ST. ALBERT'S COLLEGE (AUTONOMOUS), ERNAKULAM

Affiliated to Mahatma Gandhi University, Kottayam, Kerala

SYLLABUS FOR UNDERGRADUATE PROGRAMME

BACHELOR OF COMPUTER SCIENCE

UNDER CHOICEBASED CREDIT SYSTEM

(WITH EFFECT FROM 2019 ADMISSION)

Syllabus of B.Sc. Computer Science

Proposed by the Board of Studies on 8th December 2018

Prof. Sangeetha J

Chairman, Board of Studies

Approved by the Academic Council on 8th December 2019

Dr. M.L Joseph, Principal

Chairman, Academic Council.

Adopted by the Governing Council on 4th May 2019

Fr. Antony Arackal

Chairman, Governing Council

Board of Studies

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12	Asst Prof . Shine Antony	Assistant Professor, Department of Computer Science, St. Albert's College
13	Asst. Prof. Rachana Arora	Assistant Professor, Department of Computer Science, St. Albert's College

Acknowledgement

The Board of Studies places in record the help rendered to us by the scholars, parents and teachers in making this syllabus perfect. The Board wishes to thank the individual members who had worked tirelessly each day working on the enrichment of the curriculum. The board thanks the management of St. Albert's College (Autonomous) and Mahatma Gandhi University for giving us a chance to enrich the syllabus to suit the needs and necessities of the times.

We hope that syllabus will be challenging and easy for understanding at the undergraduate level. We sincerely hope those students who are to study this syllabus will be model citizens who could lead the world to better heights of glory.

We wish all the learners and facilitators all the best for the effective transaction of this syllabus.

Board of Studies

Ernakulam

04.05.2019

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Preface

As envisaged in the recent regulations of Autonomous colleges in India by University Grants Commission, autonomous colleges enjoy the academic freedom to enrich the curriculum by incorporating recent trends and needs. Curriculum and syllabus of each academic program has to be revised periodically to impart major objectives like global competency, skill component, values and regional relevance. Academicians and scholars in the respective area of knowledge have to express a missionary zeal for this great purpose.

In 2016, when St. Albert's College was granted autonomy, we adopted the curriculum and syllabus followed by the Mahatma Gandhi University, Kottayam for the year 2016. In 2017, when the Mahatma Gandhi University made a comprehensive revision of their curriculum and syllabus, it was adopted by the college as it was a better curriculum that met the needs and current demands of the culture, the society, and the expectations of the population being served. However the Syllabus revision committee of the department studied the present curriculum in detail and proposed some reasonable changes for further enrichment which may be implemented from 2019 admission onwards.

The present B.Sc. Degree programme in Computer Science is a Choice Based Credit Semester System with six semesters, offering an open course in the fifth semester and an elective course in the sixth semester. In addition to that students will be able to do one certificate course, two extra credit courses and variety of extracurricular programs during the three year programme period. The present curriculum offers wide exposure to various conventional, advanced and applied fields in computer Science which will facilitate them for a graduate finale course or for pursuing higher studies in computer Science. It is intended that students will acquire due knowledge and skill which will enable them to get employed in technological research Institutes, and in related Industries/departments. Attempts were also made to integrate the essential components to generate interest for self employment or start ups among the pupils. All possible

attempts have been made to update the syllabus by incorporating current and most recent developments in various branches of computer sciences.

Programme Outcomes

Critical Thinking: Students develops an informed and analytical approach to learning and demonstrate an in-depth knowledge of the subject

Computational Thinking: Students demonstrate competencies in computing and get domain knowledge suitable for translation of data into abstract concepts using computing technology-based tools**.**

Self-directed and Life-long Learning: Students develops a passion to be an independent lifelong learner by imbibing real-time changes in the socio-technological context, promoting continuous development and improvement of the knowledge and skills needed for employment and personal fulfilment.

Design Mindset: Students design efficient solutions for complex, real-world problems to meet the specifications with suitable consideration to cultural, societal and environmental considerations.

Programme Specific Outcomes

1) Build knowledge of computing and mathematics appropriate to the discipline and to provide effective solution in the area of computing.

2) Apply the acquired knowledge to identify the problem, analyze, design and develop the system as the solution to the problem.

3) Capable of adapting to new technologies and constantly upgrade their skills with an attitude towards independent and lifelong learning.

4) Perform professionally with social, cultural and ethical responsibility as an individual as well as in multifaceted teams with positive attitude

Regulations

1. TITLE

1.1 These regulations shall be called "ST.ALBERT'S COLLEGE (AUTONOMOUS), ERNAKULAM - REGULATIONS FOR UNDERGRADUATE PROGRAMMES UNDER CHOICE BASED CREDIT SYSTEM 2019"

2. SCOPE

The revised syllabus for Computer Science provides a strong foundation to pursue post graduation programme in computer science. The knowledge acquired by the students may also equip them to meet the industrial need, and get placed.

3. COURSE DESIGN

The UG programme in Computer Science includes Common courses, Core courses, Complementary courses, Open courses, Seminar, Project and viva voce. No course shall carry more than four credits. The student shall select any one open course in semester V offered by various departments of the College.

4. DURATION OF A COURSE

4.1. The programme shall normally extend over a period of three academic years consisting of six semesters.

4.2. There shall be two Semesters in an academic year, the "ODD" semester commences in June and on completion, the "EVEN" Semester commences. There shall be two months vacation during April/May.

4.3. No student shall be allowed to complete the programme by attending more than 12 continuous semesters.

5. ADMISSION

5.1 ELIGIBILITY CRITERIA

Candidates shall be required to have passed the Plus Two/equivalent examination with Physics, Chemistry and Mathematics

5.2 REGISTRATION

5.2.1 A student shall be permitted to register for the programme at the time of admission.

5.2.2 A student who registered for the course shall complete the course within 4 years.

6 SCHEME AND SYLLABUS

6.1 The U.G. programmes shall include (a) Common Courses I and II, (b) Core Course(s), (c) Complementary/Vocational Courses, and (d) Open Course.

6.2 There shall be one Choice Based course (Elective Course) in the sixth semester.

6.3 A separate minimum of 30% marks each for internal and external (for both theory and practical) and aggregate minimum of 35% are required for a pass for a course. For a pass in a programme, a separate minimum of Grade D is required for all the individual courses.

6.4 If a candidate secures F Grade for any one of the courses offered in a Semester/Programme, only F grade will be awarded for that Semester/Programme until he/she improves this to D Grade or above within the permitted period.

6.5 The practical examinations (external/internal) will be conducted only at the

end of even semesters for all programmes. Special sanction shall be given for those programmes which need to conduct practical examinations at the end of odd semesters.

6.1 PROJECT WORK

6.1.1 Project work shall be completed by working outside the regular teaching hours.

6.1.2 Project work shall be carried out under the supervision of a teacher in the concerned department.

6.1.3 A candidate may, however, in certain cases be permitted to work on the project in an Industrial / Research Organization on the recommendation of the Supervisor.

6.1.4 There should be an in-semester assessment and end-semester assessment for the project work.

6.1.5 The end-semester evaluation of the Project work is followed by presentation of work including dissertation and Viva-Voce.

6.2 SEMINAR LECTURES

Every student shall deliver one seminar lecture as an internal component for every course. The seminar lecture is expected to train the student in self-study, collection of relevant matter from the books and Internet resources, editing, document writing, typing and presentation.

6.3 TEST PAPERS

Every student shall undergo at least two class tests as an internal component for every course. The weighted average shall be taken for awarding the grade for class tests.

6.4 ASSIGNMENTS

Every student shall submit one assignment as an internal component for every

course.

6.5 ATTENDANCE

6.5.1 The attendance of students for each course shall be another component of in-semester assessment.

6.5.2 The minimum requirement of aggregate attendance during a semester for appearing the end semester examination shall be 75%.

6.5.3 Condonation of shortage of attendance to a maximum of 10 days in a semester, once during the whole period of postgraduate programme.

6.5.4 If a student represents his/her institution, University, State or Nation in Sports, NCC, NSS or Cultural or any other officially sponsored activities such as college union / university union activities, he/she shall be eligible to claim the attendance for the actual number of days participated subject to a maximum of 10 days in a Semester based on the specific recommendations of the Head of the Department and Principal of the College.

6.5.5 A student who does not satisfy the requirements of attendance shall not be permitted to take the end-semester examinations.

Model III BSc

A	Programme Duration	6 Semesters
B	Total Credits required for successful completion of the Programme	120
C	Credits required from Common Course I	8
D	Credits required from Core + Complementary + Vocational Courses including Project	112
E	Minimum attendance required	75%

7 EVALUATION AND GRADING

7.1 Evaluation

The evaluation of each paper shall contain two parts:

- Internal or In-Semester Assessment(ISA)
- External or End-Semester Assessment(ESA)

20 marks shall be given to internal semester evaluation and the remaining 80 marks to external semester evaluation. The ratio between internal and external marks is 1:4. Both internal and external marks are to be mathematically rounded to the nearest integer. Both internal and external marks are to be rounded to the next integer. All papers (theory & practical), grades are given on a 7-point scale based on the total percentage of marks, (ISA+ESA) as given below:-

Percentage of Marks	Grade	Grade Point
95 and above	S Outstanding	10
85 to below 95	A^+ Excellent	9
75 to below 85	A Very Good	8
65 to below 75	B^+ Good	7
55 to below 65	B Above Average	6
45 to below 55	C Satisfactory	5
35 to below 45	D Pass	4
Below 35	F Failure	0
	Ab Absent	0

7.1.1 CREDIT POINT AND CREDIT POINT AVERAGE

Credit Point (CP) of a paper is calculated using the formula:

CP = C × GP, where C is the Credit and GP is the Grade point.

Semester Grade Point Average (SGPA) of a Semester is calculated using the formula:

SGPA = TCP/TC, where TCP is the Total Credit Point of that semester.

Cumulative Grade Point Average (CGPA) is calculated using the formula:

CGPA = TCP/TC, where TCP is the Total Credit Point of that programme.

Grade Point Average (GPA) of different category of courses viz. Common Course I, Common Course II, Complementary Course I, Complementary Course II, Vocational course, Core Course is calculated using the formula:

GPA = TCP/TC, where TCP is the Total Credit Point of a category of course.

TC is the total credit of that category of the course.

The overall grade for a programme for certification shall be based on CGPA scale given below.

GPA	Grade	
9.5 and above	S	Outstanding
8.5 to below 9.5	A+	Excellent
7.5 to below 8.5	A	Very Good
6.5 to below 7.5	B+	Good
5.5 to below 6.5	B	Above Average
4.5 to below 5.5	C	Satisfactory
3.5 to below 4.5	D	Pass
Below 3.5	F	Failure

A separate minimum of D Grade for internal and external are required for a pass for a course. For a pass in a programme a separate minimum of Grade D is required for all the courses and must score a minimum CGPA of 2.00 or an overall grade of C+ and above

7.1.2 Internal Evaluation

7.1.2.1 The internal evaluation shall be based on predetermined transparent system involving periodic written tests, assignments, seminars and attendance in respect of theory courses and based on written tests, lab skill/records/viva and attendance in respect of practical courses. The marks assigned to various components for in-semester evaluation is as follows:

Components of Internal Evaluation [Theory]

Components of Internal Evaluation of theory	Marks
Assignment / Seminar / Viva	5
Two Test Papers [Average of 2 tests]	10
Attendance	5
Total	20

All components of Internal Evaluation are Mandatory

Components of Internal Evaluation [Practical]

Components of Internal Evaluation of practical	Marks
Assignment / Seminar / Viva	5
Two Test Papers [Average of 2 tests]	10
Attendance	5
Total	20

Components of Internal Evaluation [Project]

Components of External Evaluation of Project	Marks

Punctuality	5
Experimentation/data collection	5
Knowledge	5
Report	5
TOTAL	20

All components of Internal Evaluation are Mandatory

Evaluation of Attendance

Percentage of attendance	Marks
Above 90%	5
Between 85 and 90 %	4
Between 80 and 85 %	3
Between 75 and 80 %	2
75	1

7.1.2.2 To ensure transparency of the evaluation process, the in-semester marks awarded to the students in each course in a semester shall be published on the notice board at least one week before the commencement of external examination. There shall not be any chance for improvement for in semester marks.

