Don Bosco College (Co-Ed)

Department of Computer Science

Guezou Nagar, Athanavur, Yelagiri Hills – 635 853.

B.SC. (CS) – PROGRAM HANDBOOK
UNDER CBCS
(With effect from 2020-2021)

Overview

B.Sc. Computer Science is a 3-year undergraduate program which deals with subjects and topics related to computer science and services. Technological implementation of computer systems is the main agenda of the program. The program ranges widely from creating quality professionals and research fellows who are working in every sector of the world today. The B.Sc. (Computer Sc.) program has been designed to cater to the ever changing demands of software technology along with necessary inputs to make them adopt to the needs of recent trends of technology besides it offers basic programing languages such as C, C++ and Java thus students acquire professional and technical skills, which enable them to produce mini projects. It also offers recent tools i.e. Weka, Data modeling tools, VB, Photoshop, Audacity, Xampp and Dreamweaver. These tools help students to design software projects, to develop dynamic webpages locally, learn basics knowledge about mobile computing and networks. Thus a computer science graduate would be able to satisfy the demands such as aptitude and technical skills, leadership skills, teamwork, communication skills of the various IT sectors and Industry and continuously work to sustain and improve their professional competencies to succeed in a competitive professional environment and appreciate business and social environments of information technology development.

Vision

An abode where education and expertise in ICT culminate to achieve integrity and excellence.

Mission

Stimulate the student community with integral development in all dimensions, knowledge and skill set to become employable in the competitive world.

Objectives

1. To offer programmers of study that develops employable youth with integral values for life.
2. To conduct co-curricular, extra-curricular and extension activities for holistic formation of the students.
3. To motivate students to become agents of social transformation.
4. To partner with institutions and execute subject-based projects to develop rural India.
5. To develop economic programmers for the sustainability of the institute.

Strategies

1. Create an ambience of trust so that students feel free to express themselves.
2. Help students to be more communicative.
3. Support students in software application development for better employability.
4. Support slow/fast learners.
5. Prepare students to present papers at national conferences or symposiums.
6. Encourage students to be tech-savvy.
7. Support students to realize their responsibility in the society.

REGULATIONS

Programme

"Programme" means a course of study leading to the award of a degree in a discipline.

Course

"Course" refers to a paper / practical / subject offered under the degree programme. Each Course is to be designed variously under lectures / tutorials / laboratory or field work / seminar / practical training / Assignments / Term paper or Report writing etc., to meet effective teaching and learning needs.

Credits

The weight age given to each course of study (subject) by the experts of the Board of Studies concerned. The total minimum credits, required for completing a UG program is 140.

Choice Based

All Undergraduate Programmers' offered by Thiruvalluvar University are under Choice Based Credit System. This is to enhance the quality and mobility of the students within and between the Universities in the country and abroad.

Eligibility for Admission to the Course:

Candidate seeking admission to the first year of the UG Degree Course should have passed the Higher Secondary Course Examination (Academic or Vocational) Conducted by the Govt. of Tamil Nadu with Mathematics as a subject or any other Examination accepted as equivalent thereto by the Syndicate subject to such other conditions as may be prescribed.

Duration of the Course

The course shall extend over a period of **three years comprising** of six semesters with two semesters in one academic year. There shall not be less than 90 working days for each semester. Examination shall be conducted at the end of every semester for the respective subjects. Each semester has 90 working days consisting of 5 teaching hours per working day. Thus, each semester has 450 teaching hours and the whole Programme has 2700 teaching hours.

Medium of Instruction and Examinations

The medium of instruction and examinations for the courses of Part I, II & IV-(i) (a) & (i)(b) shall be the language concerned. For part III & remaining Part IV courses other than modern languages, the medium of instruction shall be either Tamil or English and the medium of examinations is English / Tamil irrespective of the medium of instructions.

Course of study

The course of study for the UG degree courses of all branches shall consist of the following:

PART-I	Tamil or any one of the following modern/classical languages i.e. Telugu, Kannada, Malayalam, Hindi, Sanskrit, French, German, Arabic & Urdu.	The subject shall be offered during the **first four semesters** with one examination at the end of each semester (4 courses: 4x4=16 credits).

PART-II	Communicative English and English offered under Part II of the Programme.	The subject shall be offered during the **first four semesters** with one examination at the end of each semester (4 courses: 4x4= 16 credits)
PART-III	(i) Core subject	Core papers including practical's wherever applicable are offered as prescribed in the scheme of examination, by the Boards of studies of different subjects. There shall be 14 / 15 /16 Core papers including practical with 57 credits for all UG Courses, except for para-professional courses like B.Com or B.B.A.,. However for B.Com or B.B.A., courses, there shall be 19 Core papers with 73 credits.
	(ii) Allied Subjects	Allied papers including practical wherever applicable are offered as prescribed in the scheme of Examination by the Boards of Studies of different subjects. There shall be 4 papers, **one each** in I, II, III and IV semester, for all UG Courses except for Science courses with practical.
	(iii) Electives Courses	Three elective courses with (3x3=9) credits are to be offered one in the V Semester and two in the VI Semester. Elective subjects are to the selected from the list of electives prescribed by the Board of Studies concerned, as given below. Colleges can choose any one of the papers, given below, as elective for a particular semester whether 5th semester or 6th semester. Elective paper for a particular semester once chosen by a particular college, should not be changed without getting prior permission and approval of the University.

PART –IV	(i) Basic Tamil / Advanced Tamil	Those who have not studied Tamil up to XII std and taken a non-Tamil language under Part-I shall take Tamil comprising of two courses with 2 credits each (2x2=4 credits). The course content of which shall be equivalent to that prescribed for the 6th standard by the Board of Secondary Education and they shall be offered in the **third and fourth semesters**.
	(OR) Non-Major Elective	**Non-major electives** comprising of two courses with (2x2=4) credits, in the **third and fourth semesters**.
	(ii) Skill Based Subjects	All the UG programmes shall offer four courses of **skill based subjects one each** in III, IV, V & VI semester with 3 credits each (4x3= 12 credits) for which examination shall be conducted at the end of the respective semesters.
	(iii) Foundation Courses:	There are 3 Foundation Courses offered. a) Environmental Studies - offered in 1st Semester, under Part IV of the programme. b) Value Education - offered in 2nd Semester under Part IV of the programme. c) Soft Skill - offered in 2nd Semester under Part IV of the programme. (a) Environmental Studies: All the UG programmers' shall offer a course in Environmental Studies subject and it shall be offered in the **first semester as** one paper with 2 credits. Examination shall be conducted at the end of the semester 1st semester. (b) Value Education:

		All the UG programmers' shall offer a course in "Value Education subject and it shall be offered in the **second semester as** one paper with 2 credits. Examination shall be conducted at the end of the 2nd semester. (c) Soft Skill: All the UG programmers' shall offer a course in "Soft Skill" subject and it shall be offered in the **Second Semester by the Department of English**, as one paper with 1 credit. Examination shall be conducted at the end of the 2nd semester.
PART- V	Extension Activities	Proper relevant records shall be maintained by the respective departments and if necessary it may be verified by the university authority at any time. The extension activities shall be conducted outside the regular working hours of the college. The mark sheet shall carry the gradation relevant to the marks awarded to the candidates. This grading shall be incorporated in the mark sheet to be issued at the end of the semester for which students shall pay fee for one theory paper. The marks shall be sent to the Controller of Examinations before the commencement of the final semester examinations. Marks to be awarded as follows: o 20% of marks for Regularity of attendance. o 60% of marks for Active Participation in classes/camps/games/special Camps/programmes in the college/ District / State/ University activities. o 10% of marks for Exemplary awards/Certificates/Prizes. o 10% of marks for Other Social components such as Blood Donations, Fine Arts, etc.

PASSING MINIMUM

1. A candidate shall be declared to have passed the whole examination, if the candidate passes in all the theory papers and practical's wherever prescribed as per the scheme of examinations by earning 140 credits in Part I, II, III, IV and V. He / She shall also fulfill the extension activity prescribed by earning 1 credit to qualify for the degree.

2. A candidate should get **not less than 40% in the University (external)** Examination, compulsorily, in any course of Part I, II, III& IV papers. Also the candidate who secures **not less than** 40% marks in the external as well as internal (CIA) examinations put together in any course of Part I, II, III & IV shall be declared to have successfully passed the examination in the subject in theory as well as Practical's.

DISTRIBUTION

Table - 1(A): The following are the distribution of marks for external and internal for University (external) examination and continuous internal assessment and passing minimum marks for **theory papers of UG Programmes**.

UNI. EXAM TOTAL (ESE)	PASSINGMINIMUM FOR UNI.EXAM	CIA TOTAL	PASSING MINIMUM FOR CIA	TOTAL MARKS ALLOTTED	PASSING MINIMUM (UNI.EXAM+CIA)
75	30	25	0	100	40

Table - 1(B): The following are the Distribution of marks for Continuous Internal Assessment in the theory papers of UG Programmes.

S.No.	For Theory - UG courses	Distribution of Marks	
		Assignments	Tests
1	Assignment-1 (First 2 Units of the Syllabus)	10	-
2	Test-1 (First 2 Units of the Syllabus for 1 Hour duration)	-	50
3	Assignment-2 (3rd& 4th Units of the Syllabus)	10	
4	Test-2 (First 4 Units of the Syllabus for 2 Hours duration)	-	50
5	Assignment-2 (5th Unit of the Syllabus)	10	-
6	Test-3 (Entire Syllabus for 3 Hours duration)	-	100
	TOTAL MARKS	30	200
	Marks to be converted to	5	20
	Total Maximum Marks for CIA	25	

Table – 2(A): The following are the distribution of marks for University (external) examinations and continuous internal assessments and passing minimum marks for the practical courses of UG Programmes**.**

UNI. EXAM TOTAL (ESE)	PASSING MINIMUM FOR UNI.EXAM	CIA TOTAL	PASSING MINIMUM FOR CIA	TOTAL MARKS ALLOTTED	PASSING MINIMUM (UNI.EXAM+CIA)
75	30	25	0	100	40

Table – 2(B): The following are the distribution of marks for the Continuous Internal Assessment in UG practical courses.

S.No.	For Practical - UG courses	Distribution of Marks	
		Assignments	Tests
1	Regular maintenance of the Observation note book-1 (Up to the end of I-Semester)	10	-
2	Test-1 (Up to the end of I-Semester for 2 Hours duration)	-	25
3	Regular maintenance of the Observation note book-2 (Up to the end of II-Semester)	10	
4	Test-2 (Up to the end of II-Semester for 2 Hours duration)	-	25
5	Regular maintenance & proper completion of the Record note book	10	-
6	Test-3 (Entire Syllabus following University examination pattern)	-	25
	TOTAL MARKS	30	75
	Marks to be converted to	10	15
	Total Maximum Marks for CIA	25	

QUESTION PAPER PATTERN

The following question paper patterns shall be followed for CBCS pattern syllabi for the candidates admitted from the academic year 2017-2018 onwards.

