APPENDIX – 32 (R&S)
UNIVERSITY OF MADRAS

SRI SANKARA ARTS & SCIENCE COLLEGE
AUTONOMOUS

M.Sc., COMPUTER SCIENCE AND TECHNOLOGY
(FIVE YEAR INTEGRATED COURSE)
(Effective from the academic year 2018-2019)

REGULATIONS
Choice based credit system

1. ELIGIBILITY FOR ADMISSION:

Candidates seeking admission to the first year of the integrated M.Sc. Computer Science and Technology course shall be required to have passed Higher Secondary Examination conducted by Government of Tamil Nadu or an examination accepted as equivalent thereto by the syndicate, with Mathematics & Physics.

2. ELIGIBILITY FOR THE AWARD OF DEGREE

1. **B.Sc CST**

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in a Autonomous College for a period of not less than three academic years, passed the examinations of all the Six Semesters prescribed earning **140** credits in Parts-I, II, III, IV,

V & VI and fulfilled such conditions as have been prescribed therefore. The parent university will award degrees to the students evaluated and recommended by autonomous colleges. The degree certificates will be in a common format devised by the university. The name of the college will be mentioned in the degree certificate, if so desired. The declaration of results was decided by the examination committee.

2. M.Sc CST

A Candidate shall be eligible for the award of the Degree only if he / she has undergone the prescribed course of study in a Autonomous College for a period of not less than five academic years, passed the examinations of all the ten Semesters prescribed earning 230 (140+91) credits in Parts-I, II, III, IV & V and fulfilled such conditions as have been prescribed therefore. The parent university will award degrees to the students evaluated and recommended by autonomous colleges. The degree certificates will be in a common format devised by the university. The name of the college will be mentioned in the degree certificate, if so desired. The declaration of results was decided by the examination committee.

3. DURATION

Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year shall comprise the third and fourth semesters, the third academic year shall comprise the fifth and sixth semesters, the fourth academic year shall comprise the seventh and eighth semester, the fifth

academic year shall comprise the nineth and tenth semesters respectively.

The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester exclusive of the days for the conduct of semester examinations.

In each semester, Courses are administered in 15 teaching weeks and another 5 weeks are utilized for evaluation and grading purposes. Each week has 30 working hours spread over in a 5 day week. Depending upon the content and specialization, a paper may have 1 to 6 credits. Total number of teaching hours in a semester will be 450 hrs.

4. MEDIUM OF INSTRUCTION

The medium of instruction shall be English.

5. COURSE OF STUDY

A Master's programme consists of a number of papers. The term Course is used to indicate logical part of a subject matter of the programme. In each of Master'sprogrammes, there will be a prescription of (i) language –I (Tamil, Sanskrit or other languages), (ii) language – II (English), (iii) a set of compulsory courses (called core subjects), some optional courses (called elective / allied subjects) and projects, (iv) a set of papers recommended by UGC and TANSCHE (Advanced Tamil / Soft skill / Environmental Studies / Value education), (v) Extension activities.

The detail of the Study for Master Degree Courses shall consist of the following:

PART – I Language Courses (LC) [Tamil / Other Languages]

PART – II English Language Courses (ELC)

PART – III Core Subjects

Allied Subjects

Projects / Field work

PART – IV

1. (a) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under

Part-I shall take Tamil comprising of two papers (level will be at 6th Standard).

(b) Those who have studies Tamil up to XII Std. and taken a Non-Tamil Language under Part-

I shall take Advanced Tamil comprising of two papers.

(c) Others who do not come under a + b can choose non-major elective comprising of two

papers.

2. Skill Based Subjects - Soft Skills

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed papers on Soft Skills.

For three years PG degree Programme, a candidate must undergo a minimum of 2 papers (2 x 2 = 4 credits). Papers will be finalized in due course.

3. Environmental Studies

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed paper on Environmental studies. For three years UG degree Programme, a candidate must undergo environmental studies during third semester of second year (2 credits). Syllabus is common to all UG courses.

4. Value Education

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed paper on value education. For three years UG degree Programme, a candidate must undergo value education during fourth semester of second year (1 credit). Paper will be finalized in due course.

PART – V Extension Activities

A candidate shall be awarded a maximum of 1 Credits for Compulsory Extension Service. All the Students shall have to enroll for NSS /NCC/ NSO (Sports & Games) Rotract / Youth Red cross or any other service organizations in the college and shall have to put in Compulsory minimum attendance of 40 hours which shall be duly certified by the Principal of the college before 31st March in a year. If a student LACKS 40 HOURS ATTENDANCE in the First year,

he/she shall have to compensate the same during the subsequent years. Students those who complete minimum attendance of 40 hours in One year will get HALF A CREDIT and those who complete the attendance of 80 or more hours in Two Years will ONE CREDIT. Literacy and population Education Field Work shall be compulsory components in the above extension service activities. The working hours should not overlaps the normal teaching hours.

PART – VII Internship

Each PG student shall appear for intenship training during the vacation of II Semester for a minimum period of 15 days and shall submit the report to the controller of examinations. Each student is allotted 4 credits on submission of the report.

The following procedure be be followed for Internal Marks:

Theory Papers:	Internal Marks
Best Two tests out of 3	10 marks
Attendance	5 marks
Seminar	5 marks
Assignment	5 marks
	---
	25 marks

Break-up Details for Attendance

Below 60%	- No marks
60% to 75%	- 3 marks
76% to 90%	- 4 marks
91% to 100%	- 5 marks

Practical:	Internal Marks	40
	Attendance	5 marks
	Practical Best Test 2 out of 3	30 marks
	Record	5 marks

Project:

Internal Marks	Best 2 out of 3 presentations	20 marks
Viva		20 marks
Project Report		60 marks

6. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTERS:

(i) Candidates shall register their names for the First semester examination after the admission in the PG courses.

(ii) Candidates shall be permitted to proceed from the First Semester upto the Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current (subject) Semester subjects.

(iii) Candidates shall be eligible to proceed to the subsequent semester, only if they earn, sufficient attendance as prescribed therefore by the Syndicate from time to time.

Provided in case of candidate earning less than 50% of attendance in any one of the semester due to any extraordinary circumstance such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorised Medical Attendant (AMA), duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the course of study. Such candidate shall have to repeat the missed semester by rejoining after completion of final semester of the course, after paying the fee for the break of study as prescribed by the University from time to time.

7. PASSING MINIMUM:

a) There shall be no Passing Minimum for Internal.

b) For External Examination, Passing Minimum shall be of 50%(Fifty Percentage) of the maximum marks prescribed for the paper.

c) In the aggregate (External + Internal) the passing minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.

d) Grading shall be based on overall marks obtained (internal + external).

For M.Sc. Degree Course in Computer Science & Technology (5 year Integrated course)

B.Sc. Degree Course in Computer Science and Technology

A candidate shall be declared to have passed:

a) There shall be no Passing Minimum for Internal.

b) For External Examination, Passing Minimum shall be of 40%(Forty Percentage) of the maximum marks prescribed for the paper for each Paper/Practical/Project and Viva-voce.

c) In the aggregate (External + Internal) the passing minimum shall be of 40% .

d) He/She shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in Parts-I, II, III, IV & V. He/she shall also fulfill the extension activities prescribed earning a minimum of 1 Credit to qualify for the Degree.

8. CLASSIFICATION OF SUCCESSFUL CANDIDATES:

Candidates who secured not less than 60% of aggregate marks (Internal + External) in the whole examination shall be declared to have passed the examination in the First Class.

All other successful candidates shall be declared to have passed in Second Class.

Candidates who obtain 75% of the marks in the aggregate (Internal + External) shall be deemed to have passed the examination in First Class with Distinction, provided they pass all the examinations (theory papers,

practicals, project and viva-voce) prescribed for the course in the First appearance.

9. GRADING SYSTEM:

The term grading system indicates a TEN (10) Point Scale of evaluation of the performances of students in terms of marks obtained in the Internal and External Examination, grade points and letter grade.

Ci = Credits earned for course i in any semester.

Gi = Grade Point obtained for course i in any semester.

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

For a Semester :

GRADE POINT AVERAGE [GPA] = $\sum i$ Ci Gi / $\sum i$ Ci

Sum of the multiplication of grade points by the credits of the courses

GPA = ----------

Sum of the credits of the courses in a semester

For the entire programme:

CUMULATIVE GRADE POINT AVERAGE [CGPA] = $\sum n \sum i$ CniGni /$\sum n \sum i$ Cni

Sum of the multiplication of grade points by the credits of the entire programme

CGPA= ----------

Sum of the credits of the courses of the entire programme

TEN POINT SCALE

RANGE OF MARKS	**GRADE POINTS**	**LETTER GRADE**	**DESCRIPTION**
90–100	9.0–10.0	O	Outstanding
80–89	8.0–8.9	D+	Excellent
75–79	7.5–7.9	D	Distinction
70–74	7.0–7.4	A+	Very Good
60–69	6.0–6.9	A	Good
50–59	5.0–5.9	B	Average
00–49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

CGPA	GRADE	CLASSIFICATION OF FINAL RESULT
9.5-10.0	O+	First Class - Exemplary *
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction *
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
0.0 and above but below 5.0	U	Re-appear

* The candidates who have passed in the first appearance and within the prescribed semester of the PG Programme (Core, Elective, Non-major Electives and Extra-Disciplinary courses alone) are eligible.

10. RANKING:

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking / Distinction.

Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations under "Requirements for Proceeding to subsequent Semester" are only eligible for Classification.

11. PATTERN OF QUESTION PAPER:

PART –A (50 words):Answer 10 out of 12 Questions
10 x 1 = 10 marks

PART –B (200 words):Answer 5 out of 7 Questions 5 x 5 = 25 marks

PART –C (500 words):Answer 4 out of 6 Questions 4 x 10 = 40 marks

12. TRANSITORY PROVISION:

Candidates who have undergone the course of study prior to the academic year 2018-2019 will be permitted to appear for the examinations under those Regulations for a period of three years i.e., up to and inclusive of April/May 2023 Examinations. Thereafter, they will be permitted to appear for the examination only under the Regulations then in force.

***M.Sc. COMPUTER SCIENCE AND TECHNOLOGY (5 YEAR INTEGRATED)**

Structure of the Course and Evaluation Pattern:

If a candidate is unable to continue this course after the sixth semester, he/she will be awarded B.Sc.(Computer Science & Technology) provided he/she has passed in all subjects up to VI Semester.

M.Sc. DEGREE COURSE IN COMPUTER SCIENCE AND TECHNOLOGY (FIVE YEAR INTEGRATED COURSE)

I Semester

Course/Component	Name of the Subject	Credits	Exam Duration	Marks		
				Int.	Ext.	Total
Part –I, Paper I	Language – I*	3	3	25	75	100
Part – II, Paper I	English - I*	3	3	25	75	100
Part - III Allied– I: Paper I	Mathematics – I	5	3	25	75	100
Part - III Allied– II:Paper I	Applied Physics – I	5	3	25	75	100

Part - III	Fundamentals of Digital Computers	4	3	25	75	100
Non Major Elective / VI Tamil for non Tamil Students	Non Major Elective / VI Tamil for non Tamil Students	2	3	25	75	100
Part – IV Soft Skill	Soft Skill -I	3	3	40	60	100

II Semester

Course/Component	Name of the Subject	Credits	Exam Duration	Marks		
				Int.	Ext.	Total
Part –I, Paper II	Language – II*	3	3	25	75	100
Part– II, Paper II	English - II*	3	3	25	75	100
Part - III Allied–I:Paper II	Mathematics – II	5	3	25	75	100
Part - III Allied–II:Paper II	Applied Physics – II	5	3	25	75	100
Part - III	Practical – I: Digital Lab	4	3	40	60	100
Non Major Elective / VI Tamil for non Tamil Students	Non Major Elective / VI Tamil for non Tamil Students	2	3	40	60	100
Part – IV Soft Skill	Soft Skill - II	3	3	50	50	100

III Semester

Course/Component	Name of the Subject	Credits	Exam Duration	Marks		
				Int.	Ext.	Total
Part - III	Computer Oriented Mathematics	4	3	25	75	100
Part - III	Internet and its application	4	3	25	75	100
Part - III	Microprocessors	4	3	25	75	100
Part - III	Programming in C and C++	4	3	25	75	100
Part – IV Soft Skill	Soft Skill – III	3	3	50	50	100
Environmental Studies	Environmental Studies / Exam. In IV Semester	2	3	25	75	100
Part - III	Practical – III : C Programming and : Microprocessors Lab	3	3	40	60	100

IV SEMESTER THEORY

Course/Component	Name of the Subject	Credits	Exam Duration	Marks		
				Int.	Ext.	Total
Part - III	Operating Systems	4	3	25	75	100
Part - III	Data Structures	4	3	25	75	100
Part - III	Object Oriented Analysis and Design	4	3	25	75	100
Part - III	Java Programming	4	3	25	75	100
Part – IV Soft Skill	Soft Skill – IV	3	3	50	50	100
Part - III	Practical IV : Java programming lab	3	3	40	60	100

V SEMESTER THEORY

Course/Component	Name of the Subject	Credits	Exam Duration	Marks		
				Int.	Ext.	Total
Part - III	Database Management Systems	4	3	25	75	100
Part - III	Elective-I	5	3	25	75	100
Part - III	Visual Programming	4	3	25	75	100
Part - III	Computer Networks	4	3	25	75	100
Part - III	Practical V : RDBMS with Visual Programming Lab	3	3	40	60	100
Part – IV	Value Education	2	3	25	75	100