7.1.2.3 The course teacher and the faculty advisor shall maintain the academic record of each student registered for the course and a copy should be kept in the college for at least one year for verification.

7.1.3 External Evaluation

The end-semester evaluation in theory courses is to be conducted by the Office of the

Controller of Examinations. The marks assigned to various components for end-semester evaluation is as follows:

Components of End Semester [Theory]

Components of End Semester Evaluation	Component Marks
In Semester Evaluation	20
End Semester Evaluation	80
Total	100

Components of End Semester [Practical]

Components of End Semester Evaluation	Component Marks
In Semester Evaluation	20
End Semester Evaluation	80
Total	100

Components of End Semester [Project]

Components of End Semester Evaluation	Component Marks
In Semester Evaluation	20
Dissertation (End Semester)	50
Viva Voce (End Semester)	30
Total	100

8 COMPLETION OF PROGRAMME AND PROMOTION

8.1 A candidate has to complete the Programme within a period of four years after the

registration.

8.2 A candidate who does not complete the concerned semester with the minimum attendance requirement prescribed will not be permitted to attend the next semester.

9 GRIEVANCE REDRESSAL MECHANISMS

Internal assessment shall not be used as a tool for personal or other type of vengeance. A student has all rights to know, how the teacher arrived at the marks. In order to address the grievance of students, a three-level Grievance Redressal mechanism is envisaged. A student can approach the upper level only if grievance is not addressed at the lower level. Level 1: Department Level: The Department cell chaired by the HOD, Department Secretary and Tutor as members. Level 2: College level: A committee with the Principal as Chairman, College Coordinator, HOD of concerned Department and Department Coordinator as members. The internal evaluation marks/grades in the prescribed format should reach the Controller of Examinations before the commencement of End semester examinations every academic year.

10 PATTERN OF QUESTIONS

Questions shall be set to assess knowledge acquired, standard and application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge.

A question paper shall be a judicious mix of very short answer type, short answer type, short essay type /problem solving type and long essay type questions.

Sl. No	Pattern	Marks	Choice of questions	Total marks
1	Short Answer/problem type	2	10/12	20
2	Short essay/problem	5	6/9	30
3	Essay/problem	15	2/4	30

Total	80

11 MARK CUM GRADE CARD

The College, under its seal, shall issue to the students a MARK CUM GRADE CARD on completion of each programme, which shall contain the following information:

a. Name of the College

b. Title and Model of the Undergraduate Programme

c. Name of the Semester

d. Name and Register Number of the student

e. Date of publication of result

f. Code, Title, Credits and Maximum Marks (Internal, External and Total) of each course opted in the semester.

g. Internal, External and Total Marks awarded, Grade, Grade point and Credit point in each course opted in the semester.

h. The total credits and total credit points in the semester.

i. Semester Grade Point Average (SGPA) and corresponding Grade.

j. Cumulative Grade Point Average (CGPA), GPA corresponding to Common Courses I and II, Core Course, Complementary Courses, Vocational Courses and Open Course.

k. The final Mark cum Grade Card issued at the end of the final semester shall contain the details of all courses taken during the final semester examination and shall include the final Grade(SGPA) scored by the candidate from 1st to 5th semesters, and the overall Grade for the total programme.

12 RANK CERTIFICATE

The college publishes rank list of top 10 candidates for each programme after the publication of 6th semester results. Rank certificate shall be issued to candidates who secure positions from 1st to 3rd in the rank list. Candidates who secure positions from fourth to tenth in the rank list shall be issued position certificate indicating their position in the rank list. Candidates shall be ranked in the order of merit based on the CGPA scored by them. Grace marks awarded to the students should not be counted fixing the rank/position. Rank certificate and position certificate shall be signed by the Controller of Examinations.

13 There shall be 3 level monitoring committees for the successful conduct of the scheme. They are -

13.1 Department Level Monitoring Committee (DLMC), comprising HOD and two senior most teachers as members.

13.2 College Level Monitoring Committee (CLMC), comprising Principal, Controller of Examinations and A.O/Superintendent as members.

13.3 Governing Council.

14 TRANSITORY PROVISION

Notwithstanding anything contained in these regulations, the Governing Council shall, for a period of one year from the date of coming into force of these regulations, have the power to provide by order that these regulations shall be applied to any programme with such modifications as may be necessary.

15 The Governing Council is authorized to make necessary criteria for eligibility for higher education in the grading scheme, if necessary, in consultation with affiliating University and other Universities. The Governing Council is also authorized to issue orders for the perfect realization of the Regulations.

Annexure I: Model Mark Cum Grade Card

St. Albert's College (Autonomous)

Ernakulam-682 018, Kerala, India.

Accredited by National Assessment and Accreditation Council (NAAC)at A Grade

ISO 9001: 2015 Certified

Affiliated to Mahatma Gandhi University, Kottayam, Kerala

GRADE CARD

NAME OF THE CANDIDATE		Student Photo
PERMANENT REGISTER NUMBER (PRN):		
DEGREE		
PROGRAMME		
STREAM		
NAME OF THE EXAMINATION		
DATE OF ISSUE		

COURSE CODE	COURSE TITLE	CREDITS	MARKS						GRADE	GP	CGP	RESULT
			INTERNAL		EXTERNAL		TOTAL					
			AWARDED	MAXIMUM	AWARDED	MAXIMUM	AWARDED	MAXIMUM				
Common Course - I												
Common Course - II												
Core Course												
Complimentary Course												
TOTAL												

SEMESTER RESULT	SCPA :	SG :

Controller of Examinations Principal

Annexure II: Model Mark Cum Grade Card

St. Albert's College (Autonomous)

Ernakulam- 682 018, Kerala, India.

Accredited by National Assessment and Accreditation Council (NAAC)at A Grade

ISO 9001: 2015 Certified

Affiliated to Mahatma Gandhi University, Kottayam, Kerala

CONSOLIDATED MARK CUM GRADE CARD

NAME OF THE CANDIDATE	
PERMANENT REGISTER NUMBER (PRN)	
DEGREE	
PROGRAMME	
STREAM	
DATE OF BIRTH	
DATE OF ELIGIBILITY	

Student Photo

SEMESTER RESULTS

SEMESTER	MARKS AWARDED	MAXIMUM MARKS	CREDITS	SCPA	GRADE	MONTH AND YEAR OF PASSING	RESULT
SEMESTER 1							
SEMESTER 2							
SEMESTER 3							
SEMESTER 4							
SEMESTER 5							
SEMESTER 6							
TOTAL							

PROGRAMME PART RESULTS

PROGRAMME PART	MARKSAWARDED	MAXIMUMMARKS	CREDITPOINTS	CREDITS	CCPA	GRADE
COMMON COURSE I:						
CORE COURSE:						
COMPLEMENTARY COURSE:						
OPEN COURSE:						

TOTAL						
FINAL RESULT						
CREDITS	CCPA	GRADE	RESULT			

COURSE CODE	**COURSE TITLE**	CREDITS	**MARKS**									
			INTERNAL		**EXTERNAL**		**TOTAL**					
			AWARDED	MAXIMUM	AWARDED	MAXIMUM	AWARDED	MAXIMUM	GP	CP	I A	RESULT
SEMESTER 1												
Common Course - I												
Core Course												
Complementary Course												
SEMESTER RESULT			SCPA:				SG:					
SEMESTER 2												
Common Course - I												
Core Course												
Complementary Course												
SEMESTER RESULT			SCPA:				SG:					

SEMESTER 3		
Common Course - I		
Core Course		
Complementary Course		
SEMESTER RESULT	SCPA:	SG :
SEMESTER 4		
Common Course - I		
Core Course		
Complementary Course		
SEMESTER RESULT	SCPA:	SG:
SEMESTER 5		
Core Course		
Open Course		
SEMESTER RESULT	SCPA:	SG:
SEMESTER 6		
Core Course		
Project		

Choice Based Core Course												
SEMESTER RESULT						SCPA:					SG:	

Controller of Examinations Principal

Annexure III: Reverse side of the mark cum Grade Card (Common to all Semesters)

DESCRIPTION OF EVALUATION PROCESS

Grade and Grade point

The evaluation of each course comprises Internal and External components with the ratiol:4 for all courses. Grade and grade points are given on 7-point scale based on the percentage of marks (internal + external) as given in table-I.

Decimals are corrected to next higher whole number

Table -1

% of Marks	Grade	Grade Point
95 and above	S — Outstanding	10
85 to below 95	A+ Excellent	9
75 to below 85	A — Very Good	8
65 to below 75	Good	7
55 to below 65	B — Above Average	6
45 to below 55	C — Satisfactory	5
35 to below 45	D- Pass	4
Below 35	F Failure	
	Ab Absent	

Credit Point and Credit Point Average

Credit Point (CP) of a course is calculated using the formula: — CP = C ^{x} GP, where C is the Credit and GP is the Grade point

Semester Credit Point Average (SCPA) or Cumulative Grade Point Average (CCPA) for a programme is calculated using the formula:- SCPA or CCPA = TCP/TC, where TCP is the Total Credit Point of that semester or programme , TC = Total Credit

GPA	Grade
9.5 and above	S — Outstanding
8.5 to below 9.5	A+ Excellent
7.5 to below 8.5	A Very Good
6.5 to below 7.5	B+ — Good
5.5 to below 6.5	B — Above Average
4.5 to below 5.5	C Satisfactory
3.5 to below 4.5	D - Pass
Below 3.5	F — Failure

Grade Point Average (GPA), of a course is calculated using the formula:- GPA = TCP/TC, where TCP is the

Total Credit Point of a course, TC is the total credit of that course

A separate minimum of 30% marks each for internal and external (for both theory and practical) and aggregate minimum of 35% are required for a pass for a course. For a pass in a programme, a separate minimum of Grade D is required for all the individual courses and an overall grade D or above is mandatory. If a candidate secures F Grade for any one of the courses offered in a Semester/Programme, only F grade will be awarded for that semester /programme until he/she improves this to **D Grade** or above within the permitted period.