External Maximum 75 Marks – wherever applicable (Ext.75 + Int.25 = Total. 100)

Section A	Very short answer questions	10X 2=20	10 questions – 2 from each unit
Section B	Short answer questions of either / or type (like 1a (or) 1b)	5X5=25	5 questions – 1 from each unit
Section C	Essay-type questions / Problem (Answer any 3 out of 5)	3X10=30	5 questions – 1 from each unit

NOTE: In Section "C" one of the questions shall be application oriented or a problem, wherever applicable.

GRADING

Once the marks of the CIA and end-semester examinations for each of the course are available, they shall be added. The mark thus obtained shall then be converted to the relevant letter grade, grade point as per the details given below:

Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/Paper)

RANGE OF MARKS	GRADE POINTS	LETTER GRADE	DESCRIPTION
90-100	9.0-10.0	O	Outstanding
80-89	8.0-8.9	D+	Distinction
75-79	7.5-7.9	D	
70-74	7.0-7.4	A+	First Class
60-69	6.0-6.9	A	
50-59	5.0-5.9	B	Second Class
40-49	4.0-4.9	C	Third Class
00-39	0.0	U	Re-appear
Absent	0.0	AAA	Absent

PROGRAM EDUCATION OBJECTIVES (PEO)

OB1: EDUCATION The graduate will be able to pursue their higher studies in the field of Computer Science / Applications.

OB2: TECHNOLOGY The graduate will be able to understand, analyze and develop software application and attitude to adapt to emerging technological changes

OB3: RESEARCH The graduate will be able to work in a research team to provide computing paradigm or solution with innovation.

OB4: ETHICAL & PROFESSIONAL GROWTH The graduate will be able to develop skills in articulating one's own value system and live by the values in life and in one's profession.

PROGRAM LEARNING OUTCOMES (PLO)

1. **Problem Solving:** Ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve problems related to Technology, Life and Career.
2. **Individual and Team work:** Ability to Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

3. **Communication Skills:** Ability to Communicate effectively on complex activities with the software community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
4. **Professionalism:** Understand the professional ethics and apply the same for public and the public interest.
5. **Ethics and equity:** Ability to apply ethics, accountability, and equity in all dealings.
6. **Life-long learning:** Ability to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
7. **Knowledge of Computer *systems***. Ability to demonstrate the knowledge of sustainable development of Software, Components, Tools, Computing Systems and Solutions with an understanding of the impact of these solutions on society and environment..
8. **Application of mathematical principles:** Apply mathematical principles to solve real world problems using appropriate data structures and suitable algorithms.
9. **Programming:** Understand, analyze, design and develop *computer programs* using C, C++, Java and upcoming popular technologies.
10. **Software Engineering:** Apply process and life cycle of software engineering to develop software.
11. **Database Design:** Model and design the ***database*** for any computer system.
12. **Appreciation and Application of Emerging Technologies**: Analyze and appreciate *emerging computing systems* such as mobile, cloud, decision support, data mining, operating system, IoT, Networks, Information Security and related topics.

MAPPING OF INSTITUTION OBJECTIVES WITH PEOs

COLLEGE / PROGRAMME	EDUCATION	TECHNOLOGY	RESEARCH	ETHICAL AND PROFESSIONAL
OB1 : EDUCATION	√			
OB2 : RESEARCH			√	√
OB3 : EMPLOYABILITY		√		√

OB4 : COMM.SERVICE				√

MAPPING PEOs WITH POs / PSOs

PEO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
1: EDUCATION	√	√	√			√	√	√	√	√	√	√
2: TECHNOLOGY	√					√	√		√		√	√
3: RESEARCH	√	√		√		√		√			√	√
4: ETHICAL AND PROFESSIONAL		√		√	√	√				√		√

COURSESTRUCTURE

S. No.	Part	Study Components / Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	6	4	Programming in C	25	75	100
4.	III	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5.	III	Allied -1	Paper-1	7	3	**(to choose any one)** 1. Mathematics I 2. Mathematical Foundations I	25	75	100
6.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**

7.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**22**		**175**	**525**	**700**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
10.	III	Core Theory	Paper-2	5	4	C++ & Data Structure	25	75	100
11.	III	Core Practical	Practical-2	2	2	C++ and Data Structures Lab	25	75	100
12.	III	Allied-1	Paper-2	7	5	**(to choose any one)** 1. Mathematics II 2. Mathematical Foundations II	25	75	100
13.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**200**	**600**	**800**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER III					**CIA**	**Uni. Exam**	**Total**
16.	I	Language	Paper-3	6	4	Tamil/ OtherLanguages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	3	3	Programming in JAVA	25	75	100
19.	III	Core Practical	Practical-3	3	3	Programming in JAVA Lab	25	75	100
20.	III	Allied II	Paper-3	4	3	**(Choose any one)** 1. Physics I 2. Statistical Methods and Their Applications I	25	75	100
	III	Allied II	Practical	3	0	Physics/Statistics Practical	0	0	0
21.	IV	Skill Based	Paper-1	3	2	Digital Logic Design and Computer Organization	25	75	100
22.	IV	Non-Major Elective	Paper-1	2	2	Introduction to Information Technology	25	75	100
		Sem. Total		**30**	**21**		**175**	**525**	**700**
		SEMESTER IV					**CIA**	**Uni. Exam**	**Total**
23.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
24.	II		Paper-4	6	4	English	25	75	100
25.	III	Core Theory	Paper-4	3	3	Relational Database Management Systems	25	75	100
26.	III	Core Practical	Practical-4	3	3	RDBMS Lab	25	75	100

27.	III	Allied II	Paper-4	4	3	**(to choose any one)** 1. Physics II 2. Statistical Methods and their Applications II	25	75	100
28.	III	Allied II	Practical	3	2	Physics/Statistics Practical	25	75	100
29.	IV	Skill Based	Paper-2	3	2	Wireless Data Communication	25	75	100
30.	IV	Non-Major	Paper-2	2	2	Internet Technology	25	75	100
		Sem. Total		**30**	**23**		**200**	**600**	**800**

S.NO.	**Part**	**Study Components** **Course Title**		**Ins. hrs /week**	**Credit**	**Title of the Paper**	**Maximum Marks**		
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
31.	III	Core Theory	Paper-5	6	4	Mobile Application Development	25	75	100
32.	III	Core Theory	Paper-6	6	4	Operating System	25	75	100
33.	III	Core Theory	Paper–7	4	3	Design and Analysis of	25	75	100
34.	III	Core Practical	Practical-5	4	3	Mobile Applications	25	75	100
35.	III	Core Practical	Practical-6	4	3	Operating System-Lab	25	75	100
36.	III	Internal Elective	Paper-1	3	3	**(to choose any one)** 1. Data Mining	25	75	100
37.	IV	Skill Based	Paper-3	3	2	Software Engineering	25	75	100
				30	**22**		**175**	**525**	**700**

SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
38.	III	Core Theory	Paper-8	4	4	Open Source Software	25	75	100
39.	III	Core Theory	Paper-9	4	4	Python Programming	25	75	100
40.	III	Core Practical	Practical-7	4	3	Python Programming Lab	25	75	100
41.	III	Core Practical	Practical-8	4	2	Open Source Programming Lab	25	75	100
42.	III	Project		5	5	Project Work (Group/Individual Project)	25	75	100
43.	III	Internal Elective	Paper - 2	3	3	**(to choose any one)** 1. Big Data Analytics 2. Cryptography 3. Digital Image Processing	25	75	100
44.	III	Internal Elective	Paper - 3	3	3	**(to choose any one)** 1. Artificial Intelligence 2. System Software 3. Cloud Computing	25	75	100
45.	IV	Skill Based	Paper - 4	3	2	Internet Of Things	25	75	100
46.	V	Extension Activities		0	1		100	0	100
		Sem. Total		**30**	**27**		**300**	**600**	**900**
					140				**4600**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400

Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Allied Practical	1			100	100
	Electives	3	3	9	100	300
	Core	9	(3-5)	34	100	900
	Core practical	8	(2-3)	21	100	800
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100

	Total	**46**		**140**		**4600**

NON-MAJOR ELECTIVES (Semesters 3 & 4)

SEM	PART	CODE	TITLE	TYPE	HRS	CREDIT
3	IV	CNBA37	Management Concepts	T	2	2
		CNCP37	Elements of Accountancy	T		
		CNMA34	Basic Mathematics	T		
		CNEN35	Language Skills and Communication I	T		
4	IV	CNCP46	Advertising and Salesmanship	T		
		CNMA44	Foundation Mathematics for Competitive Examination	T		
		CNEN45	Language Skills and Communication II	T		
		CNBA47	Training and Development	T		

LIST OF ELECTIVE PAPERS

Semester 5 - Paper 1		
A	CECS 54A	Data Mining
B	CECS 54B	Information Security
C	CECS 54C	Software Testing
Semester 6 - Paper 2		
A	CECS 63A	Big Data Analytics
B	CECS 63B	Cryptography
C	CECS 63C	Digital Image Processing
Semester 6 - Paper 3		
A	CECS 64A	Artificial Intelligence
B	CECS 64B	System Software
C	CECS 64C	Cloud Computing

MAPPING COURSE OUTCOMES WITH POs / PSOs

SEM	COURSE CODE	COURSE	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
1	CLT 10	TAMIL I	√	√	√	√	√	√						
	CLE 10	ENGLISH I	√	√	√	√	√	√						
	CCS 11	DIGITAL LOGIC AND C PROGRAMMING	√	√	√	√	√	√	√	√	√		√	√
	CES 10	ENVIRONMENTAL STUDIES	√	√	√	√	√	√						
	CAMA 15B	MATHEMATICS FOUNDATION I	√	√	√	√	√	√		√	√			√
	CPCS 13	C PROGRAMMING LAB	√	√	√	√	√	√	√	√	√		√	√
2	CLT 20	TAMIL II	√	√	√	√	√	√						
	CLE 20	ENGLISH II	√	√	√	√	√	√						
	CCS 21	C++ AND DATA STRUCTURES	√	√	√	√	√	√	√	√	√	√	√	√
	CAMA 25B	MATHEMATICS FOUNDATION II	√	√	√	√	√	√		√	√			√
	CSS 20	SOFT SKILLS	√	√	√	√	√	√						
	CGA 20	VALUE EDUCATION	√	√	√	√	√	√						
	CPCS 23	C++ AND DATA STRUCTURES LAB	√	√	√	√	√	√	√	√	√	√	√	√
3	CLT 30	TAMIL III	√	√	√	√	√	√						
	CLE 30	ENGLISH III	√	√	√	√	√	√						
	CCS 31	JAVA PROGRAMMING	√	√	√	√	√	√	√	√	√	√	√	√
	CACS 32	STATICS AND ITS APPLICATION-I	√	√	√	√	√	√					√	√
	CSCS 33	DESIGN AND ANALYSIS OF ALGORITHMS	√	√	√	√	√	√		√	√		√	√
	CNBA 37	Management Concepts	√	√	√	√	√	√						
	CPCS 36	JAVA LAB	√	√	√	√	√	√	√	√	√	√	√	√
	CLT 40	TAMIL IV	√	√	√	√	√	√						
	CLE 40	ENGLISH IV	√	√	√	√	√	√						