ELECTIVE – I

1.Multimedia Systems

2.Mobile Computing

3. Professional Ethics

VI SEMESTER THEORY#

Course/Component	Name of the Subject	Credits	Exam Duration	Marks		
				Int.	Ext.	Total
Part - III	Elective – II	5	3	25	75	100
Part - III	Elective – III	5	3	25	75	100
Part - III	Computer Organization and Architecture	4	3	25	75	100
Part - III	Web Technologies	4	3	25	75	100
Part - III	Practical – VI : Web Application lab	3	3	40	60	100
Part – V	**Extension Activities**	1				

ELECTIVE – II

1.Software Engineering

2. Big Data Analysis

3.Service Oriented Architecture

ELECTIVE – III

Compiler Design

Cloud Computing

Information Security

VII SEMESTER THEORY

Course/Component	Name of the Subject	Credits	Exam Duration	Marks		
				Int.	Ext.	Total
Part - III	Advanced Java Programming	4	3	25	75	100
Part - III	Design and Analysis of Algorithms	4	3	25	75	100
Part - III	Open Source Technologies	4	3	25	75	100

Part - III	Elective IV	4	3	25	75	100
Part – IV Soft Skill	Soft Skill – V	2	3	50	50	100
Part - III	Practical VII: Advanced Java Programming Lab.	3	3	40	60	100
Part - III	Practical VIII : Open Source Programming Lab.	3	3	40	60	100

ELECTIVE – IV

1. Computer Graphics
2. Artificial Intelligence and Expert Systems
3. Systems Software

VIII SEMESTER THEORY

Course/Component	**Name of the Subject**	**Credit**	**Exam Duration**	**Marks**		
				Int.	**Ext.**	**Total**
Part - III	Unix and Shell Programming	4	3	25	75	100

Part - III	Distributed Databases	4	3	25	75	100
Part - III	e-Commerce	4	3	25	75	100
Extra Disciplinary Elective -1	Theory of computation	4	3	25	75	100
Part - III	Elective V	3	3	25	75	100
Part – IV Soft Skill	Soft Skill – VI	2	3	50	50	100
Part – IV Soft Skill	Soft Skill – VII	2	3	50	50	100
Part – V Internship**	During Summer Vacation	-	3	-	-	100
Part - III	Practical IX : Unix Lab	3	3	40	60	100

**** Internship will be carried out during the summer vacation of the fourth year and marks should be sent to the University by the College and the same will be included in the Ninth Semester Marks Statement.**

ELECTIVE V

1		Software Project Management
2		Fuzzy Logic
3		Computer Simulation and System Modelling

IX SEMESTER THEORY

Course/Component	Name of the Subject	Credits	Exam Duration	Marks		
				Int.	Ext.	Total
Part - III	Network Programming	4	3	25	75	100
Part - III	Software Testing	4	3	25	75	100
Extra Disciplinary Elective -II	Data Warehousing and Data Mining	4	3	25	75	100
Part - III	Elective VI	3	3	25	75	100
Part - III	Elective VII	3	3	25	75	100
Part – IV Soft Skill	Soft Skill – VIII	2	3	50	50	100
Part – V	Internship	2		-	100	100
Part - III	Practical X : Network Programming Lab	3	3	40	60	100

ELECTIVE VI

1	TCP/IP Networks
2	Artificial Neural Networks
3	Windows Programming

ELECTIVE VII

1	Cryptography
2	Distributed Computing
3	Image Processing

X SEMESTER

Course/Component	Name of the Subject	Credits	Exam Duration	Marks		
				Int.	Ext.	Total
Part - III	Project	16	3	20	80	100

 # Soft Skill courses for IV and V year shall be opted by the students as per soft skills regulations for postgraduate courses.

Non –Major Elective: Semester - I

1. HTML
2. FLASH
3. MS ACCESS

Non –Major Elective: Semester - II

1. HTML - LAB
2. FLASH - LAB
3. MS ACCESS -LAB

APPENDIX – 32 (S)
UNIVERSITY OF MADRAS

SRI SANKARA ARTS & SCIENCE COLLEGE
AUTONOMOUS

M.Sc., COMPUTER SCIENCE AND TECHNOLOGY
(FIVE YEAR INTEGRATED COURSE)
(Effective from the academic year 2018-2019)

SYLLABUS

SEMESTER -I

Title of the paper	**Fundamentals of Digital Computers**	
Category :	Year & Semester	Credits
	Firs year & Semester -I	4

Unit 1: Number System - Converting numbers from one base to another - Complements - Binary Codes – Binary logic - Logic gates – Truth Tables.

Unit 2: Boolean Algebra- Axioms- Theorems- Simplification of Boolean functions- Map Method- (up to 5 variables) -don't care condition -McCaskey Tabulation Method-

Unit 3: Sequential Logic – RS,JK,D and T Flip-Flops – Registers - Shift Registers - Counters - Ripple Counters - Synchronous counters - Design of Counters.

Unit 4: Adders-Subtractors-Decoders-Encoders-Multiplexer-Demultiplexer- Design of circuits using decoders/multiplexers-ROM-PLA-Designing circuits using ROM/PLA

Unit 5 : Design of ALU – Design of Status Register - Design of Accumulator – Introduction to Computer design

Recommended Texts

(i) M. Morris Mano, 1994, Digital Logic and Computer Design, PHI, New Delhi.

(ii) T.C. Bartee, 1991, Computer Architecture and Logical design, Tata McGraw-Hill, New Delhi.

(iii) V.Rajaraman,2002, Fundamentals of Computers, Third Edition, PHI, New Delhi

Reference Books

i. Rafiquzzaman, Mohamed. *Fundamentals of digital logic and microcomputer design*. John Wiley & Sons, 2005.

ii. Boyce, Jefferson C. *Digital computer fundamentals*. Prentice Hall PTR, 1977.

Title of the paper	**Digital Lab**	
Category :	Year & Semester	Credits
	Firs year & Semester II	4

Study of Logic Gates

a. Logic gates using discrete components

b. Verification of truth table for AND, OR, NOT, NAND, NOR and EXOR gates

c. Realisationof NOT, AND , OR, EX-OR gates with only NAND gates

d. Realisationof NOT, AND , OR, EX-OR gates with only NOR GATES

1. Implementation of logic circuits

a. Verification of associative law for AND, OR GATES

b. Verification of distributive law for AND, OR GATES

c. Karnaugh's map reduction and logic circuit implementation

2. Adder and subtractor

a. Verification of Demorgan's law

b. Implementation of Half-adder and Half –subtractor

c. Implementation of Full-adder and full-subtractor

d. Four bit binary adder

e. Four bits binary subtractor using 1s and 2s complement

3. Shift registers

a. Implementation of shift register, serial transfer

b. Ring counter

c. 4 – bit binary counter

d. BCD Counter

Title of the paper	**Computer Oriented Mathematics**	
Category :	Year & Semester	Credits
	Second year & Semester III	4

Unit-I: Propositions and Compound Propositions - Logical Operations - Truth tables - Tautologies and Contradictions - Logical Equivalence - Algebra of propositions - Conditional and Biconditional Statements - Arguments - Logical Implications - Quantifiers - Negation of Quantified Statements - Basic Counting Principles - Factorial - Binomial Coefficients - Permutations - Combinations - Pigeonhole Principle - Ordered and Unordered partitions.

Unit-II: Order and Inequalities - Mathematical Induction - Division Algorithm - Divisibility - Euclidean Algorithm - Fundamental theorem of Arithmetic - Congruence relation - Congruence Equations - Semi groups - Groups - Subgroups - Normal subgroups - Homomorphisms - rings - Integral Domains - Fields - Polynomials over a Field.

Unit-III: Roots of Equations: Graphical Methods - Bisection Methods -False-Position Method - Fixed-point Iteration - Newton-Raphson Method - Secant Method - Multiple Roots - System of Nonlinear Equations - Roots of Polynomials: Conventional Methods - Mueller's Method - Bairstow's Method.

Unit-IV: Algebraic Equations: Gauss Elimination - Non-linear system of Equations - Gauss-Jordan - LU Decomposition - Matrix Inverse - Error Analysis - Tridiagonal Systems - Cholesky Decomposition - Gauss-Seidel.

Unit-V: Differentiation and Integration: Trapezoidal Rule - Simpson's Rule - Romberg Integration - Gauss Quadrature - Richardson Extrapolation - Derivatives and Integrals for Data with Errors.

Recommended Texts

1. SeymourLipschutz and Marc Lipson - Discrete Mathematics - Second Edition - Tata McGraw Hill Edition - 1999.

2. Steven C. Chopra and Raymond P.Canale - Numerical Methods for Engineers - Third Edition - McGraw Hill International Edition - 1998.

Title of the paper	**Internet and its Applications**	
Category :	Year & Semester	Credits
	Second year & Semester III	4

Unit-I: Internet Concepts - Internet Services - Types of Accounts - Media for Internet - ISP - TCP/IP and Connection Software - - Disconnecting from the internet.Dial-up Networking - Setting up and internet Connection - Testing Connection

Unit-II: Contenders - Issues in high-speed Connection - Connecting via ISDN, ADSL and Cable Modem - Intranets - Components of an Intranet - Steps for Creating Intranet - Maintenance - Connecting LAN to Internet.

Unit-III: E-mails - Downloading E-mails - Signatures and Stationery - Web Based E-mail - E-mail tasks - Outlook Express - Sending and Receiving files using Eudora - Outlook Express and Pine - Multiple e-mail accounts - Sending form letters - Formatting e-mail - E-mail mailing lists.

Unit-IV: Forms of chat and Conferencing - Internet Relay Chat (IRC) - Chatting in Microsoft Chat and V.Chat - Starting and managing a channel - Web-based Chat - Direct Chat systems - MUDs, MOOs and mussles - Voice and Video Conferencing.

Unit-V: Elements of web - Browsers - Security and Privacy Issues - Purchasing Products Online with wallet programs - Netscape Navigator and Communicator - Microsoft Internet Explorer.

Recommended Texts

1. Margaret Levine Young - Internet - The Complete Reference - Millennium Edition - TMH Edition - 1999.

2. Harley Hahn - The Internet - Complete Reference - Second Edition - TMH Edition.

3. Deitel, Harvey M., Paul J. Deitel, and Tem R. Nieto. *Internet &world wide web*. Prentice Hall, 2002.

Title of the paper	**Microprocessors**	
Category :	Year & Semester	Credits
	Second year & Semester III	4

Unit-I: Number systems - Conversion from one number system to another - Compliments - Binary codes. Introduction to Micro Computers, Microprocessors and Assembly languages – micro processor architecture and its operations – 8085 MPU.

Unit-II: 8085 instruction set and classifications. Writing assembly levels programs – programming techniques such as looping, counting and indexing addressing nodes – dynamic debugging.

Unit-III: Counters and time delays – hexadecimal counter modulo10 counter – pulse timings for flashing lights – debugging counter and time delay program – stack – subroutine – conditional call and return instructions.

Unit-IV: BCD to binary and binary to BCD conversions – BCD to HEX and HEX to BCD conversions – ASCII to BCD

and BCD to ASCII conversions – binary to ASCII and ASCII to binary conversions – multi byte addition – multi byte subtraction – BCD addition – BCD subtraction – multiplication and division.

Unit-V: Interrupt – implementing interrupts – multiple interrupt 8085 – trap – problems on implementing 8085 interrupt – DMA memory interfaces – RAM & ROM – I/O interface – direct I/O memory trapped I/O.

Recommended Texts

1. R S Gaonkar – Microprocessor architecture – Programming and application with 8085/8080A – Wiley Eastern Limited – 1990

2. M.M. Mano, Digital Logic and Computer Design, Pearson Education

3. A Mathur – Introduction to Microprocessor – III Edition – Tata McGraw Hill Publishing Co. Ltd. – 1993

Reference Book:

i. Kumar, K. Udaya. *The 8085 Microprocessor: Architecture, Programming and Interfacing*. Pearson Education India, 2008.

ii. Srinath, N. K. *8085 MICROPROCESSOR: PROGRAMMING AND INTERFACING*. PHI Learning Pvt. Ltd., 2005.

iii. Godse, DA Godse AP. *Microprocessors & Microcontrollers*. Technical publications, 2007.

Title of the paper	Programming in C and C++	
Category :	Year & Semester	Credits
	Second year & Semester III	4

UNIT I: Character set-Identifiers-Keywords-Data types-Constants-Variables-Declaration-Expression-Statements-Operators-Data Input and Output statements-Storage classes-Automatic variables-External variables-Static variable

UNIT II: Control Statements-Functions-Arrays-Pointers-Structure and Unions.

UNIT III: Classes and Objects-Constructors and Destructors-Constructors-Parameterized, Multiple Constructors-Constructors with Default arguments-Dynamic initialization of objects-copy, Dynamic constructors- Destructors.

UNIT IV: Operator overloading and Type Conversions, Inheritance: Extending classes. Pointers, virtual functions and polymorphism, Managing console I/O Operations.

UNIT V:C++ streams-C++ stream classes-Unformatted I/O Operations-Formatted console I/O Operations, Working with files: classes for file stream operations-opening and closing a file-EOF-File modes-File pointers-sequential I/O Operations.