Read By	
Verified By	

QR Code

Programme Design

Semester I

No.	Course Code	Course Title	Course Category	Hours per week	Credit
1	ENG1CCT0119	English- I	Common Course	5	4
2	MAT1CMT0119	Mathematics-I	Complementary Course	4	4
3	CSC1CMT0119	Computer Fundamentals and Basics of Pc Hardware	Complementary Course	4	4
4	CSC1CRT0119	Methodology of Programming and C Language	Core Course	4	3
5	CSC1CMT0219	Fundamentals of Digital System	Complementary Course	4	4
6	CSC1CRP0119	Software Lab –I	Core Course	4	2

Semester II

No.	Course Code	Course Name	Course Category	Hours per week	Cre dit
1	ENG2CCT0119	English- II	Common Course	5	4
2	MAT2CMT0119	Mathematics-II	Complementary Course	4	4
3	CSC2CMT0119	Data Communication	Complementary Course	4	4
4	CSC2CRT0119	Computer Organization and Architecture	Core Course	4	4
5	CSC2CRT0219	Object Oriented Programming Using C++	Core Course	4	3
6	CSC2CRP0119	Software Lab –II	Core Course	4	2

Semester III

No.	Course Code	Course Name	Course Category	Hours per week	Credit
1	STAT3CMT0219	Probability and Statistics	Complementary Course	4	4
2	CSC3CRT0119	Database Management Systems	Complementary Course	4	3
3	CSC3CRT0219	System Analysis and Design	Core Course	4	4
4	CSC3CMT0119	Networking Fundamentals	Complementary Course	4	4
5	CSC3CRT0319	Data Structure Using C++	Complementary Course	4	3
6	CSC3CRP0119	Software Lab –III	Core Course	5	2

Semester IV

No.	Course Code	Course Name	Course Category	Hours per week	Credit
1	CSC4CRT0119	Linux Administration	Core Course	4	4
2	CSC4CMT0119	Microprocessor And Assembly Language Programming	Complementary Course	4	4
3	CSC4CRT0319	Computer Aided Optimization Techniques	Core Course	4	4
4	CSC4CRT0219	Web Programming Techniques	Core Course	4	3
5	CSC4CMP0119	Assembly Language Programming Lab	Complementary Course	5	2
6	CSC4CRP0119	Software Lab –IV	Core Course	4	2

Semester V

No.	Course Code	Course Name	Course Category	Hours per week	Credit
1	CSC5CRT0119	System Software And Operating System	Core Course	4	4
2	CSC5CRT0219	IT and Environment	Core Course	4	4
3	CSC5CRT0319	Java Programming Using Linux	Core Course	4	3
4	CSC5CRT0419	Computer Security	Core Course	4	4

5	CSC5COT0119	Open Course	Core Course	4	3
6	CSC5CRP0119	Software Development Lab I (Mini Project)	Core Course	5	3

Semester VI

No.	Course Code	Course Name	Course Category	Hours per week	Credit
1	CSC6CRT0119	Computer Graphics	Core Course	4	4
2	CSC6CRT0219	Big Data :Analytics	Core Course	4	4
3	CSC6CBT0119	Programme Elective	Core Course	4	4
4	CSC6CRP0119	Seminar	Core Course	4	2
5	CSC6CPR0119	Software Development Lab II (Main Project)	Core Course	5	3
6	CSC6CRV0119	Viva Voce	Core Course	5	1

Detailed Syllabus: Semester I

Core Course I: Methodology Of Programming And C Language (CSC1CRT0119)

63 Hours **3 Credits**

Course Outcomes

The students will be able:

- To describe the advantages of a high level language like C, the programming process, and the compilation process.
- To apply good programming principles to the design and implementation of C

programs.

- To design, implement, debug and test programs using the fundamental elements of C.
- To demonstrate an understanding of primitive data types, values, operators and expressions in C.

Module I

(11 Hours)

Introduction to programming, Classification of computer languages, Language translators (Assembler, Compiler, Interpreter), Linker, Characteristics of a good programming language, Factors for selecting a language, Subprogram, Purpose of program planning, Algorithm, Flowchart, Pseudocode, Control structures (sequence, selection, Iteration), Testing and debugging

Module II (14 Hours)

C Character Set, Delimiters, Types of Tokens, C Keywords, Identifiers, Constants, Variables, Rules for defining variables, Data types, C data types, Declaring and initialization of variables, Type modifiers, Type conversion, Operators and Expressions- Properties of operators, Priority of operators, Comma and conditional operator, Arithmetic operators, Relational operators, Assignment operators and expressions, Logical Operators, Bitwise operators

Module III (11 Hours)

Input and Output in C – Formatted functions, unformatted functions, commonly used library functions, Decision Statements If, if-else, nested if-else, if-else-if ladder, break, continue, goto, switch, nested switch, switch case and nested if. Loop control- for loops, nested for loops, while loops, do while loop.

Module IV

(14 Hours)

Array, initialization, array terminology, characteristics of an array, one dimensional array and operations, two dimensional arrays and operations. Strings and standard functions, Basics of a function, function definition, return statement, Types of functions, call by value and reference. Recursion -Types of recursion, Rules for recursive function, direct and indirect recursion, recursion vs iterations, Advantages and disadvantages of recursion

Module V **(13 Hours)**

Pointers, Features of Pointer, Pointer and address, Pointer declaration, void wild constant pointers, Arithmetic operations with pointers, pointer and arrays, pointers and two dimensional arrays. Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, typedef, bitfields , enumerated data types, Union, Dynamic memory allocation, memory models, memory allocation functions.

References

- Ashok Kamthane - Programming in C, Third Edition, Pearson Education
- P K Sinha & Priti Sinha - Computer Fundamentals , Fourth Edition, BPB Publications.
- E. Balaguruswamy -Programming in ANSI C ,Seventh Edition , McGraw Hill Education
- Byron Gotfried - Programming with C, Second Edition, Schaums Outline series. McGraw Hill

Core Course II: Software Lab I (CSC1CRP0119)

64 Hours **2 Credits**

Course Outcomes

The students will be able:

- To develop the logic for a given problem.
- To write the algorithm and draw a flow chart.
- To recognize and understand the syntax and construction of C code.
- To know the steps involved in compiling, linking and debugging C code.
- To make use of different data-structures like arrays, pointers, structures and files.
- To understand function declaration and definition.
- To know the alternative ways of providing solution to a given problem.

Syllabus

1. Programs to familiarize printf() and scanf() functions.
2. Programs Based on Decision statements , break, goto, continue, switch and Loop controls statements.
3. Programs Based on One dimensional and two dimensional arrays.
4. Programs on Strings and string handling functions.
5. Programs based on Pointers, operations on pointers, Arrays & Pointers,
6. Programs based on functions, Call by value, Call by reference, Recursion,
7. Programs based on structure and union, array of structures, Pointer to structure,

structure and functions 8. Simple programs using pointers and malloc().

Scheme of Evaluation for software lab I external is as follows:

Division of Marks (Practical - 3 hours External)

First program from part 1& 2 - 25 marks

1. Flowchart - 5 marks
2. Logic – 10 marks
3. Successful compilation – 5 marks
4. Result – 5 marks

Second program should be based on advanced concepts ,part 3 to part 8 - 35 marks

1. Logic – 20 marks
2. . Successful compilation – 10 marks
3. Result – 5 marks) Viva Voce - 10 marks Lab Record (minimum of 25 Programs) - 10 marks Total Marks - 80 marks

Viva Voce - 10 marks

Lab Record (minimum of 25 Programs) - 10 marks

Total Marks - 80 marks

Detailed Syllabus: Semester II

Core Course III: Computer Organization And Architecture (CSC2CRT0219)

72 Hours **4 Credits**

Course Outcomes

The students will be able:

- To understand the basic structure of computer
- To understand the control unit operations
- To design memory organization that uses banks for different word size operations
- To understand the concept of cache mapping techniques
- To understand the concept of I/O organization

Module I: BASIC COMPUTER ORGANIZATION AND DESIGN (13 Hours)

Basic computer organization and design - Operational concepts, Instruction codes, Computer Registers, Computer Instructions, Memory locations and addresses, Instruction cycle, Timing and control, Bus organization.

Module II: CENTRAL PROCESSING UNIT (15 Hours)

Central Processing Unit- General Register Organization, Stack Organization, Addressing modes, Instruction Classification, Program control.

Module III: MEMORY ORGANIZATION (16 Hours)

Memory Organization – Memory Hierarchy, Main Memory, Organization of RAM, SRAM, DRAM, Read Only Memory-ROMPROM, EROM,EEPROM, Auxiliary memory,

Cache memory, Virtual Memory, Memory mapping Techniques.

Module IV: PARALLEL COMPUTER STRUCTURES

(15 Hours)

Parallel Computer Structures- Introduction to parallel processing, Pipeline computers, Multi processing systems, Architectural classification scheme-SISD, SIMD, MISD, MIMD.

Module V: PIPELINING AND VECTOR PROCESSING

(13 Hours)

Pipelining and Vector processing- Introduction to pipelining, Instruction and Arithmetic pipelines (design) Vector processing, Array Processors.

References

- M.Morris Mano-Computer Systems Architecture, Third Edition, Pearson Education
- Kai Hwang and F A Briggs-Computer Architecture and parallel processing, McGraw Hills,1990
- Carl Hamacher -Computer Organization, Fifth Edition, Tata McGraw Hill.
- John P Hayes -Computer Architecture & Organization–Mc Graw Hill
- William Stallings-Computer Organization and Architecture , Seventh Edition, Pearson Education

Core Course IV: Object Oriented Programming Using C++ (CSC2CRT0319)

72 Hours **3 Credits**

Course Outcomes

The students will be able:

- To describe the advantages of a high level language like C/C++, the programming process, and the compilation process.
- To describe and use software tools in the programming process.
- To apply good programming principles to the design and implementation of C/C++ programs.
- To design, implement, debug and test programs using the fundamental elements of C/C++.
- To demonstrate an understanding of primitive data types, values, operators and expressions in C/C++.

Module I: PRINCIPLES OF OBJECT ORIENTED PROGRAMMING, BEGINNING WITH C++(17 Hours)

Principles of Object Oriented Programming, Beginning with C++- Procedure Oriented Programming-Object Oriented Programming-Basic concepts of objectoriented

programming- Benefits of OOP- Applications of OOP-A simple C++programStructure of C++ program- C++ data types- Symbolic constants- Reference by variablesOperators in C++- Operator precedence- Control structures- Function in C++ - The main function, Function prototyping- Call by reference- Return by reference- Inline functionDefault arguments- Function overloading.

Module II: CLASSES AND OBJECTS (15 Hours)

Classes and Objects - Specifying a class- Defining member functions- Nesting of member functions -Private member functions - Arrays within a class - Memory allocation for objects-Static data members -Static member functions -Arrays of objects - objects as function arguments Friendly functions- Returning Objects.

Module III: CONSTRUCTERS AND DESTRUCTORS, OVERLOADING (12 Hours)

Constructers and Destructors, Overloading - Constructors- Default constructor-Parameterized constructor-Copy constructor- Multiple constructors-Constructors with default arguments- Dynamic constructor-DestructorsOperator overloading- Unary and Binary operator overloading- Overloading using friendsRules for overloading- Type conversion.

Module IV: INHERITANCE (14 Hours)

Inheritance– Defining derived classes-Visibility modes-Single, Multilevel, Multiple, Hierarchical and Hybrid inheritance- Virtual base classes- Abstract classes- Constructors in derived classes- Nesting of classes.

Module V: POINTERS, VIRTUAL FUNCTIONS AND POLYMORPHISM, WORKING WITH FILES
(14 Hours)

Pointers, Virtual Functions and Polymorphism, Working with Files– Pointers- Pointers to objects- this pointer-Pointers to derivedclasses- Virtual functions- Pure virtual functions- File Stream classes, Opening and closing a file- File opening modes- File pointers and their manipulations- Sequential input and output operations.

References

- .E. Balagurusamy - Object Oriented Programming with C++, Fifth edition, Tata McGraw Education Hill , 2011.
- Ashok N. Kamthane, Object oriented Programming with ANSI & Turbo C++, First Edition, Pearson India
- Robert Lafore, Object Oriented Programming in Turbo C++, First Edition, Galgotia Publications
- D Ravichandran, Programming with C++, Second edition, Tata McGraw- Hill.

Core Course V: Software Lab -II (CSC2CRP0119)

64 Hours **2 Credits**

Course Outcomes

The students will be able:

- To recognize and understand the syntax and construction of C++ code.
- To gain experience of object oriented language programming.
- To make use of different data-structures like arrays, pointers, structures and files.
- To understand function declaration and definition.
- To know the alternative ways of providing solution to a given problem.

1. Programs based on default arguments, function overloading

2. Programs based on array of objects, friend functions, passing objects as arguments to function.
3. Programs based on operator overloading (binary, unary) using member functions and friend functions.
4. Programs based on constructors, different types of constructors.
5. Programs based on inheritance, different types of inheritance.

Detailed Syllabus: Semester III

Core Course VI: Database Management Systems (CSC3CRT0119)

64 Hours **3 Credits**

Course Outcomes

The students will be able:

- To list and explain the fundamental concepts of a relational database system.
- To utilize a wide range of features available in a DBMS package.
- To analyze database requirements and determine the entities involved in the system and their relationship to one another.
- To develop the logical design of the database using data modeling concepts such as entity-relationship diagrams.

- To manipulate a database using SQL.

Module I: INTRODUCTION (11 Hours)

Introduction – Characteristics of the Database Approach – Database users :DBA , Database Designers ,End users –Advantages of using the DBMS Approach – Data models, Schemas , and Instances – Three-Schema Architecture and Data Independence. DBMS Languages: DDL, DML – The Database System Environment: DBMS Component Modules.