4	CCS 41	DATABASE MANAGEMENT SYSTEM	√	√	√	√	√	√			√	√	√	√
	CSCS 42	STATICS AND ITS APPLICATION-II	√	√	√	√	√	√					√	√
	CSCS 43	COMPUTER ORGANIZATION AND ARCHITECTURE	√	√	√	√	√	√	√	√	√	√	√	√
	CNBA 47	TRAINING AND DEVELOPMENT	√	√	√	√	√	√						
	CPCS 46	RDBMS LAB	√	√	√	√	√	√	√	√	√	√	√	√
5	CCS 51	MOBILE APPLICATION AND DEVELOPMENT	√	√	√	√	√	√				√	√	√
	CCS 52	OPERATING SYSTEM	√	√	√	√	√	√	√	√	√	√	√	√
	CCS 53	DATA COMMUNICATION AND NETWORKING	√	√	√	√	√	√	√	√				√
	CECS 54A	Data Mining	√	√	√	√	√	√	√	√	√	√	√	√
	CECS 54B	Information Security	√	√	√	√	√	√	√	√	√	√	√	√
	CECS 54C	Software Testing	√	√	√	√	√	√	√	√	√	√	√	√
	CSCS 55	SOFTWARE ENGINEERING	√	√	√	√	√	√	√	√	√	√	√	√
	CPCS 56	MOBILE APPLICATION DEVELOPMENT LAB	√	√	√	√	√	√	√	√	√	√	√	√
	CPCS 57	OPERATING SYSTEM LAB	√	√	√	√	√	√	√	√	√	√	√	√
6	CCS 61	PYTHON PROGRAMMING	√	√	√	√	√	√	√	√	√	√	√	√
	CCS 62	OPEN SOURCE PROGRAMMING	√	√	√	√	√	√				√	√	√
	CECS 63A	Big Data Analytics	√	√	√	√	√	√		√		√	√	√
	CECS 63B	Cryptography	√	√	√	√	√	√	√	√	√	√	√	√
	CECS 63C	Digital Image Processing	√	√	√	√	√	√	√					√
	CECS 64A	Artificial Intelligence	√	√	√	√	√	√	√			√	√	√
	CECS 64B	System Software	√	√	√	√	√	√	√			√	√	√
	CECS 64C	Cloud Computing	√	√	√	√	√	√	√			√	√	√
	CSCS 65	Internet of Things	√	√	√	√	√	√		√	√	√	√	√

	CPCS 66	Practical VII – Python Programming Lab	√	√	√	√	√	√	√	√	√	√	√	√
	CPCS 67	Practical VIII – Open Source Programming Lab	√	√	√	√	√	√		√	√	√	√	√
	CPCS 68	Group / Individual Project	√	√	√	√	√		√	√	√	√		
	CEA 60	EXTENSION ACTIVITIES	√	√	√	√	√	√						

THIRUVALLUVAR UNIVERSITY

B.Sc., Computer Science Syllabus

(With effect from 2020 - 2021)

SEM I	LANGUAGE	Lecture	Practical	Credit
CLT10	TAMIL - I	6	0	4

myF – 1 ftpij 1. ghujpahh; - neQ;RnghWf;F jpiyNa… (7 ghly;fs;)

2. ghujpjhrd; - 1. jkpopd; ,dpik 2. rq;fehjk;

3. ftpkzpNjrpa tpehafk;gpsi; s - kyUk; khiyAk; - ‘Nfhtpy; topghL’

4. ftpQh; Rujh - Njd;kio – ‘jiyik jhq;Fk; jkpo;’

5. mg;Jy; uFkhd; - Myhgid – ‘MwhtJ mwpT’

6. K.Nkj;jh - Njrg; gpjhTf;F xU njUg;ghlfdpd; mQ;ryp

7. eh.jduhrd; - me;jfpuhkj;J kdpjd; - ‘J}a;ik kyul;Lk;’

8. Rfpu;juhzp - rpwg;G kz;lyk; - vq;fs; tsehL

9. khyjp ikj;up - mfjp

myF -2 ciueil

1. uh.gp.NrJg;gps;is - tho;f;ifAk; ituhf;fpaKk;

2. kapiy rPdp Ntq;flrhkp - goq;fhyj;J mzpfyd;fs;

myF -3 ehlfk;

1. mwpQh; mz;zh - ghujk;

2. MW. mofg;gd; - nfhy;ypg;ghit

myF -4 rpWfij

1. ehw;fhyp - fp. uh[ehuhazd;

2. tst.Jiuad; - Nryj;jhh; tz;b

myF -5 nkhopj;jpwd;

1. mbg;gil ,yf;fzk; - ngah;r;nrhy;> tpidr;nrhy; mwpjy;

2. z-d-e> y-s-o> u-w NtWghL mwpjy;

3. fiyr; nrhy;yhf;fk;

4. gpwnkhopr; nrhy; ePf;fpj; jkpo;r;nrhy; mwpjy; ,yf;fpa tuyhW

,yf;fpa tuyhW ghlg;gFjpia xl;ba ,yf;fpa tuyhW : 20-Mk; E}w;whz;Lf; ftpQh;fs; ftpij> ciueil> ehlfk;> rpWfij Mfpa ,yf;fpaq;fspd; tsh;r;rp epiy.

SEM I	GENERAL ENGLISH	Lecture	Practical	Credit
CLE 10	ENGLISH I	6	0	4

LEARNING OBJECTIVES

1. To write, read, and understand any text.
2. To understand English better and to attain competency in both written and spoken skills.

LEARNING OUTCOMES

1. Learn new words and their meanings within the context of literary texts.
2. Understand the basic elements of poetry.
3. Learn about the storytelling skills.
4. Identify the elements of a One-Act Play.
5. Learn to form new words, antonyms and synonyms using prefixes and suffixes, to make new dialogues, letters (formal & informal) and to write short paragraphs.

UNIT -1: PROSE

1. My greatest Olympic Prize - JesseOwens 2. The Tree Speaks –Rajagopalachari C 3. Snake in the Garden – R.K.Narayan 4. Futurology - Aldous Huxley

UNIT - 2: POETRY

1. The River – Parthasarathy 2. Ode to Nightingale – John Keats 3. "O Captain, My Captain Walt Whitman 4. Paper Boat – Rabindranath Tagore

UNIT- 3: SHORT STORY AND ONE ACT PLAY

1. A Day's Wait – Ernest Miller Hemingway 2. Little Girls Wiser Than Men – Tolstoy – One act play 3. The Bishop's Candlesticks – MormanMckinnel

UNIT - 4: GRAMMAR AND COMPOSITION

1. Correct usage of Words 2. Vocabulary – Synonyms & Antonyms 3. Abbreviations 4. English for Excellence – Parts of Speech -Modern Avenue 5. Functional English: Creative Writing – College Grammar Letter of Application

UNIT - 5: COMMUNICATION SKILLS

1. Listening Conversation – (i) Agreeing and Disagreeing. (ii) Seeking and giving permission
(iii) Greetings (iv) Introducing Oneself to other

REFERENCES-- NIL

SEM I	CORE THEORY	Lecture	Practical	Credit
CCS 11	PROGRAMMING IN C	6	0	4

OBJECTIVES:

 To understand simple algorithms,
 To understand language constructs
 To understand and develop programming skills in C.
 To understand the basic concepts of decision making and looping statements.
 To understand the concepts of arrays , structures, union, pointers and files.

UNIT – I

Overview of C: History – Importance – Sample Programs – Basic Structure – Programming Style – Executing – Unix System – MS-DOS System - **Constants, Variables, and Data Types:** Character Set – C Token – Keyword and Identifiers – Constants – Variables – Data Types – Declaration of Storage Class – Assigning Values to Variables – Defining Symbolic Constants – Declaration – Overflow and Underflow of Data - **Operators and Expressions:** Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special Operators – Arithmetic Expressions, Evaluation of Expressions – Precedence of Arithmetic Operators – Some Computational Problems – Type Conversions in Expressions – Operator Precedence and Associativity – Mathematical Functions .

UNIT – II

Managing Input and Output Operations: Reading, Writing a Character – Formatted Input, Output - **Decision Making and Branching:** Decision Making with If statement – Simple If Statement – The If…Else Statement – Nesting of If…Else Statements – The Else If Ladder – The Switch Statement- The ?: Operator – The Goto Statement - **Decision Making and Looping:** The while Statement – The do Statement – The for Statement – Jumps in Loops – Concise Test Expressions.

UNIT – III

Arrays: One-Dimensional Arrays - Declaration, Initialization of One-Dimensional Arrays – Two-Dimensional Arrays - Initializing Two-Dimensional Arrays – Multi-Dimensional Arrays – Dynamic Arrays - **Character Arrays and Strings:** Declaring and Initializing String

3

Variables – Reading Strings from Terminal – Writing Strings to Screen – Arithmetic Operations on Characters – Putting String Together – Comparison of Two Strings –String-Handling Functions – Table of Strings – Other Features of Strings - **User Defined Functions**: Need for User-Defined Functions – A Multi-Function Program – Elements of User-Defined Functions – Definition of Functions – Return Values and Their Types – Function Calls – Function Declaration – Category of Functions – No Arguments and No Return Values – Arguments but no return values – Arguments with Return Values – No Arguments but Returns a value – Functions that Return Multiple Values – Nesting of Functions – Recursion – Passing Arrays, Strings to Functions – The Scope, Visibility and Lifetime of Variables – Multi file Programs.

UNIT – IV

Structure and Unions: Defining a Structure – Declaring Structure Variables – Accessing Structure Members – Structure Initialization and Copying and Comparing Structure Variable

– Operations on Individual Members – Arrays of Structures – Arrays within Structures – Structures within Structures – Structures and Functions – Unions – Size of Structures – Bit Fields **Pointers:** Understanding Pointers – Accessing the Address of Variable – Declaring, Initialization of Pointer Variables – Accessing a Variable through its pointer – Chain of Pointers – Pointer Expression – Pointer Increments and Scale Factor – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions Returning Pointers – Pointers to Functions – Pointers and Structures – Troubles with Pointers **File Management in C**: Defining and Opening a File – Closing a File – Input/Output Operations on File – Error Handling During I/O Operations – Random Access to Files – Command Line Arguments.

UNIT – V

Fundamental Algorithms: Exchanging the values of Two Variables- Counting- Summation of a Set of Numbers-Factorial Computation -Sine Function Computation –Generation of the Fibonacci Sequence-Reversing the Digits of an Integer- Base Conversion – Character to Number Conversion **- Factoring Methods:** Finding the square Root of a Number –The Smallest Divisor of an Integer-The Greatest Common Divisor of the two integers-Generating Prime Numbers- Computing the Prime Factors of an integer –Generation of Pseudo-random Numbers-Raising a Number to a Large Power-Computing the nth Fibonacci Number (Chapters: 2 & 3)

TEXT BOOK:

1. Programming in ANSI C, E. Balagurusamy, Tata McGrawhill Education, 6th Edition, 2013. (Unit I to IV)
2. How to Solve it by Computer, R.G.Dromey, PHI International (Unit V)

REFERENCE BOOKS:

1. The C Programming Language (ANSI C), Kernighan, B.W. and Ritchie, D.M., PHI.
2. C by Discovery , Foster & Foster , Penram International Publishers, Mumbai.