RECOMMENDED TEXTS

1. E. Balagurusamy, Programming in ANSI C, TATA McGraw- Hill publishing
2. E. Balagurusamy, Object-Oriented Programming with C++, TATA McGraw- Hill publishing
3. H.Schildt, C++,1998,The Complete Reference-1998-TMH Edition, 1998

REFERENCE

1. G. Micheael Schneider, Steven W. Weingart and David M, "An Introduction to Programming and Problem solving with Pascal", Perlman Wiley Eastern Ltd, New Delhi, 1991.
2. Byron S. Gottfried, "Theory and Problems of Programming with C", Tata Mcgraw-Hill Ltd, Second Edition, New Delhi.
3. R. Rajaram, Object-Oriented Programming and C++, A New Age Publication

Title of the paper	**Programming in C,C++ Lab and Microprocessors Lab.**	
Category :	Year & Semester	Credits
	Second year & Semester III	3

1. String manipulations

a. Counting the number of vowels, consonants, words white spaces in a line of text and array of lines.

b. Reverse a string & check for palindrome

c. Sub string detection and count

d. Sub string removal

e. Find and replacing substrings

2. Recursion

a. GCD of two numbers

b. Maximum & minimum

c. Fibonacci sequence

d. Tower of Hanoi

3. Matrix manipulation

a. Addition & subtraction

b. Multiplication

c. Transpose

d. Determinant of a matrix

4. Operator overloading (Unary and Binary).
5. Class and All types of Constructors.
6. Static function and Array of objects with static data.
7. Friend function and Friend class.
8. Single and Multilevel inheritance
9. Implementing derived class constructors.

Microprocessors

1. **Addition and subtraction**
    a. 8 bit addition
    b. 16 bit addition
    c. 8 bit subtraction
    d. BCD subtraction
2. **Multiplication and division**
    a. 8 bit multiplication
    b. BCD multiplication
    c. 8 bit division
3. **Sorting and searching**
    a. Square of given number
    b. Square root of given number
    c. searching for an element in a array
    d. Reversing array elements
    e. Block move
4. **Code conversion:**
    a. BCD to HEX
    b. HEX to BCD
    c. BCD to ASCII (2 digits)

SEMESTER IV

Title of the paper	**Operating Systems**	
Category :	Year & Semester	Credits
	Second year & Semester IV	4

UNIT I Introduction to operating systems – review of computer organization – operating system structures – system calls – system programs – system structure – virtual machines. Processes: Process concept – Process scheduling – Operations on processes –Cooperating processes – Interprocess communication – Communication in client-server systems. Case study: IPC in Linux. Threads: Multi-threading models – Threading issues. Case Study: threads library

UNIT II CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation. Case study: Process scheduling in Linux. Process Synchronization: The critical-section problem –Synchronization hardware – Semaphores – Classic problems of synchronization –critical regions – Monitors. Deadlock: System model – Deadlock characterization –Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance –Deadlock detection – Recovery from deadlock.

UNIT III Memory Management: Background – Swapping – Contiguous memory allocation –Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames –Thrashing. Case Study: Memory management in Linux

UNIT IV File-System Interface: File concept – Access methods – Directory structure – Filesystemmounting – Protection. File-System Implementation: Directory implementation –Allocation methods – Free-space management – efficiency and performance – recovery– log-structured file systems. Case studies: File system in Linux – file system in Windows XP

UNIT VI/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem –streams – performance. Mass-Storage Structure: Disk scheduling – Disk management –Swap-space management – RAID – disk attachment – stable storage – tertiary storage.

RECOMMENDED TEXTS

i. Silberschatz A., Galvin P.B., Gange,. 2002 , Operating System Principles ,Sixth

   Edition, John Wiley & Sons.

ii. A.S. Godbole – Operating Systems – Tata McGraw Hill – 1999.

iii. H.M. Deitel ,1990, An Introduction to Operating System,- Second Edition,Addison Wesley.

Reference book

i. Stallings, William. Operating Systems: Internals and Design Principles| Edition: 8. Pearson, 2014.

ii. Dhamdhere, Dhananjay M. Operating Systems: A Concept-based Approach, 2E. Tata McGraw-Hill Education, 2006.

iii. Tanenbaum, Andrew S., and Herbert Bos. Modern operating systems. Prentice Hall Press, 2014.

Title of the paper	**Data Structures**	
Category :	Year & Semester	Credits
	Second year & Semester IV	4

Unit-I: Abstract Data Types – Asymptotic Notations- Complexity Analysis – Arrays – Representation of Arrays – Operations on Arrays - Ordered Lists - Polynomials.

Unit-II: Singly Linked Lists – Circular Linked Lists – Doubly Linked Lists – General Lists – Stacks – Queues – Circular Queues – Evaluation of Expressions.

Unit-III : Trees – Binary Trees – Binary Tree Traversals – Binary Tree Representations – Binary Search Trees – Threaded Binary Trees – Application of Trees (Sets) – Representation of Graphs – Graph Implementation – Graph

Traversals- Application of Graph Traversals- Minimum Cost Spanning Trees – Shortest Path Problems .

Unit-IV: Internal Sorting – Optimal Sorting Time – Sorting Large Objects – Sorting with Tapes- Sorting with Disks.

Unit-V: Hashing – AVL Trees - Red-Black Trees – Splay Trees - B-Trees.

Recommended Texts

1. E.Horowitz, S.Sahni and Mehta – Fundamentals of Data Structures in C++ - Galgotia- 1999.

2. Gregory L.Heileman – Data Structures , Algorithms and Object Oriented Programming – Mc-Graw Hill International Editions – 1996.

3. Cangsam,Auguenstein,Tenenbaum,Data Structures using C & C++,PHI

Reference Books

I. R. Kruse C.L. Tondo and B. Leung ,1997, Data Structures and Program design in C, PHI.
II. Cangsam,Auguenstein,Tenenbaum,Data Structures using C & C++,PHI
III. D.Samantha,2005, Classic Data Structures, PHI,New Delhi.

Title of the paper	Object Oriented Analysis and Design	
Category :	Year & Semester	Credits
	Second year & Semester IV	4

Unit-I: System Development - Object Basics - Development Life Cycle - Methodologies - Patterns - Frameworks - Unified Approach - UML.

Unit-II: Use-Case Models - Object Analysis - Object relations - Attributes - Methods - Class and Object responsibilities - Case Studies.

Unit-III: Design Processes - Design Axioms - Class Design - Object Storage - Object Interoperability - Case Studies.

Unit-IV: User Interface Design - View layer Classes - Micro-Level Processes - View Layer Interface - Case Studies.

Unit-V: Quality Assurance Tests - Testing Strategies - Object orientation on testing - Test Cases - test Plans - Continuous testing - Debugging Principles - System Usability - Measuring User Satisfaction - Case Studies.

Recommended Texts

1. Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition - 1999.

2. Grady Booch- Object Oriented Analysis and design – Addison Wesley.

3. Mala, D. Jeya. *Object Oriented Analysis and Design Using UML*. Tata McGraw-Hill Education, 2013.

Reference Book:

1. Ramnath, Sarnath, and Brahma Dathan. *Object-oriented analysis and design*. Springer Science & Business Media, 2010.

2. Kahate, Atul. *Object Oriented Analysis & Design*. Tata McGraw-Hill Education, 2004

Title of the paper	**Programming in Java**	
Category :	Year & Semester	Credits
	Second year & Semester IV	4

Unit-I: Introduction to Java - Features of Java - Object Oriented Concepts - Lexical Issues - Data Types - Variables - Arrays - Operators - Control Statements.

Unit-II: Classes - Objects - Constructors - Overloading method - Access Control - Static and fixed methods - Inner Classes - String Class - Inheritance - Overriding methods - Using super-Abstract class.

Unit-III: Packages - Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Messaging - Runnable Interface - Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads - Multithreading.

Unit-IV: I/O Streams - File Streams - Applets - String Objects - String Buffer - Char Array - Java Utilities - Code Documentation.

Unit-V: Networks basics - Socket Programming - Proxy Servers - TCP/IP Sockets - Net Address - URL - Datagrams - Working with windows using AWT Classes - AWT Controls - Layout Managers and Menus.

1. Recommended Texts

i. E. Balagurusamy ,2004,Programming with JAVA-2nd Edition, Tata McGraw-Hill Publishing Co.Ltd, New Delhi.

ii. Herbert Schildt,The Complete Reference Java™ , 2-5thEdition,Tata McGraw-Hill Publishing Co. Ltd,New Delhi.

iii. Y. Daniel Liang ,2003, An Introduction to JAVA Programming ,Prentice-Hall of India Pvt. Ltd.

2. Reference Books

i. Y. Daniel Liang ,2003, An Introduction to JAVA Programming ,Prentice-Hall of India Pvt. Ltd.

ii. Cay S. Horstmann and Gary Cornell,2005,Core Java™2 Volume I,Fundamental 7thEdition,Pearson Education.

iii. Deitel, Paul, and Harvey Deitel. *Java how to program*. Prentice Hall Press, 2011.

Title of the paper	**Programming in Java Lab**	
Category :	Year & Semester	Credits
	Second year & Semester IV	3

APPLICATIONS:

1. Sort the given numbers using arrays.
2. Implement the FIND and REPLACE operations in the given multiple text
3. Find the student's percentage and grade using command line arguments.
4. Substring Removal from a String. Use String Buffer Class.
5. Determining the Perimeter and Area of a Triangle. Use Stream Class.
6. Determining the Order of Numbers Generated randomly using Random Class.

7. Usage of Calendar Class and Manipulation.
8. Implementation of Point Class for Image Manipulation.
9. String Manipulation Using Char Array.
10. Database Creation for Storing E-mail Addresses and Manipulation.
11. Usage of Vector Classes.
12. Interfaces and Packages
13. Implementing Thread based Applications and Exception Handling.
14. Application using Synchronization such as Thread based, Class based and Synchronized Statements.
15. Textiles (copy, display, counting characters, words and lines)
16. Data file creating and processing for electricity billing.
17. Data file creating and processing for telephone billing

APPLETS:

18. Working with Frames and Various Controls.
19. Working with Dialog Box and Menus.
20. Working with Colors and Fonts.

21. Drawing various shapes using Graphical statements.
22. Working with panel and all types of Layout.
23. Design a simple calculator with minimal of 10 operations
24. Usage of buttons, labels, text components in suitable application
25. Usage of Radio buttons, check box ,choice list in suitable application.
26. Develop an applet to play multiple audio clips using multithreading.

SEMESTER V

Title of the paper	**Database Management Systems**	
Category :	Year & Semester	Credits
	Third year & Semester V	4

UNIT I Purpose of Database System -– Views of data – Data Models – Database Languages —Database System Architecture – Database users and Administrator – Entity– Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases

UNIT II The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional

Operations- SQL fundamentals - Integrity – Triggers - Security – Advanced SQLfeatures –Embedded SQL– Dynamic SQL- Missing Information– Views

UNIT III Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT IV Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery –Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking –Intent Locking – Deadlock-Serializability

UNIT V Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary storage – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing

Recommended Texts

I. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database SystemConcepts”, Fifth Edition, Tata McGraw Hill, 2006 (Unit I and Unit-V)

II. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”,Eighth Edition, Pearson Education, 2006.(Unit II, III and IV)

Reference Books

I. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems",FourthEdition , Pearson / Addisionwesley, 2007.

II. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGrawHill, 2003.

Title of the paper	**Visual Programming**	
Category :	Year & Semester	Credits
	Third year & Semester V	4

Unit –I Introduction to Windows , GUI concept, Concept of Event driven programming, TheVisual Basic IDE (5.50), Types of Visual Basic Projects, Visual Basic Editions, The Visual Basic Project Lifecycle, Project Files. Customizing a Form - Writing Simple Programs - Toolbox - Creating Controls - Name Property - Command Button - Access Keys - Image Controls - Text Boxes - Labels - Message Boxes - Grid - Editing Tools - Variables - Data Types - String - Numbers.

Unit-II: Displaying Information - Determinate Loops - Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures.

Unit-III: Lists - Arrays - Sorting and Searching - Records - Control Arrays - Combo Boxes - Grid Control - Projects with Multiple forms - DoEvents and Sub Main - Error Trapping.

Unit-IV: VB Objects - Dialog Boxes - Common Controls - Menus - MDI Forms - Testing, Debugging and Optimization - Working with Graphics.

Unit-V: Monitoring Mouse activity - File Handling - File System Controls - File System Objects - COM/OLE - automation - DLL Servers - OLE Drag and Drop.

Recommended Texts

1. Gary Cornell - Visual Basic 6 from the Ground up - Tata McGraw Hill - 1999.
2. Noel Jerke - Visual Basic 6 (The Complete Reference) - Tata McGraw Hill - 1999.

Reference Book:

1. Schneider, David I. *An Introduction to Programming Using Visual Basic 2012*. Prentice Hall Press, 2013.

2. Thayer, Rob. *Visual Basic 6 Unleashed*. Sams, 1998.

Title of the paper	**Computer Networks**	
Category :	Year & Semester	Credits
	Third year & Semester V	4

Unit 1: Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless

LANs –RFID and sensor networks - Physical layer – Theoretical basis for data communication - guided transmission media

Unit-2: Wireless transmission - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.

Unit 3: Elementary data link protocols - sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

Unit 4: Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol.

Unit 5: Transport layer – transport service- Elements of transport protocol - Addressing, Establishing & Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP - Network Security: Cryptography.

Recommended Texts:

i. S. Tanenbaum, 2011, Computer Networks, Fifth Edition, Pearson Education, Inc.
ii. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw Hill, New Delhi.

iii. F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.