Module II: RELATIONAL MODEL (15 Hours)

Relational Model– Entity Relationship Modeling: Introduction –Entity Types , Entity Sets , Attributes and Keys –Relationship Types ,Relationship Sets, Roles , and Structural Constraints – Weak Entity Types – Notationfor ER diagrams – Sample ER diagrams. Relational Model concepts: Domains ,Attributes , Tuples , and Relations – Characteristics of Relations –Relational Model Constraints and Relational Database Schemas : Domain Constraints, Key Constraints ,Relational Database Schemas , Entity Integrity , Referential Integrity, and Foreign Keys .

Module III: SQL (14 Hours)

SQL- Data Types – Data Definition commands : CREATE , ALTER ,DROP - Adding constraints in SQL –Basic SQL Queries : INSERT ,SELECT ,DELETE ,UPDATE - Substring comparison using LIKE operator ,BETWEEN operator – Ordering of rows – SQL set operations :UNION , EXCEPT , INTERSECT – Complex Queries : Comparison involving NULL and Threevalued logic ,Nested queries , EXISTS and UNIQUE functions, Renaming of attributes and Joining of tables, Aggregate functions ,Grouping –Managing Views.

Module IV: NORMALIZATION AND INDEXING STRUCTURES FOR FILES

(12 Hours)

Normalization and Indexing Structures for Files – Normalization: Informal Design Guidelines for Relational Schemas Department of Computer Science BSc Computer Science –Functional Dependencies – Normal forms : First Normal Form , Second Normal Form , Third Normal Form – General Definitions of Second and Third Normal Forms –Boyce-Codd Normal Form. Indexing Structures for files: -Types of Single-Level Ordered Indexes: Primary Indexes, Clustering Indexes, and Secondary Indexes.

Module V: TRANSACTION PROCESSING AND DATABASE SECURITY TRANSACTION PROCESSING AND DATABASE SECURITY

(12 Hours)

Transaction Processing - Introduction to Transaction Processing - Transaction and System Concepts –Desirable properties of Transactions. Concurrency control mechanisms. Database Security and Authorization: Types of Security – Control measures – Database Security and DBA – Access Control , User Accounts, and Database Audits –Access Control based on Granting and Revoking Privileges.

References

- .Ramez Elmasri and Shamkant B.Bavathe - DATABASE SYSTEMS , Sixth Edition, Pearson Education.
- C.J Date- An Introduction to Database Systems, Eighth edition, Pearson Education,2003 2. Reghu Ramakrishnan and Johannes Gehrke- Database Management Systems , Third edition, Mc Graw Hill International Edition.
- Dipin Desai , An Introduction to Database Systems , First Edition, Galgoria Publications .

FOR TRUTH AND SERVICE

Core Course VII: System Analysis And Design (CSC3CRT0219)

64 Hours **4 Credits**

Course Outcomes

The students will have the:

- Ability to understand the elements of SDLC
- Ability to understand the various approaches to system analysis and design
- Ability to develop the data flow diagram of the system
- Ability to understand the common deployment

Module I **(12 Hours)**

Information systems concepts, Business information systems; Describing the business organization – organization chart , organization function list ; information system levels - operational, lower, middle, topmanagement; the system development life cycle concepts;hardware and software end products. Life cycle activities- life cycle flow chart, task, management review, baseline specifications, role of system analyst.

Module II **(10 Hours)**

Basic tool of system analysis: identification codes – definition, need for codes, code plan, code dictionary, common type of codes, forms design – basic parts of form, style and types of form, Department of Computer Science BSc Computer Science principles of form design .Tools for structure analysis and design: Types of basic charts, decision tables, decision trees, structured English, data flow diagram, data dictionary, system flow charts, flow charting symbols, information oriented flow charts, process oriented flow charts, HIPO charts.

Module III **(10 Hours)**

Study phase: Study phase activities, information service request, initial investigation, fact finding techniques, fact analysis techniques, steps in feasibility analysis, study phase report.

Module IV **(10 Hours)**

Design phase: Design phase activities, structure design, input design- input data, input media and devices, output design, design phase report.

Module V
(12 Hours)

Development phase: Development phase activities, bottom up and top down computer program development, training- programmer, operator, user trainings ; convertion; change over plan; steps in computer program development; structured programming; development phase report.

Module VI **(10 Hours)**

Operation phase: Operation phase activities; change over crisis; change over activities; routine operations; security; performance evaluation.

References

- Marvin Gore & John Stubbe- Elements Of System Analysis, Galgotia Book Source.
- Elias M Awad - System Analysis And Design , Second Edition, Galgotia Publications.

- Richard Fairley - Software Engineering Concepts , Tata McGraw Publication,2001.

Core Course VIII: Data Structures Using C++ (CSC3CRT0319)

64 Hours **3 Credits**

Course Outcome

The students will be able:

- To introduce the concepts of Abstract data Type, data structure, performance measurement, time and space complexities of algorithms.
- To discuss the implementation linear data structures such as stacks,'j queues and lists and their applications.
- To discuss the implementation of different non linear data structures such as trees and graphs.
- To introduce various search data structures such as hashing, binary search trees, red black trees, splay trees and b-trees.
- To introduce various internal sorting techniques and analyze their time complexities.

Module I (15 Hours)

Concept of Structured data - Data structure definition, Different types; Algorithm: Definition, Algorithm Analysis, Complexity, Asymptotic Notation, classification of data

structures, Arrays – Memory allocation and implementation of arrays in memory, array operations, Applications -sparse matrix representation and operations, polynomials representation and addition, Concept of search and sort – linear search, binary search, selection sort, insertion sort, quick sort.

Module II (14 Hours)

Stacks – Concepts, organization and operations on stacks using arrays (static), examples, Applications - Conversion of infix to postfix and infix to prefix, postfix evaluation, subprogram calls and execution, Multiple stacks representation. Queues - Concepts, organization and operations on queues, examples. Circular queue – limitations of linear queue, organization and operations on circular queue. Double ended queue, Priority queue.

Module III (12 Hours)

Linked list: Concept of dynamic data structures, linked list, types of linked list, linked list using pointers, insertion and deletion examples, circular linked list, doubly linked lists Applications- linked stacks and queues, memory management basic concepts, garbage collection.

Module IV (14 Hours)

Trees - Concept of recursion, trees, tree terminology, binary trees, representation of binary trees, strictly binary trees, complete binary tree, extended binary trees, creation and operations on binary tree, binary search trees, Creation of binary search tree, tree traversing methods – examples, binary tree representation of expressions.

Module V (10 Hours)

File - Definition, Operations on file (sequential), File organizations - sequential, Indexed sequential, random files, linked organization, inverted files, cellular partitioning, hashing – hash tables, hashing functions, collisions, collision resolving methods.

References

- G.S Baluja - Data Structures Through C++ (A Practical Approach), Second Edition-2004, Danapat Rai & Co.
- Ellis Horowitz and Sartaj Sahni - Fundamentals of Data Structures in C++ , Second Edition, Galgotia Publications.
- Seymour Lipschutz, Theory and Problems of Data Structures, Schaums Outline Series,2006, McGraw Hill
- Yedidyah Langgsam, Moshe Augustein, Aaron M Tenenbaum- Data structures using C and C++ , Second Edition, Prentice Hall

Core Course IX: Software Lab III (CSC3CRP0119)

64 Hours **2 Credits**

Course Outcomes

The students will be able to:

- Select appropriate data structures as applied to specified problem definition.
- Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
- Students will be able to implement Linear and Non-Linear data structures.
- Develop the logical design of the database using data modeling concepts such as entityrelationship diagrams.

- Design and develop a relational database for an organisation

(There will be two questions; the first from DBMS and second from Data structures.)

I.SQL Commands (2 hrs. per week)

1. Data definition commands - CREATE, ALTER, DROP, Adding Constraints Primary key, foreign key, unique key, check, not null.

2. Basic SQL queries INSERT, SELECT, DELETE, UPDATE, Using multiple tables, ordering of rows using ORDER BY option, Set operations using UNION, EXCEPT, INTERSECT, Substring Comparison using LIKE operator, BETWEEN operator.

3. Complex Queries Nested Queries, EXISTS and UNIQUE/DISTINCT functions, NULL values, Renaming of attributes and Joining of tables, Aggregate functions and grouping.

4. Managing views, Simple stored procedures.

5. Data Control commands - Access Control and Privilege command

Section I- Data Structures using C++. (3 hours per week)

Array – Insertion , Deletion, Polynomial addition using arrays Sort – Selection, Insertion, Quick Search – Linear search, Binary search Sparse matrix – Sparse form representation, transpose and addition using the sparse form

Section II

Stack - Implementation using arrays (linear stack) Queue – Implementation using arrays (linear queue)

Section III

Singly linked list – Implementation using dynamic memory allocation techniques, arrange the list based on the ascending or descending order of the information field, concatenate two linked lists, interchange any two nodes in a list.

Section IV

Creation of binary search trees, Insertion and deletion of nodes.

FOR TRUTH AND SERVICE

Detailed Syllabus: Semester IV

Core Course X: Linux Administration (CSC4CRT0119)

64 Hours **4 Credits**

Course Outcomes

The students will be able to:

- Demonstrate how to install LINUX in server and workstation configurations
- Demonstrate how to install and use office software on a LINUX workstation • Use advanced LINUX commands and utilities for system administration
- Create user and group accounts and secure system resources • Develop shell programmes in bash.
- Understand the working of different servers such as apache, DHCP, DNS etc.

Module I: OVERVIEW OF LINUX

(14 Hours)

Overview of Linux – What is Linux, Linux's root in Unix, Common Linux Features, advantage of Linux, Overview of Unix and Linux architectures, Linux files system, hardware requirements for Linux, Linux standard directories. Commands for files and directories cd, ls, cp, rm, mkdir, rmdir, pwd, file, more, less, Creating and viewing files using cat, file comparisons.

Module II: ESSENTIAL LINUX COMMANDS

(12 Hours)

Essential Linux commands– Processes in Linux, process fundamentals, connecting processes with pipes, redirecting input/output, Background processing, managing multiple processes, process scheduling – (at, batch), nohup command, kill, ps, who, find, sort, touch, file, file processing commands - wc, cut, paste etc Mathematical commands - expr, factor etc. Creating and editing files with vi editor.

Module III: SHELL PROGRAMMING

(12 Hours)

Shell programming-Basics of shell programming, various types of shell available in Linux, comparisons between various shells, shell programming in bash. Conditional and looping statements, case statement, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automating system tasks.

Module IV: SYSTEM ADMINISTRATION

(14 Hours)

System administration- Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of users accounts, creating and

mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command.

Module V: (12 Hours)

Simple filter commands: pr, head, tail, cut, sort, uniq, tr - Filter using regular expression grep, egrep, sed Understanding various Servers :DHCP, DNS, Squid, Apache, Telnet, FTP,Samba.

References

- Jain, S.P & Narang, K.L., Advanced Accountancy, Kalyani Publishers, New Delhi
- Maheswari, S.N & Maheswari, S.K., Advanced Accounting, Vikas PublishingHouse, New Delhi
- Shukla, M.C., & Grewal, T.S., Advanced Accountancy, S Chand and Company Pvt. Ltd, New Delhi
- Shukla, S.M., & Gupta, S.P, Advanced Accounting, Sahitya Bhavan Publications, Agra.
- MA Arulanandam and KS Raman, Advanced Accountancy, Himalaya Publishing House, Mumbai.
- Raman B S, Corporate Accounting United Publishers
- The Chartered Accountant (Journal), Institute of Chartered Accountants of India,New Delhi.

Core Course XI: Computer Aided Optimization Techniques (CSC4CRT0319)

64 Hours **4 Credits**

Course Outcomes

The students will be able to:

- Identify and develop operational research models from the verbal description of the real system.
- Understand the mathematical tools that are needed to solve optimisation problems
- Understand the content of an operations strategy and the decisions involved • Solve the problems using special solution algorithms.
- Formulate and solve problems as networks and graphs.
- Use CPM and PERT techniques, to plan, schedule, and control project activities.

