Syllabus

Master of Computer Application

(w.e.f. 2014-15)

DEPARTMENT OF COMPUTER SCIENCE

Central University of Haryana
Mahendergarh

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DEPARTMENT OF COMPUTER SCIENCE
CENTRAL UNIVERSITY OF HARYANA
MAHENDERGARH, HARYANA

University Logo

University Logo is conceived with a globe at its centre surrounded by holy trinity of three arcs and at the bottom is a shloka taken from 'Neeti Shatkam' written by Bhartihari.

The arc at the bottom epicts an open book and a Veena, symbolising University's commitment to meeting the quest for acquiring knolwedge, learning, enlightenment and promoting art and culture.

The arc at the right that epicts processes of science, technology and adventurism symbolises the University's commitment to promoting scientific progress and creating a culture of creativity, innovation and enquiring approach.

The arc at the left that epicts nature symbolises University's commitment to promoting education inculcating respect for environment, ecology and living in harmony with nature.

The globe at the centre surrounded by the human chain and the pigeon flying above expresses University's belief that commitments represented by the trinity of three arcs shall lead to global peace, prosperity and human solidarity-the real spirit of education.

The shloka at the bottom conveys that 'education' is the unrivalled treasure of all.

Vision Statement

To develop enlightened citizenship for a knowledge society for peace and prosperity of individuals, nation and the larger world through promotion of innovation, creative endeavors and scholarly inquiry

Mission Statement

- To be a leading model by defining learning, teaching and discovery in a global, national and local context
- To strive to create a learning ambience with diverse cultural backgrounds and enhance student's acquisition of useful knowledge, skills and analytical abilities through innovative teaching and holistic learning environment
- To facilitate cutting edge research in emerging areas and expanding research in traditional areas
- To progressively expand in phases academic and research areas to be pursued by the University from time to time into their diversified focuses
- To focus on relevance, quality and excellence in each area and discipline of study that University is to pursue
- To develop partnership with international and national institutions and facilitate providing international linkages for contextual and cultural learning for both faculty and students
- To involve stakeholders including Government, Industry, Community and others in providing relevant and quality education
- To create and maintain highest level of integrity, ethics and values on Campus and ensure zero tolerance for lack of these core commitments

University Objectives

- To disseminate and advance knowledge by providing instructional and research facilities in such branches of learning as it may deem fit;
- To make special provisions for integrated courses in humanities, social sciences, science and technology in its educational programmes;
- To take appropriate measures for promoting innovations in teaching-learning process and inter-disciplinary studies and research;
- To educate and train manpower for the development of the country;
- To establish linkages with industries for the promotion of science and technology; and
- To pay special attention to the improvement of the social and economic conditions and welfare of the people, their intellectual, academic and cultural development.

Central University of Haryana

The Central University of Haryana, established by MHRD, under the Central Universities Act-2009 (Act No. 25 of 2009) made a spirited beginning under the leadership of its sagacious and visionary founder Vice Chancellor Prof. Mool Chand Sharma, from a rented building in Gurgaon as transit office and Narnaul B.Ed. college building as campus. It has now shifted to its Permanent Campus sprawling over 488 acres of land at Jant-Pali Villages, Mahendergarh district of Haryana. The University, fully funded by the UGC, is all set to emerge as a seat of great learning in the Southern Haryana under the leadership of its reverent and visionary Acting Vice-Chancellor Prof. U. P. Sinha. Being at the nascent stage of establishment, the University immediately after getting possession of the land at Jant-Pali, Mahendergarh acted through various empowered Committees and Groups to chart out the course of development. After duly considering the recommendations of various empowered committees the Executive Council of the University approved the road map for the first phase of development of the campus on the site at Jant-Pali, Mahendergarh. The first phase of development comprises the construction of boundary wall and a block of four buildings. The construction of boundary wall is complete and the four blocks are functional to run the academic programmes. These blocks host separate hostels for boys and girls, modest accommodation for faculty and other staff, academic wing with class rooms, seminar rooms, tutorial rooms, laboratories, libraries, conferencing facilities, etc. These buildings will be integrated as a part of hostel zone when the development of the Campus enters in the final phase. Marching ahead on the journey of promoting grass root research and fruitful engagement with society many brainstorming sessions of idea generation are held. After comprehensive deliberations University has adopted **"Multidisciplinary Approach to Inclusive Education"** as motto.

DEPARTMENT OF COMPUTER SCIENCE

Department of Computer Science, Central University of Haryana was opened in the academic year 2013-14 by offering MCA programme. This *Department* is functioning under the School of Computer Science & Informatics and is the founding department of the School.

Department of Computer Science offers PG programme i.e. MCA of three years duration which are divided into six semesters & based on choice based credit system (CBCS).

Department aims to impart quality education in the field of Computer Science, and to design and offer courses with the twin objective of producing world class computer professionals to keep pace with the R & D activities in this fast emerging and changing field of computer applications.
It believes in close interaction with the industry on a regular basis to keep pace with ever changing scenario of the IT industry. This highly coveted and prestigious course has proven credibility and value in the industry. The course curriculum is so designed that it gives an edge to our students over others in almost every area of computer applications.

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Course Structure for MCA under Choice Based Credit System has been given on the next page.

SCHEME OF EXAMINATION

MCA (Credit-Based System)

Semester I

Course Code	Course Nomenclature	Duration of Exam	Total Credits
SCS CSC 01 101 C 4004	Computer Fundamentals and Problem Solving through C	3 Hours	4
SCS CSC 01 102 C 4004	Discrete Mathematical Structures	3 Hours	4
SCS CSC 01 103 C 4004	Computer Oriented Numerical and Statistical Methods using C	3 Hours	4
SCS CSC 01 104 C 0022	Software Lab. – I Programming in C (Based on SCS CSC 01 101 C 4004)	3 Hours	2
SCS CSC 01 105 C 0022	Software Lab. – II Numerical and Statistical Methods using C (Based on SCS CSC 01 103 C 4004)	3 Hours	2
SCS CSC 01 101 E 3003	Software Engineering	3 Hours	3
SCS CSC 01 102 E 3003	Operating Systems	3 Hours	3
SCS CSC 01 101 S 2002	Cyber Security	3 Hours	2
Total			**24**

Semester – II

Course Code	Course Nomenclature	Duration of Exam	Total Credits
SCS CSC 01 201 C 4004	Object-oriented Systems and C++	3 Hours	4
SCS CSC 01 202 C 3003	Digital Design and Computer Organization	3 Hours	3
SCS CSC 01 203 C 4004	Data Structures using C / C++	3 Hours	4
SCS CSC 01 204 C 0022	Software Lab. – III Programming in C++ (Based on SCS CSC 01 201 C 4004)	3 Hours	2
SCS CSC 01 205 C 0022	Software Lab. – IV Data Structures implemented in C / C++ (Based on SCS CSC 01 203 C 4004)	3 Hours	2
SCS CSC 01 201 E 3003	Computer Oriented Optimization Techniques	3 Hours	3
SCS CSC 01 202 E 3003	Computer Networks	3 Hours	3
	Course to be offered by other School / Department	***3 Hours***	***3***
Total			**24**

Semester III

Course Code	Course Nomenclature	Duration of Exam	Total Credits
SCS CSC 01 301 C 4004	Database Management Systems	3 Hours	4
SCS CSC 01 302 C 3003	Design and Analysis of Algorithms	3 Hours	3
SCS CSC 01 303 C 4004	Programming in Java	3 Hours	4
SCS CSC 01 304 C 0022	Software Lab. – V RDBMS (Based on SCS CSC 01 301 C 4004)	3 Hours	2
SCS CSC 01 305 C 0022	Software Lab. – VI Programming in Java (Based on SCS CSC 01 303 C 4004)	3 Hours	2
SCS CSC 01 301 E 3003	System Modelling & Simulation	3 Hours	3
SCS CSC 01 302 E 3003	E-Commerce	3 Hours	3
	Course to be offered by other School / Department	3 Hours	3
Total			**24**

Semester – IV

Course Code	Course Nomenclature	Duration of Exam	Total Credits
SCS CSC 01 401 C 4004	Computer Graphics	3 Hours	4
SCS CSC 01 402 C 3003	Theory of Computation	3 Hours	3
SCS CSC 01 403 C 4004	Advanced Database Systems	3 Hours	4
SCS CSC 01 404 C 0022	Software Lab. – VII Graphics Programming in C/C++ (Based on SCS CSC 01 401 C 4004)	3 Hours	2
SCS CSC 01 405 C 0022	Software Lab. – VIII Oracle/DB2/MySQL (Based on SCS CSC 01 403 C 4004)	3 Hours	2
SCS CSC 01 401 E 3003	Artificial Intelligence	3 Hours	3
SCS CSC 01 402 E 3003	Advanced Computer Architecture	3 Hours	3
	Course to be offered by other School / Department	***3 Hours***	***3***
Total			**24**

Semester V

Course Code	Course Nomenclature	Duration of Exam	Total Credits
SCS CSC 01 501 C 4004	Linux and Shell Programming	3 Hours	4
SCS CSC 01 502 C 3003	Compiler Design	3 Hours	3
SCS CSC 01 503 C 4004	Web Engineering	3 Hours	4
SCS CSC 01 504 C 0022	Software Lab. – IX Shell programming (Based on SCS CSC 01 501 C 4004)	3 Hours	2
SCS CSC 01 505 C 0022	Software Lab. – X Programming in XML/JavaScript/C# with .NET (Based on SCS CSC 01 503 C 4004)	3 Hours	2
SCS CSC 01 501 E 3003	Data Warehousing & Data Mining	3 Hours	3
SCS CSC 01 502 E 3003	High Performance Networks	3 Hours	3
	Course to be offered by other School / Department	3 Hours	3
Total			**24**

Semester – VI

Course Code	Course Nomenclature	Total Credits
SCS CSC 01 601 C 001515	Major Project	15
Total		**15**

Note:

1) One credit in theory paper is equivalent to one hour classroom teaching per week.
2) One credit in practical/lab course is equivalent to 2 hours practical/lab work per week
3) A teacher will conduct practical class in a group of 15 students.