Reference Books

1) D. Bertsekas and R. Gallagher, 1992, Data Networks, Prentice hall of India, New Delhi.

2) Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi.

Title of the paper	**RDBMS with visual programming Lab.**	
Category :	Year & Semester	Credits
	Third year & Semester V	3

1. Payroll
2. Mark sheet Processing
3. Savings bank account for banking
4. Inventory System
5. Invoice system
6. Library information system
7. Student information system
8. Income tax processing system
9. Electricity bill preparation system
10. Telephone directory maintenance.

Title of the paper	**Multimedia Systems**	
Category : Elective	Year & Semester	Credits
	Third year & Semester V	5

Unit – 1: **Introduction:** Objectives – History of Multimedia – Its market – Content copyright – Resources for multimedia developers – Types of produces – Evaluation – Hardware Architecture – OS and Software – Multimedia Architecture – Software library – Drivers.

Unit – 2: MM Audio: Digital medium - Digital audio technology - sound cards - recording -editing - MP3 - MIDI fundamentals - Working with MIDI - audio file formats - adding sound to MM project.

Unit – 3:MM TEXT: Text in MM - Text and Graphics : Elements of Text – Text Data files – Using text in Multimedia Application – Hypertext – Elements of Graphics – Images and color – Graphics files and Application formats – Creating images for multimedia use –Using graphics in Application.

Unit – 4: MM Animation: Computer animation fundamentals - Kinematics - morphing - animation s/w tools and techniques. **MM Video:** How video works - broadcast video standards - digital video fundamentals - digital video production and editing techniques - file formats.

Unit – 5: MM Project: stages of project - MM skills - design concept - authoring - planning and costing – MM team. **Multimedia and Internet:** Internet – HTML and web authoring – Multimedia considerations for Internet – Design considerations for web pages.

Reference Books

1. Multimedia Magic - S.Gokul revised and updated second edition - BPB

2. Multimedia Making it Work - TayVaughen 6th edition - TMH

3. Multimedia Technology and Applications – David Hillman-Galgotia Publications pvt.Ltd, 1998.

Title of the paper	**Mobile Computing**	
Category :	Year & Semester	Credits
Elective	**Third year & Semester V**	5

Unit 1: Introduction - Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing – Wireless Transmissions –Multiplexing – Spread Spectrum and Cellular Systems- Medium Access Control – Comparisons.

Unit 2: Telecommunication Systems – GSM – Architecture – Sessions – Protocols – Hand Over and Security – UMTS and IMT – 2000 – Satellite Systems.

Unit 3: Wireless Lan - IEEE S02.11 – Hiper LAN – Bluetooth – Security and Link Management.

Unit 4: Mobile network layer - Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies

Unit 5: Mobile transport layer - Congestion Control – Implication of TCP Improvement – Mobility – Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance.

Recommended Text

1) J. Schiller, 2003, Mobile Communications,2nd edition, Pearson Education, Delhi.

2)Hansmann, Merk, Nicklous, Stober, 2004, Principles of Mobile Computing, 2nd Edition, Springer (India).

3) Pahlavan, Krishnamurthy, 2003(2002), Principle of wireless Networks: A unified Approach, Pearson Education,Delhi.

Reference Books

1) MartynMallick, 2004, Mobile and Wireless Design Essentials, Wiley Dreamtech India Pvt. Ltd., NewDelhi.

2) W.Stallings, 2004, Wireless Communications and Networks, 2nd Edition, Pearson Education, Delhi.

Website and e-Learning Source

1) http://csbdu.in/pdf/mobile%20communication.pdf

Title of the paper	PROFESSIONAL ETHICS	
Category :	Year & Semester	Credits
Elective	**Third year & Semester V**	5

UNIT I COMPUTER ETHICS INTRODCUTION AND COMPUTER HACKING

A general Introduction – Computer ethics: an overview – Identifying an ethical issue – Ethics and law – Ethical theories - Professional Code of conduct – An ethical dilemma – A framework for ethical decision making - Computer hacking – Introduction – definition of hacking – Destructive programs – hacker ethics - Professional constraints – BCS code of conduct – To hack or not to hack? – Ethical positions on hacking.

UNIT II ASPECTS OF COMPUTER CRIME AND INTELLECTUAL PROPERTY RIGHTS

Aspects of computer crime - Introduction - What is computer crime – computer security measures – Professional duties and obligations - Intellectual Property Rights – The nature of Intellectual property – Intellectual Property – Patents, Trademarks, Trade Secrets, Software Issues, Copyright - The extent and nature of software piracy – Ethical and professional issues – free software and open source code.

UNIT III REGULATING INTERNET CONTENT, TECHNOLOGY AND SAFETY

Introduction – In defence of freedom expression – censorship – laws upholding free speech – Free speech and the Internet - Ethical and professional issues - Internet technologies and privacy – Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk.

UNIT IV COMPUTER TECHNOLOGIES ACCESSIBILITY ISSUES

Introduction – Principle of equal access – Obstacles to access for individuals – professional responsibility - Empowering computers in the workplace – Introduction – computers and employment – computers and the quality of work – computerized monitoring in the work place – telecommuting – social, legal and professional issues - Use of Software, Computers and Internet-based Tools - Liability for Software errors - Documentation Authentication and Control – Software engineering code of ethics and practices – IEEE-CS – ACM Joint task force.

UNIT V SOFTWARE DEVELOPMENT AND SOCIAL NETWORKING

Software Development – strategies for engineering quality standards – Quality management standards – Social Networking – Company owned social network web site – the use of social networks in the hiring process – Social Networking ethical issues – Cyber bullying – cyber stalking – Online virtual world – Crime in virtual world - digital rights management – Online defamation – Piracy – Fraud.

REFERENCES:

1. Caroline Whitback," Ethics in Engineering Practice and Research ", Cambridge University Press, 2011.

2. George Reynolds, "Ethics in Information Technology", Cengage Learning, 2011.

3. John Weckert and Douglas Adeney, Computer and Information Ethics, Greenwood Press, 1997.

4. Penny Duquenoy, Simon Jones and Barry G Blundell, "Ethical , legal and professional issues in computing", Middlesex University Press, 2008.

5. Richard Spinello, "Case Studies in Information and Computer Ethics", Prentice Hall, 1997.

6. Sara Baase, "A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet", 3rd Edition,Prentice Hall, 2008.

7. http://www.infosectoday.com/Articles/Intro_Computer_Ethics.html

SEMESTER VI

Title of the paper	**Computer Organization And Architecture**	
Category :	Year & Semester	Credits
	Third year & Semester VI	4

Objective: To gain knowledge about the architecture of computer and to understand the concepts of CPU, ALU Design, I/O Instruction format and different processors.

Unit - 1 Digital Logic Circuits (8 hrs.) - Digital Computers - Logic Gates - Boolean Algebra - Map Simplification - Product - of - Sums Simplification - Don't - Care Conditions - Combination Circuits - Flip-Flops - SR, D, JK, T, Edge-Triggered Flip-Flops - Excitation Tables.

Unit - 2 Digital Components (6 hrs.) - Integrated circuits - Decoders - NAND Gate Decoder - Decoder Expansion - Encoders - Multiplexers - Registers with Parallel Load - Shift Registers - Bidirectional Shift Registers with Parallel Load - Binary Counters with Parallel Load - Memory Unit - RAM - ROM - Types of ROMs.

Unit - 3 Basic Computer Organizations: (10 hrs.) - Data types - Number Systems - Octal & Hexadecimal - Instruction codes - Operation codes - Stored Program Organization - Indirect Address - Effective Address - Computer Registers - Common Bus System - Computer Instructions - Instruction Formats - Instruction Set Completeness - Timing and Control - Clock Pluses - Hardwired Control - Micro programmed Control - Control Unit - Timing Signals - Instruction Cycle - Fetch and decode - Determine the Type of Instruction - Register - Reference Instructions - Memory - Reference Instructions - AND, ADD, LDA, STA, BUN, BSA, ISZ - Control Flowchart - Input-Output and Interrupt - I/O Configuration - I/O Instructions - Program Interrupt - Interrupt Cycle.

Unit - 4 Complete Computer Description (5 hrs.) - Flowchart for Computer Operation - Design of a Basic Computer - Control Logic Gates - Control of Registers and Memory - Control of Single Flip - Flops - Control of Common Bus - Design of Accumulator Logic - Control of AC Register - Adder and Logic Circuit.

Unit - 5 Central Processor Organizations: (13 hrs.) - Introduction - General Register Organization - Control Word - ALU - Example of Micro operations - Stack Organization - LIFO - Stack Pointer - Register Stack - PUSH & POP - Memory Stack - Stack Limits - Instruction Formats - Three Types of CPU Organization - Three, Two, One, Zero - Address, RISC Instructions - Addressing Modes - Mode Field - Implied, Immediate, Register, Register Address, Auto increment, Auto decrement, Direct Address, Indirect Address, Relative Address, Indexed Address and Base Register Addressing Modes - Numerical Example - Data Transfer and Manipulation - Set of Basic Operations - Data Transfer Instructions - Data Manipulation Instructions - Arithmetic Instructions - Logical and Bit Manipulation Instructions - Shift Instructions - Program Control - Status Bit Conditions - Conditional Branch Instructions - Numerical Example - Subroutine Call and Return - Program Interrupt - Program Status - Word - Supervisor Mode - Three Types of Interrupts.

Recommended Texts

1. M. Morris Mano, Computer System Architecture, Prentice Hall of India, III Edition

2.Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India, IV Edition

Reference books

1. William Stallings, Computer Organization and Architecture, Pearson Education, V edition

2. Carl Hamacher, Computer Organization, McGraw Hill International, V Edition

Title of the paper	**Web Technologies**	
Category :	Year & Semester	Credits
	Third year & Semester VI	4

Unit 1: Introduction to JavaScript – Advantage of JavaScript – JavaScript Syntax – Data type – Variable – Array – Operator and Expression – Looping Constructor – Function – Dialog box.

Unit 2: JavaScript document object model – Introduction – Object in HTMl – Event Handling – Window Object – Document object – Browser Object – Form Object – Navigator object – Screen object – Build in Object – User defined object – Cookies

Unit 3: Features of C# - C# and .NET framework – Getting started – C# language fundamentals – classes and objects – Inheritance and Polymorphism –Interfaces-Arrays – Indexers and Collections – Strings and Regular Expressions – Handling Exceptions – Delegates and Events.

Unit 4:ASP. NET Language Structure – Page Structure – Page event, Properties & Compiler Directives. HTML server controls – Anchor, Tables, Forms, Files. Basic Web server Controls – Label, Textbox, Button, Image, Links, Check & Radio button, Hyperlink. Data List Web Server Controls – Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

Unit 5: Request and Response Objects, Cookies, Working with Data – OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced Issues – Email, Application Issues, Working with IIS and page Directives, Error handling. Security – Authentication, IP Address, Secure by SSL & Client Certificates.

Recommended Texts

(i) I. Bayross, 200, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI, BPB Publications.

(ii) G.Buczek, 2002, ASP.NET Developers Guide, TMH.

(iii) Jesse Liberty, 2002, Programming C#", Second Edition, O'Reilly Press.

Reference Books

(i) J. Jaworski, 1999, Mastering Javascript, BPB Publications.

(ii) T. A. Powell, 2002, Complete Reference HTML (Third Edition),Tata McGraw-Hill, New Delhi.

(iii) Richard Anderson, Professional ASP.NET, Wrox Press Ltd.

Title of the paper	**Web Application Lab**	
Category :	Year & Semester	Credits
	Third year & Semester VI	3

1. Write a script to create an array of 10 elements and arrange them in the ascending ordescending order.

2. Write a function in JavaScript that takes a string and looks at it character by character and perform all the String manipulation..

3. Create a simple calculator which should perform all the mathematical operations.

4. Create a document and add a link to it. Create a new window on that document. When the user moves

the mouse over the link , it should load the linked document on it.

5. Create a document that accepts the user's name in a text field form and displays the same the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.

6. Create a Web form for an online library. This form must be able to accept the Membership Id of the person borrowing a book, the name and ID of the book, and the name of the book's author. On submitting the form, the user (the person borrowing the book) must be thanked and informed of the date when the book is to be returned. You can enhance the look of the page by using various ASP.NET controls.

7. Use a calendar control in the page to determine the current date (when the book is borrowed) and calculate the due date, which must be three weeks from the current date. Display the due date to the user.

8. Create an array containing the titles of five new movies. Use this array as a data source for a drop down list control. The page must be capable of displaying the selected movie title to the user when the user clicks on the submit button.

9. Create a virtual directory in IIS. Create a global. sax file and include the "Session Start" and "Session End" and, "Application_BeginRequest" and "Application_EndRequest" events. Write a simple

ASP.NET page and execute it in the browser. What is the output that you get?

10. Create an ASP.NET application. The application must consist of a form that accepts the user's credentials and validate the same. The user is then allowed to purchase items from the site by filling in a form. The user is finally informed when the purchased goods will be delivered to him/her.

    a. Create a single default error page for any errors occurring in the application.

    b. Use ASP.NET debugger to debug the application during its development

    c. Enable tracing for the application. Display the user entered data in the purchase form as trace information at the bottom of the purchase page.

    d. Switch off tracing for the application.