Module I
(12 Hours)

OR: Introduction, origin and development, nature and features, scientific methods, modelling, advantages and limitations of models, solution methods for models, methodology, OR and decision making, applications, opportunities and shortcomings. Linear Programming Problem: Introduction, Mathematical formulation of LPP, Graphical solution method and exceptional cases, General LPP, Canonical and Standard forms of LPP.

Module II **(14 Hours)**

Linear Programming Problem: Simplex method - Introduction, Properties, Computational Procedure of simplex method, Artificial variables, Two-Phase method, Big-M method. Duality in Linear Programming: Introduction, General Primal-Dual pair, Formulating Dual problem, Dual Simplex Method.

Module III (15 Hours)

Transportation Problem: Introduction, LP formulation, Existence of solution, Transportation Table, Loops, Solution – Initial Basic Feasible Solution (North West Corner method, Least Cost method and VAM) and Optimal Solution (MODI method and Stepping Stone method), Tran-shipment problems. Assignment Problems: Introduction, Mathematical formulation, Solution – using Hungarian method, Special cases, Traveling Salesman problem.

Module IV (10 Hours)

Sequencing Problem: Introduction, Problem of Sequencing, Basic Terms, Processing n jobs through 2 machines, Processing n jobs through k machines, Processing 2 jobs through k machines and Maintenance Crew Scheduling.

Module V (14 Hours)

Network Routing Problems: Introduction, Network Flow Problems, Minimal Spanning Tree problem, Shortest Route problem, Maximal Flow problems – Augmenting path and MaxflowMincut methods. Network Scheduling: Introduction, Basic Components, Logical Sequencing, Rules, Concurrent Activities, Critical Path Analysis – CPM, Probability Considerations and PERT method, Distinction between PERT and CPM, Applications, Advantages and Limitations.

References

- Kanti Swarup, P.K. Gupta, Man Mohan, Operations Research, 16th edition , Sultan Chand & Sons.
- Hamdy A. Taha, Operations Research: An Introduction, 9th edition, Pearson

- Prem Kumar Gupta and D.S. Hira, Problems in Operations Research, Sultan Chand & Sons.
- K. V Mital and C. Mohan, Optimization Methods in Operations Research and System Analysis, Third edition, New Age International.

Core Course XII: Web Programming Techniques (CSC4CRT0219)

64 Hours **3 Credits**

Course Outcomes

The students will be able to:

- Develop interactive web pages using HTML, CSS and JavaScript
- Build dynamic web site using server side PHP Programming and Database connectivity.
- Develop web applications for real time situations

Module I (12 Hours)

Introduction to web, WWW architecture, Fundamentals of HTML, text formatting tags, marquee, inserting images, links, lists, creating tables, frames, working with form elements.

Module II (15 Hours)

CSS introduction, <link> and <style> elements, CSS properties, Controlling Fonts, Text formatting, Text- pseudo classes, Selectors, Links, Backgrounds, lists Introduction to Java Script, Java Script variables, operators, decision control statements, looping, functions, arrays, events, popup boxes-alert, prompt, conform box, built-in objects, writing JavaScript, form validation

Module III (11 Hours)

Introduction to PHP, server side scripting, role of web server software, php comments, variables, echo and print, PHP operators, data types, branching statements, loops, arrays.

Module IV (12 Hours)

PHP functions, PHP form, Passing information between pages, $_GET, $_POST, $_REQUEST. String functions, include and require, session and cookie management, error handling in PHP, Object Oriented Programming using PHP.

Module V (14 Hours)

Introduction to MySQL, data types, SQL commands-CREATE, UPDATE, INSERT, DELETE, SELECT, PHP functions for MySQL connectivity and operation-mysql_connect, mysql_select_db, mysql_query, mysql_fetch_row, mysql_fetch_array, mysql_result, mysql_list_fields, mysql_num_fields, insertion, updation and deletion of data using PHP, displaying data from MySQL in webpage.

References

- Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi-"Beginning PHP5", Wiley Publishing, Inc
- Ivan Bayross -"HTML, DHTML, JavaScript, Pearl & CGI ", , BPB Publication
- Rasmus Lerdorf and Kevin Tatore, "Programming PHP", Shroff Publishers & Distributors Pvt. Ltd

- Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi, "Beginning PHP" Wiley Publishing, Inc

Core Course XIII: Software Lab -IV (CSC4CRP0119)

64 Hours **2 Credits**

Course Outcomes

The students will be able to:

- Design a basic web site using HTML5 and CSS3 to demonstrate responsive web design.
- Implement dynamic web pages with validation using JavaScript objects by applying different event handling mechanism.
- Develop simple web application using server-side PHP programming and Database Connectivity using MySQL.

Demonstrate simple web application using Python Django Framework.

Section 1: Module I, II, III

- Implement dynamic web pages with validation using JavaScript objects by applying different event handling mechanism Creating simple webpages using HTML tags and CSS.
- Simple validation programs using Java Script.
- PHP including Loops, decision statements and arrays

Section 2: Module IV, V

- PHP programs using session.
- PHP programs using Data base connectivity

Division of Marks (Practical - 3 hours External)

First program - questions from Modules 1 to 3 - 25 marks

Second program should be based on advanced concepts – questions from modules 4 to 6 - 35 marks

Viva Voce - 10 marks

Lab Record (minimum of 20 Programs) - 10 marks Total 80 marks

FOR TRUTH AND SERVICE

Detailed Syllabus: Semester V

Core Course XIV: System Software And Operating Systems (CSC5CRT0119)

64 Hours **4 Credits**

Course Outcomes

The students will be able:

- To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.
- To understand the various phases of compiler and compare its working with assembler.
- To understand how linker and loader create an executable program from an object module created by assembler and compiler.
- To understand the basics of operating systems like kernel, shell, types and views of operating systems
- To Describe the various CPU scheduling algorithms for removing deadlocks. • Explain various memory management techniques and concept of thrashing
- To use disk management and disk scheduling algorithms for better utilization of external memory.

Module I (14 Hours)

System software- General concepts,Language processing concepts, Fundamentals of Language processing, Fundamentals of language specification - Programming Language Grammar, Classification of grammar. Assemblers: Elements of assembly language programming – assembly language statements, Design specification of an assembler. Macros: Definition- Call- Expansion.

Module II

(12 Hours)

Scanning & Parsing : Finite State Automata. Parsing - Parse trees ,topdown parsing,bottom up parsing. Compilers - Phases of compiler- Aspects of compilations- code optimization. Linkers and Loaders - Relocation and linking concepts- Design of linker-Type of loaders.

Module III

(12 Hours)

Operating System: OS Definition, Functions, OS as a resource manager, types of OS Evolution of OS, Operating System Services. Process:Basic Concepts, Process Scheduling, Operations on Processes, Inter process communication, CPU Scheduling - Scheduling Criteria, Scheduling Algorithms.

Module IV (14 Hours)

Process Synchronization -The Critical Section problem,Semaphores. Dead Locks : System Model, Dead Lock Characterization, Methods of Handling Dead Locks, Dead Lock Prevention, Dead Lock Avoidance, Dead Lock Detection, Recovery from Dead Lock.

Module V (12 Hours)

Memory Management:Memory Management Strategies -Swapping, Contiguous memory allocation, Paging, Segmentation, Page Replacement.File System :- File Concept, Access Methods, Allocation Methods.

References

- D M Dhamdhere - System programming and operating Systems , Tata McGraw Hill

- Abraham Silberschatz, Peter Galvin and Greg Gagne - Operating System Principles, Seventh Edition, John Wiley
- John J Donovan - System Programming, First edition, Tata McGraw Hill 2009.
- William Stallings - Operating Systems, Sixth edition, Prentice Hall of India 2010.

Core Course XV: IT & Environment (CSC5CRT0219)

64 Hours **4 Credits**

Course Outcomes

The students will be able to:

- Create an awareness about the multidisciplinary nature of environmental studies.
- Acquire detailed knowledge on natural resources such as forest, mineral, food, energy, water, land resources.
- Develop knowledge about the features, structure and function of a given ecosystem.
- Introduction to the value of biodiversity and its conservation, environmental pollution, social issues.
- Develop an awareness on IT and society-issues and concerns, cyber security, impact of IT on language.
- An introduction to the three generations of human rights, Human rights and united nations and the human rights in India.

Module I **(14 Hours)**

Multidisciplinary nature of environmental studies : Definition, scope and importance, Need for public awareness.

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of individual in conservation of natural resources. Equitable use of resources for sustainable life styles.

Ecosystems : Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids., Introduction, types, characteristic features, structure and function of the given ecosystem:- Forest ecosystem

Module II **(14 Hours)**

Unit 1: Biodiversity and its conservation: Introduction, Biogeograhical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values., India as a mega-diversity nation, Hot-sports of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India

Environmental Pollution :Definition, Causes, effects and control measures of: - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal

pollution, Nuclear hazards, Solid waste Management: Causes, effects and control measures of urban and industrial wastes., Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.

Social Issues and the Environment :Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns, Case studies, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and holocaust, Case studies, Consumerism and waste products, Environment Protection Act , Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

Module III **(9 Hours)**

Internet as a knowledge repository, academic search techniques, creating cyber presence. Academic websites, open access initiatives, opens access publishing models, Introduction to use of IT in teaching and learning -Educational software, Academic services–INFLIBNET, NPTEL, NICNET, BRNET .

Module IV **(12 Hours)**

IT & Society- issues and concerns- digital divide, IT & development, the free software movement , IT industry: new opportunities and new threats, software piracy, cyber ethics, cyber crime, cyber threats, cyber security, privacy issues, cyber laws, cyber addictions, information overload, health issues- guide lines for proper usage of computers, internet and mobile phones. e-wastes and green computing, impact of IT on language & culturelocalization issues- UnicodeIT and regional languages, Green Computing Concept.

Module V **(15 Hours)**

Human Rights– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights). Human Rights and United Nations – contributions, main human rights related organs - UNESCO,UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights. Human Rights in India – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities Environment and Human Rights - Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment Conservation of natural resources and human rights: Reports, Case studies and policy formulation. Conservation issues of western ghatsmention Gadgil committee report, Kasthurirengan report. Over exploitation of ground water resources, marine fisheries, sand mining etc.

Assignment may include Field study involving

- Visit to a local area to document environmental grassland/ hill /mountain
- Visit a local polluted site – Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds etc
- Study of simple ecosystem-pond, river, hill slopes, etc

References

- "Technology in Action" Alan Evans, Kendall Martin, Mary Anne Poatsy, Pearson
- Bharucha Erach, Text Book of Environmental Studies for undergraduate Courses.
- Clark.R.S., Marine Pollution, Clanderson Press Oxford (Ref)
- Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T.2001 Environmental Encyclopedia, Jaico Publ. House. Mumbai. 1196p .(Ref)

- Dc A.K.Enviornmental Chemistry, Wiley Eastern Ltd.(Ref)
- Down to Earth, Centre for Science and Environment (Ref)
- Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge University Press 1140pb (Ref)
- Jadhav.H & Bhosale.V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p (Ref)
- Mekinney, M.L & Schock.R.M. 1996 Environmental Science Systems & Solutions. Web enhanced edition 639p (Ref)
- Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)
- Odum.E.P 1971. Fundamentals of Ecology. W.B. Saunders Co. USA 574p (Ref)
- Rao.M.N & Datta.A.K. 1987 Waste Water treatment Oxford & IBII Publication Co.Pvt.Ltd.345p (Ref)
- Rajagopalan. R, Environmental Studies from crisis and cure, Oxford University Press, Published: 2016 (TB)
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut (Ref)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (Ref)
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Stadards, Vol I and II, Enviro Media (Ref)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (Ref)

- Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p (Ref)
- M-Magazine, R-Reference TB- Text Book.