ORDINANCE RELATING TO PROGRAMMES LEADING TO THE AWARD OF POST GRADUATE DEGREES / DIPLOMAS

1. Definitions:

1.1 "Course" means a Semester course.

1.2 "Credit" (c) is the weightage assigned to a course in terms of contact hours.

1.3 "Grade" means a letter grade assigned to a student on the basis of evaluation of a course on a ten point scale.

1.4 "Grade point" (g) means the numerical equivalent of a letter grade assigned to a student in the ten point scale.

1.5 Semester Grade Point Average (SGPA) means the grade point average of a student for a semester calculated in the following manner:

SGPA = $(g_1 x c_1) + (g_2 x c_2) + \ldots$(in respect of all courses for which the student has registered in the semester concerned) divided by the total number of credits offered by the student in the semester.

1.6 "Cumulative Grade Point Average" (CGPA) means a cumulative index grade point average of a student calculated in the following manner:

CGPA = $(g_1 x c_1) + (g_2 x c_2) + \ldots$(in respect of all the courses for which the student has registered up to and including the semester for which the cumulative index is required) divided by the total number of credits offered by the student in the said courses.

1.7 "Final Grade Point Average" (FGPA) is the final index of a student at the time of award of a degree, calculated in the following manner:

$$\text{FGPA} = \frac{\sum_{i=1}^{n} g_i \, x \, c_i}{\sum_{i=1}^{n} c_i}$$

Where

c_i = credit in the i^{th} course

g_i = grade point secured by the student in the i^{th} course

n = total number of courses prescribed for the student for the entire programme.

1.8 "Final Grade" is the letter equivalent assigned to a student on the basis of his/her FGPA at the time of the award of the degree.

2. Eligibility for admission:

A candidate may be admitted to the Master's programme if he/she has obtained a Bachelor's degree under 10+2+3 system recognized by the University, or a degree recognized as its equivalent, provided such a candidate has attained the minimum proficiency in the subject at the time of admission as decided by the University from time to time.

3. Semesters:

3.1 An academic year shall consist of two semesters, viz.:Odd semester and Even semester.

3.2 Ordinarily an Odd semester shall extend from July to December, and an Even semester from January to May.

3.3 A semester normally extends over a period of 15 weeks, each week having 30 hours of instruction spread over a week.

4. Type of courses:

Each programme may have three types of courses, viz. core courses, elective courses and self-study-courses.

4.1. Core courses:

4.1.1 Core courses are those, knowledge of which is deemed essential for students registered for a particular Master's programme. Where feasible and necessary, two or more programmes may prescribe one or more common core courses.

4.1.2 Core courses shall be mandatory for all students registered for that Master's programme.

4.1.3 Core courses shall be spread over all the semesters of the programme.

4.2 Elective courses:

Elective courses are intended to:

- allow students to specialize in one or more branches of the broad subject area; or
- acquire knowledge and skills in a related area that may have applications in the broad subject area; or
- bridge any gap in the curriculum and enable acquisition of essential skills (e.g. statistical, computational, language, communication skills, etc.); or
- help pursue an area of interest to the student.

4.3 Self-study courses:

4.3.1 Self-study courses are optional, not mandatory. They are not taken into account for awarding grades.

4.3.2 Students may also choose 3 additional courses to enable them to acquire extra credits through self-study.

4.3.3 Self-study courses shall be in advanced topics in a course (core or elective) under the supervision of a faculty member.

Note: A course (Core/Elective/Self-study) may also take the form of a Dissertation/ Project work/ Practical training/ Field work/ Internship/ Seminar, etc.

5. Credits:

Credit defines the quantum of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, in each course, credits are assigned on the basis of the number of lectures/tutorials/laboratory work/field work and other forms of learning required completing the contents in a 15 week schedule. 2 hours of laboratory work/field work is generally considered equivalent to 1 hour of lecture.

- 1 credit = 1 hour of instruction per week (1 credit course = 15 hours of instruction per semester)

- 3 credits = 3 hours of instruction per week (3 credit course = 45 hours of instruction per week)

A Core course may carry 3 to 4 credits; an elective/ Self-study will not normally carry more than 3 credits. However, a dissertation/ project work may carry up to 6 credits; a semester-long field work may carry 10-15 credits.

6. Auditing:

Students may be permitted by the individual faculty member at his/her discretion to audit two courses without assigning any credits.

7. Course numbering:

Each course offered by a faculty/department is identified by a unique course code: e.g. SSS C 001 Eco 3003, where

- SSS stands for School of Social Sciences;
- C stands for core course;
- 001 stands for the serial number of the course;
- The figures 3,0,0,3 stand for credits attached to lectures (practical, if it is a practical course), tutorials, practical work (theory, if it is a practical course) and total number of credits for the course respectively.

8. Duration of programme:

The minimum duration for completion of a one-year Post Graduate Diploma programme shall be two consecutive semesters (one odd and one even semester), for a two-year Master's programme in any subject shall be four consecutive semesters (two odd and two even semesters) and for a three-year Master's programme - six semesters, i.e. three odd and three even semesters. The maximum period for completion shall be four semesters, six semesters and eight semesters respectively.

Provided that a semester or a year may be declared by the Academic Council zero semester or zero year in the case of a student if he/she could not continue with the academic work during that period due to illness and hospitalization, or due to accepting a foreign scholarship/fellowship, subject to fulfillment of requirements laid down in this respect by regulations. Such zero semester/year shall not be counted for calculation of the duration of the programme in case of such a student.

9. Student Advisor:

The Department in which the student gets admitted shall appoint an Advisor for him/her from amongst the members of the faculty concerned. All faculty members of the department shall function as Student Advisors and shall have more or less equal number of students. The Student Advisor shall advise the student in choosing courses and render all possible help to the student.

10. Course Registration:

10.1 Registration of courses is the sole responsibility of a student. No student shall be allowed to do a course without registration, and no student shall be entitled to any credits in the course unless he/she has been formally registered for the course by the scheduled date fixed by the University.

10.2 Every student has to register in each semester (in consultation with his/her Student Advisor) for the courses he/she intends to undergo in that semester by applying in the prescribed proforma in triplicate , duly signed by him/her, the Student Advisor and the Head of the Department, within the deadline notified for the purpose by the University.

10.3 Late registration may be permitted by the Dean of the faculty upto a maximum of two weeks after the commencement of the semester on payment of prescribed late registration fee.

10.4 A student shall register for a minimum of 15 credits and can register for a maximum of 24 credits in a semester.

10.5 Withdrawal from a course shall be permitted up to one week from the date of registration, provided the courses registered after withdrawal shall enable the student to earn a minimum of 15 credits. Withdrawal from a course shall not be allowed for those who had late registration.

10.6 A student shall be allowed to add a course or substitute a course for another course of the same type (core, elective or self study) for valid reasons with the consent of the Student Advisor not later than two weeks from the date of commencement of the semester.

10.7 A student may take more elective courses than prescribed in the programme, in which case in the calculation of the Semester/ Cumulative/ Final Grade Point Average only the prescribed number of elective courses in the descending order of the grades obtained by him/her shall be included.

11. Evaluation & examination:

11.1 Sessional evaluation shall be done on a continuous basis, taking into account the student's class performance, fulfillment of home assignments and performance at the compulsory sessional tests (2 best out of 3 tests to be conducted in a semester). For uniformity, particularly for interdepartmental transfer of credits, there shall be a uniform procedure of examination to be adopted by all faculty members. There shall be three sessional tests and one end-semester examination in each course during every semester.

11.2 Sessional Test 1 shall be held during the sixth week of the semester for the syllabi covered till then.

11.3 Sessional Test 2 shall be held during the eleventh week for the syllabi covered between seventh and eleventh week.

11.4 Sessional test 3 shall be held during the fourteenth week of the semester for the remaining syllabus after the sessional test 2.

11.5 Sessional tests may employ one or more assessment tools such as objective tests, assignments, paper presentation, laboratory work, etc. suitable to the course.

11.6 The pattern of assessment of sessional work, including the weightages to be given to different elements like class performance, home assignments and the sessional tests, for each course shall be prescribed by the School Board on the recommendation of the Board of Studies of the Department concerned and shall be made known to the students at the commencement of each semester.

11.7 A student cannot repeat sessional tests.

11.8 The sessional work and the end semester examination shall have equal weightage i.e. 50% each. The 50% weightage allotted to sessional work shall consist of 30% for class performance and home assignments and the remaining 20% for the two compulsory sessional tests (i.e. 10% each), or 20% for class performance and home assignments and 30% for the two sessional tests, depending upon the nature of the course.

11.9 A student clears the sessional work in a course if he / she has participated in the sessional work and secured a grade higher than F in it.

11.10 End semester Examinations covering the entire syllabus prescribed for the course and carrying 50% of weightage shall be conducted under the direction of the Dean of the School.

11.11 Examiners or Board of Examiners shall be appointed for each course by the School Board on the recommendation of the Board of Studies of the Department concerned.