SEM I	ALLIED I	Lecture	Practical	Credit
CAMA15B	MATHEMATICS FOUNDATION I	6	0	4

LEARNING OBJECTIVES

To acquire knowledge on the basic concepts of Logical operators, set theory and Set operation, Relations and Functions, Binary operation, Binary algebra, Permutations and Combinations, Differentiation, Straight lines, Pair of Straight lines in the field of Computer application.

The students will be able to

CO01: Explain the fundamental concepts from the Logical operators.
CO02: Appreciate the validity of arguments (Proposition).
CO03: Demonstrate accurate and efficient use of set theoretical techniques.
CO04: Determine the Relations and Functions.
CO05: Interpret the concepts of the Binary Operations and Boolean algebra.
CO06: Solve problem in permutations combinations.
CO07: Analyze problems in Differentiation.
CO08: Distinguish Straight-line equation from angle, point and slope.

SYLLABUS

UNIT-I: SYMBOLIC LOGIC

Proposition, Logical operators, conjunction, disjunction, negation, conditional and bi-conditional operators, converse, Inverse, ContraPositive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT-II: SET THEORY

Sets, set operations, venn diagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions, Relations: Equivalence relation. Equivalence class, Partially and Totally Ordered sets, Functions: Types of Functions, Composition of Functions.

UNIT-III: BINARY OPERATIONS

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

UNIT-IV: DIFFERENTIATION

Simple problems using standard limits,

Lt	x^n-a^n, lt	sinx, lt	tanxlt	e^x-1, lt	$(1+1/n)^n$, lt (1+n) 1/n
X	x-a x	x x	x x 0 x n		

Differentiation,successive differentiation, Leibnitz theorem, partial differentiation, Applications of differentiation, Tangent and normal, angle between two curves.

UNIT-V: TWO-DIMENSIONAL ANALYTICAL GEOMETRY

Straight Lines - Pair Straight Lines

REFERENCES

P.R. Vittal, Mathematical Foundations – Maragham Publication, Chennai.
U. Rizwan, Mathematical Foundation - SciTech, Chennai
V.Sundaram& Others, Discrete Mathematical Foundation - A.P.Publication, sirkali.
P.Duraipandian& Others, Analytical Geometry 2 Dimension - Emerald publication 1992.

SEM I	CORE PRACTICAL	Lecture	Practical	Credit
CPCS 13	PROGRAMMING IN C LAB	0	3	3

Objectives:

1. To understand concepts of for/while loop and switch.
2. To understand language Functions and recursions.
3. To understand and develop String Manipulations.
4. To understand the basic concepts of searching and sorting.
5. To understand the concepts of structures.

Control Statements:

1. Print n Fibonacci numbers – (using for)
2. Print n Prime numbers – (using while)
3. Simple arithmetic on two numbers – (using switch/case)

Functions:

4. Swap two values using call by value / call by reference.

Recursion:

5. To compute NcR and NpR
6. To Compute GCD and LCM

String Manipulation.

7. Operations on string such as length, concatenation, reverse, counting, and copy of a string to another.

Matrices:

8. Matrix Addition, Subtraction, Multiplication, Transpose of n x m matrices.
9. Inverse of a square matrix.

Searching:

10. Binary Search.

Sorting:

11. Bubble Sort
12. Insertion Sort

Structures:

13. Students Mark statement

Pointers:

14. Arithmetic operations on pointers.

Files

15. Creating/ Reading/ Writing a text/binary file.

6

REFERENCE BOOK:

1. Programming in ANSI C, E. Balagurusamy, Tata McGrawhill Education, 6th Edition, 2013.

Outcomes:

 Enhance the analyzing and problem solving skills and use the same for writing programs in C.
 Write diversified solutions, draw flowcharts and develop a well-documented and indented program according to coding standards.
 Learn to debug a given program and execute the C program.
 To have enough practice the use of conditional and looping statements.

 To implement arrays, functions and pointers.

SEM I	ENVIRONMENTAL STUDIES	Lecture	Practical	Credit
CES10	ENVIRONMENTAL STUDIES	2	0	2

LEARNING OBJECTIVES

The students will be able to

CO01: Explain the various natural resources and the impact of man-made fertilizers on the environment.
CO02: Describe the Ecosystem, Biodiversity and its Conservation.
CO03: Explain the Environmental Pollution and Management
CO04: Analyze the Social Issues concerning Human Population such as Environmental ethics, health and the role of IT on the environment and human health
CO05: Visit and study a simple local ecosystem and prepare a FIELD WORK Report.

SYLLABUS

UNIT-I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES

Environmental Sciences - Relevance - Significance - Public awareness – Forest resources - Water resources - Mineral resources - Food resources – conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT-II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem. **Biodiversity** - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity - Insitu&Exsitu.

UNIT-III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earthquake, Cyclone and Landslides. Role of individuals in prevention of pollution - pollution case studies.

UNIT-IV: SOCIAL ISSUES - HUMAN POPULATION

Urban issues - Energy - water conservation - Environmental Ethics – Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental Production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness – Case studies.

UNIT-V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem – Report submission

REFERENCES

Kumarasamy, K., A.Alagappa Moses AndM.Vasanthy, 2004. Environmental Studies, Bharathidsan University Pub, 1, Trichy

Rajamannar, 2004, Environemntal Studies, Evr College Pub, Trichy

Kalavathy,S. (Ed.) 2004, Environmental Studies, Bishop Heber College Pub., Trichy.

SEM II	LANGUAGE	Lecture	Practical	Credit
CLT20	TAMIL II	6	0	4

Nehf;fk;

khzth;fs; tho;f;ifapy; mwnewpAld; tho;tjw;Fk; kdijxUKfgLj;Jtjw;Fk; gf;jp ,yf;fpaq;fSk; rpw;wpyf;fpaq;fSk; khzth;fSf;Fgad;gLfpwJ. gf;jp ,yf;fpaj;jpd; thapyhfGuhzq;fspd; Kf;fpaj;Jtj;ijAk; nja;tq;fspd; ngUikfisAk; khzth;fs; mwpe;Jf;nfhs;fpwhh;fs;. flTsh;fisAk; murh;fisAk; Nguhpyf;fpaq;fs; Ngrpafhyq;fspy; rpw;wpyf;fpaq;fs; vspakf;fspd; tho;f;ifKiwiagw;wpNgRfpwJvd;gijkhzth;fs; mwpe;Jf;nfhs;fpwhh;fs;.

The students will be able to

CO01: khzth;fs; ehad;khh;fs;>rpj;jh;fspd; tho;f;iftuyhw;iwAk; mth;fs; ghbaghly;fisAk; mwpe;Jf;nfhs;fpwhh;fs;.

CO02: khzth;fs; Mo;th;fspd; tho;f;ifKiwiaAk; jpUkhypd; ngUikfisAk; mwpe;Jf;nfhs;fpwhh;fs;

CO03: khzth;fs; J}J>cyh>NfhitMfparpw;wpyf;fpatiffismwpe;Jf;nfhs;fpwhh;fs;
CO04: khzth;fs; rkak; Fwpj;jk; fpwpj;Jtk;> ,];yhkpak; Mfparka E}yfspy; $Wk; tuyhw;Wr; nra;jpfismwpe;Jf;nfhs;fpwhh;fs;.
CO05: khzth;fs; nghJf;fl;LiuvOJjTk;>gy; Jiwapy; Njh;r;rpg;ngw;wMSikfisNeh;fhzy; nra;jy; vg;gbvd;gjidnjhpe;Jf;nfhs;fpwhh;fs;.

myF. 1 - m. jpUQhdrk;ge;jh; - Njthuk;>jpUtPopkpoiy–khzpf;fthrfh; - jpUthrfk;>jpU%yh; - jpUke;jpuk;khzth;fs; jkpo; ,yf;fpaj;jpy; mbahh;fspd; jkpo;g;gw;iwAk; irtj;jpUKiwfs; gd;dpnuz;LFwpj;Jk; mwpe;Jf;nfhs;fpwhh;fs;rpwg;GNehf;fk;khzth;fs; ehad;khh;fs;>rpj;jh;fspd; tho;f;iftuyhw;iwAk; mth;fs; ghbaghly;fisAk; mwpe;Jf;nfhs;fpwhh;fs;.

myF. 2Mz;lhs; - jpUg;ghit–njhz;lubg; nghbaho;thh; - jpUg;gs;spnaOr;rp>FyNrfuho;thh; - ngUkhs; jpUnkhopehyhapujpt;agpuge;jj;jpy; Mo;thh;fspd; tho;f;iftuyhw;iwnjhpe;Jf;nfhs;tJld; tho;f;ifapy; gpd;gw;wTk; nra;thh;fs;.rpwg;GNehf;fk;khzth;fs; Mo;th;fspd; tho;f;ifKiwiaAk; jpUkhypd; ngUikfisAk; mwpe;Jf;nfhs;fpwhh;fs;

myF.3 jkpo;tpLJ}J – 69>90 fz;zpfs;>jpUf;fapyhaQhdcyh– 1>10 fz;zpfs; tiu>jQ;irthzd; Nfhit– 1>5 ghly;fs; tiurq;f ,yf;fpaq;fspd; jdpg;ghly;fshftUfpd;wrpw;wpyf;fpaq;fiskhzth;fs; gpioapd;wpvOjTk; gbf;fTk; nra;thh;fs;.rpwg;GNehf;fk;khzth;fs; J}J>cyh>NfhitMfparpw;wpyf;fpatiffismwpe;Jf;nfhs;fpwhh;fs;

myF.4,uhkypq;fmbfs; - jpUtUl;gh>vr;.V. fpU\;zg;gps;is - ,ul;rz;aahj;jphpfk;>Fzq;Fb k];jhd;rhfpG– k];jhd; rhfpGghly;fs;>Kj;njhs;shapuk; - 9>ghly;fs; kl;Lk;.khzth;fs; rka ,yf;fpaq;fs; Fwpj;Jmwpe;Jf;nfhs;tJld; mjd; fijahly;fisnrhy;yTk; vOjTk; gofpf;nfhs;fpwhh;fs;. rpwg;GNehf;fk;
khzth;fs; rkak; Fwpj;jk; fpwpj;Jtk;> ,];yhkpak; Mfparka E}yfspy; $Wk; tuyhw;Wr; nra;jpfismwpe;Jf;nfhs;fpwhh;fs;.
myF..5 Neh;fhzy;>nghJf;fl;Liufs;>khzth;fs; fbjk; vOjTk; Neh;fhziyg; gw;wpAk; njhpe;Jf;nfhs;Sjy;.

SEM II	GENERAL ENGLISH	Lecture	Practical	Credit
CLE 20	ENGLISH II	4	0	2

LEARNING OBJECTIVES

The students will be able to

CO01: Identify the characteristics of prose through intensive reading of various texts

CO02: Analyze and interpret the poetical devices and critique the themes intended in the poems.

CO03: Identify the elements of short story and One-Act play

CO04: Apply the basic sentence structures and other grammatical elements in writing

CO05: Demonstrate basic communication skills required for professional scenario.