Core Course XVI: Java Programming Using Linux (CSC5CRT0319)

64 Hours **3 Credits**

Course Outcomes

The students will be able to:

- Understand concept of Object Oriented Programming & Java Programming Constructs.
- Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
- Understand the concept of exception handling and Input / Output operations

- Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events

Module I (14 Hours)

Concepts of Object oriented programming, Benefits of OOP, Features of Java. Java environment, Java tokens, Constant, variables, data types, operators, Control Statementsbranching statements, looping statements, jump statements, labeled loops.

Module II (12 Hours)

Defining a Class, Fields declaration, Method declaration, Creating object, Accessing class members, method overloading, Constructors, constructor overloading, super keyword, static Members, Inheritance, overriding methods, dynamic method dispatch, final(variables, methods and classes), abstract methods and classes, interfaces, visibility control.

Module III (12 Hours)

Arrays- One dimensional arrays, declaration, creation, initialization of arrays, two dimensional arrays, String class. Packages: - Java API packages overview (lang, util, io, awt, swing, applet), user defined packages-creating packages, using packages Exception Handling Techniquestrycatch-throw-throws-finally -Multi-threading- creation of multithreaded program-Thread classRunnable interface, Thread life cycle

Module IV (14 Hours)

Event Handling-Delegation Event Model-Event Classes-Sources of Events-Event ListenersEvent classes- Swing- architecture, components of swing- JLabel, JButton, JCheckBox, JRadioButton, JList, JComboBox, JTextField, JText Area, JPanel, JFrame,

Layout Managers(Flow Layout, Grid Layout, Card Layout, Border Layout, Box Layout, Null Layout).

Module V (12 Hours)

Applet Fundamentals -applet tag, applet life cycle, passing parameters to applets. Working with graphics - Line, Rectangle, Oval, Arc, color setting. JDBC architecture- JDBC connection, JDBC statement object, JDBC drivers.

References

- E. Balagurusamy- Programming with Java , Third Edition, McGraw Hill Companies.
- K. Somasundaram - PROGRAMMING IN JAVA2, First Edition, Jaico Publishing House.
- Patrick Naughton - Java2 The Complete Reference, Seventh Edition:
- Cay S Horstmann & Gary Cornell - Core Java Volume 1- Fundamentals, Eighth edition.
- Java 6 Programming Black Book 2007 Edition, Dreamtech press.

Core Course XVII: Computer Security (CSC5CRT0419)

64 Hours **4 Credits**

Course Outcomes

The students will be able to:

- Students will be able to learn a variety of frameworks and relate them to arising security issues in cyberspace
- Students will be able to address system security issues and their impact on individuals, organizations, and society.
- Students will learn the basic concepts in computer security including software vulnerability and analysis and defence and applied cryptography

Module I (9 Hours)

Introduction-Principles of Security- Need for Security- Threats- Attacks

Module II (14 Hours)

Cryptography :Cipher Methods: Caesar cipher -One time pad – Mono alphabetic Cipher -Play fair cipher- Poly alphabetic cipher -Vigenère – Cipher, Transposition ciphers – Cryptographic Algorithms: Symmetric & Asymmetric- Cryptographic tools: PKI- Digital SignaturesStenography

Module III (14 Hours)

System Security : Intrusion Detection and Prevention Systems, Why IDPS? Types of IDPS,Password Management, Countermeasures

Module IV (15 Hours)

Network Security:Electronic Mail Security, Pretty Good Privacy, S/MIME, IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload.

Module V (12 Hours)

Web Security: Web Security considerations- Secure Socket Layer -Transport layer SecuritySecure electronic transaction. Firewalls-Packet filters- Application Level GatewayCircuit Level Gateway.

References

- Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security" Fourth Edition
- William Stallings, "Cryptography and Network Security – Principles and Practices",Fourth Edition,2006,Pearson Education.
- Behrouz A. Forouzan, Dedeep Mukhopadhyay "Cryptography & Network Security", Second Edition,Tata McGraw Hill, New Delhi, 2010.
- Atul Kahate, "Cryptography and Network Security", Second Edition, Tata McGraw Hill.

Core Course - XVIII: Software Development Lab I (Mini Project) (CSC5CRP0119)

60 Hours **3 Credits**

Course Outcomes

The students will be able to:

- Demonstrate and build the project successfully by hardware requirements, coding, emulating and testing.
- Demonstrate an ability to work in teams and manage the conduct of the research study.
- Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
- Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.
- Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.
- Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.

Detailed Syllabus: Semester VI

Core Course XIX: Computer Graphics (CSC6CRT0119)

64 Hours **4 Credits**

Course Outcomes

The students will be able:

- To list the basic concepts used in computer graphics.
- To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- To describe the importance of viewing and projections.
- To define the fundamentals of animation, virtual reality and its related technologies.
- To understand a typical graphics pipeline.
- To design an application with the principles of virtual reality

Module I: INTRODUCTION (12 Hours)

Introduction : A survey of Computer Graphics, overview of graphics systems-Video display devices- Refresh CRT, Raster-Scan and Random-Scan Displays ,Color CRT Monitors, DVST, Flat-Panel Displays , Raster Scan systems, Random scan systems, Input devices, Hard copy devices, Graphics software.

Module II: OUTPUT PRIMITIVES (12 Hours)

Output primitives: Line drawing algorithms: DDA algorithm, Bresenham's line algorithm, Circle generating algorithm- Midpoint circle algorithm, Character generation.

Module III: 2D GEOMETRIC TRANSFORMATIONS
(14 Hours)

2D geometric Transformations: Basic transformations: Translation, Rotation, Scaling; Other transformations-Reflection and shear, Matrix representation and homogenous coordinates, Composite transformation, Interactive picture construction Techniques. Twodimensional viewing: viewing pipeline, window and viewport, window to viewport transformation. Clipping operations- Point clipping, Line clipping:- Cohen Sutherland line clipping, Polygon clipping:- Sutherland- Hodgeman polygon clipping, Text Clipping.

Module IV: THREE-DIMENSIONAL CONCEPTS
(14 Hours)

Three-dimensional concepts: Three dimensional display methods, Three dimensional object representations- Polygon surfaces, Sweep representations, Constructive solid geometry methods, octrees and quadtrees.

Module V: COMPUTER ANIMATION (12 Hours)

Computer Animation: Design of animation sequences, raster animations, computer animation languages, key-frame systems, morphing, motion specifications.

References

- Donald D.Hearn & M. Pauline Baker, Computer Graphics C Version, Second Edition,, PHI Pvt. Ltd.
- Newman W M & R F Sproul, Principles of Interactive Computer Graphics, Second Edition McGraw Hill Publishers.

Core Course XX: Big Data Analytics (CSC6CRT0219)

64 Hours **4 Credits**

Course Outcomes

The students will be able to:

- Explain the motivation for big data systems and identify the main sources of Big Data in the real world.
- Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store retrieve and process Big Data for Analytics.
- Implement several Data Intensive tasks using the Map Reduce Paradigm.

- Apply several newer algorithms for Clustering Classifying and finding associations in Big Data • Design algorithms to analyze Big data like streams, Web Graphs and Social Media data.
- Design and implement successful Recommendation engines for enterprises.

Module I: INTRODUCTION TO BIGDATA PLATFORM
(12 Hours)

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 - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

Module II: MINING DATA STREAMS
(14 Hours)

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing -Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

Module III: HADOOP **(12 Hours)**

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

Module IV: HADOOP ENVIRONMENT (12 Hours)

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - MonitoringMaintenance-Hadoop benchmarks- Hadoop in the cloud

Module V: FRAMEWORKS (14 Hours)

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services –HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

References

- Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
- Tom White " Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.
- Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing.
- Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
- Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
- Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
- Pete Warden, "Big Data Glossary", O'Reilly, 2011.

FOR TRUTH AND SERVICE

Core Course XXI: Seminar (CSC6CRP0119)

60 Hours **2 Credits**

Each student can choose a latest topic of current day interest in the areas of Computer Science / Information Technology and present a seminar presentation using appropriate presentation media. A seminar presentation report in bound form in the pattern of a complete technical report (with contents page, well structured presentation, references etc.) should be submitted. There will not be any external evaluation for the Software lab VI and Seminar Presentation Scheme of Evaluation of Seminar Presentation (core) (INTERNAL) is as follows:

Division of Marks

Seminar Presentation Internal (100 marks)

Presentation - 40 marks

Questions and Answers - 30 marks

Documentation 10 marks Seminar report with proper Content and Binding - 20 marks

Total Marks -100 marks

Core Course XXII: Software Development Lab Ii (Main Project) (CSC6CPP0119)

64 Hours **3 Credits**

Course Outcomes

The students will be able to:

- Discover potential research areas in the field of IT.
- Conduct a survey of several available literature in the preferred field of study.
- Compare and contrast the several existing solutions for research challenge.
- Demonstrate an ability to work in teams and manage the conduct of the research study.
- Formulate and propose a plan for creating a solution for the research plan identified.
- To report and present the findings of the study conducted in the preferred domain

Software development lab: 7 hrs. per week Individual project.

The project topic shall be chosen from areas of current day interest using latest packages / languages running on appropriate platforms (Except the tools used in software developmentI), so that the student can be trained to meet the requirements of the Industry. A project report should be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

Scheme of Evaluation for Software Development Lab II external is as follows: Division of Marks (Software Development Lab II)

Project demonstration and Presentation - 40 marks
Viva related to project - 20 marks

Project report with proper content and binding -20 marks

Total Marks - 80mark

Core Course XXIII: Viva Voce (CS6CRV0119)

1 Credits

Scheme of Evaluation of Viva voce (core) for External is as follows:

Each student should attend a course viva voce based on syllabus from semester I to semester VI.

Total Marks – 100 marks

Optional Core Courses

Details of Optional Core Courses

Sl. No.	Course Code	Course Name	Hours per Week	Credit
1	CSC6CBT0119	Cloud Computing	4	4
2	CSC6CBT0119	Python And Latex	4	4
3	CSC6CBT0119	Digital Image Processing	4	4

Optional Core Course: Semester VI

Optional Core I: Cloud Computing (CSC6CBT0119)

64 Hours **4 Credits**

Course Outcomes

The students will be able to:

- Define Cloud Computing and memorize the different Cloud service and deployment models.
- Describe importance of virtualization along with their technologies.
- Use and Examine different cloud computing services.
- Analyze the components of open stack & Google Cloud platform and understand Mobile Cloud Computing.
- Describe the key components of Amazon web Service.
- Design & develop backup strategies for cloud data based on features.

Module I (14 Hours)

Introduction: Cloud Computing at a Glance, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies, Principles of Parallel and Distributed Computing: Eras of Computing, Parallel vs. Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing.

Module II
(12 Hours)

Virtualization: Introduction, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples.

Module III

(12 Hours)

Cloud Computing Architecture: Introduction, Cloud Reference Model, Types of Clouds, Economics of the Cloud, Open Challenges.

Module IV

(14 Hours)

Aneka: Cloud Application Platform: Framework Overview, Anatomy of the Aneka Container, Building Aneka Clouds, Cloud Programming and Management, Data Intensive Computing: Map-Reduce Programming – What is Data-Intensive Computing?, Technologies for DataIntensive Computing, Aneka MapReduce Programming.

Module V (12 Hours)

Cloud Platforms in Industry: Amazon Web Services, Google AppEngine, Microsoft Azure, Cloud Applications: Scientific Applications, Business and Consumer Applications.

References

- Rajkumar Buyya, Christian Vecchiola, S ThamaraiSelvi- Mastering Cloud Computing, Tata McGraw Hill Publications.
- Kumar Saurabha, "Cloud Computing " Wiley Publication Krutz ,Vines "Cloud Security". Wiley Publication.
- A Srinivasan & J. Suresh " Cloud Computing : A Practical Approach for learning and Implementation " , First edition ,Pearson.

Optional Core II: Python And Latex (COM4CRT0619)

64 Hours **4 Credits**

Course Outcomes

The students will be able:

- To familiarize the students with the principles and practice of co-operative management and administration.
- To enable the students to identify the issues in the process of management and administration of co-operatives.