11.12 The distribution of weightage for the valuation of semester-long project work/ dissertation shall be:

i) Periodic presentation : 20%

ii) Concise dissertation : 60%

iii) Viva voce : 20%

Or as decided by the School Board on the recommendations of the Board of Studies of the Department concerned.

11.13 An application for admission to the semester examination shall be made in the prescribed form and forwarded to the Dean of the School through the HOD concerned and shall be accompanied by the following documents:

i) Clearance in sessional evaluation;

ii) Clearance of all dues.

12. Grades and Grade points:

The students shall be graded in sessional tests, end semester examinations, etc. in each course on the following ten point scale:

Grade	**Grade Point**
A+	**9.00**
A	**8.25**
A-	**7.50**
B+	**6.75**
B	**6.00**
B-	**5.25**
C+	**4.50**
C	**3.75**
C-	**3.00**
F	**0**

Note:

1. There shall be no rounding of SGPA/CGPA/FGPA.
2. The SGPA/CGPA/FGPA obtained by a student is out of a maximum possible 9 points.

The Final Grade Point Average obtained by a student shall be classified into the following divisions:

FGPA	**Class/ Division**
8.5 and above	First Class with Distinction
7.0 and above, but less than 8.5	First Class
5.0 and above, but less than 7.0	Second Class
4.0 and above, but less than 5.0	Pass

13. Credit requirements:

13.1 For a one-year Post Graduate programme, the credit requirements for the award of the Post Graduate Diploma shall be 40 credits (±10%), including a minimum of 9 credits from elective courses (of which at least 3 credits shall be from elective course offered by another Department).

13.2 For a two-year Master's programme, the credit requirements for the Master's degree shall be 80 credits (±10%), including a minimum of 18 credits from elective courses (**of which at least 6 credits shall be from elective courses offered by other Departments**).

13.3 For a three-year Master's programme, the credit requirements for the Master's degree shall be 120 credits (±10%), including 27 credits from elective courses (of which 9 credits shall be from elective courses offered by other Departments).

14 Grade point requirements:

A student in order to be eligible for the award of the Master's degree of the University must have fulfilled the following requirements:

i) He/she has taken and passed all the prescribed courses as laid down;

ii) He/she has obtained a FGPA of 4.00 at the end of the programme.

Provided that students who are otherwise eligible for the award of the degree / diploma but have secured a FGPA less than 4.00 at the end of the permissible period of semesters may be allowed by the Department / School concerned to repeat the same course/s or other courses of the same type in lieu thereof in the two extra semesters provided in clause 8 on "Duration of Programme".

15 Removal of name of a student from the programme:

a. The name of a student falling under the following categories shall automatically stand removed from the rolls of the University:
   (a) A student who fails to fulfill the minimum grade point requirements under clause 14.
   (b) A student who has already exhausted the maximum duration allowed for completion of the Programme and has not fulfilled the requirements for the award of the degree / diploma.
b. The School Board, on the recommendation of the Board of Studies of the Department concerned, may remove the name of a student from the programme of study if
   (a) he / she fails to clear at least 50% of the prescribed core courses at the end of the 1st semester.
   (b) he / she has still to clear courses which cannot possibly be cleared in the remaining period of the programme which he/ she is allowed to register for the normal load in the said period.

Notwithstanding what is contained in the foregoing clauses of this Ordinance, the Academic Council may, in exceptional circumstances and on the recommendations of the Board of Studies of the Department and the School Board as well as on the merits of each individual case, consider at its discretion and for reasons to be recorded relaxation of any of the provisions except those prescribing CGPA / FGPA requirements.

MCA
SEMESTER–I

SCS CSC 01 101 C 4004 : COMPUTER FUNDAMENTALS & PROBLEM SOLVING THROUGH C

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 4

L	T	P	Total
4	-	-	4

Time: 3 Hours (Examination)

SYLLABUS

Computer Fundamentals: Computer components, characteristics & classification of computers, hardware & software, peripheral devices.

Algorithmic Development: Techniques of problem solving, Flowcharting, decision table, structured programming concepts, Modular Programming, Algorithms for searching, sorting and merging. Programming methodologies: top-down and bottom-up programming.

Elements of C: C character set, identifiers and keywords, Data types: declaration and definition.

Operators: Arithmetic, relational, logical, bitwise, unary, assignment and conditional operators and their hierarchy & associatively.

Data input/output.

Control statements: Sequencing, Selection: if and switch statement; alternation, Repetition: for, while, and do-while loop; break, continue, goto.

Functions: Definition, prototype, passing parameters, recursion.

Data Structures: arrays, struct, union, string, data files.

Pointers: Declaration, operations on pointers, array of pointers, pointers to arrays.

References:

1. Computer Programming and Problem Solving Through C by Dharminder Kumar, Varun Kumar, Excel books, 2005, New Delhi.
2. Computing Fundamentals and Programming in C by Nasib Singh Gill, Khanna Book Publishing Co.(P) Ltd., New Delhi
3. Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, 3rd Ed., Addison Wesley.
4. AK Sharma, Fundamental of Computer & Programming with C, Dhanpat Rai Publications.
5. Yashwant Kanetker, Let us C, BPB Publications.
6. Gottfried, Programming with C, Tata McGraw Hill.

SCS CSC 01 102 C 4004 : DISCRETE MATHEMATICAL STRUCTURES

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 4

Time: 3 Hours (Examination)

L	T	P	Total
4	-	-	4

SYLLABUS

GROUP AND SUBGROUPS: Group axioms, Permutation Groups, Subgroups, Cosets, Normal subgroups, Semi-groups, FREE Semi-groups, Applications, (modular arithmetic, error correcting codes, grammars, language, Finite State Machine).

Graphs: Directed and undirected graphs, chains, Circuits, paths, Cycles, connectivity, Adjacency and incedence matrices, Minima's path Application(Flow charts and state transition graphs, algorithms for determining cycle and minimal paths, polish notation and trees, flows in networks).

Lattices and Boolean Algebra: Relations to partial ordering, Lattices, Hasse diagram, Axiomatic definition of Boolean algebra as algebraic structures with two operations basic results truth values and truth tables. The algebra of propositional function. The Boolean algebra of truth values, Applications (Switching circuits, Gate circuits).

Finite Fields: Definition Representation, Structure, Integral domain Irreducible polynomial, Polynomial roots, Splitting field.

REFERENCES:

1. Alan Doerr, Kenneth Levaseur, APPLIED DISCRETE STRUCTURES FOR COMPUTER SCIENCE, Galgotia Publications Pvt. Ltd.
2. Scymour Lipschutz, Marc Lars Lipson, DISCRETE MATHEMATICS, McGRAW-HILL international editions, Schaum's Series.
3. Bernard Kolman,Robert C.Busby,DISCRETE MATHEMATICAL STRUCTURES FOR COMPUTER SCIENCE, Prentice-Hall of India Pvt. Ltd.
4. Kenneth G.Rosen: DISCRETE MATHEMATICS and ITS APPLICATIONS, McGRAW-HILL INTERNATIONAL EDITIONS, Mathematics series.

SCS CSC 01 103 C 4004 : COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS USING C

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 4

Time: 3 Hours (Examination)

L	T	P	Total
4	-	-	4

SYLLABUS

Computer Arithmetic: Floating point representation of numbers, arithmetic operations with normalized floating point numbers and their consequences. Error in number representation - pitfalls in computing.

Iterative Methods: Bisection, False position, Newton-Raphson methods, Discussion of convergences, Polynomial evaluation, Solving polynomial equations (Bairstow's Method).

Solving of Simultaneous Linear Equations and ordinary Differential Equations: Gauss elimination method, Ill-conditioned equations, Gauss-Seidal iterative method, Taylors series and Euler methods, Runge-kutta methods, Predictor corrector methods.

Numerical Differentiation and Integration: Differentiation formulae based on polynomial fit, Pitfalls in differentiation, Trapezoidal, Simpson's rules and Gaussian Quadrature.

Interpolation and Approximation: Polynomial interpolation, Difference tables, Inverse interpolation, Polynomial fitting and other curve fitting. Approximation of functions by Taylor series and Chebyshev polynomials.

Statistical methods: Sample distributions, Test of Significance, n2, t and F test.

Analysis of Variance: Definition, Assumptions, Cochran's Theorem, One-way classification, ANOVA Table, Two-way classification (with one observation per cell).

Time Series Analysis: Components and Analysis of Time Series, Measurement of Trend, Seasonal fluctuations and cyclic movement.

References:

1. Gupta S.P. and Kapoor, V.K., Fundamentals of Applied station statistics, Sultan Chand & Sons.
2. Gupta S.P. and Kapoor, V.K., Fundamentals of Mathematical statistics, Sultan Chand and Sons.
3. Rajaraman V., Computer Oriented Numerical Methods, Prentice Hall, India.
4. Graybill, Introduction to Statistics, McGraw.
5. Anderson, Statistical Modelling, McGraw.

SCS CSC 01 101 E 3003 : SOFTWARE ENGINEERING

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 3

Time: 3 Hours (Examination)

L	T	P	Total
3	-	-	3

SYLLABUS

Software and software engineering - Software characteristics, software crisis, software engineering paradigms.

Planning a software project - Software cost estimation, project scheduling, personnel planning, team structure.

Software configuration management, quality assurance, project monitoring, risk management.

Software requirement analysis - structured analysis, object oriented analysis and data modeling, software requirement specification, validation.

Design and implementation of software - software design fundamentals, design methodology (structured design and object oriented design), design verification, monitoring and control, coding.