SYLLABUS

UNIT - 1 PROSE

1. Ant and Grasshopper - Somerset Maugham 2. Early Influences - A.P.J. Abdul Kalam 3. Forgetting – Robert Lynd 4. The Unity of Indian Culture – HumayunKabir

UNIT - 2 POETRY

1. The Soul's Prayer.-Sarojini Naidu 2. The Lotus - Toru Dutt 3. Nutting – William Wordsworth 4. Ozymandias - P.B.Shelley

UNIT - 3 SHORT STORY AND ONE ACT PLAY

4. The Doll's House - Katherine Mansfield 5. Karma - Kushwant Singh One Act Play 6. Hijack -Charles Wills

UNIT - 4 Vocabulary 6. Functional Grammar 7. Functional English

UNIT - 5COMMUNICATION SKILLS

8. Making Request 9. Offering Help 10. Inviting Someone 11. Asking Permission

REFERENCES-- NIL

SEM II	CORE THEORY	Lecture	Practical	Credit
CCS 21	C++ AND DATA STRUCTURES	6	0	6

C++ & DATA STRUCTURES

Objectives:

1. To understand the concepts of object-oriented programming and master OOP using C++.
2. To understand the concepts of Inheritance, polymorphism and templates.
3. To understand the concepts of different view of data, stack and queues.
4. To understand the concepts of Programming with Recursion, Binary Search Tree and graphs.
5. To understand the concepts of Sorting and Searching Algorithms.

UNIT-I :

Principles of Object Oriented Programming – Beginning with C++ – Token , Expressions and Control Structures- Functions in C++ – Classes and Objects – Constructors and Destructors.

UNIT-II :

Operator Overloading and Type Conversions – Inheritance : Extending Classes – Pointers, Virtual Functions and Polymorphism - Managing Console I/O Operations. Working with Files - Templates – Exception Handling – Manipulating Strings.

UNIT-III:

Data Design & implementations: Different views of data – Abstraction and Built-in Types – Arrays ADTs Stacks and Queue (Linear and Linked) , Stack (Array and Pointer)- Applications- Infix to Postfix Conversions – Queue(Array and Pointer) – List(Array and Pointer) – Applications: (Polynomial Addition) - Doubly Linked Lists.

UNIT – IV:

Programming with Recursion : Recursion – Verifying and Writing Recursive Functions **– Binary Search Tree :** Implementation – Tree Traversal **– Graphs:** Implementations – BFS – DFS – Dijkstras Shortest Path Algorithm.*(Chapter 7:Section 7.1,7.4 7.5, Chapter 8:Section 8.1,8.4, Chapter 9:Section 9.3)*

UNIT-V:

Sorting and Searching Algorithms: Sorting – Searching – Hashing *(Chapter 10: Section 10.1,10.2,10.3)*

TEXT BOOK:

1. Object Oriented Programming with C++, E Balagurusamy , Tata McGraw Hill, 6th Edition, 2014.
(Units I, II)
11
2. C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition, 2010.
(Units III, VI & V)

REFERENCES:

1. C++ The Complete Reference, Herbert Schildt, Tata McGraw Hill, 4th Edition, 2003.
2. OOP In ANSI C and Turbo C, Ashok N.Kamthene, Pearson Education, 6th Edition, 2008.
3. Data Structures and Algorithms, Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Addison Wesley Longman Inc., 2nd Edition, 1999.

Course Outcomes:

 The Student will be able to understand the concepts of object oriented programming Apply structure and inline functions.
 The Student will be able to understand the concepts of the types of inheritances and Applying various levels of Inheritance for real time problems Apply the OOPs concepts class and object. Understand Explain the file concept and exception handlings in C++
 The Student will be able to understand the concepts of Stacks and Queue using array and pointers.
 The Student will be able to understand the concepts of Recursion, Binary Search Tree and graphs.
 The Student will be able to understand the concepts of Sorting and Searching Algorithms.

SEM II	ALLIED I	Lecture	Practical	Credit
CAMA 25B	MATHEMATICAL FOUNDATION II	7	0	6

LEARNING OUTCOMES
CO01: Describe matrix and perform different operations on it.
CO02: Solve Simultaneous Linear equations.
CO03: Test and explain the concepts of Consistency and Inconsistency of linear equations
CO04: Solve problems relating to matrix of linear transformations:
CO05: Solve problems using Integration techniques.
CO06: Compare and contrast Straight line equation from angle, point and slope in three dimensions.
SYLLABUS
UNIT-I: MATRICES Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermition, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by (i) Cramer's rule. (ii) Matrix Inversion Method.

UNIT-II: MATRICES Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem, matrix of linear transformations: reflection about the x, y axes and the line y=x, rotation about the origin through an angle, expansion or compression, shears, translation.

UNIT-III Integration Simple problems, integration of rational function involving algebraic expressions of the form $1, \frac{1}{}, \quad px+q \quad px+q, px+q\ ax^2+bx+c$
$ax^2+bx+cax^2+bx+cax^2+bx+cax^2+bx+c$ integrations using simple substitutions integrations involving trigonometric functions of the form

$\frac{1}{}$	,	$\frac{1}{}$	,
$a+b\cos x$	$a^2\sin^2x+b^2\cos^2x$		Integration by parts.

UNIT-IV
Properties of definite integrals. Reduction formulae for

$\int x^n e^{ax} dx$, $\int \sin^n x dx$, $\int \cos^n x dx$, $\int x^m (1-x)^n dx$, applications of integration for (i) Area under plane caurves, (ii) Volume of solid of revolution.

UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes, straight lines.

Text Book. Vittal, Mathematical Foundations - Margham Publication, Chennai.

Reference Books

U. Rizwan, Mathematical Foundation - SciTech, Chennai

V.Sundaram& Others, Dircrete Mathematical Foundation - A.P.Publication, sirkali.

P.Duraipandian& Others, AnalyticalGeometry 3Dimension –Emerald publication 1992 Reprint.Manicavachagompillay&Natarajan. Analytical Geometry part II - three Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

SEM II	CORE PRACTICAL	Lecture	Practical	Credit

Objectives:

1. To develop C++ programming skills in design
2. To understand the basic concepts of different abstract types and structure of data.
3. To understand the concepts of Function Overloading
4. To understand the concepts of Stack, Queue, List, Doubly Linked List - using Pointers-using Arrays.
5. To understand the concepts of Searching and Sorting Algorithms.

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LIST OF LAB EXERCISES

1. Constructors & Destructors, Copy Constructor.
2. Friend Function & Friend Class.
3. Inheritance.
4. Polymorphism & Function Overloading.
5. Virtual Functions.
6. Overload Unary & Binary Operators Both as Member Function & Non Member Function.
7. Class Templates & Function Templates.
8. Exception Handling Mechanism.
9. Standard Template Library concept.
10. File Stream classes.
11. Array implementation of Stack, Queue : Infix to postfix
12. Implementation of Stack, Queue, List, Doubly Linked List - using Pointers-Polynomial Addition
13. Implementation of Binary Search Tree, Traversal
14. Implementation of Searching and Sorting Algorithms.
15. Graph Implementation of shortest path (Djikstras)

REFERENCE :

1. Object Oriented Programming with C++, E Balagurusamy , Tata McGraw Hill, 6th Edition, 2014.
2. C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition,

2010.

Course Outcomes:

- Understand the Creating and Deleting the Objects with the Concepts of Constructors and Destructors.
- Demonstrate the Polymorphism Concepts and Operator Overloading.
- Understand basic Data Structures such as Arrays, Linked Lists, Stacks, Queues, Doubly Linked List and Infix to Postfix Conversion.
- Apply Algorithm for solving problems like Sorting and Searching.
- Apply Algorithms and use Graphs and Trees as tools to visualize and simplify

SEM II	VALUE EDUCATION	Lecture	Practical	Credit
CGA20	VALUE EDUCATION	2	0	2

LEARNING OUTCOMES

To know the values of human, social, local and global life in the context of one's own setting.

The students will be able to

CO01: Appreciate human values and gain self-esteem

CO02: Realize the importance of family and its members particularly women in the society

CO03: Interpret the ethical values in the context of profession, media, family and personal life.

CO04: Recognize the values of the society and its impact

CO05: Formulate the ethical system at the international level and modern trends.

UNIT-I

Value Education - Definition - relevance to present day - Concept of Human Values - self-introspection - Self-esteem.

UNIT-II

Family values - Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-III

Ethical values - Professional ethics - Mass media ethics - Advertising ethics - Influence of ethics on family life - psychology of children and youth - Leadership qualities - Personality development.

UNIT-IV

Social values - Faith, service and secularism - Social sense and commitment - Students and Politics - Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressal mechanisms.

UNIT-V

Effect of international affairs on values of life/ Issue of Globalization - Modern warfare - Terrorism. Environmental issues - mutual respect of different cultures, religions and their beliefs.

Reference Books

T. Anchukandam and J. Kuttainimathathil (Ed) Grow Free Live Free, KrisituJyoti Publications, Bangalore (1995)
Mani Jacob (Ed) Resource Book for Value Education, Institute for Value Education, New Delhi 2002.
DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.
Daniel and Selvamony - Value Education Today, (Madras Christian College, Tambaram and ALACHE, New Delhi, 1990)
S. Ignacimuthu - Values for Life - Better Yourself Books, Mumbai, 1991.
M.M.M.Mascaronhas Centre for Research Education Science and Training for Family Life Promotion - Family Life Education, Bangalore, 1993.

SEM II	SOFT SKILLS	Lecture	Practical	Credit
CSS20	SOFT SKILLS	2	0	2

LEARNING OBJECTIVES

The students will be able to

CO01: Demonstrate the skills for listening, writing, reading and writing
CO02: Read and respond to instruction
CO03: Seek and respond to information in day to day life
CO04: Correct grammatical and spelling errors
CO05: Actively engage in formal, in-formal and non-verbal communication

SYLLABUS

UNIT I

Skills in Listening and Writing --Skills in Reading and Understanding

UNIT - II

2.1. Skills to Read and Respond to Instructions
2.2. Skills of Interpretation and Transcoding Information

UNIT III

3.1. Skills in Seeking and Responding to Information
3.2. Skills of Day-to-Day communication

UNIT IV

4.1. Grammatical skills and Spelling rules
4.2. Career skills

UNIT V

5.1. Skills of formal and in-formal expressions
5.2. Skills of non-verbal communication

Note: The contents of the previous book for 'Soft Skills' by Trinity Publication for I year UG students have not been changed. However, the titles of the contents have beenmodified.