Module I **(12 Hours)**

The Python Pogramming Language , Variables , Basic expressions and statements , Arithmetic Operators , Data types - Type conversion , Numbers, Floats , String operations

Module II **(12 Hours)**

The Python Pogramming Language , Variables , Basic expressions and statements ,

Arithmetic Operators , Data types - Type conversion , Numbers, Floats , String operations

Module III **(14 Hours)**

Basic inbuild functions , User defined functions , Function Calls , Parametrized function calls , Function returns , Recursive functions , Scope concepts - local, global.

Module IV **(14 Hours)**

User input , Reading files , Writing to files , Directories , Interactive programming , Pickling , Exceptions

Module V **(12 Hours)**

What is LaTeX , Structure -Layout - Margin, Header/Footer , Sectioning , Bullets and Numbering , Images

References

- Downey, A. et al., "How to think like a Computer Scientist: Learning with Python", John Wiley, 2015.
- Stefan Kottwitz "LaTeX: Beginner's Guide"Packt Publishing, 2011.
- Swaroop C H, "Byte of Python", CreateSpace Independent Publishing Platform, 2015.
- Zed Shaw, "Learn Python the Hard Way",Addison-Wesley, 2014.
- WikiBooks - https://en.wikibooks.org/wiki/LaTeX/.
- F. Mittelbach and M Goossens with Braams, Carlisle, and Rowley, "The LaTeX Companion", Addison-Wesley Second edition.

Optional Core III: Digital Image Processing (CSC6CBT0119)

64 Hours **4 Credits**

Course Outcomes

The students will be able:

- To give an insight into the prevailing co-operative legal system.
- To enable the students to understand the legal framework of co-operation in India and in Kerala.

Module I **(12 Hours)**

Definition of an image, different types of images, digital image processing-definition, advantages, applications. Basic steps in DIP, elements of visual perception, pixel

relationship.

Module II **(14 Hours)**

Image Enhancement In Spatial Domain : Basics, histogram manipulation. Spatial filtering: smoothing linear filters, order- statistics filter- median filter and mean filter; sharpening filters-the Laplacian.

Module III **(12 Hours)**

Image Enhancement In Frequency Domain Fourier transform and frequency domain, basis of filtering in frequency domain. Smoothing filters-Ideal, Butterworth, Gaussian low pass filter; Sharpening filters- Ideal, Butterworth, Gaussian high pass filters

Module IV **(12 Hours)**

Introduction, basis of set theory, Dilation, Erosion, Structuring elements, Opening and Closing, Top hat and bottom hat transformation.

Module V **(14 Hours)**

Image Segmentation Point, line, edge detection-detection of isolated points, basic edge detection; Pixel based approach-Basics of intensity thresholding, Basic global thresholding; region based segmentation-region growing, region splitting and merging.

References

- Kerala Co-operative Societies Act,1959 (Bare Act).
- Goyal, D.B , Co-operative Legislation :Trends and Dimensions.
- Mohanan, P.N , Co-operative Societies Laws in Kerala, Kerala State Publications.

- Trivedi, B.B , Law and Management of Co-operatives.
- Pillai F.R (ed) , Kerala Co-operative Societies Act and Rules.

Open Courses

Open Course: Semester V

Open Course (For Other Streams): Computer Fundamentals, Internet & Ms Office (CSC5COT0119)

62 Hours **2 Credits**

Course Outcomes

The students will be able to:

- Recognize when to use each of the Microsoft Office programs to create professional and academic documents.
- Use Microsoft Office programs to create personal, academic and business documents following current professional and/or industry standards.
- Apply skills and concepts for basic use of computer hardware, software, networks, and the Internet in the workplace.

Module I **(10 Hours)**

Computer Fundamentals: History, Generations, Classifications, Operating Systems, Types of Networks

Module II **(12 Hours)**

The Internet, TCP/IP, IP Addressing, Client Server Communication, Intra-net, WWW, Web Browser and Web Server, Hyper-links, URLs, Electronic Email

Module III **(12 Hours)**

Word processing: Introduction, Microsoft Word, Basic Menus, Formatting the text & paragraph, Working with Index

Module IV **(14 Hours)**

Spread Sheet: Introduction, Microsoft Excel, Basic Menus, Formulas, Basic functions, Charts and Graphs.

Module V **(12 Hours)**

MicrosoftPower Point: Introduction, Basic Menus, Template, Slide Basics, Charts, Adding Multimedia & Animation.

References

- "Learning Computer Fundamentals, MS Office and Internet & Web Technology", Dinesh Maidasani, Firewall Media, Lakshmi Publications.
- Harley Hahn - "Internet Complete Reference", , Second Edition, Tata McGraw Hill Education.
- Gary B. Shelly, Misty E. Vermaat - "Microsoft Office 2010: Advanced" , CENGAGE Learning 2010.

Complementary Courses

COMPLEMENTARY COURSES

Sl. No.	Course Code	Course Name	Hours per Week	Credits
1	CSC1CMT0119	Computer Fundamentals and Basics of Pc Hardware	4	4
2	CSC1CMT0219	Fundamentals of Digital System	4	4
3	CSC2CMT0119	Data Communication	4	4
4	CSC3CMT0119	Networking Fundamentals	4	4
5	CSC4CMT0119	Microprocessor And Assembly Language Programming	4	4
6	CSC4CMP0119	Assembly Language Programming Lab	5	2

Complementary Course: Semester I

Complementary Course I: Computer Fundamentals And Basics Of PC Hardware (CSC1CMT0119)

72 Hours **4 Credits**

Course Outcomes

The students will be able:

- To understand Era of computer development.
- To draw and explain the basic architecture and working of a computer system.
- To describe the Booting process of computer system.
- To identify the power supply strategy used in a computer.
- To understand the working of standard input and output devices.

Module I **(15 Hours)**

Introduction to Computers: Generations of Computer (I-V), Classification of Computers: Analog, Digital and Hybrid Computers, Micro, Mini, Mainframe, Super Computers, Servers, Laptop and Block Diagram of a Computer, Functions of the Different Units: Input unit, Output unit, Memory unit, CPU (ALU+CU). Booting Process- POST, BIOS, clock speed, memory speed, memory capacity.

Module II **(12 Hours)**

Introduction to Computer Hardware, DC regulated power supply- Block Diagram, Concepts of Switch Mode Power supply, Inverters, UPS and their applications. Basic Components of CPU, Mother Board.

Module III

(15 Hours)

Expansion Slots- ISA, EISA, MCA, VESA, PCI local bus, Processor, Connectors, CMOS memory, SMPS, Serial and Parallel Ports, USB, BIOS chip, Steps for assembling a PC.

Module IV (15 Hours)

Input Devices: Keyboard, Point and draw devices: mouse, joystick, track ball, light pen, Data Scanning devices: image scanner, OCR, OMR, MICR, Bar code reader, Voice Recognition Device: Microphone, Output Devices: Monitor- CRT displays, Non-CRT displays, TFT: LED, LCD, Plasma. Printer, Impact and non-impact, Character, line and Page Printers.

Module V (15 Hours)

Memory: Primary Memory, RAM- SRAM, DRAM, ROM, PROM, EPROM, EEPROM, flash memory, Secondary memory: Hard Disk: Structure of a hard disk, how data is stored in a hard disk, concept of tracks, sectors, clusters, cylinders, CD-R, RW, DVD-RW, Blue-ray disk, HVD, PC memory Units: SIMM, DIMM, RIMM.

References

- Pradeep Sinha and Priti Sinha - Computer Fundamentals, Fourth Edition- 2007, BPB Publications.
- B. RAM, "Computer Fundamentals: Architecture and Organization", New age international (P) Limited.
- Balagurusamy - Fundamentals of Computer, First Edition- 2009, McGraw-Hill.
- Anita Goel - Computer Fundamentals, First Edition-2010, Pearson.
- Peter Norton, "Introduction to Computers", McGraw Hill.

Complementary Course II: Fundamentals Of Digital Systems (CSC1CMT0119)

72 Hours **4 Credits**

Course Outcomes

The students will be able:

- To apply the principles of number system, binary codes and Boolean algebra to minimize logic expressions.
- To develop K-maps to minimize and optimize logic functions up to 5 variables.
- To acquire knowledge about various logic gates and logic families and analyze basic circuits of these families.
- To design various combinational and sequential circuits such as encoders, decoders and counters using multiplexers, and flip – flops.
- To describe and compare various memory systems, shift registers and analog to digital and digital to analog conversion circuits.

Module I: NUMBER SYSTEMS, OPERATIONS AND CODES (18 Hours)

Number Systems, Operations and Codes - Decimal Numbers, Binary Numbers, Decimal to Binary Conversion, Binary Arithmetic, 1's and 2's complement of binary numbers, Signed numbers, Arithmetic operations with signed numbers, Hexadecimal

numbers, Binary to hexadecimal conversion, Hexadecimal to binary conversion, Hexadecimal to decimal conversion, Decimal to Hexadecimal conversion, Hexadecimal addition and subtraction, Octal numbers, Octal to decimal conversion, Decimal to Octal conversion, Octal to binary conversion, Binary to Octal conversion, Binary coded decimal, 8421 BCD code, BCD addition, Digital codes- gray code, binary to gray code conversion, Alphanumeric codes, parity codes.

Module II: LOGIC GATES, LOGIC LEVELS AND WAVEFORMS

(15 Hours)

Logic Gates, Logic Levels and Waveforms - Logic Levels and Digital waveforms, Logic Gates: AND, OR, NOT, XOR, XNOR, NAND (Definition, Symbols, Truth Tables and Operation). Universal Property of NAND and NOR gates. Logic gate operations with pulse waveforms.

Module III: BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATIONS

(14 Hours)

Boolean Algebra and Logic Simplifications - Boolean operations and expressions, Laws and rules of Boolean algebra, De-morgans theorems, Boolean analysis of logic circuits, simplification using Boolean algebra, standard forms of Boolean expression, Boolean expressions and truth tables. The Karnaugh Map, Karnaugh SOP minimization, Karnaugh POS minimization, Five variable Karnaugh maps.

Module IV: COMBINATIONAL LOGIC AND ITS FUNCTIONS

(12 Hours)

Combinational Logic and its functions - Basic combinational Logic circuits, Implementing combinational logic, combinational logic using NAND and NOR gates, Basic overview of logic functions, Basic adders, parallel binary adders, comparators, decoders, encoders, code converters, multiplexers, demultiplexers, parity generators/ checkers.

Module V: SEQUENTIAL CIRCUITS

(15 Hours)

Sequential Circuits - Latches, RS flip flop using NAND/ NOR gates, Clocked RS, D, JK and T flip flops, Edge triggered flip flops, Master slave flip flops, Asynchronous counter operation, Synchronous counter operations, Up/Down Synchronous counter, Design of synchronous counters. Basic shift register functions. Serial in- Parallel out shift registers, Parallel in -Serial out shift registers, Serial in- Serial out shift registers, Parallel in Parallel out shift register.

References

- Floyd and Jain- Digital Fundamentals, Eighth Edition, Pearson Education Reference: 1.A P Malvino and D P Leach - Digital Principles and Applications, Fourth edition, Tata McGraw Hill Publishers, co Ltd.

Complementary Course: Semester II

Complementary Course III: Data Communication (CSC2CMT0119)

64 Hours **4 Credits**

Course Outcomes

The students will be able to:

- Describe the components of a data communications system.
- Identify key considerations in selecting various transmission media in networks.
- Explain the role of line codes in a data communications network.
- Explain the role of digital communications devices in a data communications network.
- Describe the various types of signals and their features.
- Describe the various error detection and correction schemes.

Module I: DATA AND SIGNALS
(14 Hours)

Data and Signals – Analog and Digital Data, Analog and Digital Siginals, Periodic and Nonperiodic, Periodic Analog signals, Time and Frequency Domains, Composite Signals, Bandwidth, Digital Signals, Bit Rate, Digital Signal as a Composite Analog Signal, Transmission of Digital and Analog Signals, Transmission Impairment, Attenuation, Distortion, Noise, Data rate limits, Noiseless channel: Nyquist bit rate, Noisy Channel: Shannon Capacity, Simplified Communication & Data Communication models. Data Flow-Simplex, Half Duplex, Full Duplex.