Software reliability - metric and specification, fault avoidance and tolerance, exception handling, defensive programming.

Testing - Testing fundamentals, white box and black box testing, software testing strategies: unit testing, integration testing, Validation testing, System testing, debugging.

Software maintenance - maintenance characteristics, maintainability, maintenance tasks, maintenance side effects, CASE Tools.

References:

1. Software Engineering by Nasib Singh Gill, Khanna Book Publishing Co.(P) Ltd., New Delhi
2. Pressman S. Roger, Software Engineering, Tata McGraw-Hill.
3. Jalote Pankaj, An integrated Approach to Software, Engineering, Narosa Publishing House
4. Sommerville Ian, Software Engineering, 5th ed., Addison Wesley-2000
5. Fairley Richard, Software Engineering Concepts, Tata McGraw Hill

SCS CSC 01 102 E 3003 : OPERATING SYSTEMS

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 3

Time: 3 Hours (Examination)

L	T	P	Total
3	-	-	3

SYLLABUS

Operating System Introduction- Functions, Characteristics, Structures - Simple Batch, Multiprogrammed, timeshared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System services, System Calls, Virtual Machines.

Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple-Processor Scheduling, Real-Time Scheduling.

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping,

Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

Deadlocks - System Model, Dead locks Characterization, Methods for Handling Deadlocks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

I/O Management - I/O software and its types, Disk Scheduling.

Case Study- UNIX, LINUX, and Windows NT.

References:

1. Silberschatz & Galvin: Operating System Concept, Wiley, Latest Edition.
2. Milan Milenkovic: Operating Systems, Tata McGraw - Hill, Latest Edition.
3. William Stallings: Operating Systems, PHI, Latest Edition.
4. Yashawant Kanetkar: Unix Shell Programming, BPB.
5. A.S. Tanenbaum: Modern Operating Systems, latest edition Pearson/PHI.
6. Dhamdhere: Operating Systems, Tata McGraw Hill.

SCS CSC 01 101 S 2002 : Cyber Security

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 2

Time: 2 Hours (Examination)

L	T	P	Total
2	-	-	2

SYLLABUS

History and its Importance of Cyber Security, Goals of Cyber Security, Basic Principles of Security and other terms in Information Security, Basics of Communication Systems and Networking Concepts.

Overview of Cyber Crimes , Cyber Crime / Social Theories, Cyber Threats, Attacks, Assessing Damages, Cyber-crime and Cyber terrorism, Information Warfare and Surveillance, Cyber Forensics, Security metrics-Classification and their benefits.

Physical Security - Needs, Disaster and Controls, Basic of Physical Security, Access Control- Biometrics, Economic and Social Aspects,Security Threats to E-Commerce, Business Transactions on Web, EDI andE-Governance, Concepts in Electronics Payment Systems/Cards, Email, Web and OS Security, Business Continuity and Disaster Recovery.

Basic Concepts of Cryptographic Systems, Digital Signature, Biometrics, Finger Prints, Firewalls, VPN, Authentication Mechanisms,Hacking Techniques, Password Cracking, Insecure Network connections, Malicious Code,Applications of Cryptography.

Information Security &Cyber Laws, IPR, Patent Law, Copyright Law, Legal Issues, Ethics, Security Assurance, International Standards, Security Audit,Legal Challenges, Introduction to Information Security Standards,Security Management, Security Policy, Security Procedures and Guidelines.

References:

1. Godbole," Information Systems Security", Willey

2. Merkov, Breithaupt," Information Security",Pearson Education

3. Pfleeger&Pfleeger, "Security in Computing",Pearson Education

4. Schou,Shoemaker,"Information Assurance for the Enterprise", Tata McGraw Hill

5. Sood,"Cyber Laws Simplified", McGraw Hill

6. Furnell, "Computer Insecurity", Springer

7. IT Act 2000

MCA
SEMESTER–II

SCS CSC 01 201 C 4004 : OBJECT ORIENTED SYSTEMS AND C++

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 4

Time: 3 Hours (Examination)

L	T	P	Total
4	-	-	4

SYLLABUS

Object-Oriented Concepts: Data abstraction, encapsulation, Classes and objects, modularity, hierarchy, typing, concurrency, persistence.

Object-Oriented Methodology: Advantages and disadvantages of OO methodologies. Modeling, Domain analysis. OMT Methodology- Object Model, links and associations, multiplicity, link attributes, role names, ordering qualification, aggregation, generalization and inheritance, abstract class, meta data, object diagram. Dynamic Model-events, states, scenarios, event traces, state diagram. Functional Model-data flow diagrams. Analysis, System design and Object design.

Programming in C++: Data Types, struct vs classes, static data & member function, constant parameters & member functions, friend functions & friend classes, role of constructors & destructors, dynamic objects, operator overloading, function overloading, inheritance, virtual functions, abstract class, virtual class, template functions & template classes, exception handling, file stream classes, ASCII & Binary files, sequential & random access to a file.

References:

1. Rumbaugh, J. et. al., Object-Oriented Modelling and Design, Prentice Hall of India.
2. Booch, Grady, Object Oriented Analysis & Design, Addison Wesley.
3. Stroustrup, B., The C++ Programming Language, Addison-Wesley.
4. Lippman, C++ Primer, 4/e, Addison-Wesley
5. Balaguruswami, E., Object Oriented Programmming In C++, Tata McGraw-Hill.
6. Schildt, Herbert, C++ : The Complete Reference, 2/e, Tata McGraw-Hill.

SCS CSC 01 202 E 3003: COMPUTER NETWORKS

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 3

Time: 3 Hours (Examination)

L	T	P	Total
3	-	-	3

SYLLABUS

Network Concepts : Goals and applications of Computer Networks; Topologies; Categories of Networks - LAN, MAN, WAN, Inter-networks; point-to-point and broadcast networks; Introduction to SMDS, X.25 Networks, ISDN, frame relay and ATM networks.

Network architecture: Concept of protocols & services; OSI model and functions of its layers; TCP/IP reference model.

Data communication concepts : Components of a data communication system; transmission modes; transmission media - guided and wireless media; introduction to switching (circuit, message and packet) and multiplexing (frequency division and time division); concept of Modems.

Framing and Error control: Framing techniques; Error control- error detection & correction.

Data Link Control: Acknowledgments; Elementary data-link protocols, Automatic Repeat Request; Sliding Window protocols.

Medium Access Control and LANs : Multiple Access protocols of MAC sublayer - ALOHA, 1-persistent, p-persistent and non-persistent CSMA, CSMA/CD, Collision free protocols, Limited contention protocols, Wavelength Division Multiple Access, MACA, GSM, CDPD, CDMA; IEEE Standard 802 for LANs and MANs- Ethernet, token bus, token ring, DQDB, Logical Link Control.

Routing : Deterministic and Adaptive routing; Centralized and distributed routing; shortest-path; flooding; flow based; optimal; distance vector, link-state, hierarchical; routing for mobile hosts; broadcast and multicast routing;

Congestion control: Principles of congestion control; Traffic shaping; choke packets; load shedding; RSVP.

TCP/IP: Elements of Transport Protocols; transmission control protocol (TCP); user datagram protocol (UDP); Internet protocol (IP).

References:

1. Computer Networks - Andrew s. Tanenbaum, PHI.
2. Data Communications, Computer Networks and Open Systems, fourth edition-Fred Halsall, Addison Wesley.
3. Introduction to Data communications and Networking- Behrouz, Frozen, Tata McGraw Hill.
4. Data and Computer Communications, fifth edition-William Stallings, PHI.

SCS CSC 01 202 C 3003: Digital Design and Computer Organization

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 3

Time: 3 Hours (Examination)

L	T	P	Total
3	-	-	3

SYLLABUS

Information Representation: Number systems, BCD codes, character codes, error detecting and correcting codes, fixed-point and floating point representation of information. Binary arithmetic operations, Booths multiplication.

Binary Logic: Boolean algebra, Boolean functions, truth tables, canonical and standard forms, simplification of Boolean functions, digital logic gates.

Combinational Logic: Design procedure, adders, subtractors, encoders, decoders, multiplexers, de-multiplexers and comparators.

Sequential Logic: Flip-flops, shift registers and counters.

Memory System: Memory parameters, semiconductor RAMs, ROMs, magnetic and optical storage devices.

CPU organization: Processor organization, Machine instructions, instruction cycles, instruction formats and addressing modes, microprogramming concepts, micro-program sequencer.

I/O Organization: I/O interface, interrupt structure, transfer of information between CPU/memory and I/O devices, and IOPs.

References:

1. Mano, M. Morris, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. Nasib Singh Gill and J.B. Dixit: Digital Design and Computer Organisation, University Science Press (An Imprint of Laxmi Publications), New Delhi.
3. Rajaraman, V., Radhakrishanan,T., An Introduction To Digital Computer Design,Prentice Hall of India Pvt. Ltd., 4th Ed.
4. Hayes, J.P., Computer Architecture and Organization, McGraw Hill, Third Ed.
5. Heuring, V.P., Jordan, H.F., Computer Systems Design and Architecture, Addison Wesley.

SCS CSC 01 203 C 4004: DATA STRUCTURES USING C/C++

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 4

Time: 3 Hours (Examination)

L	T	P	Total
4	-	-	4

SYLLABUS

Introduction to Data Structures, Primitive and Composite, Arrays, Matrices, Sparse Matrices, String representation and manipulation, Stack, Queue, Dequeue, Linked lists, Trees, Binary trees, Threaded Binary tree, Balanced tree, Different tree traversal algorithms, Representation of Graphs and Applications, various searching and sorting techniques, Hashing, Dynamic Memory Management.