11. Create the Employee information and perform all the validator controls.

Title of the paper	**Software Engineering**	
Category : Elective	Year & Semester	Credits
	Third year & Semester VI	5

Unit-I: The Product-The Process-Project Management Concepts-Software Projects And Project Metrics

Unit-II: Software Project Planning-Risk Analysis And Management-Project Scheduling And Tracking-Software Quality Assurance.

Unit-III:.Software Configuration Management-System Engineering-Analysis Concepts And Principles-Analysis Modeling

Unit-IV: Design Concepts And Principles-Architectural Designs-User Interface Design.

Unit-V: Component level Design-Software Testing Techniques-Software Testing Strategies-Technical Metrics For Software.

Recommended Texts

1. Roger S. Pressman - Software Engineering A Practitioner's approach – 5th edition - McGraw Hill.
2. Ian Sommerville – Software Engineering - 5th Edition – Addison Wesley.

Reference Books

i. Kotonya, Gerald, and Ian Sommerville. Requirements engineering: processes and techniques. Wiley Publishing, 1998.

ii. Leach, Ronald J. Introduction to software engineering. CRC Press, 2016.

Title of the paper	**Big Data Analytics**	
Category : Elective	Year & Semester	Credits
	Third year & Semester VI	5

UNIT I - INTRODUCTION TO BIG DATA

Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools

UNIT II - STATISTICAL DATA ANALYSIS

Parameter and Statistic- Sampling Distribution- Meaning- Standard Error and its uses.Tests of Significance- Null and Alternative Hypotheses.Type-I and Type-II Error- Critical Region and Level of Significance. One tailed and Two tailed Tests. Critical values or Significant values. Tests of Significance for Large Samples- Test of Significance for Single Proportion- Test of Significance for Difference of Proportions- Test of Significance for Single Mean- Test of Significance for Difference of Means.Chi-Square Distribution – Definition- Applications of Chi-Square Distribution- To test the goodness of fit.- To test the independence of Attributes.Student's" t" -Distribution-

Definition- Applications of Student's "t" –Distribution- To test for Single Mean- To test for Difference of Means- Paired t-test for Difference of MeansF-Distribution- Definition- To Test for Equality of Two Population variances.Meaning of Resampling and its uses. Basic ideas of Randomization, Exact Test, Cross ValidationJacknife and Bootstrap.Prediction Error and its uses.

UNIT III - HADOOP

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution – Map Reduce Features

UNIT IV - HADOOP ENVIRONMENT

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance

UNIT V - FRAMEWORKS

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper.

TEXT BOOKS:

1. Michael Berthold, David J. Hand, (2007), "Intelligent Data Analysis", Springer. (For Unit I to III)

2. Tom White (2012), " Hadoop:The Definitive Guide" Third Edition, O'reilly Media (For Unit IV to V)

REFERENCE BOOKS:

1. AnandRajaraman and Jeffrey David Ullman, (2012), "Mining of Massive Datasets", Cambridge University Press.

2. Viktor Mayer, Schonberger, Kenneth Cukier,(2013), "BIg Data : A Revolution That Will Transform How We Live, Work and Think",Houghton Mifflin Harcourt publishing company.

Title of the paper	SERVICE ORIENTED ARCHITECTURE	
Category :	Year & Semester	Credits
Elective	**Third year & Semester VI**	5

UNIT I XML AND WEB SERVICES

XML structure – Elements – Creating Well-formed XML - Name Spaces – Schema Elements,

Types, Attributes – XSL Transformations – Parser – Web Services Overview – Architecture.

UNIT II WSDL, SOAP and UDDI

WSDL - Overview Of SOAP – HTTP – XML-RPC – SOAP: Protocol – Message Structure –

Intermediaries – Actors – Design Patterns And Faults – SOAP With Attachments – UDDI.

UNIT III SOA BASICS

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed

internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles

of service orientation – Service Layers.

UNIT IV SOA in J2EE and .NET

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-

WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java

API for XML based RPC (JAX-RPC) – JAX-RS SOA support in .NET – ASP.NET web

services.

UNIT V CLOUD COMPUTING

Vision of Cloud computing – Cloud Definition – Characteristics and Benefits – Virtualization –

Cloud computing Architecture – Cloud Reference Model, Types of Clouds – Cloud Platforms

in Industry.

REFERENCES

1. Dan woods and Thomas Mattern, “Enterprise SOA designing IT for BusinessInnovation”, O‟REILLY, First Edition, 2006.

2. Frank. P. Coyle, “XML, Web Services And The Data Revolution”, Pearson Education,2002

3. Heather Williamson, “XML, The Complete Reference”, McGraw Hill Education, 2012.

4. Newcomer, Lomow, “Understanding SOA with Web Services”, Pearson Education,2009.

5. RajkumarBuyya, Christian Vecchiola, S. ThamaraiSelvi, “Mastering CloudComputing”, McGraw Hill Education, 2013.

6. SandeepChatterjee, James Webber, “Developing Enterprise Web Services. AnArchitect‟s Guide”, Pearson Education, 2009

7. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”,Pearson Education, 2008.

Title of the paper	**Principles of Compiler Design**	
Category :	Year & Semester	Credits
	Third year & Semester VI	5

UNIT I - LEXICAL ANALYSIS

Introduction to Compiling- Compilers-Analysis of the source program-The phases- Cousins-The grouping of phases-Compiler construction tools.The role of the lexical analyzer-Input buffering-Specification of tokens-Recognition of tokens-A language for specifying lexical analyzer.

UNIT II - SYNTAX ANALYSIS and RUN-TIME ENVIRONMENTS

Syntax Analysis- The role of the parser-Context-free grammars-Writing a grammar-Top downparsing-Bottom-up Parsing-LR parsers-Constructing an SLR(1) parsing table. Type Checking- Type Systems-Specification of a simple type checker.Run-Time Environments-Source language issues-Storage organization-Storage-allocation strategies.

UNIT III - INTERMEDIATE CODE GENERATION

Intermediate languages-Declarations-Assignment statements - Boolean expressions-Case statements- Back patching-Procedure calls.

UNIT IV - CODE GENERATION

Issues in the design of a code generator- The target machine-Run-time storage management-Basic blocks and flow graphs-Next-use information-A simple code generator-Register allocation and assignment-The dag representation of basic blocks - Generating code from dags.

UNIT V - CODE OPTIMIZATION

Introduction-The principle sources of optimization-Peephole optimization- Optimization ofbasic blocks-Loops in flow graphs- Introduction to global data-flow analysis-Code improving transformations.

Recommended Texts

1. Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, “Compilers-Principles, Techniques, andTools”, Pearson Education Asia, 2007.

2. David Galles, “Modern Compiler Design”, Pearson Education Asia, 2007

Reference Books

1. Steven S. Muchnick, “Advanced Compiler Design & Implementation”, MorganKaufmann Pulishers, 2000.

2. C. N. Fisher and R. J. LeBlanc “Crafting a Compiler with C”, Pearson Education, 2000.

Title of the paper	Cloud Computing	
Category : Elective - III	Year & Semester	Credits
	Third year & Semester - VI	5

Unit 1: UNDERSTANDING CLOUD COMPUTING: Cloud Computing –History of Cloud Computing –Cloud Architecture –Cloud Storage –Why Cloud Computing Matters –Advantages of Cloud Computing –Disadvantages of Cloud Computing –Companies in the Cloud Today –Cloud Services

Unit 2: DEVELOPING CLOUD SERVICES: Web-Based Application –Pros and Cons of Cloud Service Development – Types of Cloud Service Development –Software as a Service –Platform as a Service- Infrastructure as a service –Web Services –On-Demand Computing –Discovering Cloud Services Development Services and Tools –Amazon Ec2 – Google App Engine –IBM Clouds

Unit 3: CLOUD COMPUTING FOR EVERYONE: Centralizing Email Communications –Collaborating on Schedules –Collaborating on To-Do Lists –Collaborating Contact Lists –Cloud Computing for the Community – Collaborating on Group Projects and Events –Cloud Computing for the Corporation

Unit 4: USING CLOUD SERVICES: Collaborating on Calendars, Schedules and Task Management –Exploring Online Scheduling Applications –Exploring Online Planning

and Task Management –Collaborating on Event Management –Collaborating on Contact Management –Collaborating on Project Management –Collaborating on Word Processing - Collaborating on Databases –Storing and Sharing Files

Unit 5: OTHER WAYS TO COLLABORATE ONLINE: Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services –Evaluating Web Conference Tools –Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis

Recommended Text

1) Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.

2) Kumar Saurabh, "Cloud Computing –Insights into New Era Infrastructure", Wiley Indian Edition, 2011.

3) Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008

Reference Book:

1)Handbook of Cloud Computing – BorkoFurht,Armando Escalante Editors, Springer

Title of the paper	Information Security	
Category : Elective - III	Year & Semester	Credits
	Third year & Semester VI	5

UNIT 1 Introduction to Computer Security: Vulnerabilities - Threats and attacks - Public key cryptography and cryptanalysis - knapsack cryptosystem – Control against program threats.

UNIT-2 Operating System Security: Authentication methods and protocols - Password based authentication - Token base authentication - Biometric authentication - Digital certificates - X-509 directory services – PKI - Needham Schroeder Authentication protocol - Single sign-on - Kerberos Authentication Protocol - Federated Identity management. Access control: Policies, DAC, MAC, RBAC - Access control matrix - ACLs and capability lists - multiple level security models. Linux security model: File system security - Linux vulnerabilities - Windows security architecture - windows vulnerabilities.

UNIT 3 Software security: Software flaws - Buffer overflow - Incomplete mediation - Race conditions. Malware: Viruses, Worms, Trojans, Logic bomb, Bots and Root kits. Miscellaneous software attacks: Salami attack, Linearization attacks. Trusted computing: Software reverse engineering - Digital rights management.

UNIT 4 Network security: Basics, TCP/IP vulnerabilities layer wise: Packet sniffing - ARP spoofing - port scanning - IP spoofing - TCP syn flood - DNS spoofing. Internet security protocols: SSL – TLS – IPSEC - secure Email and S/MIME. Denial of service: classic DOS attacks - source address spoofing - ICMP flood - SYN flood - UDP flood - Distributed denial of service - Defense against denial of service attacks. Firewalls, Intrusion detection systems: Host based and network based IDS - Honey pots.

UNIT 5 Database Security: Security requirements – Reliability and Integrity, Sensitive data – Interface – Multilevel Database – Proposals of multilevel security.

Recommended Text books:

1. Computer security principles and practice, by William Stallings, Pearson Education.
2. Security in Computing by Charles P. Pfleeger and Shari Lawrence Pfleeger, Pearson Education.
3. Cryptography and Network security by Behrouz A. Forouzon, Tata McGraw Hill.

Reference Books:

1. Information security principles and practice by Mark Stamp, Wiley publication.
2. Network security bible 2nd edition by Eric Cole, Wiley India.

Website:

https://www.owasp.org/index.php/Top_10_2013

SEMESTER – VII

Title of the paper	**Advance Java Programming**	
Category :	Year & Semester	Credits
	Fourth year & Semester VII	4

Unit 1: Servlet Overview – Servlet life cycle - The Java Web Server – Simple Servlet – Servlet Packages – Using Cookies - - Session Tracking - Security Issues – using JDBC in Servlets – HTML to Servlet Communication - applet to Servlet communication.

Unit 2: Java Beans: The software component assembly model- The java bean development kit- developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool- JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.

Unit 3: EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans- EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in Perl- Perl control structures and operators – functions and scope

Unit 4: RMI – Overview – Developing applications with RMI: Declaring & Implementing remote interfaces-stubs & skeletons, Registering remote objects, writing RMI clients –

Pushing data from RMI Servlet – RMI over Inter-ORB Protocol

Unit 5: JSP –Introduction JSP-Examining MVC and JSP - JSP scripting elements & directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Java mail-Components-Java mail API-Integrating into J2EE-Understanding Java Messaging Services-Introducing Java Transactions – STRUTS – Introduction -frame work – MVC based web application.

Recommended Text:

1) James McGovern, Rahim ,Adatia, Yakor Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, New Delhi

2) Herbert Schildt, 2002, Java 2 Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi.

3) Jamie Jaworski, 1999, Java 2 Platform – Unleashed, First Edition, Techmedia-SAMS.

Reference books:

(1) D. R.Callaway,1999, Inside Servlets, Addison Wesley, Boston

(2) Joseph O'Neil, 1998, Java Beans from the Ground Up, Tata McGraw Hill, New Delhi.

(3) T. Valesky, T.C. Valesky, 1999, Enterprise JavaBeans, Addison Wesley.

Title of the paper	**Design and Analysis of Algorithms**	
Category :	Year & Semester	Credits
	Fourth year & Semester VII	4

UNIT I Introduction - Definition of Algorithm – pseudo code conventions – recursive algorithms – time and space complexity –big-“oh” notation – practical complexities – randomized algorithms – repeated element – primality testing - Divide and Conquer: General Method - Finding maximum and minimum – merge sort.

UNIT II Divide and conquer contd. – Quick sort, Selection, Strassen's matrix multiplication – Greedy Method: General Method –knapsack problem - Tree vertex splitting - Job sequencing with deadlines – optimal storage on tapes.

UNIT III Dynamic Programming: General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack. Search techniques for graphs – DFS-BFS-connected components – biconnected components.

UNIT IV Back Tracking: General Method – 8-queens - Sum of subsets - Graph Coloring – Hamiltonian cycles. Branch and Bound: General Method - Traveling Salesperson problem.