SEM III	LANGUAGE	Lecture	Practical	Credit
CLT 30	TAMIL-III	5	0	2

mbj;jsg; gbg;G : gFjp - 1 jkpo;

,uz;lhkhz;L - %d;whk; gUtk;

jpUf;Fws;
1. kf;fl;NgW
2. tpUe;Njhk;gy;
3. ,iwkhl;rp
4. fhykwpjy;
5. neQ;NrhLGyj;jy;
rpyg;gjpfhuk;
kJiuf;fhz;lk; - VohtJfhij
Ma;r;rpah; Fuit
kzpNkfiy- gj;njhd;gjhtJfhij
rpiwf;Nfhl;lk; mwf;Nfhl;lk; Mf;fpafhij.
rPtfrpe;jhkzp
fhe;jUtjj;ijahh; ,yk;gfk;
fk;guhkhazk;
fpl;fpe;jhfhz;lk; - thyptijg; glyk;
nghpaGuhzk; - Kjw;fhz;lk;
jLj;jhl;nfhz;lGuhzk;
rPwhg;Guhzk; - ,uz;lhk; fhz;lk; -
EGt;tj;Jf; fhz;lk; - rijf;fl;biag;
ngz;ZUtikj;jglyk;
Njk;ghtzp- Kjw;fhz;lk; - tsd; rdpj;jglyk;

SEM III	LANGUAGE	Lecture	Practical	Credit
CLE 30	ENGLISH-III	5	0	2

UNIT -1 PROSE
1.The Right to Public Amnesia–Santhoshesai
2.On aying "Please"–.A.G. Gradiner.
3.With the Photographer –Stephen Leacock4.Indian Women -Dr.S.Radhakrishnan

UNIT -2 POETRY
1.Time and Love -William Shakespeare
2.Satan's Speech –John Milton
3.Obituary -A.K.Ramunujam
4.The Professor –Nissim Ezekiel

UNIT -3 DRAMA
1.LadyMacbethsoliloquy-Act I scene V
2.Women's Monologue-Antony & Cleopatra ActIV scene ii and Act V scene
xiiiBIOGRAPHY1.Mother Teresa -F.G.Herod

UNIT -4 VOCABULARY
1.Lexical Skills2.Functional Grammar3.Functional English

UNIT -5 COMMUNICATION SKILLS
1. Asking for Advice
2.Expressing Gratitude
3.Complementing and Congratulating4.Complaining

SEM III	CORE THEORY	Lecture	Practical	Credit
CCS 31	JAVA PROGRAMMING	5	0	3

PROGRAMMING IN JAVA

COURSE OBJECTIVES:

- Knowing about a General-purpose and Purely object-oriented programming language including data types, control statements, and classes
- Secured, well-suited for internet programming using applets and GUI-based

UNIT I

Declarations and Access Control: Identifiers and Keywords: Oracle's Java Code Conventions. Define Classes: Import Statements and the Java API - Static Import Statements. Use Interfaces: Declaring an Interface- Declaring Interface Constants. Declare Class Members: Access Modifiers - Non access Member Modifiers - Constructor Declarations - Variable Declarations. Declare and Use enums: Declaring enums. Object Orientation: Encapsulation - Inheritance and Polymorphism- Polymorphism - Overriding / Overloading: Overridden Methods -Overloaded Methods.

UNIT II

Object Orientation: Casting - Implementing an Interface - Legal Return Types: Return Type Declarations - Returning a Value. Constructors and Instantiation: Overloaded Constructors - Initialization Blocks. Statics: Static Variables and Methods. Assignments: Stack and Heap - Literals, Assignments, and Variables: Literal Values for All Primitive Types. Scope - Variable Initialization - Passing Variables into Methods: Passing Object Reference Variables - Passing Primitive Variables. Garbage Collection. Operators: Java Operators - Assignment Operators - Relational Operators - instanceof Comparison - Arithmetic Operators - Conditional Operator - Logical Operators.

UNIT III

Working with Strings, Arrays, and Array Lists: Using String and StringBuilder: The String Class -

The StringBuilder Class - Important Methods in the StringBuilder Class. Using Arrays: Declaring an Array -Constructing an Array - Initializing an Array. Using ArrayList:ArrayList Methods in Action - Important Methods in the ArrayList Class. Flow Control and Exceptions: Using if and switch Statements -Creating Loops Constructs - Handling Exceptions - Catching an Exception Using try and catch - Using finally. String Processing, Data Formatting Resource Bundles: String, StringBuilder, and StringBuffer -Dates, Numbers, Currencies, and Locales.

UNIT IV

I/O and NIO: File Navigation and I/O: Creating Files Using the File Class - Using FileWriter and FileReader. File and Directory Attributes -DirectoryStream - Serialization. Generics and Collections: toString(), hashCode(), and equals(): The toString() Method - Generic Types - Generic Methods - Generic Declarations. Inner Classes: Method – Local. Inner Classes - Static Nested Classes - Threads: Defining, Instantiating, and Starting Threads - Thread States and Transitions - Synchronizing Code, Thread Problems - Thread Interaction. Concurrency: Concurrency with the java.util.concurrent Package - Apply Atomic Variables and Locks - Use java.util.concurrent Collections - Use Executors and ThreadPools.

UNIT V

Applets: Applet fundamentals - Applet class - Applet life cycle - Steps for developing an applet program - Passing values through parameters - Graphics in an applet - Event-handling. GUI Applications - Part 1: Graphical user interface - Creating windows - Dialog boxes - Layout managers - AWT component classes - Swing component classes. GUI Applications - Part 2: Event handling - Other AWT components - AWT graphics classes - Other swing controls.

TEXT BOOK(S):

1. Kathy Sierra, Bert Bates — OCA/OCP Java SE 7 Programmer I & II Study Guide, Oracle Press. (Unit I,II,III,IV).

2. Sagayaraj, Denis, Karthik and Gajalakshmi, 2018, Java Programming - For Core and Advanced Learners, University Press (India) Private Limited, Hyderabad.(Unit V).

REFERENCE BOOKS:

1. Hebert Schild, 2002, The Complete Reference Java2, [Fifth Edition]. Tata McGraw-Hill, New Delhi.

2. John Hubbard, R.2004. Programming with Java. [Second Edition]. Tata McGraw-Hill,New Delhi.

3. Debasish Jana. 2005. Java and Object-Oriented Programming Paradigm, [Second Printing]. Prentice-Hall of India, New Delhi.

4. Sagayaraj, Denis, Karthik and Gajalakshmi 2018, Java Programming for core and advanced Learners, University Press India Pvt. Ltd., Hyderabad.

Course Outcomes:

- Students are able to know about a General-purpose and Purely object-oriented programming language including data types, control statements, and classes
- Students are able to Secured, well-suited for internet programming using applets and GUI-based

SEM III	CORE PRACTICAL	Lecture	Practical	Credit

CPCS 35	PROGRAMMING IN JAVALAB	4	0	3

List of Practical's

1. Implementation of Classes and Objects

2. Implementation of Inheritance and Polymorphism

3. Implementation of Interface and Package concepts

4. Implementation of Flow, Border ,Grid Layouts

5. Implementation of Tic-Tac Toe Application Using Applets

6. Implementation of Frames, Menus, Dialog

7. Implementation of Swing concepts

8. Implementation of Exception Handling

9. Implementation of Multi Threading

10. Implementation of I/O Streams

11. Implementation of Java Networking concepts

12. Implementation of Java Servlets (Connecting Database)

13. Implementation of RMI

14. Implementation of Java Beans

SEM III	SKILL BASED SUBJECT	Lecture	Practical	Credit
CSCS 33	DESIGN AND ANALYSIS OF ALGORITHM	3	0	3

LEARNING OBJECTIVES

Digital Logic Design and Computer Organization

Objectives:

This course aims to provide the students with a detailed knowledge on digital logic, internals of the System logic circuits and to know the working principles of the computers.

UNIT-I BINARY NUMBER SYSTEM

Objective : To understand the basics of Number System

Number system and its conversions-. Digital Computers and Digital Systems - Binary Number System – Binary Addition – Binary Subtraction- Binary Multiplication and Division-Number Base Conversion: decimal, binary, octal, hexadecimal. The Basic Gates - Boolean Algebra - Universal Gates - Boolean Laws and Theorem.

UNIT-IISIMPLIFICATION

Objective: To understand the concept of Simplification of Boolean expressions using K-map and arithmetic circuits.

Sum of products - Product of Sums - K-map simplifications - Don't care conditions-QuineMcclausky tabulation method. Combinational Arithmetic Circuits: Adders-Subtractors-full adder-subtractor-BCD Adder.

UNIT-III COMBINATIONAL LOGIC CIRCUITS

Objective: To understand the concept of Combinational Logic Circuits

Multiplexers-De-Multiplexers- Decoders : -Encoders- Decoders-Sequential Logic Circuit: Flip-Flops -RS Flip flop- JK Flip flop- D Flip flop-T Flip flop and Master Slave. Counters-Synchronous and Asynchronous –Shift Registers and its types.

UNIT- IV BASIC STRUCTURE OF COMPUTERS

Objective: To understand the concept of **Basic Structure of Computers**

Basic Operational Concepts, Bus Structures - Central Processing Unit: General Register and stack Organization-Instruction Formats Addressing Modes-Data Transfer and manipulation.

UNIT V- INPUT OUTPUT AND MEMORY ORGANIZATION

Objective: To understand the basic concepts of Input Output and Memory Organization

Peripheral Devices- I/O Interface - Asynchronous Data Transfer- -Priority Interrupt – Direct Memory Access – I/O Processor.Memory Organization– Main Memory-Auxiliary Memory – Associative Cache and Virtual Memory.

TEXT BOOKS:

1. M. Morris Mano -Digital Logic and Computer Design- PHI.

2. M. Morris Mano, Computer System Architecture, Pearson Education.

REFERENCE BOOKS:

1 Thomas C. Bartee Digital Computer Fundamentals- McGraw HillPub.
2 Malvino& Leach- Digital Principles and Applications –McGraw HillPub.
3. S. Ramalatha - Digital Computer Fundamentals, MeenakshiAgency.
4. V. Carl Hamacher, Zvonko G. Vranesic, Safwat G. Zaky, Computer Organization, McGraw Hill HigherEducation.
5. John P. Hayes, Computer System Architecture, McGraw Hill HigherEducation

SEM III	NON-MAJOR ELECTIVE - PAPER 1	Lecture	Practical	Credit
CNCS 34	INTRODUCTION TO INFORMATION TECHNOLOGY	2	0	2

LEARNING OBJECTIVE

It also provides students with an introduction to the range of applications of Information Technology, partly through an introduction to the second disciplines available to them.
It introduces students to some of the techniques that they will need for later courses, in particular object-oriented design and databases and SQL.

SYLLABUS

UNIT – I Introduction to Computers:
Definition - Characteristics of a Computer - Classification of Computers - Basic Anatomy of the Computer - Applications / Uses of Computers in different fields

UNIT – II Input and Output Devices:
Input Devices - Output Devices - Data Representation - Programming Languages / Computer Languages - Software: System Software - Application Software

UNIT – III Data Communication and Computer Networks:
Data Communication - Computer Network - The Uses of a Network - Types of Networks - Network Topologies- Transmission Media: Guided Transmission Media - Wireless Transmission

UNIT – IV Internet and its Applications:
History of Internet - Uses of Internet - Advantages of Internet - ISP - Internet Services - IP Address - Web Browser - URL - DNS - Internet Explorer - Types of internet connections - E-mail - Search Engine.