References:

1. Yedidyah Langsam, Moshe J Augernstein and Aarson M.Tanenbaum, Data Structures using C and C ++, PHI, New Delhi
2. Trembley, J.P. and Sorenson P.G., An Introduction to Data Structures with Applications, McGraw-Hill International Student Edition, New York
3. Seymour Lischutz, Data Structures, McGraw-Hill Book Company, Schaum's Outline Series, New York.

SCS CSC 01 201 E 3003: COMPUTER ORIENTED OPTIMIZATION TECHNIQUES

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 3

L	T	P	Total
3	-	-	3

Time: 3 Hours (Examination)

SYLLABUS

Introduction: The Historical development, Nature, Meaning and Management Application of Operations research. Modeling, It's Principal and Approximation of O.R. Models, Main characteristic and phases, General Methods of solving models, Scientific Methods, Scope, Rule on Decision Making and development of Operation Research in India.

Linear Programming : Formulation, Graphical solution, standard and matrix forms of linear programming problems, Simplex method and its flow chart, Two phase Simplex method, Degeneracy.

Duality: Introduction, Definition, General Rule for converting any primar into its Dual, Dual Simplex method and its flow chart.

Integer Programming: Importance and Applications, Gomorg's all integer programming problem technique, Branch and Bound Method.

Queuing Models : Introduction, Applications, Characteristic Waiting and Ideal time costs, Transient and Steady states, Kendall's Notations, M/M/1, M/M/C, M/Ek/1 and Deterministic Models. (No Mathematical derivations included).

PERT and CPM: Basic steps in PERT and CPM, Forward and Backward computation, Representation in Tabular form, Slack and Critical path, Difference between CPM and PERT, Float.

References:

1. Gupta P.K., Hira and D.S., Operation Research, Sultan Chand & Sons, New Delhi.
2. Kanti Swarup, Gupta P.K. & Man Mohan, Operation Research, Sultan Chand & sons, New Delhi.
3. Mittal, K.V., Optimization Methods in Operations Research and System Analysis, New Age International (P) Ltd., New Delhi.
4. Rao S.S., Optimization Theory and Applications, Wiley Eastern Ltd. New Delhi.
5. Sharma, S.D., Operations Research, Kedar Nath and Ram Nath, Meerut.
6. Taha, H.A., Operation Research - An Introduction, McMillan Publishing Co, New York.
7. Bazara, Operation Research & Networking, Wiley.
8. Avieral, Optimization Techniques.

SCS CSC 01 202 E 3003: COMPUTER NETWORKS

Note: Total 8 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Total Credits: 3

L	T	P	Total
3	-	-	3

Time: 3 Hours (Examination)

SYLLABUS

Network Concepts : Goals and applications of Computer Networks; Topologies; Categories of Networks - LAN, MAN, WAN, Inter-networks; point-to-point and broadcast networks; Introduction to SMDS, X.25 Networks, ISDN, frame relay and ATM networks.

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Data communication concepts : Components of a data communication system; transmission modes; transmission media - guided and wireless media; introduction to switching (circuit, message and packet) and multiplexing (frequency division and time division); concept of Modems.

Framing and Error control: Framing techniques; Error control- error detection & correction.

Data Link Control: Acknowledgments; Elementary data-link protocols, Automatic Repeat Request; Sliding Window protocols.

Medium Access Control and LANs : Multiple Access protocols of MAC sublayer - ALOHA, 1-persistent, p-persistent and non-persistent CSMA, CSMA/CD, Collision free protocols, Limited contention protocols, Wavelength Division Multiple Access, MACA, GSM, CDPD, CDMA; IEEE Standard 802 for LANs and MANs- Ethernet, token bus, token ring, DQDB, Logical Link Control.

Routing : Deterministic and Adaptive routing; Centralized and distributed routing; shortest-path; flooding; flow based; optimal; distance vector, link-state, hierarchical; routing for mobile hosts; broadcast and multicast routing;

Congestion control: Principles of congestion control; Traffic shaping; choke packets; load shedding; RSVP.

TCP/IP: Elements of Transport Protocols; transmission control protocol (TCP); user datagram protocol (UDP); Internet protocol (IP).

References:

1. Computer Networks - Andrew s. Tanenbaum, PHI.
2. Data Communications, Computer Networks and Open Systems, fourth edition-Fred Halsall, Addison Wesley.
3. Introduction to Data communications and Networking- Behrouz, Frozen, Tata McGraw Hill.
4. Data and Computer Communications, fifth edition-William Stallings, PHI.

MCA
SEMESTER–III

DATA BASE MANAGEMENT SYSTEMS

SCS CSC 01 301 C 4004 Total Credits: 4

L	T	P	Total
4	-	-	4

Unit-I

Basic Concepts: File Systems vs. DMBS, Characteristics of the Data Base Approach, Abstraction and Data Integration, Database users, Advantages and Disadvantages of a DBMS.
Data Base Systems Concepts and Architecture: Data Models, Schema and Instances, DBMS architecture and Data Independence, Data Base languages and Interfaces, DBMS functions and component modules.

Unit-II

Entity Relationship Model: Entity Types, Entity Sets, Attributes & keys, Relationships, Relationships Types, Roles and Structural Constraints, Design issues, E-R Diagrams, Design of an E-R Database Schema, Reduction of an E-R schema to Tables.
Relational Data Model: Relational model concepts, Integrity constraints over Relations, Relational Algebra – Basic Operations.
SQL: DDL, DML, and DCL, views& Queries in SQL, Specifying Constraints & Indexes in SQL.
Relational Data Base Management System: ORACLE, Basic structure, Date Base Structure & its manipulation in ORACLE, Storage Organization in ORACLE, Programming ORACLE Applications.

Unit-III

Conventional Data Models: An overview of Network and Hierarchical Data Models.
Relational Data Base Design: Functional Dependencies, Decomposition, Normal forms based on primary keys (1 NF, 2 NF, 3 NF, & BCNF
Practical Data Base Design: Role of Information systems in Organizations, Database design process, physical database design in Relational Database.
Transaction Processing Concepts: Introduction to Transaction Processing, Transaction & System Concepts, Properties of Transaction, Schedules and Recoverability, Serializability of Schedules.

Unit-IV

Concurrency Control Techniques: Locking Techniques, Time stamp ordering, Multi-version Techniques, Optimistic Techniques, Granularity of Data items.
Recovery Techniques: Recovery concepts, Recovery Techniques in centralized DBMS.
Data Base Security: Introduction to Data base Security issues.

References:

1. Elmasri & Navathe: Fundamentals of Database systems, Pearson Education.
2. Henry F. Korth, Abraham Silberschatz and S. Sudarshan: Database System Concepts, McGraw Hill International Edition, 6th edition.
3. C.J. Date: An Introduction to Data Bases Systems 7th Edition, Addison Wesley N. Delhi.
4. Ivan Bayross : SQL, PL/SQL- The Program Language of ORACLE, BPB Publication.
5. Thomas M. Connolly, Carolyn E. Begg : Database Systems: A Practical Approach to Design, Implementation and Management, 5/E , Pearson Education.

DESIGN AND ANALYSIS OF ALGORITHMS
SCS CSC 01 302 C 3003

Total Credits: 3

L	T	P	Total
3	-	-	3

Unit-I

Introductory Concepts: Review of important data structures like Array, Lists, Stack, Queues, Priority queues, Binary trees, B-Tree, Heaps, and Graphs. Analysis of algorithms, asymptotic notation-Big-O, Omega and Theta notations, recurrence relations, solving recurrences, introductory concepts in program verification and testing, Structured design methodology.

Unit-II

Design Structures : General Method, Algorithm Design strategies : Divide & Conquer, Greedy Method, Dynamic Programming, Basic Sorting, Searching and Traversal Techniques, Basic Tracking, Branch and Bound.

Unit-III

Lower Bound Theory : Non-deterministic algorithm, Non-deterministic programming constructs, Simple Non-Deterministic programs, Comparison trees, oracles and adversary arguments, techniques for algebraic problems, lower bounds on parallel computation. Divide and conquer (recursion) versus dynamic programming. Fibonacci numbers and binomial coefficients. All pairs shortest path. Matrix-chain multiplication.

Unit-IV

NP-Hard and NP-Complete Problems : P, NP, NP-Hard & NP-Complete Classes, Reductions : Vertex cover, Simple Max Cut, Hamiltonian Circuit, Traveling salesman problem, kernel, 3-dimensional matching, and other NP-Complete Problems, Satisfiability and variations, Cook's theorem, examples of NP-Hard problems, approximation algorithms : Traveling salesman problem and others.

References:

1. Ellis Horowitz and Sartaj Sahni : Fundamentals of Computer Algorithms, Galgotia Publications.
2. Aho, Hopcroft and Ullman : The Design and Analysis of Computer Algorithms, Addison Wesley.
3. Tremblay and Sorenson: An Introduction of Data Structures with Applications, McGraw Hill.
4. Goodman, S.E., and Hetedniemi, S.T. : Introduction to the Design and Analysis of Algorithms, McGraw Hill.
5. Voll, Knuth, D.E. : Fundamentals of Algorithms: The Art of Computer Programming, Naresh Publications.