UNIT V Lower Bound Theory: Comparison trees - Oracles and advisory arguments - Lower bounds through reduction - Basic Concepts of NP-Hard and NP-Complete problems.

Recommended Texts

i) E. Horowitz, S. Sahni and S. Rajasekaran, 1999, Computer Algorithms, Galgotia, New Delhi.

Reference Books

G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, New Delhi.
(ii) A.V. Aho, J.E. Hopcroft, J.D. Ullmann, !974, The design and analysis of Computer Algorithms, Addison Wesley, Boston.
(iii) S.E.Goodman and S.T.Hedetniemi, 1977, Introduction to the Design and Analysis of algorithms, Tata McGraw Hill Int. Edn, New Delhi.

Title of the paper	**Open Source Programming**	
Category :	Year & Semester	Credits
	Fourth year & Semester VII	4

Unit I : History & Features of Linux, Login & Logout from Linux System., Commands for files and directories – bc, cal, cd, ls,md, pwd, more, less, cp, chgrp, chmod, chown, clear,

copy, date, find, ps, kill, ls, mail, mkdir, more, mv, rm, rmdir, wc, whois, grep, write, telnet , pipeline, concept. vi editor. creating and viewing files using cat, file comparisons – cmp&/comm, View files, disk related commands, checking disk free spaces - batch commands, kill, ps, who, sleep, Printing commands, find, sort, touch, file.

Unit II: Introduction to PYTHON- basic data structures- variables – conditional statements and looping - regular expressions – text handling – strings - lists and dictionaries – functions- modules - classes, objects – file handling - exceptions.

Unit III: Introduction to Hyper Text Preprocessor (PHP) – Server Side Scripting – PHP File – PHP Installation – Basic PHP Syntax – Comments – PHP Variables - Variable Rules – String Variables – String Functions – PHP Operators - Conditional Statements - Looping – Arrays

Unit IV: Functions – Built in Functions – User Defined Functions - PHP File Handling – Directories – html tables- Form Handling - $_GET - $_REQUEST - $_POST – PHP Cookies – Creating, retrieving and deleting Cookies – PHP Sessions – Session Variable – Starting, Storing and Destroying Session Variables

Unit V : Database Connectivity to MySQL – Introduction to MySQL - Connect – Create – Insert – Select – Order by – Update – Delete - Retrieving data from MySQL - Manipulating data in MySQL - Simple Python programs - simple PHP programs.

Recommended Texts

(i)Programming PHP.RasmusLerdorf, Kevin Tatroe. (O'Reilly, ISBN 1565926102)
(ii)Learning PHP 5. David Sklar (O'Reilly, ISBN 0596005601)

(iii)Core PHP Programming. Leon Atkinson (Prentice Hall, ISBN 0130463469)

Reference Books

(i) PHP and MySQL Web Development, Second Edition. Luke Welling
LauraThomson (Sams Publishing)

(ii) Learning Python, 4th Edition – Mark Lutz, O'Reilly, SHROFF Publisher and Distributors.

(iii)UNIX – Concepts & Applications (Third Ed.) – Sumitabha Das, Tata McGrawHill Publications.

Title of the paper	**Advanced Java Programming Lab.**	
Category : Core –Paper	Year & Semester	Credits
	Fourth year & Semester VII	3

1. HTML to Servlet Applications

2. Applet to Servlet Communication

3. Designing online applications with JSP

4. Creating JSP program using JavaBeans

5. Working with Enterprise JavaBeans

6. Performing Java Database Connectivity.

7. Creating Web services with RMI.

8. Creating and Sending Email with Java

9. Building web applications

10. Session Bean application (statefull and stateless).

11. Develop JDBC application to illustrate cursors

Title of the paper	**Open Source Programming –Lab**	
Category :	Year & Semester	Credits
	Fourth year & Semester VII	3

PHP and MySQL Lab

1. Create a PHP page which accepts the user name and displays a welcome page for theuser with his name being displayed.
2. Create a PHP page that accepts two strings and displays the following

(i) Concatenated string (ii) Length of the two strings.

3. Write a PHP program that accepts a string and searches for the location of the substring in the main string.
4. Write a program to fetch the current date and depending on the day of the week display appropriate greeting messages.
5. Using an array store different car models. Accept a car model from the user and search for the same in the array. If it is present in the array display that the model is available, else display appropriate message.
6. Develop a simple calculator which accepts two numbers and does the basic operations like addition, subtraction, multiplication and division. Use functions to implement this in PHP.
7. Develop a web site that has two pages. Accept the details of the user like Name, Gender (Use Check box), age and educational qualification(use list box)in the first page and using POST method display the details in a formatted manner in the second page using HTML tags.
8. In MySQL create a database to store the student details like name, course, semester number and marks of that semester subjects. Display the information in a PHP web page in table format.
9. Python programming using files.
10. Python programming using list and dictionaries.

Title of the paper	**Computer Graphics**	
Category : Elective	Year & Semester	Credits
	Fourth year & Semester VII	4

UNIT I output primitives – Line, Circle and Ellipse drawing algorithms - Attributes of output primitives – Two dimensional Geometric transformation - Two dimensional viewing –Line, Polygon, Curve and Text clipping algorithms

UNIT II Parallel and Perspective projections - Three dimensional object representation –Polygons, Curved lines, Splines, Quadric Surfaces,- Visualization of data sets - 3Dtransformations – Viewing -Visible surface identification.

UNIT III Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Key frame - Graphics programming using OPENGL – Basic graphics primitives –Drawing three dimensional objects - Drawing three dimensional scenes

UNIT I Introduction to Shading models – Flat and Smooth shading – Adding texture to faces –Adding shadows of objects – Building a camera in a program – Creating shaded objects– Rendering texture – Drawing Shadows.

UNIT V Fractals and Self similarity – Peano curves – Creating image by iterated functions –Mandelbrot sets – Julia Sets – Random Fractals – Overview of Ray Tracing – Intersecting rays with other primitives – Adding Surface texture – Reflections andTransparency – Boolean operations on Objects.

Recommended Texts

1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition,Pearson Education,2004.

2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education,2003.

Reference Books

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer**Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.**

Title of the paper	Artificial Intelligence And Expert Systems	
Category :	Year & Semester	Credits
Elective	**Fourth year & Semester VII**	4

Unit I – General issues and overview of AI

The AI problems: what is an AI technique; Characteristics of AI applications Problem Solving, Search andControl Strategies General Problem solving; Production systems; Control strategies; forward and backward chaining Exhaustive searches: Depth first Breadth first search.

Unit II – Heuristic Search Techniques

Hill climbing; Branch and Bound technique; Best first search and A* algorithm; AND/OR Graphs; Problemreduction and AO* algorithm; Constraint Satisfaction problems Game Playing Min Max Search procedure; Alpha-Beta cutoff; Additional Refinements.

Unit III – Knowledge Representation

First Order Predicate Calculus; Skolemnisation; Resolution Principle and Unification; InferenceMechanisms Horn's Clauses; Semantic Networks; Frame Systems and Value Inheritance; Scripts;Conceptual Dependency AI Programming Languages Introduction to LISP, Syntax and Numeric Function;List manipulation functions; Iteration and Recursion; Property list and Arrays, Introduction to PROLOG.

Unit IV – Natural Language Processing and Parsing Techniques

Context – Free Grammar; Recursive Transition Nets (RTN); Augmented Transition Nets (ATN); SemanticAnalysis, Case and Logic Grammars; Planning Overview – An Example Domain: The Blocks Word;Component of Planning Systems;

Goal Stack Planning (linear planning); Non-linear Planning usingconstraint posting; Probabilistic Reasoning and Uncertainty; Probability theory; Bayes Theorem andBayesian networks; Certainty Factor.

Unit V – Expert Systems

Introduction to Expert Systems, Architecture of Expert Systems; Expert System Shells; Knowledge Acquisition; CaseStudies; MYCIN, Learning, Rote Learning; Learning by Induction; explanation based learning.

Essential Text Books

1. Elaine Rich and Kevin Knight: Artificial Intelligence – Tata McGraw Hill.

2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems – PrenticeHal of India.

Reference Books

1. Nils J. Nilsson: Principles of Artificial Intelligence – Narosa Publication house.

2. Artificial Intelligence : A Modern Approach, Stuart Rusell, Peter Norving, Pearson Education 2nd Edition.

3. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education.

4. Artificial Intelligence by Gopal Krishna, Janakiraman.

Title of the paper	**Systems Software**	
Category : Elective	Year & Semester	Credits
	Fourth year & Semester VII	4

Unit I:Language Processors: Introduction. Assembler:Elements of assembly language programming – simple assembly scheme – pass structure of assembler – design of two phase assembler.

Unit II:Macro and Macro Processor: Macro definition and call – Macro expansion – Nested Macro calls – Advanced Macro Facilities.

Unit III:Linker: Relocating and linking concepts – Design of a linker – self relocating program – a linker for MSDOS – linking for overlays

Unit IV:Loader: Loader schemes – compile & go loader – general loader schemes – absolute loader – relocating loader – direct linking loader – design of direct linking loader

Unit V:System software tools: Text editors: Overview of the Editing Process - User Interface – Editor Structure. – InteractiveDebugging systems - Debugging functions and capabilities – Relationship with other parts of thesystem – User-Interface Criteria.

Text Book:

1. Systems Programming by John J Donovan (McGraw-Hill Education)
2. Operating System and System Programming – Dhamdhere (McGraw-Hill Education)

Reference Book:

1. System Software: An Introduction to systems programming by Leland Beck (Pearson)
2. System Software : Nityashri,(McGraw-Hill Education)
3. System Programming with C and Unix.- Hoover (Pearson Education)

SEMESTER VIII

Title of the paper	**Unix And Shell Programming**	
Category :	Year & Semester	Credits
	Fourth year & Semester VIII	4

UNIT-I

Introduction to Unix: The UNIX Operating System, The UNIX Architecture, Features of UNIX, Internal And External Commands, Command Structure.General-purpose

utilities:cal, date, echo, printf, bc, script, passwd, path, who, uname, tty, stty, pwd, cd, mkdir, rmdir, od.Handling files:The File System, cat, cp, rm, mv, more, file, ls, wc, pg, cmp, comm, diff, gzip, tar, zip, df, du, mount, umount, chmod, The vi editor ,security by file Permissions. Networking commands: ping, telnet, ftp, finger, arp, rlogin.

UNIT-II : Introduction to shells: Unix Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell Edition Environment Customization. Filters: Filters, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, translating characters,Ordering a File, uniq.

UNIT-III : Regular expressions:Atoms,operatorsGrep:Operation, grep Family, Searching for File Content.SED:Scripts, Operation, Addresses, commands, Applications, grep and sed.AWK:Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications, awk and grep, sed and awk.

UNIT-IV

Interactive korn shell: Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process.korn shell programming: Basic Script concepts,

Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

UNIT-V interactive c shell: C shell features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, On-Off Variables, Startup and Shutdown Scripts, Command History, Command Execution Scripts.c shell programming: Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples. file management: File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir,closedir, mkdir, rmdir, umask.

TEXT BOOKS:

1. Sumitabha Das, *"Unix Concepts And Applications"*, 4thEdition. TMH, 2006. (1, 2 units)

2. Behrouz A. Forouzan, Richard F. Gilbery, *"Unix and shell Programming"*, 1stEdition, Cengage Learning India, 2003.

REFERENCES:

1. Graham Glass, King Ables, *"Unix for programmers and users"*, 3rd Edition, Pearson Education, 2009.
2. N.B Venkateswarlu, *"Advanced Unix programming"*, 2ndEdition, BS Publications, 2010.

3. YashwanthKanitkar,*"Unix Shell programming"*, 1stEdition, BPB Publisher, 2010.

Title of the paper	Distributed Databases	
Category :	Year & Semester	Credits
	Fourth year & Semester VIII	4

UNIT I

Features of distributed Vs centralized databases -- Why Distributed databases –distributed database management systems (DDBMSs) – review of databases – review of computer networks – level of distribution transparency - reference architecture for distributed databases – types of data fragmentation – distributed transparency for read only applications - distributed transparency for update applications - distributed database access primitives – integrity constraints in distributed databases – framework for distributed database design – the design of database fragmentation – allocation of fragments .

UNIT II

Equivalence transformation for queries – Transforming Global Queries in to Fragment Queries – Distributed Grouping and Aggregate Function Evaluation – Parametric Queries – Optimization of Access Strategies - A Framework

for Query Optimization – Join Queries – General Queries. A Framework for Transaction Management – Supporting Atomicity of Distributed Transactions – Concurrency Control for Distributed Transactions – Architectural Aspects of Distributed Transactions.

UNITIII

Foundations of Distributed Concurrency Control –Distributed Deadlocks- Concurrency Control based on Timestamps-Optimistic Methods for Distributed Concurrency Control-Reliability –Basic concepts Non Blocking Commitments Protocols-Reliability and Concurrency Control –Determining a Consistent View of the Network-Detection and Resolution of Inconsistency - Checkpoints and Cold Restart-Distributed Database Administration - Catalog Management in Distributed Databases–Authorization and Protection.

UNIT IV

Distributed object Database Management Systems-Fundamental Objects Concepts and Models-Objects – Abstract Data types –Composition (Aggregation)-Class-Collection-Sub typing and inheritance- Object Distribution Design- Horizontal Class Partitioning- Vertical Class Partitioning- Path Partitioning – Class Partitioning Algorithms-Allocation-Replication.