UNIT – V Operating System:
Evolution of operating systems - Function of Operating System - Classification of Operating – System - Example of Operating System – DOS –Windows – UNIX - Linux

TEXT BOOKS:

Alexis Leon and Mathews Leon, “Fundamentals of Information Technology”, Vikas Publishing House Pvt. Ltd.
Introduction to Information Technology, P.Rizwan Ahmed, Second Edition, Margham Publications, 2016
Introduction to Information Technology, PelinAksoy, Laura DeNardis, Cengage Learning India Private Limited.
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SEM IV	LANGUAGE	Lecture	Practical	Credit
CLT 40	TAMIL-IV	5	0	2

myFI

1. FWenjhif(ghlyfs-7›8›58›94›103)
2. ewwpiz (ghlyfs-1›226›238›249›380)
3. IqFWE}W(FufFggjJ1-5›rpWntzfhfifggjJ1-5)

myFII

4. GwehD}W (ghlyfs-10›18›206›212›278)
5. gjpwWggjJ(ghlyfs-20›59)

myFIII

6. fypjnjhif(ghlyfs-8›59›84›108›120)

ghpghly jpUkhy -1:36-73
nrtNts -5:55-81
itia -6:1-24

myFIV

gjJgghlL-KyiygghlL(KOtJk)

myFv

rqf,yffpatuyhW
vlLjnjhifE}yfs
gjJgghlLE}yfs

nkhopngahgG
nfhLffggllssMqfpyggFjpiajjkopynkhopngahjjy.
mYtyfffbjk-jkopynkhopngahjjy

SEM IV	LANGUAGE	Lecture	Practical	Credit
CLE 40	ENGLISH-IV	5	0	2

UNIT -1 PROSE

1. What is Courage - J.B.Priestly
2. Travel By Train - J.B.Priestly
3. Nobel Lecture - C.MalalaYousafjai
4. I won”t Let him Go -MathavanKutty

UNIT -2 POETRY

1. Stooping by Woods on Snowy Evening – Robert Frost
2. Refugee Mother and Child -Chinua Achebe
3. An Octobere Morning - JayantaMahapatra
4. Lyric No.1-XX11 (From Gitanjali) – Rabindranath Tagore

UNIT -3 DRAMA

Selected Scenes from Shakespeare

1. Hamlet (Soliloquy) Act III Scene I
2. Funeral Oration – Julius Caesar Act III Scene II

BIOGRAPHY

1. Rabindranath Tagore – E.M. Carter

UNIT -4 VOCABULARY

1. Lexical Skills
2. Functional Grammar and English Grammar

UNIT -5

1. E-mail
2. Presentation Skills
3. Curriculum Vitae and Covering Letter
4. Facing an Interview

SEM IV	CORE THEORY	Lecture	Practical	Credit
CCS 41	DATABASE MANAGEMENT SYSTEM	5	0	2

RELATIONAL DATABASE MANAGEMENT SYSTEMS

Objective:

- ✓ The students are able to understand database concepts and database management system software and have a high-level understanding of major DBMS components and their function.
- ✓ The students are able to understand the E R model and relational model.
- ✓ The students are able to be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
- ✓ The students are able to Understand Functional Dependency and Functional Decomposition.
- ✓ The students are able to understand the architecture of database management system and also understand the various different architecture such as server system architecture, parallel sytems and distributed database systems.

UNIT- I : DATABASE ARCHITECTURE AND ER DIAGRAM 12 Hours

Database system applications - Purpose of database systems - View of data- Database languages - Database architecture - Database users and administrators - History of database systems-Entity relationship modeling: entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, sub classes; super classes, inheritance, specialization and generalization

UNIT- II: RELATIONAL DATA MODEL 12 Hours

Relational model concepts, Relational constraints, Relational Languages : Relational Algebra, The Tuple Relational Calculus - The Domain Relational Calculus - SQL: Basic Structure-Set Operations- Aggregate Functions-Null Value-Nested Sub Queries-Views Complex QueriesModification Of Database-Joined Relations-DDL-Embedded SQL-Dynamic SQL-Other SQL Functions- -Integrity and Security.

UNIT - III: DATA NORMALIZATION 12 Hours

Pitfalls in relational database design – Decomposition – Functional dependencies – Normalization – First normal form – Second normal form – Third normal form – Boyce-codd normal form – Fourth normal form – Fifth normal form.

UNIT- IV: STORAGE AND FILE ORGANIZATION 12 Hours

Disks - RAID -Tertiary storage - Storage Access -File Organization – organization of files - Data Dictionary storage

UNIT- V: QUERY PROCESSING AND TRANSACTION MANAGEMENT 12 Hours

Query Processing - Transaction Concept - Concurrency Control - Locks based protocol Deadlock Handling -Recovery Systems.

TEXT BOOK:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010. 2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition,2002

REFERENCES

1. Bipin Desai, An Introduction to database systems, Galgotia Publications, 2010. 2. RamezElamassri, Shankant B-Navathe, Fundamentals of Database Systems, Pearson, 7th Edition, 2015

E - REFERENCES

1. NPTEL, Introduction to database desigh, Dr P Sreenivasa Kumar Professor CS&E, Department, IIT, Madras
2. 2. NPTEL, Indexing and Searching TechniquesinDatabasesDr. ArnabBhattacharya,IIT Kanpur

Course Outcomes:

- Describe the database architecture and its applications Sketch the ER diagram for real world applications Uses various ER diagram for a similar concepts from various sources.
- Discuss about the relational algebra and calculus Construct various queries in SQL and PL/SQL Compiles various queries in SQL, Relational Calculus and Algebra.
- Describe the various normalization forms Apply the normalization concepts for a table of data Practices a table and implement the normalization concepts.
- Explain the storage and accessing of data.
- Illustrate the query processing in database management. Define the concurrency control and deadlock concept

SEM IV	CORE PRACTICAL	Lecture	Practical	Credit
CPCS 45	RDBMS LAB	0	4	3

RELATIONAL DATABASE MANAGEMENT SYSTEMS LABS

Objectives:

- ✓ To understand the concepts of DDL/DML/DCL/TCL commands.
- ✓ To understand the concepts of Join queries.
- ✓ To understand the concepts of exception handling.
- ✓ To understand the concepts of cursors.
- ✓ To understand the concepts of packages.

LAB EXERCISES:

1. Execute a single line query and group functions.
2. Execute DDL Commands.
3. Execute DML Commands
4. Execute DCL and TCL Commands.
5. Implement the Nested Queries.
6. Implement Join operations in SQL
7. Create views for a particular table
8. Implement Locks for a particular table.
9. Write PL/SQL procedure for an application using exception handling.
10. Write PL/SQL procedure for an application using cursors.
11. Write a PL/SQL procedure for an application using functions
12. Write a PL/SQL procedure for an application using package

REFERENCE BOOK:

Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010. 2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition,2002

Course Outcomes:

- Design and Implement a database schema for a given problem domain.
- Populate and Query a database using SQL DDL/DML Commands.
- Build well formed in String Date/Aggregate Functions.
- Design and Implement a database query using Joins, Sub-Queries and Set Operations.

Program in SQL including Objects (Functions, Procedures, Triggers)

SEM IV	SKILL BASED SUBJECT	Lecture	Practical	Credit
CSCS 44	WIRELESS DATA COMMUNICATION	3	0	3

LEARNING OBJECTIVES

To enable the student to have a better understanding of architecture of computer and prepare the student for higher level of programming

The students will be able to

CO01: Explain instruction cycle.
CO02: Discuss the different computer register
CO03: Identify and explain the appropriate I/O and O/P interrupts
CO04: Explain timing, control and memory reference instructions
CO05: Discuss the working of the control unit
CO06: Write micro programs for the control unit.
CO07: Compare and contrast the different instruction formats
CO08: Use appropriate addressing modes in micro instructions
CO09: Explain the different peripheral devices and interfaces
CO010: Discuss the three modes of data transfer (DMA, Program IO, Interrupt Driven)
CO011: Differentiate the I/O Processors
CO012: Elaborate the Organization of the memory Unit.

SYLLABUS

UNIT –I Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory Reference Instructions – Input-Output and Interrupts.

UNIT – IIControl Memory – Address Sequencing – Micro program Examples – Design of Control Unit.

UNIT –III Introduction – General Register Organization – Instruction Formats – Addressing Modes.

UNIT – IV Peripheral Devices – I/O interface – Asynchronous Data Transfer – Modes of Transfer - Direct Memory Access – Input Output Processor (Excluding IBM and Intel IOPs).

UNIT – V Auxiliary Memory – Main Memory – Auxiliary Memory - Associative Memory – Cache Memory -Virtual Memory.

TEXT BOOK

Morris Mano M. Computer System Architecture. New Delhi **:**Prentice Hall of India Private Limited, 2011

REFERENCES

William Stallings . Computer Organization and Architecture. 8th edition. Pearson publication, 2010
Morris Mano. Digital Login and Computer Design. New Delhi :Prentice Hall of India Private Limited, 2001

SEM IV	NON MAJOR ELECTIVE (NME-II)	Lecture	Practical	Credit
CNCS 44	INTERNET AND ITS APPLICATIONS	2	0	2

LEARNING OUTCOME

Understand the meaning of the term internet and its functioning.
Know the various applications of internet.
Understand various IT terms and their role in internet functioning.
List the different components of internet and their functions.
Understand internet protocols and its types.
Know the functioning and types of search engines.
Know the basic HTML to design and develop a webpage.

UNIT - I Internet Basics
Introduction to Computers Programming Language types History of Internet Personal computers History of World Wide Web- Micro software .NET Java-Web resources.

UNIT - II Web Browsers
Web Browsers - Internet Explorer - connecting to Internet Features of Internet explorer6 Searching the Internet- online help and tutorials - File Transmission Protocol (FTP) Browser settings.

UNIT - III E-Mail
Attaching a file, Electronic mail creating an E-mail id sending and Receiving mails - attaching a file - Instance messaging - other web browsers.

UNIT - IV HTML
Introduction to HTML headers – Linking - Images-special characters and line breaks unordered lists- simple HTML programs.

UNIT - V Digital Cash
E-marketing consumer tracking Electronic advertising search engine – CRM - credit card payments Digital cash and e-wallets micro payments- smart card

Text book
Internet and World Wide Web Third edition H.M.Deitel, P.J. Deitel and A.B.Goldberg - PHI

Reference
The Internet- Complete Reference Harley hahn, Tata McGraw Hill

SEM V	CORE THEORY	Lecture	Practical	Credit
CCS 51	MOBILE APPLICATION DEVELOPMENT	6	0	3

MOBILE APPLICATIONS DEVELOPMENT

Objectives:

This course aims to provide the students with a detailed knowledge on Mobile Application Development and Deployment about Android programming from basics to building mobile applications for digital world.

UNIT I: INTRODUCTION TO ANDROID PLATFORM

Objective: To understand the basics of smart phones and android platforms**.**

Introduction to Mobile Application Development – Various platforms – Smart phones – Android platform: features – Architecture – Versions – ART (Android Runtime) – ADB (Android Debug Bridge) – Development environment/IDE: Android studio and its working environment – Emulator setup – Application framework basics – XML representation and Android manifest file – Creating a simple application.

UNIT II: ANDROID UI DESIGN

Objective: To understand the basic concepts of user interface related to app development.

GUI for Android: activities lifecycle – Android v7 support library – Intent: Intent object – Intent filters – Adding categories – Linking activities – User Interface design components – Basic Views – Picker Views – List View – Specialized Fragment – Gallery and Image View – Image Switcher – Grid View, Options Menu – Context Menu – Clock View –Web view – Recycler View.

UNIT III: DATA PERSISTENCE

Objective: To understand the important of data persistence in mobile environment.

Different Data Persistence schemes: Shared preferences – File Handling – Managing data using SQLite database – Content providers: user content provider – Android in build content providers.