PROGRAMMING IN JAVA
SCS CSC 01 303 C 4004

Total Credits: 4

L	T	P	Total
4	-	-	4

Unit-I
Java's Byte-code, Java Virtual Machine. Java's Class Library, Data Types, Variables, and Operators, Operator Precedence. Selection Statements, Scope of Variable. Defining Classes, Methods, Constructors, Creating Objects of a Class, Assigning Object Reference Variables, variable this, Defining and Using a Class, Automatic Garbage Collection. *Arrays and Strings*: Arrays, String Handling Using String Class, String Buffer Class. *Extending Classes and Inheritance*: Class Inheritance, Access Attributes, Polymorphism, Multiple Levels of Inheritance, Abstraction through Abstract Classes, Using Final Modifier, The Universal Super class-Object Class.

Unit-II
Packages & Interfaces: Defining a Package, Adding Classes from a Package ,CLASSPATH, Standard Packages, Access Protection in Packages, Concept of Interface. Exception Handling: The concept of Exceptions, Types of Exceptions, Dealing with Exceptions, Exception Objects, Defining Exceptions. Multithreading Programming: The Java Thread Model, Creating a Thread, Creating Multiple Threads, Thread Priorities, Synchronization, Deadlocks Inter-thread communication, Deadlocks.

Unit-III
Input/output in Java: I/O Basic, Byte and Character Structures, I/O Classes, Reading Console Input Writing Console Output, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File, Stream Benefits. Creating Applets in Java: Applet Basics, Applet Architecture, Applet Life Cycle, Simple Applet Display Methods, Requesting Repainting, Using the Status Window, the HTML APPLET Tag Passing Parameters to Applets.

Unit-IV
Working with Windows: AWT Classes, Window Fundamentals, Working with Frame, Creating a Frame Window in an Applet, Displaying Information within a Window. Working with Graphics and Texts: Working with Graphics, Working with Color, Setting the Paint Mode, Working with Fonts, Managing Text Output Using Font Metrics, Exploring Text and Graphics. Working with AWT Controls, Layout Managers and Menus. Introduction to Swing classes.

References:

1. Herbert Schildt : The Complete Reference Java 2, Fourth Edition, Tata McGraw Hill.
2. Liang Y.Daniel : Introduction to Java Programming (7^{th} Edition), 2009, Pearson Education.
3. E. Balaguruswami : Programming with Java, Second Edition, Tata McGraw Hill.
4. Mughal K.A., Rasmussen R.W : A Programmer's Guide to Java Certification, Addison-Wesley, 2000.

SYSTEM MODELING & SIMULATION
SCS CSC 01 301 E 3003

Total Credits: 3

L	T	P	Total
3	-	-	3

Unit-I

Systems and environment: Concept of model and model building, model classification and representation, Use of simulation as a tool, steps in simulation study.

Continuous-time and Discrete-time systems: Laplace transform, transfer functions, statespace models, order of systems, z-transform, feedback systems, stability, observability, controllability.

Statistical Models in Simulation: Common discrete and continuous distributions, Poisson process, empirical distributions

Unit-II

Random Numbers: Properties of random numbers, generation of pseudo random numbers, techniques of random number generation, tests for randomness, random variate generation using inverse transformation, direct transformation, convolution method, acceptance-rejection

Unit-III

Design and Analysis of simulation experiments: Data collection, identifying distributions with data, parameter estimation, goodness of fit tests, selecting input models without data, multivariate an time series input models, verification and validation of models, static and dynamic simulation output analysis, steady-state simulation, terminating simulation, confidence interval estimation, Output analysis for steady state simulation, variance reduction techniques

Unit-IV

Queuing Models: Characteristics of queuing systems, notation, transient and steady-state behaviour, performance, network of queues

Large Scale systems: Model reduction, hierarchical control, decentralized control, structural properties of large scale systems

References:

1. Averill Law : Simulation Modeling and Analysis (3rd ed.), Tata McGraw-Hill, 2007
2. G. Gordan : System Simulation (2nd ed.), Pearson Education .
3. A.F. Seila, V. Ceric and P. Tadikamalla : Applied Simulation Modeling (International Student Edition), Thomson Learning, 2004
4. Jerry Banks : Handbook of Simulation: Principles, Methodology, Advances, Applications, and Practice, Wiley Inter Science.
5. J. Banks, J.S. Carson, B.L. Nelson : Discrete Event System Simulation (4th ed.), Prentice-Hall of India,2004.

E-COMMERCE
SCS CSC 01 302 E 3003

Total Credits: 3

L	T	P	Total
3	-	-	3

Unit-I
Basic Concepts: Introduction, Definition, Objectives, Advantages and Disadvantages, Forces driving E- Commerce, Traditional commerce Vs. E-Commerce, E-Commerce opportunities for industries, Growth of E-Commerce, Electronic data Interchange: Concepts of EDI and Limitations, Applications of EDI, Disadvantages of EDI, EDI Models, EDI Implementation, MIME and Value Added Networks, Internet based EDI.

Unit-II
E-Commerce Models: B2C, B2B, C2C, C2B, other models- Brokerage model, aggregator Model, Info-mediary model, community model and value chain model, Advertise model.
Electronic payment system: Special Features required in payment systems, Types of E-payment systems, E-cash, E-cheque, credit card, smart card, electronic purses, e-billing, E-e-Micropayments, Point of sales systems (POS) - Meaning, uses, structure.

Unit-III
Customer Relationship Management & technologies: E-Transition Challenges in Indian Corporate, E-Commerce and WWW, e- marketing, E- Customer Relationship Management, E-CRM problems and solutions, CRM capabilities and customer life cycle, E- supply chain management. E- Strategy: Planning the E-commerce Project, E-commerce strategy and Knowledge management, E- business Strategy and Data Warehousing & Mining. ERP for E-commerce. Customer effective Web design – Requirement, Strategy and Model.

Unit-IV
m- Commerce: Overview of mobile-commerce, Mobile delivery technology & Switching Methods, Attributes of m- Commerce, Drivers of m- commerce, m-commerce Security issues, Mobile ATM(ICICI Bank Case Study). Applications of m-commerce: Mobile Financial Applications, m-wallet, Mobile shopping, Advertising and Content provision.
Security Issues in E-Commerce: Security Risk of E- commerce, Types of Threats. Security tools and risk management approach.

References:

1. Bharat Bhaskar: Electronic Commerce- Framework Technologies and Applications, TATA McGraw Hill
2. Ravi Kalakota & A.B. Whinston: Frontiers of Electronic Commerce, Pearson education
3. Ravi Kalakota & A.B. Whinston : Electronic Commerce – A Manager's Guide, Pearson education.
4. Agarwala Kamlesh N and Agarwala Deeksha : Business on the Net _Introduction to the E-Com., Macmillan India
5. P.T. Joseph: E- Commerce - A Managerial Perspective, PHI 2002.

MCA
SEMESTER–IV

COMPUTER GRAPHICS
SCS CSC 01 401 C 4004

Total Credits: 4

L	T	P	Total
4	-	-	4

Unit-I
Introduction: Survey of computer Graphics and its applications; Interactive and passive graphics; display processors; Graphic Devices: Display systems-refresh CRTs, raster scan and random scan monitors, Grey shades, Interlacing, beam penetration shadow mask monitors, look up tables, plasma panel, LED and LCD monitors, VGA and SVGA resolutions; Hard copy Devices-printers, plotters; Interactive Input Devices.

Unit-II
Drawing Geometry: Coordinate system; resolution; use of homogeneous coordinate system; scan conversion: symmetrical DDA, simple DDA, Bresenhams line drawing algorithm, Circle drawing using DDA and polar coordinates, Bresenhams circle drawing algorithm, generation of ellipse. Curve Drawing

Unit-III
2-D Transformations : Translation; rotation; scaling; mirror reflection; shearing; zooming; panning; input techniques-pointing, positioning, rubber band methods and dragging; tweening, Morphing. Graphic operations: Clipping-line clipping using Sutherland-Cohen and midpoint sub-division algorithm,Liang Barsky Line clippers algorithm, polygon clipping; window and viewport; windowing transformation; Filling algorithms.

Unit-IV
4-D Graphics : 3D modelling of objects; 3D display techniques; coordinate system; 3D transformation matrices for translation, scaling and rotation; parallel projection; perspective projection; Hidden-surface removal - Z-buffer, back face, scan-line, depth-sorting, area subdivision; Shading - modelling light intensities, gouraud shading, phong shading.

References:

1. M. Pauline Baker: Computer Graphics - Donald Hearn, PHI.
2. Newman & Sproull : Principles of Interactive Computer Graphics, McGraw Hill.
3. Foley, A. Van Dam, S. K. Feiner, J. F. Hughes: Computer Graphics Principles & Practice, Addison Wesley.
4. Rogers: Procedural elements of Computer Graphics, McGraw Hill.
5. D.P. Mukherjee, Fundamentals of Computer Graphics and Multimedia, PHI.

THEORY OF COMPUTATION
SCS CSC 01 402 C 3003

Total Credits: 3

L	T	P	Total
3	-	-	3

Unit-I

Formal Languages, Need for formal computational models, Non-computability and examples of non-computable problems, diagonal argument and Russel's paradox, Chomsky hierarchy of formal languages, Regular languages, Regular sets, regular grammars, computable and non-computable problems.

Unit-II

Deterministic and Non-Deterministic finite automata, equivalence of deterministic and non-deterministic finite automata, Kleen's characterization theory for sets accepted by finite automata, finite state machines and their relations to combinatorial switching circuits, complexity, State equivalence and state minimization of finite automata, pumping lemma, Algebra decomposition and structure theory.