UNIT V

Alternative clients / Server Architectures-Cache Consistency-Object Identifier Management- Pointer Swizzling Object Migration-Distributed Object Storage-Object Query

Processor Architectures- Query Processing Issues – Query Execution Correctness Criteria-Transaction Models and Object Structures- Transaction Management in Object DDBMSs-Transactions as Objects- Conclusion- Bibliographic Notes-Exercises.

BOOKS FOR STUDY:

1. Stefano Ceri, Giuseppe Pelagatti –Distributed Databases Principles and Systems-McGraw Hill.

2. M.TamerOzsu, Patrick Valduriez- Distributed Database Systems-Prentice Hall- Second Edition

Title of the paper	E-Commerce	
Category :	Year & Semester	Credits
	Fourth year & Semester VIII	4

Unit I : Introduction to Electronic Commerce: What is E-Commerce (Introduction and Definition) - Goals of E-Commerce - Technical Components of E-commerce - Functions of E-commerce - Adv / Dis Adv of E-commerce - Scope of E-commerce - Electronic commerce Applications • Electronic commerce and Electronic Business(C2C) (2G , G2G , B2G , B2P ,B2A,P2P,B2A,C2A,B2B,B2C).

Unit –II Internet Security: Computer Monitoring - Privacy on Internet - Corporate Email privacy - Computer Crime (

Laws , Types of Crimes) - Threats - Attack on Computer System - Hacking - Computer Virus (How it spreads , Virus problem , Virus protection • Encryption and Decryption - Secret key Cryptography - DES - Public key Encryption - RSA - Authorization and Authentication - Firewall - Digital Signature. E-mail and secure e-mail technologies for Electronic Commerce

Unit – III Electronic Data Interchange: Introduction - Concepts of EDI and Limitation - Application of EDI - Disadvantages of EDI - EDI model. Electronic payment System: Introduction - Types of Electronic payment system - Payment types - Traditional payment - Value exchange system - Credit card system - Electronic funds transfer - Paperless bill - Electronic cash.

Unit –IV MasterCard/Visa Secure Electronic Transaction: Introduction –Business Requirements – Concepts – payment Processing.Approaches to Safe Electronic Commerce . Overview – Secure Transport Protocols – Secure Transaction – Secure Electronic Payment Protocol (SEPP) – Secure Electronic Transaction (SET).

Unit –V Intelligent Agents: Definition and capabilities – limitation of agents – security – web based marketing – search engines and Directory registration – online advertisements – Portables and info mechanics – website design issues.

Reference books:-

1. e-Commerce Concepts , Models , Strategies by G.S.V Murthy

2. E-Commerce by Kamlesh K Bajaj and Debjani Nag

3. Electronic Commerce by Gary P. Schneider

4. Ravi Kalakota and Andrew B Whinston, " Frontiers of Electronic Commerce",Pearson Education Asia, 1999.

5.. Marilyn Greenstein and Todd M Feinman , " Electronic commerce: Security, Risk Management and Control " Tata McGraw-Hill , 2000

Title of the paper	**Theory of Computation**	
Category : Extra Disciplinary Elective -I	Year & Semester	Credits
	Fourth year & Semester - VIII	4

Unit 1: Propositions and Compound Propositions – Logical Operations – Truth Tables –Tautologies and Contradictions – Logical Equivalence –Algebra of Propositions – Conditional and Biconditional Statements –Arguments – Logical Implication – Quantifiers – Negation of Quantified Statements – Basic Counting Principles – Factorial – Binomial Coefficients – Permutations – Combinations – Pigeonhole Principle – Ordered and Unordered Partitions.

Unit 2: Order and Inequalities – Mathematical Induction – Division Algorithm – Divisibility – Euclidean Algorithm – Fundamental Theorem of Arithmetic – Congruence Relation – Congruence Equations – Semigroups – Groups –

Subgroups – Normal Subgroups – Homomorphisms – Graph Theory: basic definitions-paths, reachability, connectedness matrix representation of graphs, trees.

Unit 3: Finite Automata and Regular Expressions: Finite State Systems – Basic definitions – Non-deterministic finite automata – Finite automata with -moves – Regular expressions.

Unit 4: Properties of Regular sets: Pumping lemma – Closure properties – Decision Algorithms – My hill – Nerode Theorem – Context Free Grammars – Derivation Trees.

Unit 5: Simplifying Context free grammars - Chomsky normal forms – Greibach Normal forms – Pushdown automata and context-free languages

1. **Recommended Texts**

(i) J.P. Tremblay and R. Manohar, 1997, Discrete Mathematical Structures with applications to Computer Science, Tata McGraw-Hill, New Delhi.

(ii) P. Linz, 1997, An Introduction to Formal Languages and Automata, Second Edition, Narosa Pub. House, New Delhi.

(iii) S. Lipschutz and M. Lipson, 1999, Discrete Mathematics, Second Edition, Tata McGraw-Hill, New Delhi.

(iv) J.E.Hopcraft and J.D.Ullman, 1993, Introduction to Automata Theory, Languages and Computation, Narosa Publishing House, New Delhi.

2. Reference Books

(i) D.C.Kozen, 1997, Automata and Computability, Springer-Verlag, New York.

(ii) J. Martin, 2003, Introduction to Languages and the Theory of Computation, 3rd Edition, Tata McGraw-Hill, New Delhi.

Title of the paper	Unix Lab	
Category :	Year & Semester	Credits
	Fourth year & Semester VIII	3

Students can refer the following book for further details.

Charles Crowley - Operating Systems (A Design Oriented Approach) - TMH - 1998.

1. Inter Process Communication (IPC) using Message Queues.
2. IPC using pipes.
3. Implementation of wait and signal using counting semaphores.
4. Implementation of wait and signal using binary semaphores.

5. Atomic Counter update problem.
6. Counting Semaphores at the user level using binary semaphores.
7. Signaling processes.
8. Deadlock detection (for processes passing messages)
9. Process Scheduling: FCFS
10. Process Scheduling: Least Frequently Used.
11. Process Scheduling: Round Robin.
12. Producer-Consumer problem with limited buffers.
13. Dining-Philosopher Problem.
14. Reader-Writer problem.
15. Two Process Mutual Exclusion.

Title of the paper	Software Project Management	
Category : Elective	Year & Semester	Credits
	Fourth year & Semester VIII	3

UNIT 1:INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT

Project Definition – Contract Management – Activities Covered By Software ProjectManagement – Overview Of Project Planning – Stepwise Project Planning.

UNIT2:

PROJECT EVALUATION Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash FlowForecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

Unit 3 Software Development Life Cycle PlanIntroduction of SDLC, its importance and selection. Project Schedule – Sequencing and scheduling Activities –NetworkPlanning Models – Forward Pass – Backward Pass – Activity Float – Shortening ProjectDuration – Activity on Arrow Networks Resource planning: Manpower planning and financial planning and other resources planning.

Unit 4 Risk Management – Nature Of Risk – Types OfRisk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning AndControl. Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring –Earned Value – Prioritizing Monitoring – Getting Project Back To Target

Unit 5 Understanding Behavior Instruction In The Best Methods – Motivation– The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –HealthAnd Safety .

TEXT BOOK:

Bob Hughes, Mikecotterell, “Software Project Management”, Third Edition, TataMcGraw Hill, 2004.

REFERENCES:

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, “Software Project Management”, Pearson Education, 1999.
3. Jalote, “Software Project Manangement in Practive”, Pearson Education, 2002.

Title of the paper	**Fuzzy Logic**	
Category :	Year & Semester	Credits
Elective	**Fourth year & Semester VIII**	3

Unit – I:Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, a-cuts, Properties of a-cuts, Decomposition, Theorems, Extension Principle. **Operations on Fuzzy Sets:** Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations

Unit – II:Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. **Fuzzy Relations**: Crisp & Fuzzy Relations, Projections &Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on single set, Equivalence, Compatibility & Ordering Relations, Morphisms, Fuzzy Relation Equations.

Unit – III:Possibility Theory: Fuzzy Measures, Evidence & Possibility Theory, Possibility versus Probability Theory. **Fuzzy Logic:** Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Unit – IV:Uncertainty based Information: Information &Uncertainty, Nonspecificity of Fuzzy & Crisp sets, Fuzziness of Fuzzy Sets.

Unit – V:Applications of Fuzzy Logic in soft computing: Engineering – Medicine –Management and Decision making – computer Science- Systems Science – other applications

Text books:

1. Fuzzy Sets, Uncertainty & Information by G.J.Klir& T.A. Folyger, PHI, 1988.
2. Fuzzy sets & Fuzzy logic by G.J.Klir&B.Yuan, PHI, 1995.

REFERENCES

1. George J. Klir& Tina Folger A., "*Fuzzy sets Uncertainty & Information",* PHI Learning Pvt.Ltd,2010

2. Timothy J.Ross, *''Fuzzy Logic with Engineering applications*", John Wiley and Sons, 2010
3. Jang J.S.R. Sun C.T., Mizutani E., "*Neuro fuzzy and Soft Computing*", PHI Learning Pvt. Ltd., 2012

Title of the paper	Computer Simulation and System Modeling	
Category : Elective	Year & Semester	Credits
	Fourth year & Semester VIII	3

Unit-I: Introduction to Simulation: Advantages and Disadvantages of Simulation – Areas of Application – Systems and System Environment- Components of a System – Discrete and Continuous System – Model of a System – Types of Models – Discrete- Event System Simulation – Steps in a Simulation Study: Simulation Examples. Programming Languages for Simulation: FORTRAN, GPSS, SIMAN, SIMSCRIPT, SLAM andMODSIM III.

Unit-II: Statistical Models in Simulation: Useful Statistical Models- Discrete Distributions – Continuous Distributions- Poisson Process – Empirical Distributions. Simulation of Manufacturing and Material Handling Systems: Modeling of Manufacturing Systems- Models of Material Handling Systems – Goals and Performance measures- Issues in simulating Manufacturing and Material Handling Systems- Simulators and Languages for Manufacturing and Material Handling Systems. Simulation of Queueing Systems:

Queueing System Characteristics- Queueing Notation – Transient and Steady – State behavior of queues- Long-Run-Measures of Performance of Queuing Systems- Steady – State – Behavior of Infinite Population Markovian Models-Network of Queues.

Unit-III: Random Number Generation**:** Properties of Random Numbers- Generation of Pseudo Random Numbers-Techniques for Generating Random Numbers- Tests for Random Numbers. Random Variate Generation: Inverse Transformation Technique- Uniform Distribution – Exponential Distribution – Weibull Distribution- Triangular Distribution- Empirical Continous Distribution – Discrete Distribution – Direct Transformation for the Normal Distribution – Convolution Method for Erlang Distribution – Acceptance-Rejection Technique: Pisson Distribution-Gamma Distribution.

Unit-IV: Input Data Analysis: Data Collection – Identifying the Distribution with Data- Parameter Estimation-Goodness-of-Fit Tests:- Chi-Square Test- Kolmogrov- Smirnov Test; Selecting Input Models without Data – Multivariate and Time Series Input Models. Verification and Validation of Simulation Models**:** Model Building, Verification and Validation – Verification of Simulation Models- Calibration and Validation of Models:- Face Validity- Validation of Model Assumptions- Validating Input-Output Transformations- Input-Output Validation using a Turing Test.

Unit-V: Output Data Analysis: Stochastic Nature of Output Data – Types of Simulation with respect to output Analysis-

Measures of Performance and their Estimation – Output Analysis for Terminating Simulations- Output Analysis for Steady-State Simulations. Comparison and Evaluation of Alternative System Designs: Comparison of Two System Designs – Comparison of Several System Designs – Statistical Models for Estimating the Effect of Design Alternatives – Metamodeling.

Books for Study:

1. Jerry Banks , John S.Carson, II and Barry L.Nelson - 'Discrete-Event System Simulation' - 2nd Edition. - Printice Hall - 1995.

2. Averill M. Law and W. David Kelton - Simulation Modeling and Analysis – TMH - 2000.

SEMESTER IX

Title of the paper	Network Programming	
Category :	Year & Semester	Credits
	Fifth year & Semester IX	4

Unit 1 Introduction – Environment of a UNIX Process – process relationships signals – Interprocess Communication- Overview of TCP/IP. DATA COMMUNICATIONS AND NETWORK MANAGEMENT

Unit 2 Analogy of Telephone Network Management- Distributed Computing Environments- Communications Protocols. Network Management Goals, Organization, and Functions - Network&System Management- Network Management System.

Unit 3 Introduction to TCP Sockets

Introduction to sockets – Socket Address Structure - Internet Multicasting – TCP/IP over ATM networks - Mobile IP – Private Network Interconnection (NAT, VPN). Classful Internet Addresses - Mapping Internet Addresses to Physical Addresses (ARP) - Determining and Internet.

Unit 4 Client-Server Model of Interaction Socket Interface: Creating socket, sending and receiving data, obtaining local and Remote socket Addresses, host names, internal host domain – set socket options- socket Library calls – Obtaining Information about Hosts, networks, Protocols, network services.

Unit 5 Applications of socket programming FTP, SMTP, POP, HTTP, SNMP, RTP - Internet Security and Firewall Design (IPsec) - Future of TCP/IP (IPv6). Thread servers – Thread creation and Termination.

REFERENCE BOOKS:

1. Douglas E. Comer, "Internetworking with TCP/IP, Principles, Protocols and Architectures", 4th Edition, Prentice – Hall India
2. Richard Stevens.W, "UNIX network programming", Vol. 1, PHI, 1998.