Module II: TRANSMISSION MEDIA (12 Hours)

Transmission Media Guided media, Twisted-pair cable – UTP, STP, Connectors Coaxial Cable, Connectors FiberOptic Cable Propagation Modes, Unguided Media - Wireless Transmission - Terrestrial Microwave, Satellite Microwave, Radio Waves. Infrared.

Module III: DIGITAL TRANSMISSION (12 Hours)

Digital Transmission- Analog to Digital Conversion : Block Diagram of Digital Communication System. Parallel and serial ports Pulse Code Modulation(PCM), Sampling, Sampling Rate, Quantization, Delta modulation, Adaptive Delta Modulation, Transmission modes, Parallel Transmission, Serial Transmission, Asynchronous Transmission, Synchronous Transmission.

Module IV: ANALOG TRANSMISSION (12 Hours)

Analog Transmission- Digital to Analog Conversation, Modulation of Digital Data, Bit Rate, Baud Rate, Carrier signal, ASK, FSK, PSK, QAM. Analog to Analog modulation, Amplitude Modulation, Frequency Modulation, and Phase Modulation. Bandwidth Utilization : Multiplexing and Spectrum Spreading : Multiplexing, FDM, WDM, TDM, Synchronous TDM, Digital Siginal Services, Statistical TDM, Spread Spectrum, FHSS, DSSS

Module V: SWITCHING (14 Hours)

Switching - Switching Types; Introduction to wireless telecommunication systems and Networks, History and Evolution Different generations of wireless cellular networks 1G, 2G,3G and 4G networks. Common Cellular System components, 3G cellular systems components, Cellular component identification Call establishment. Introduction to GSM ,GPRS ,Wi-Fi, WiMAX, ZigBee Networks , Security issues and challenges in a Wireless network.

References

- Behrouz A.Forouzan - Data Communications and Networking, Fifth Edition, TATA McGraw Hill Education.
- William Stallings- Data and Computer communications, Eighth Edition, Pearson.

Complementary Course: Semester III

Complementary Course IV: Networking Fundamentals (CSC3CMT0119)

64 Hours **4 Credits**

Course Outcomes

The students will be able to:

- Describe the functions of each layer in OSI and TCP/IP model.
- Explain the functions of application layer, presentation layer and data link layer paradigms and Protocols.
- Describe the session layer design issues and transport layer services.
- Classify the routing protocols and analyze how to assign the IP addresses for the given network.
- Explain the types of transmission media with real time applications.

Module I (14 Hours)

Network: Definition-Models-LAN, WAN, MAN, Network Criteria, Type of connectionspointto-point, multipoint. Topology-Categories-Mesh, Star, Bus, Ring.

InternetHistory, service providers. Protocol and standards Connecting Devices: Hubs, Repeaters, Bridges, Switches, Gateways. Connecting remote LANS

Module II (12 Hours)

Reference Models : OSI Reference model, TCP/IP Reference model, Addressing. Data Link Layer: Error Detection and Correction, Block Coding-Linear Block Codes, Cyclic Codes, Cyclic Redundancy Check- Advantages, Checksum-One's Complement

Module III (14 Hours)

Framing- Flow Control, Error Control, Noisy and Noiseless Channels. Network Layer: Logical Addressing, IPV4 Address-Address Space Notation, Network Address Translation.IPV6 address-structure, address space, advantages, tunnelling, Address mapping.

Module IV (12 Hours)

Routing and Forwarding: Forwarding techniques, Routing table, Distance vector routing, multicast routing, and routing protocols. User Datagram Protocol-ports, user datagram, uses, TCP-features, segment, connection.

Module V (12 Hours)

Congestion Control- Open loop and Closed loop, Quality of Service. Application Layer Domain Name Space, Distribution, TELNET, FTP, SMTP, URL, Cookies, HTTP-Definition, Proxy Sever

References

- Behrouz A Forouzan - Data communication and Networking , Fourth Edition, McGraw.
- Andrew S Tanenbaum - Computer Networks, Fourth Edition, Prentice Hall.
- William Stallings- Data and Computer Communications , Eighth Edition, Prentice Hall.
- Fred Halsall, Lingana Gauda Kulkarni - Computer Networking & Internet, Fifth Edition, AddisonWesley .

Complementary Course: Semester IV

Complementary Course V: Microprocessors And Assembly Language Programming (CSC4CRT0219)

64 Hours **4 Credits**

Course Outcomes

The students will be able to:

- Describe the basic organization of computer and the architecture of 8086 microprocessor.

- Implement assembly language program forgiven task for 8086 microprocessors.
- Demonstrate control unit operations and conceptualize instruction level parallelism.
- Demonstrate and perform computer arithmetic operations on integer and real numbers.
- Categorize memory organization and explain the function of each element of a memory hierarchy.
- Identify and compare different methods for computer I/O mechanisms.

Module I (12 Hours)

Microprocessor architecture and its operations – microprocessor initiated operations and 8085 bus organization, internal data operations, 8085 registers, externally initiated operations. Memory – memory map, memory and instructions, peripheral mapped I/O.8085 Microprocessor and its architecture.

Module II (14 Hours)

8086 Internal architecture. Basic 8086 microcomputer system – system overview, 8086 bus, Read machine cycle,Write machine cycle. Assembly language programming – program development steps, 8086 instructions – data transfer instructions, arithmetic instructions, bit manipulation instructions, string instructions, program execution, Constructing the machine codes for 8086 instructions. Implementing standard program in 8086 - unconditional jump instructions, condition flags, conditional jump instructions, If-then, If-then else, and multiple if-then-else, while-do , repeat-until , loop instructions, instruction timing and delay loops.

Module III (12 Hours)

Strings, Procedures and Macros – 8086 string instructions, writing and using procedures,CALL and RET instructions, stack, using PUSH and POP to save register contents, passing parameters, reentrant and recursive procedures, writing and using macros.

Module IV (14 Hours)

8086 interrupts – program examples, interrupt Types, 8254 software – programmable TIMER/ COUNTER – basic 8253 and 8254 operations, 8255A, 8259A Priority interrupt controller. Direct Memory Access data transfer – circuit connections and operations of the Intel 8257 DMA controller, DMA transfer timing diagram.

Module V (12 Hours)

Intel 80286 microprocessor – architecture, signals and system connections, Real address mode operation, protected mode operation. Intel 80386 32-bit microprocessor – architecture, pins and signals. Introduction to 80486 microprocessor. Introduction to RISC machines.

References

- A.Nagoor Kani - Microprocessor 8086 programming & interfacing,Second edition, Tata McGraw Hill Education.
- Microprocessors and Interfacing , Programming and Hardware, Douglas V- Hall. Tata McGrawHill,1990.
- Barry B.Brey - Architecture, Programming and Interfacing ,Eighth Edition, Prentice – Hall India.

- The Intel Microprocessors 8086 / 8088 , 80186 / 80188 , 80286 , 80386 , 80486 , Pentium, and Pentium Pro processor.

Complementary Course VI: Assembly Language Programming Lab

(CSC4CMP0119)

60 Hours **2 Credits**

Course Outcomes

The students will be able to:

- Apply the fundamentals of assembly level programming in microprocessors.
- Build a program on a microprocessor using arithmetic & logical instruction set of 8086.
- Develop the assembly level programming using 8086 loop instruction set.
- Write programs based on string and procedure for 8086 microprocessors.
- Analyze abstract problems and apply a combination of hardware and software to address the problem.
- Make use of standard test and measurement equipment to evaluate digital interfaces.

(Five programs from each section and 12 hrs per section.)

1. Simple Arithmetic Calculations
2. Conditional Statements
3. Control Statements
4. Loop and Arrays
5. Character Strings
6. Subroutines and Stack Operations

Scheme of Evaluation for lab external is as follows:

Division of Marks (Practical - 3 hours External)

First program - questions from 1 to 3 - 25 marks

(Logic – 12 marks, Successful compilation – 8 marks, Result – 5 marks)

Second program should be based on advanced concepts – questions from 4 to 6 - 35 marks

(Logic – 20 marks, Successful compilation – 10 marks, Result –5 marks)

Viva Voce - 10 marks

Lab Record (minimum of 20 Programs) - 10 marks Total 80 marks

GIST OF CHANGES

SEMESTER	CHANGES	
	EXISTING	PROPOSED
I	Methodology Of Programming And C Language **Module IV** Array, initialization, array terminology, characteristics of an array, one dimensional array and operations, two dimensional arrays and operations. Strings and standard functions, Pointers, Features of Pointer, Pointer and address, Pointer declaration, void wild constant pointers, Arithmetic operations with pointers, pointer and arrays, pointers and two dimensional arrays. **Module V**	Methodology Of Programming And C Language **Module IV** Array, initialization, array terminology, characteristics of an array, one dimensional array and operations, two dimensional arrays and operations. Strings and standard functions, Basics of a function, function definition, return statement, Types of functions, call by value and reference. Recursion -Types of recursion, Rules for recursive function, direct and indirect recursion, recursion vs iterations, Advantages and disadvantages of recursion. **Module V** Pointers, Features of Pointer, Pointer and address, Pointer declaration,

	Basics of a function, function definition, return statement, Types of functions, call by value and reference. Recursion -Types of recursion, Rules for recursive function, direct and indirect recursion, recursion vs iterations, Advantages and disadvantages of recursion. Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, type def, bit fields , enumerated data types, Union, Dynamic memory allocation, memory models, memory allocation functions.	void wild constant pointers, Arithmetic operations with pointers, pointer and arrays, pointers and two dimensional arrays. Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, type def, bit fields , enumerated data types, Union, Dynamic memory allocation, memory models, memory allocation functions.
II	**Data Communication** **Module V** Circuit-Switched Networks, Three Phases, Packet Switching, Datagram Networks, Virtual-Circuit networks, Three Phases, Connection Oriented and Connectionless Services. Telephone Network :Major Components, Local Loops, Trunks, Switching Offices, Dial-Up service,	**Data Communication** **Module V** Switching Types; Introduction to wireless telecommunication systems and Networks, History and Evolution Different generations of wireless cellular networks 1G, 2G,3G and 4G networks. Common Cellular System components, 3G cellular systems components, Cellular component identification Call establishment.

	Digital Subscriber Line, Cable Networks, Traditional Cable Networks, HFC Network, Cable TV for data transfer.	Introduction to GSM ,GPRS ,Wi-Fi, WiMAX, ZigBee Networks , Security issues and challenges in a Wireless network
III	**Database Management System** **Module V** Transaction Processing: Introduction to Transaction Processing - Transaction and System Concepts –Desirable properties of Transactions. Database Security and Authorization: Types of Security – Control measures – Database Security and DBA – Access Control , User Accounts, and Database Audits –Access Control based on Granting and Revoking Privileges.	**Database Management System** **Module V** Transaction Processing: Introduction to Transaction Processing - Transaction and System Concepts –Desirable properties of Transactions. Concurrency control mechanisms. Database Security and Authorization: Types of Security – Control measures – Database Security and DBA – Access Control , User Accounts, and Database Audits –Access Control based on Granting and Revoking Privileges
I	**Data structure Using C++** Concept of Structured data - Data structure definition, Different types and classification of data structures, Arrays – Memory allocation and implementation of arrays in memory, array operations, Applications -sparse matrix representation and operations, polynomials representation and addition, Concept of search and	**Data structure Using C++** Concept of Structured data - Data structure definition, Different types; Algorithm: Definition, Algorithm Analysis, Complexity, Asymptotic Notation, classification of data structures, Arrays – Memory allocation and implementation of arrays in memory, array operations, Applications -sparse matrix representation and operations,

	sort – linear search, binary search, selection sort, insertion sort, quick sort.	polynomials representation and addition, Concept of search and sort – linear search, binary search, selection sort, insertion sort, quick sort.