Unit-III

Context Free Grammers, Chomsky & Greibiech normal form theorems, Self embedding, Equivalence of context free languages and sets accepted by non-deterministic push down store automata, pushdown automata, closure properties of context free languages, Ambiguity, Ambiguous grammars, Parsing: Early's, Cook-Kasami-Young, Tomito's, top-down and bottom-up methods, Restrictions of push-down automata.

Unit-IV

Linear bounded automata (LBA): Power of LBA, closure properties; Turing machine (TM): one-tape, Multitape Turing machines and related formalism for recognition, Time and space complexity in terms of TM, Construction of TM for various problems, Unsolvability of the halting problem, reduction of post correspondence problem to the halting problem, Undecidable properties of grammars. Recursive and recursively enumerable language.

References:

1. Kamla kirtheivshan & Rama R : Automata theory & Computation, PEARSON, 1/e.
2. Peter Linz : An introduction to formal language & automata, Jones & Bartlete pub. 5/e.
3. Hopcroft, J.E.& Ullman ,J.D : Formal languages and their relation to Automata, Addison-Wasley
4. E.V.Krishnamurthy : Introductory Theory of Computer Science Ease-West press Pvt. Ltd.
5. Lewis, H.R. & Papadimitrious, C.H : Elements of the Theory of Computation.PHI.
6. Zoha Mauna : Mathematical Theory of Computation, Wiley Inter-science.

ADVANCED DATABASE SYSTEMS
SCS CSC 01 403 C 4004

Total Credits: 4

L	T	P	Total
4	-	-	4

Unit-I

Extended E-R Model: Subclasses, Super classes and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization. Object-Oriented Data Model: Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods and Persistence, Type Hierarchies and Inheritance, Complex Objects, Polymorphism, Multiple Inheritance, Versions and Configurations.

Unit-II

Object Relational Databases: Basic Concepts of Object-Relational Systems, Object-Relational features of Oracle, An Overview of SQL3, Object-Relational support in SQL3, Nested Relational Data Model. Further Normalization: Higher Normal Forms, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Forms, Domain-Key Normal Form.

Unit-III

Database System Architectures: Centralized Systems, Client-Server Systems, Server System Architecture, Parallel Systems, Distributed Systems. Distributed Databases and Client-Server Architecture: Distributed Database Concepts, Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design, Types of Distributed Database Systems, Overview of Concurrency Control and recovery in Distributed Databases. An Overview of Client-Server Architecture, Distributed Databases in Oracle.

Unit-IV

Web Interfaces to Databases: Web Fundamentals, Databases and the Web, Web Servers and Sessions, Providing access to Database on WWW. The Oracle Web server. Performance Tuning, Performance Benchmarks. Enhanced Data Models for Advanced Applications: An overview of Active Databases, Spatial Databases, Deductive Databases and Multimedia Databases.

References:

1. Elmasri & Navathe : Fundamentals of Database systems, Addison Wesley, New Delhi.
2. Korth, Silberschatz & Sudarshan: Database System Concept, McGraw Hill International 6th Edition.
3. C.J.Date: An Introduction to Data bases Systems 7th Edition, Addison Wesley, New Delhi.
4. Bipin C.Desai: An Introduction to Database System, Galgotia Publication, New Delhi
5. Ivan Bayross: SQL, PL/SQL-The Program Language of ORACLE, BPB Publication, New Delhi.

ARTIFICIAL INTELLIGENCE
SCS CSC 01 401 E 3003

Total Credits: 3

L	T	P	Total
3	-	-	3

Unit-I
AI and its importance, history of AI, applications areas, AI approach for solving problems.
Problem representation: State space representation, problem reduction representation, bounding functions. Propositional logic: syntax and semantics. First order predicate logic (FOPL): syntax and semantics, conversion to clausal form, inference rules, unification, resolution principle, proof procedure, refutation.

Unit-II
Structured knowledge: Associative networks, Frame structures, Conceptual dependencies and scripts, semantic nets, production system: commutative and non-commutative production systems, Decomposable and non-decomposable production systems, Procedural and declarative knowledge, forward and backward reasoning, matching, control knowledge.

Unit-III
Search and control strategies: Strategies for state space search, data driven and goal driven search; Search algorithms- uninformed search (depth first, breadth first, depth first with iterative deepening) and informed search (Hill climbing, best first, A, A*, AO algorithm, mini-max etc.), computational complexity, Properties of search algorithms-Admissibility, Monotonicity, Optimality, Dominance, etc. , genetic algorithms.

Unit-IV
Expert system architecture: Rule based architecture, Non-production system architecture. Components of Expert Systems, Stages of expert system development, Expert systems applications, Building Expert System and Shell. Knowledge acquisition and validation. managing uncertainty in expert systems - Bayesian probability theory, Stanford certainty factor algebra, Nonmonotonic logic and reasoning with beliefs, Fuzzy logic, Dempster/Shaffer theory.

References:

1. Dan W. Patterson : Introduction to Artificial Intelligence and Expert system PHI, 1/e
2. George F. Luger, William A. Stubblefield : Artificial Intelligence, The Benjamin/Cummings Publishing Company, Inc
3. Nils J. Nilsson : Principles of Artificial Intelligence, Narosa publishing house.
4. Kevin Knight, Elaine Rich & Shivashankar B Nair : Artificial Intelligence, McGraw Hill.

ADVANCED COMPUTER ARCHITECTURE
SCS CSC 01 402 E 3003

Total Credits: 3

L	T	P	Total
3	-	-	3

Unit-I

Computational Models: Concept and Interpretation, Basic Computational Models, Von Neumann Computational Model Computer Architecture: Evolution & Interpretation, Multilevel Hierarchical Framework of Computer Architecture. Parallel Processing: Types & Levels of Parallelism, Granularity, Classification of Parallel Architectures, Relationships between Languages and Parallel Architectures. ILP Processors: Evolution and Overview of ILP Processors, Dependencies among Instructions, Principle of Pipelining, General Structure of Pipeline, Performance Measures, Types of Pipelines, RISC vs CISC architectures.

Unit-II

VLIW Architecture: Overview of Proposed & Commercial VLIW Architectures, Code Scheduling in ILP Processors: Basic Block Scheduling – List Schedulers, Loop Scheduling – Loop Unrolling, Software Pipelining; Global Scheduling, Superscalar Processors – Emergence of Superscalar Processors, Parallel Decoding, Superscalar Instruction Issue, Shelving, Register Renaming, Parallel Execution, Preserving the Sequential Consistency of Instruction Execution and Exception Processing.

Unit-III

Branch Processing – Branch Problem, Performance Measures, Delayed Branching, Branch Detection, Branch Predictions, Multiway Branching, Guarded Execution, Distributed MIMD Architectures: Architectural Concepts, Direct Interconnection Networks – Measures, Linear Array, Ring, Star, tree, 2D mesh, Hypercube; Switching Techniques – Packet switching, Circuit Switching, Virtual Cut Through, Wormhole Routing.

Unit-IV

Shared Memory MIMD Architectures: Architectural Concepts, Comparison with Distributed MIMD Architecture, NUMA, COMA and CC-NUMA Architectures, Interconnection Networks - Single Shared Bus (Locked, Pended, Split Transaction Buses); Arbiter Logics, Crossbar, Multistage Networks, Cache Coherence Problem – Snoopy Protocol & Directory Based Protocols.

References:

1. Dezso Sima, Terence Fountain, Peter Kacsuk : Advanced Computer Architecture, Pearson, 2000, 1/e
2. David E. Culler, Jaswinder Pal Singh : Parallel computing architecture: A hardware/software approach, Morgan Kaufmann /Elsevier Publishers.
3. John L. Hennessey and David A. Patterson : Computer architecture – A quantitative approach, Morgan Kaufmann / Elsevier Publishers, 4th. edition, 2007
4. Kai Hwang : Advanced Computer Architecture: Parallelism, Scalability and Programmability, McGraw Hill.
5. Kai Hwang and Zhi Wei Xu : Scalable Parallel Computing, Tata McGraw Hill, New Delhi.

MCA
SEMESTER–V

LINUX & SHELL PROGRAMMING
SCS CSC 01 501 C 4004

Total Credits: 4

L	T	P	Total
4	-	-	4

Unit-I
Introduction to Linux: Linux distributions, Linux/Unix operating system, Linux/Unix architecture, Features of Linux/Unix, Accessing Linux system, Starting and shutting down system, Logging in and Logging out.

Unit-II
Commands in Linux: General-Purpose commands, File oriented commands, directory oriented commands, Communication-oriented commands, process oriented commands, etc.
Regular expressions & Filters in Linux: Simple filters viz. more, wc, diff, sort, uniq, etc., grep, sed. introducing regular expressions.

Unit-III
Linux/Unix file system: Linux/Unix files, inodes and structure and file system, file system components, standard file system, file system types, file system mounting and unmounting.
Processes in Linux : starting and stopping processes, initialization Processes, mechanism of process creation, rc and init files, job control - at, batch, cron, time, Signal handling.
Shell Programming: vi editor, shell variables, I/O in shell, control structures, loops, subprograms, creating shell scripts. Basic system administration in Linux/Unix.

Unit-IV
The C Environment: The C compiler, compiler options, managing projects, memory management, use of make files, dependency calculations, memory management - dynamic and static memory, building and using static and dynamic libraries, using ldd, soname, dynamic loader, debugging with gdb.