Title of the paper	Software Testing	
Category :	Year & Semester	Credits
	Fifth year & Semester IX	4

Unit 1: Introduction: Purpose – Productivity and Quality in Software – Testing Vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.

Unit-2: Flow/Graphs and Path Testing – Achievable paths – Path instrumentation – Application – Transaction Flow Testing Techniques – Data Flow Testing Strategies

Unit 3: Domain Testing: Domains and Paths – Domains and Interface Testing – Linguistic –Metrics – Structural Metric – Path Products and Path Expressions.

Unit-4:Syntax Testing – Formats – Test Cases – Logic Based Testing – Decision Tables – Transition Testing – States, State Graph, State Testing.

Unit-5: Verification and Validation – Fundamental Tools - Levels of Testing – Testing Approaches – Types of Testing – Test Plan – Software Testing Tools: Win Runner – Silk Test

1. Recommended Texts

(i) B. Beizer , 2003, Software Testing Techniques, II Edn., DreamTechIndia, New Delhi.

(ii) K.V.KK. Prasad , 2005, Software Testing Tools, DreamTech. India, New Delhi.

2. **Reference Books**

(i) I. Burnstein, 2003, Practical Software Testing, Springer International Edn.

(ii) E. Kit, 1995, Software Testing in the Real World: Improving the Process, Pearson Education, Delhi.

(iii) R.Rajani, and P.P.Oak, 2004, Software Testing, Tata Mcgraw Hill, New Delhi.

3**. Website, E-learning resources**

(i)
http://www.amazon.com/gp/reader/0201877562/ref=sib_dp_pt/102-1957971-9723354#reader -link

Title of the paper	**Data Warehousing and Data Mining**	
Category : Extra Disciplinary Elective -II	Year & Semester	Credits
	Fifth year & Semester IX	4

Objective: -This course introduces the basic concepts of data warehousing and data mining

Unit 1: Introduction: Data Mining tasks – Data Mining versus Knowledge Discovery in Data bases – Relational databases – Data warehouses – Transactional databases – Object oriented databases – Spatial databases – Temporal databases – Text and Multimedia databases – Heterogeneous databases - Mining Issues – Metrics – Social implications of Data mining.

Unit 2: Data Preprocessing: Why preprocess the data – Data cleaning – Data Integration – Data Transformation – Data Reduction – Data Discretization.

Unit 3: Data Mining Techniques: Association Rule Mining – The Apriori Algorithm – Multilevel Association Rules – Multidimensional Association Rules – Constraint Based Association Mining.

Unit 4: Classification and Prediction: Issues regarding Classification and Prediction – Decision Tree induction – Bayesian Classification – Back Propagation – Classification Methods – Prediction – Classifiers accuracy.

Unit 5 : Clustering Techniques: cluster Analysis – Clustering Methods – Hierarchical Methods – Density Based Methods – Outlier Analysis – Introduction to Advanced Topics: Web Mining , Spatial Mining and Temporal Mining.

1. Recommended Texts

(i) J. Han and M. Kamber , 2001, Data Mining: Concepts and Techniques, Morgan Kaufmann, .New Delhi.

2. Reference Books

(i) M. H.Dunham, 2003, Data Mining : Introductory and Advanced Topics , Pearson Education, Delhi.

(ii) PaulrajPonnaiah, 2001, Data Warehousing Fundamentals, Wiley Publishers.

(iii) S.N. Sivananda and S. Sumathi, 2006, Data Mining, Thomsan Learning, Chennai.

Title of the paper	Network Programming Lab	
Category :	Year & Semester	Credits
	Fifth year & Semester IX	3

1. Working with Java Scripts.
2. Creating ActiveX Controls.
3. OLE Server.
4. OLE Container.
5. Working with URL Monikers.
6. Creating an ISAPI Extension.
7. Creating an ISAPI Filter.

8. Building IIS Application.

9. Data- Driven DHTML Application.

10. ActiveX Documents.

Title of the paper	TCP/IP Networks	
Category :	Year & Semester	Credits
Elective	**Fifth year & Semester IX**	3

UNIT I - INTODUCTION Internetworking concepts and architecture model – classful Internet address – CIDR – Subnetting and Supernetting – AARP – RARP- IP- IP Routing – ICMP – IPV6.

UNIT II - TCP

Services – header – connection establishment and termination – interactive data flow –bulk data flow – timeout and retransmission – persist timer – keep alive timer – futuresand performance.

UNIT III - IP IMPLEMENTATIONIP global software organization – routing table – routing algorithms – fragmentation andreassembly – error processing (ICMP) – Multicast Processing (IGMP).

UNIT IV - TCP IMPLEMENTATION I

Data structure and input processing – transmission control blocks – segment format –comparision – finite state machine implementation – Output processing – mutualexclusion – computing the TCP Data length.

UNIT V - TCP IMPLEMENTATION II

Timers – events and messages – timer process – deleting and inserting timer event –flow control and adaptive retransmission – congestion avoidance and control – urgentdata processing and push function.

TEXT BOOKS:1. Douglas E Comer,"Internetworking with TCP/IP Principles,Protocols andArchitecture",Vol 1 and 2, Vth Edition

2. W.RichardStevans "TCP/IP Illustrated" Vol 1.2003.

REFERENCES:

1. Forouzan, " TCP/IP Protocol Suite" Second Edition, Tate MC Graw Hill, 2003.

2. W.Richard Stevens "TCP/IP Illustrated" Volume 2, Pearson Education 2003

Title of the paper	Artificial Neural Networks	
Category : Elective	Year & Semester	Credits
	Fifth year & Semester IX	3

Unit 1: Introduction to Neural Networks – Basic Concepts of Neural Networks – Inference and Learning – Classification Models – Association Models – Optimization Models – Self-Organization Models.

Unit 2: Supervised and Unsupervised Learning – Statistical Learning – AI Learning – Neural Network Learning – Rule Based Neural Networks – Network Training – Network Revision- Issues- Theory of Revision- Decision Tree Based NN – Constraint Based NN

Unit 3: Incremental learning – Mathematical Modeling – Application of NN- Knowledge based Approaches.

Unit 4: Heuristics- Hierarchical Models – Hybrid Models – Parallel Models – Differentiation Models- Control Networks – Symbolic Methods- NN Methods.

Unit 5: Structures and Sequences – Spatio-temporal NN – Learning Procedures – Knowledge based Approaches.

1. Recommended Texts

(i) L. Fu, 1994, Neural Networks in Computer Intelligence, Tata McGraw Hill, New Delhi.

2. Reference Books

(i) R. J. Schalkoff, 1997, Artificial Neural Networks, Tata McGraw Hill, New Delhi.

Anderson, 2001, An Introduction to Neural Network, PHI, New Delhi.

Title of the paper	Windows Programming	
Category : Elective	Year & Semester	Credits
	Fifth year & Semester IX	3

Objective:- This course introduces the concepts of Windows Programming.

Unit 1: Windows Fundamentals – Programming Concepts and Vocabulary for Windows – Windows Development Tools – Resource Information

Unit 2: Application Framework- Project Utility – Writing Windows Programming (Procedure Oriented) – Pie-chart Application

Unit 3: MFC Library – MFC Design Considerations – Key features of MFC Library – C Object – Simple Application and Template- Drawing in Client Area- Fourier Series application with Resources- Bar Chart with Resources.

Unit 4: Graph Applications – Word Processor Applications – OLE Features and Specifications - Container Application.

Unit 5: Active X Controls – Create simple Active X Controls with MFC – Customizing Controls – COM – DHTML- ATL vs. ActiveX.

Recommended Texts :-

(i) L. Klander, 2000, Core Visual C++ 6, First Indian reprint, Addison Wesley, Boston.

Reference Books:-

(i) C.H.Pappas and W.H.Murray, 1999, Visual C++ 6 (The Complete Reference), Tata McGraw Hill, New Delhi.
(ii) H. Schildt, 1999, Windows 98 Programming from the GroundUp, Tata McGraw Hill, New Delhi.

Title of the paper	**Distributed Computing**	
Category : Elective	Year & Semester	Credits
	Fifth year & Semester IX	3

Unit-I: Hardware Concepts - Switched Multiprocessor - Bus-based multicomputer - Switched Multicomputer - Software concepts - Network Operating Systems and NFS - Time

Distributed Systems. Design Issues: Transparency - Flexibility - Reliability - Performance and scalability.

Unit-II: Communications in distribute systems - The Client/Server Model - Blocking versus unbuffered primitives - Implementation of Client/Server model.

Unit-III: Synchronization in distributed systems - Clock synchronization - Mutual exclusion - Election algorithms - Atomic transactions - Dead lock distributed system - Threads - Thread usage and implementation of thread packages - Processor allocation.

Unit-IV: Distributed File System: File Service interface - Semantics of file sharing - Distributed file system - Implementation of new trends in distributed file system.

Unit-V: Distributed databases: Distributed DBMS Architecture - Sorting Data in a Distributed DBMS - Distributed Catalog Management - Distributed query processing - Updating distributed data - Distributed transaction management - Distributed Concurrency control - Recovery.

Book for Study:

A.S. Tanenbaum - Modern Operating Systems - Prentice Hall.

Title of the paper	**Image Processing**	
Category : Elective	Year & Semester	Credits
	Fifth year & Semester IX	3

UNIT - I Definition of Digital Image Processing, The Origins of Digital Image Processing, Examples ofFields that Use Digital Image Processing - X-ray Imaging, Ultraviolet Band, Visible and Infrared Bands, Microwave Band, and Radio Band Imaging; Fundamental Steps in Digital Image Processing, Components of an Image Processing System, **Digital Image Fundamentals**

Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and

Acquisition - Single Sensor, Sensor Strips, Sensor Arrays, A Simple Image Formation Model;

Image Sampling and Quantization - Spatial and Gray-Level Resolution, Aliasing and Moiré

Patterns, Zooming and Shrinking Digital Images; Some Basic Relationships Between Pixels.

UNIT II

The Image, its Mathematical Background: Overview – Linear Integral Transforms. Data Structures for Image Analysis: Level of Image Data Representation – Traditional Image Data Structures – Hierarchical Data structures. Image

Pre-processing: Pixel Brightness Transformations - Geometric transformations – Local pre-processing: Image smoothing, Edge Detectors.

UNIT III

Image Restoration Image enhancement in spatial domain – some basic gray level transformations – histogram processing – enhancement using arithmetic , logic operations – basics of spatial filtering and smoothing Image enhancement in Frequency domain – Introduction to Fourier transform: 1- D, 2 –D DFT and its inverse transform, smoothing and sharpening filters.

UNIT IV

Image restoration: Model of degradation and restoration process – noise models – restoration in the presence of noise-periodic noise reduction.. Image segmentation: Thresholding and region based segmentation.

UNIT V

Image compression: Fundamentals – models – information theory – error free compression Coding and Interpixel redundancies - Fidelity criteria - Image Compressions models - Elements of Information theory - Variable length coding - Bit plane coding –Lossy compression: predictive and transform coding. JPEG standard.MPEG

Text Books

(i) R.C. Gonzalez, R.E.Woods, [2002/008], Digital Image processing, 2nd/3rd Edition, Pearson Education.

(ii) Sonka, Hlavac, Boyle, Digital Image Processing and Computer Vision, Cengage Learning, 2009

Reference Books

(i) Anil K. Jain, 1994, Fundamentals of Digital image Processing, 2nd Edition, Prentice Hall of India, New Delhi.

(ii) Pratt. W.K., Digital Image Processing, 3rd Edition, John Wiley & Sons.

(iii) Rosenfled A. &Kak, A.C, 1982, Digital Picture Processing, vol .I & II, Academic Press

(ii) 2. Chanda&Majumdar, Digital Image Processing and Analysis, Prentice Hall ,3rdEditionz.

Website, E-learning resources

(i) http://www.imageprocesssingplace.com/DIP/dip-downloads/

Title of the paper	Cryptography	
Category :Elective	Year & Semester	Credits
	Fifth year & Semester IX	3

Unit 1: Conventional Encryption: Conventional encryption model – DES –RC 5 – Introduction to AES - Random number generation.

Unit-2: Number Theory: Modular arithmetic – Euler's theorem – Euclid's algorithm – Chinese remainder theorem – Primarily and factorization –Discrete logarithms – RSA algorithm

Unit 3: Public key Cryptography: Principles – RSA algorithm – key management- Diff – Hellman key exchange

Unit 4: Message Authorization and Hash functions: Hash functions- Authentication requirements Authentication function- Message authentication codes –Secure Hash algorithms

Unit 5: Digital Signature and Authentication Protocols : Digital Signature- Authentication Protocols –Digital signature standard.

Recommended Texts:

1) Stallings, W., 2005 , Cryptography and Network Security Principles and Practice, Pearson Education, Delhi.
2) Charlie Kaufman, Radia Perlman, Mike specimen, Network Security- Private Communication in a public world.
3) Michael Welsehenbach, 2005, Cryptography in C & C++", John Wiley.

Reference Books

1) Bruce sehneier , 2001 Applied Cryptography , John Wiley and sons.

2) KailashN.Gupta ,Kamlesh N. Agarwala, Pratek A. Agarwala, 2005, Digital signature Network security practices , PHI, New Delhi.

SEMESTER X

Main Project

Each student shall carry out an individual project for the full semester in an IT or related industry or in the department and a report of work done shall be submitted.