malicious hosts, untrusted agent, black box security, authentication for agents, security issues for aglets.

**TEXT BOOKS:**

1. Constructing Intelligent Agents with JAVA, Bigus & Bigus, Wiley, 1997.
2. Software Agents, Bradshaw, MIT Press, 2000.

**REFERENCE BOOKS:**

1. Artificial Intelligence: A Modern Approach, von Stuart J. Russell, Peter Norvig, Prentice Hall, 1994.
2. Intelligent Software Agents, Richard Murch, Tony Johnson, Prentice Hall, 2000.

**UNIT I**

Internetworking, IP Addressing, Subnetting, IP, Address resolution problem, ARP, RARP, Internet control and message Protocols,

**UNIT II**

Network layer level protocols, Transport layer protocols, Sockets, Client/server computing, Routing and routing protocols, dynamic host configuration DHCP,

**UNIT III**

Multicasting and group management, domain name systems, Issues of Multimedia Networking,

**UNIT IV**

Application protocols, network address translation, virtual private networks, proxy servers, issues of Network programming, IPv6, Network performance analysis,

**UNIT V**

High Performance Networks, any relevant topic decided by teacher, Network management, topics of current research.

**REFERENCE BOOKS:**

1. Youlu Zheng / Shakil Akhtar, "Networks for Computer Scientists and Engineers", Oxford University Press
2. James D. McCabe, "Network Analysis, Architecture & Design, 2/e, Elsevier India", 2004.

**REFERENCE BOOKS:**

1. Forouzan, "TCP/IP Protocol Suite", Tata McGraw Hill.
2. Walrand & Varaiya, "High Performance Communication Networks", 2/e, Elsevier", 2003.



**SOFTWARE QUALITY ENGINEERING**

**CSE53**

**L-T-P: 3-1-0**

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**UNIT I**

**SOFTWARE QUALITY AND ENGINEERING**

Quality concepts and productivity relationship, software quality factors, software quality costs, Total Quality Management (TQM), continuous improvement cycle: Plan, Do, Check and Act (PDCA), quality policy, cost of quality, quality engineering, quality planning: goal setting and strategy formation, assessment and improvement.

**UNIT II**

**SOFTWARE QUALITY ASSURANCE**

Components of SQA, classification, defect detection, defect prevention, defect reduction, defect containment, QA activities in software processes, verification and validation, software review, inspection, formal verification, statistical software quality approach.

**UNIT III**

**COMPONENTS MEASUREMENT WITH REFERENCE TO SQA**

Metrics, product quality metrics, process quality metrics, metrics for software maintenance, quality tools for quality control, test management and organizational structures, Capability Maturity Model (CMM), Capability Maturity Model Integration (CMMI), ISO 9000, quality and quality management metrics, Deming's Principle, SQA team formation

**UNIT IV**

**QUALITY MANAGEMENT MODEL**

Integrating quality activities in project life cycle, reviews, software testing, strategies and implementation, Computer-Aided Software Engineering (CASE) tools, The Rayleigh model framework, code integration pattern, Problem Tracking Report (PTR), reliability growth model, Service Quality, Kano Model, Customer retention, continuous process improvement, Juran's Trilogy, TQM principles, Kaizen Technique, Statistical Quality Assurance.

**UNIT V**

**SOFTWARE QUALITY ASSURANCE BEYOND TESTING**

Defect prevention and process improvement, root cause analysis for defect prevention, software inspection, inspection related activities, fault tolerance and failure containment, comparing quality assurance techniques and activities.

**TEXT BOOKS:**

1. Metrics and Models in Software Quality Engineering, Stephan H. Kan, Pearson Education, 2007.
2. An Integrated Approach to Software Engineering, Pankej Jalote, Narosa Publishing House, New Delhi 1997.

**REFERENCE BOOKS:**

3. Making Sense of Software Quality Assurance, Raghav J. Nandyal, Tata McGRAW Hill, 2007.

**UNIT-I**

Transaction and schedules, Concurrent Execution of transaction, Conflict and View Serializability, Testing for Serializability, Concepts in Recoverable and Cascadeless schedules.

**UNIT -II**

Lock based protocols, time stamp based protocols, Multiple Granularity and Multiversion Techniques, Enforcing serializability by Locks, Locking system with multiple lock modes, architecture for Locking scheduler.

**UNIT III**

Distributed Transactions Management, Data Distribution, Fragmentation and Replication Techniques, Distributed Commit, Distributed Locking schemes, Long duration transactions, Moss Concurrency protocol.

**UNIT IV**

Issues of Recovery and atomicity in Distributed Databases, Traditional recovery techniques, Log based recovery, Recovery with Concurrent Transactions, Recovery in Message passing systems, Checkpoints, Algorithms for recovery line, Concepts in Orphan and Inconsistent Messages.

**UNIT V**

Distributed Query Processing, Multiway Joins, Semi joins, Cost based query optimization for distributed database, Updating replicated data, protocols for Distributed Deadlock Detection, Eager and Lazy Replication Techniques.

**TEXT BOOKS:**

1. Silberschatz, orth and Sudershan, Database System Concept', Mc Graw Hill
2. Ramakrishna and Gehrke,' Database Management System, Mc Graw Hill

**REFERENCE BOOKS:**

1. Garcia-Molina, Ullman,Widom,' Database System Implementation' Pearson Education
2. Ceei and Pelagatti,'Distributed Database', TMH
3. Singhal and Shivratri, 'Advance Concepts in Operating Systems' MC Graw Hill