References:

1. John Goerzen : Linux Programming Bible, IDG Books, New Delhi.
2. Sumitabha Das : Your Unix - The Ultimate Guide, Tata McGraw-Hill.
3. Yashwant Kanetkar : Unix & Shell programming – BPB.
4. Richard Petersen : The Complete Reference – Linux, McGraw-Hill.
5. M.G.Venkateshmurthy : Introduction to Unix & Shell Programming, Pearson Education.
6. Stephen Prata : Advanced UNIX-A programmer's Guide, SAMS.

DATA WAREHOUSING & DATA MINING
SCS CSC 01 501 E 3003

Total Credits: 3

L	T	P	Total
3	-	-	3

Unit-I

Introduction: The Evolution of Data Warehousing (The Historical Context), The Data Warehouse - A Brief History, Characteristics, Operational Database Systems and Data Warehouse (OLTP & OLAP), today's Development Environment, Data Marts, and Metadata.

Multidimensional Data Models: Types of Data and their Uses, from Tables and Spreadsheets to Data Cubes, Identifying Facts and Dimensions, Designing Fact Tables, Designing Dimension Tables, Data Warehouse Schemas, OLAP Operations.

Unit-II

Principles Of Data Warehousing (Architecture And Design Techniques): System Processes, Data Warehousing Components, Architecture for a Data Warehouse, Three-tier Data Warehouse Architecture, Steps for the Design and Construction of Data Warehouses.

Implementation: Methods for the Implementation of Data Warehouse Systems.

Unit-III

Data Mining: Introduction: Motivation, Importance, Knowledge Discovery Process, KDD and Data Mining, Data Mining vs. Query Tools, Kind of Data, Functionalities, Interesting Patterns, Classification of Data Mining Systems, Major issues, From Data Warehousing to Data Mining.

Data Preparation: Pre-process, Data Cleaning, Data Integration and Transformation, Data Reduction. Data Mining Primitives, Languages, and System Architectures.

Unit-IV

Concept Description: An Overview of Descriptive Data Mining, Predictive Data Mining, Methods for Concept Description. Mining Association Rules: Association Rule Mining, Market Basket Analysis, Types of Association Rules, Methods for Mining Association Rules in Transaction Databases, Relational Databases and Data Warehouses. Classification and Prediction: Methods for Data Classification and Prediction. Cluster Analysis Introduction: Types of data in Cluster Analysis, A categorization of major Clustering Methods, Density-based methods, Grid-based methods, Model-based clustering methods, Outlier Analysis. Applications of Data Mining. Tools for Data Mining.

References:

1. J Hanes, M. Kamber : Data Mining Concepts and Techniques, Morgan Kaufmann Publishers, 2002.
2. Adriaans : Data Mining, Pearson Education.
3. Paolo Giudici : Applied Data Mining – Statistical Methods for Business and Industry, Wiley 2003.

WEB ENGINEERING
SCS CSC 01 503 C 4004

Total Credits: 4

L	T	P	Total
4	-	-	4

Unit-I
Role of Information Architect, Collaboration and Communication, Organizing Web Site parameters, Navigation Systems, Designing Search Interface for web-site, Conceptual Design, High-Level Design, Architectural Page Mockups, Design Sketches, good & bad web design, Process of Web Publishing, Phases of Web Site development, enhancing your web-site, web security.

Unit-II
HTML 5.0, Static and dynamic HTML, Structure of HTML documents, HTML Elements, Linking in HTML, Anchor Attributes, Image Maps, Meta Information, Image Preliminaries, Layouts, Backgrounds, Colors and Text, Fonts, Tables, Frames and layers, Audio and Video Support with HTML, Database integration with HTML, CSS, Positioning with Style sheets. Forms Control, Form Elements.

Unit-III
Introduction to CGI, PYTHON, URL, HTTP, Browser Requests, Server Responses, Proxies, Firewalls, CGI Environment Variables, Forms and CGI, Sending Data to the Server,
Introduction to ASP: Objects — Components; JSP: Objects — Components, Client (JavaScript) and Server side scripting (JSP/ASP/PHP)

Unit-IV
PHP, PHP variables, PHP - Database Management, ASP .NET, Cookies, Creating and Reading Cookies, XML: Comparison with HTML — DTD — XML Elements — Content Creation — Attributes — Entities — XSL — XLINK — XPATH — XPOINTER — Namespaces — Applications — integrating XML with other applications , Middleware Technologies: CORBA, COM, DCOM — Ecommerce: Introduction, Types — Architectures — Applications — Security.

References:

1. H.M. Deitel, P.J. Deitel, A.B. Goldberg : Internet & World Wide Web - How to Program, Pearson education, 3rd edition.
2. Chris Bates : Web Programming – Building Internet Application, 2nd Edition, Wiley Dream tech India Pvt. Ltd., 2002**.**
3. Thomas A Powell : HTML-The Complete Reference, Tata McGraw Hill.
4. Scott Guelich, Shishir Gundavaram, Gunther Birzniek : CGI Programming with Perl 2/e.

COMPILER DESIGN
SCS CSC 01 501 E 3003

. Total Credits: 3

L	T	P	Total
3	-	-	3

Unit-I
Compilation and Interpretation, Bootstrap compilers, Phases of Compilation process, Lexical Analysis, Lex package on UNIX systems. Process of Lexical Analysis, Recognition of Regular Expressions.

Unit-II
Context free grammars, Derivation and parse trees, Capabilities of CFG, Rightmost and Leftmost derivations. Formal Grammars and their application to Syntax Analysis, BNF notation, Ambiguity, YACC. The syntactic specification of Programming Languages.

Unit-III
Parsing Techniques: Top down & Bottom-up parsing, Shift Reduce parsing, Operator Precedence parsing, Predictive Parsers. Left Recursion and its removal, Recursive Descent parser, Automatic Construction of efficient Parsers: LR parsers, the Canonical Collection of LR(0) items, Constructing SLR parsing tables, Constructing Canonical LR parsing tables, Constructing LALR parsing tables, Using Ambiguous Grammars, an Automatic Parser Generator, Implementation of LR parsing tables, Constructing LALR sets of items. YACC package on UNIX systems.

Unit-IV
Intermediate Code Generation: Issues in the design of a code generator, Intermediate languages, Quadruples, Generating intermediate code for declarative statement, Assignment statement, Boolean expression, and case statement.
Code Optimization: potential cases of code optimization, optimization of basic blocks, loops in flow graphs, code improving transformation.

References:

1. Alfred V Aho and Jeffery D Ullman : Principles of Compiler Design, Narosa/Addison Wesley.
2. Jean Paul Tremblay and Sorenson : The Theory and Practice of Compiler Writing, McGraw Hill ,2/e.
3. Dhamdhere D.M : System programming and operating system (Tata Mc-grawHill).
4. Beck L. Leland : System Software, 3/e, Addison Wesley.
5. Aho, Sethi, & Ullman : Compilers Principles, Techniques and Tools, Addison Wesley.

High performance Networks
SCS CSC 01 502 E 3003

Total Credits: 3

L	T	P	Total
3	-	-	3

Unit-I
Brief Networking History: Growth of Internet; The need for speed and Quality of Service; IP-Based Internets; ISPs and Internet Backbone; TCP/IP Protocol Architecture; Operation of TCP and IP; process-to-process delivery; TCP/IP applications; Client/Server paradigm; Virtual circuit and datagram networks; Internetworking; Routers; TCP services and features; TCP connection; TCP flow and congestion control; UDP operation and uses; Internet Protocol (IP); IPv4 addresses; fragmentation; Type of Service; Classful and classless addressing; CIDR; IPv6 and its comparison with IPv4; Format and Headers of IPv6; traffic class, flow label, IPv6 addresses;

Unit-II
High-Speed Networks: Frame Relay Networks; ATM protocol architecture and ATM cells; High-Speed LAN's; Address mapping: Address Resolution Protocol (ARP), Reverse Address Resolution Protocol (RARP); Bootstrap protocol (BOOTP); Dynamic Host Configuration Protocol; Domain Name System: Name space; DNS in Internet; Resolution; DNS messages; Types of Records; Error Reporting: ICMP and its format; Types of messages; Error reporting; Query; Debugging tools;

Unit-III
Wireless LANs, FTP Commands and Replies; NFS; SMTP and its comparison with HTTP; MIME; Internet Routing: Interior and Exterior routing protocols; Autonomous Systems; RIP; OSPF; BGP; Multicasting: IGMP; Group management; format and operation of IGMP; IGMP messages; Encapsulation; MOSPF; Routing in mobile adhoc networks.
Introduction to Sockets; Socket Descriptors; Ports and Connection; The Client/Server Model of Communication;

Unit-IV
Network Security: Security services; cryptography; Message confidentiality with symmetric and asymmetric- key cryptography; Message Integrity: fingerprint, message digest, hash algorithms; Authentication; Digital Signature; Key management; IPSec; SSL/TLS; PGP; Firewalls; Virtual Private Networks;
Quality of Service in IP Networks: Integrated and Differentiated Services; Resource Reservation:RSVP; Multiprotocol Label Switching; Real-Time Transport Protocol.

References:

1. William Stallings : High-Speed Networks and Internets, Performance and Quality of Service, Pearson Education.
2. James F. Kurose, Keith W. Ross : Computer Networking, A Top-Down Approach Featuring the Internet, Pearson Education.
3. Behrouz A. Forouzan : Data Communications and Networking, Fourth Edition, McGraw Hill.
4. Douglas E. Comer : Internetworking with TCP/IP Volume – I, Principles, Protocols, and Architectures, Fourth Edition, Pearson Education.
5. Mahbub Hassan, Raj Jain : High Performance TCP/IP Networking, Concepts, Issues, and Solutions, Pearson Education.

MCA
SEMESTER–VI

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