UNIT IV: ANDROID SERVICES & NETWORK ENVIRONMENT

Objective: To understand the various services and network facilities provided by android platform.

Services: Introduction to services – Local service – Remote service – Binding the service – Communication between service and activity – Intent Service – Multi–Threading: Handlers – AsyncTask– Android network programming: HttpUrlConnection– Connecting to REST–based – SOAP based Web services – Broad cast receivers: LocalBroadcastManager– Dynamic broadcast receiver – System Broadcast – Telephony Manager: Sending SMS and making calls.

UNIT V: ADVANCED APPLICATIONS

Objective: To understand the various apps deployed and developed on by mobile platform.

Location based services: Google maps V2 services using Google API – Animations and Graphics: Property Animation – View Animations –Drawable Animations – Media and Camera API: Working with video and audio inputs – camera API – Sensor programming: Motion sensors – Position sensors – Environmental sensors – Publishing Android Apps: Guide lines – policies and process of uploading Apps to Google play.

TEXT BOOKS:

1. "Head First: Android Development", Dawn Griffiths, David Griffiths, OReilly, 1st Edition, 2015.
2. Barry Burd, "Android Application Development – All–in–one for Dummies", 2nd Edition, Wiley India, 2016.

REFERENCES:

1. "Professional Android™ Sensor Programming", Greg Milette,Adam Stroud, John Wiley and Sons, Inc 2012.
2. "Android 6 for Programmers, App Driven approach", Paul Deital, Harvey Deital, Alexander Wald, Prentice Hall, 2015.

SEM V	CORE THEORY	Lecture	Practical	Credit
CCS 52	OPERATING SYSTEM	6	0	3

Objectives:

Enable the student to get sufficient knowledge on concepts, functions and various system resources of operating systems.

UNIT I: OPERATING SYSTEM BASICS

Objective: To understand the structure and functions of operating systems.

Basic Concepts of Operating System – Services of Operating System – Operating System Types – Computer System Operation – I/O Structure – Storage Structure – Memory Hierarchy – System Components – System Calls – System Programs – System Design and Implementation – Introduction to Process – Process State – Process Control Block – Process Scheduling – Operations on Process – Interprocess Communication – Communication in Client/Server Systems – Threads.

UNIT II: CPU SCHEDULING ALGORITHM AND PREVENTION

Objective: To understand the principles of scheduler, scheduler algorithms and Deadlock.

Introduction –Types of CPU Scheduler – Scheduling Criteria – Scheduling Algorithms – Semaphores – Classic Problems of Synchronization – Basic Concept of Deadlocks – Deadlock Characterization – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery of Deadlock.

UNIT III: STORAGE MANAGEMENT

Objective: To learn various memory management schemes.

Memory Management – Basics Concept of Memory – Address Binding – Logical and Physical Address Space – Memory Partitioning – Memory Allocation – Paging – Segmentation – Segmentation and Paging – Protection – Fragmentation – Compaction – Demand Paging – Page Replacement Algorithm – Classification of Page Replacement Algorithm .

UNIT IV: I/O SYSTEMS

Objective: To study I/O management, File system and Mass Storage Structure .

File System Storage – File Concept– File Access Methods – Directory Structure – File Sharing – File Protection – File System Implementation – File System Structure – Allocation Methods – Free Space Management – Mass Storage Structure – Disk structure – Disk Scheduling and Management – RAID Levels.

UNIT V: CASE STUDIES

Objective: To learn the basics of UNIX, LINUX systems and perform administrative tasks on LINUX servers.

UNIX System – A Case Study – LINUX System – Case Study – Design Principles – Process Management – Scheduling – Memory Management – File Systems – Security .

TEXT BOOKS:

1. "Operating System Concepts" –Abraham Silberschatz Peter B. Galvin, G. Gagne, Sixth Edition, Addison Wesley Publishing Co., 2003.
2. "Operating System" – William Stalling, Fourth Edition, Pearson Education,2003.

REFERENCES:

1. "Operating systems – Internals and Design Principles", W. Stallings, 6th Edition, Pearson.
2. "Modern Operating Systems", Andrew S.Tanenbaum, Second Edition, Addison WesleyPublishing Co., 2001.
3. "Fundamentals of Operating System", Prof. R. Sriddhar, Dynaram Publication, Bangalore Company.

SEM V	CORE THEORY	Lecture	Practical	Credit
CCS 53	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	2

DESIGN AND ANALYSIS OF ALGORITHMS

Objectives:

The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem. In each case emphasis will be placed on rigorously proving correctness of the algorithm.

UNIT –I: ALGORITHM AND ANALYSIS

Objective: Understanding various algorithm design techniques.

Elementary Data Structures: Stack – Queues – Trees – Priority Queue – Graphs – What is an Algorithm? – Algorithm Specification – Performance Analysis: Space Complexity – Time Complexity – Asymptotic Notation – Randomized Algorithms.

UNIT – II: DIVIDE AND CONQUER

Objective: This technique is the basis of efficient algorithms for all kinds of problems**.**

General Method – Binary Search – Recurrence Equation for Divide and Conquer – Finding the Maximum and Minimum–– Merge Sort – Quick Sort – Performance Measurement – Randomized Sorting Algorithm – Selection Sort – A Worst Case Optimal Algorithm – Implementation of Select2 – Stassen's Matrix Multiplications.

UNIT – III: THE GREEDY METHOD

Objective: This is a simple approach which tries to find the best solution at every step.

The General Method – Container Loading – Knapsack Problem – Tree Vertex Splitting – Job Sequencing with Deadlines – Minimum Cost Spanning Trees – Prim's Algorithm – Kruskal's Algorithm – An optimal Randomized Algorithm – Optimal Storage on Tapes – Optimal Merge Pattern – Single Source Shortest Paths.

UNIT – IV: DYNAMIC POGRAMMING, TRAVERSAL & SEARCHING

Objective: Providing a general insight into the dynamic programming approach.

The General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary Search Trees – String Editing – 0/1 Knapsack – Reliability Design – The Traveling Salesperson Problem. Techniques for Binary Trees – Techniques for Graphs – BFS – DFS.

UNIT – V: BACKTRACKING & BRANCH AND BOUND

Objective: Algorithm design paradigm for discrete and combinatorial optimization problems.

The General Method – The 8– Queens Problem – Sum of Subsets– Graph Coloring – Hamiltonian Cycles – Branch and Bound: General Method – LC Branch and Bound – FIFO Branch and Bound.

TEXT BOOKS:

1. “Fundamentals of Computer Algorithms”, Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Galgotia Publications, Second Edition 2015.
2. “Introduction to Algorithms”, Coremen T.H., Leiserson C.E. and Rivest R.L., PHI Publications, Third Edition, 1998.

REFERENCES:

1. “Introduction to the Design and Analysis of Algorithms”, AnanyLevitin, Pearson Education, 2nd Edition.
2. ”Introduction to Algorithms” Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, Prentice Hall of India, New Delhi, Second Edition, 2007.
3. “Computer Algorithms – Introduction to Design & Analysis” Sara Baase and Allen Van Gelder, Pearson Education New Delhi, Third Edition, 2000.

SEM V	CORE PRACTICAL	Lecture	Practical	Credit
CPCS 56	MOBILE APPLICATION DEVELOPMENT LAB	4	0	3

MOBILE APPLICATIONS DEVELOPMENT LAB

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Intent and Activity.
3. Develop an application that uses Layout Managers and event listeners.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of RSS Feed.
6. Implement an application that implements Multi-threading.
7. Develop an application that create alarm clock.
8. Develop an application Using Widgets.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.

11. Develop an application that makes use of database.

SEM V	CORE PRACTICAL	Lecture	Practical	Credit
CPCS 57	OPERATING SYSTEM LAB	4	0	2

1. Basics of UNIX commands.
2. Shell Programming.
3. Implement the following CPU scheduling algorithms

   a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies

   a) Sequential b) Indexed c) Linked
5. Implement Semaphores
6. Implement all File Organization Techniques

   a) Single level directory b) Two level c) Hierarchical d) DAG
7. Implement Bankers Algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement e all page replacement algorithms

   a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique of memory management.
12. Implement Threading & Synchronization Applications.

SEM V	ELECTIVE I	Lecture	Practical	Credit
CECS 54A	DATA MINING	3	0	3

Objectives:

To enable the students to understand the importance of Data Mining and its techniques with recent trends and tools.

UNIT I: DATA MINING BASICS

Objective: To understand about the basics of Data Mining and Data

What is Data Mining– Kinds of Data – Kinds of patterns – Technologies used for Data Mining– Major Issues in Data Mining– Data –Data Objects and Attribute types– Data Visualization– Measuring Data Similarity and Dissimilarity–Data Preprocessing– overview– Data Cleaning– Data Integration– Data Reduction– Data Transformation and Data Discretization.

UNIT II: DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING

Objective: To understand about the methods of Data Warehousing

Data Warehouse– Basic concepts–Data Warehouse Modeling: Data Cube and OLAP– Data Warehouse Design and Usage– Data Warehouse Implementation– Data Generalization by Attribute–Oriented Induction– Data Cube Technology– Data Cube Computation Methods– Exploring Cube Technology– Multidimensional Data Analysis in cube space.

UNIT III: PATTERNS AND CLASSIFICATION

Objective: To understand about the techniques of Data Mining

Patterns– Basic concepts– Pattern Evaluation Methods–Pattern Mining: Pattern Mining in Multilevel– Multidimensional space–Constraint–Based Frequent Pattern Mining– Mining High Dimensional Data and Colossal patterns– Mining compressed or Approximate patterns– Pattern Exploration and Application. Classification–Decision tree Induction– Bayes Classification methods– Rule based Classification–Model Evaluation and selection– Techniques to Improve Classification Accuracy– Other Classification methods.

UNIT IV: CLUSTERING AND OUTLIER DETECTION

Objective: To understand about the importance of Cluster and outlier detection

Cluster Analysis– Partitioning Methods–Hierarchical Methods–Density–Based Methods– Grid–Based Methods – Evaluation of Clustering.– Clustering High – Dimensional Data–Clustering Graph and Network Data – Clustering with Constraints–Web Mining– Spatial Mining. Outlier Detection – Outliers and Outliers Analysis–Outlier Detection Methods–Outlier Approaches–Statistical– Proximity–Based– Clustering–Based– Classification Based – High–Dimensional Data.

UNIT V: RECENT TRENDS IN DATA MINING AND TOOLS

Objective: To improve the student's knowledge with recent trends and tools

Other Methodologies of Data Mining –Data Mining Applications–Data Mining Trends– Recent Data Mining Tools–Rapid miner–Orange–Weka–Knime– Sisense–Ssdt (SQL Server Data Tools)–Oracle–Rattle–Data melt–Apache Mahout.

TEXT BOOKS:

1. "Data Warehousing Fundamentals", PaulrajPonnaiah, Wiley Publishers, 2001.
2. "Data Mining: Concepts and Techniques", Jiawei Han, MichelineKamber, Morgan Kaufman Publishers, 2006.
3. "Introduction to Data mining with case studies", G.K. Gupta, PHI Private limited, New Delhi, 2008. 2nd Edition, PHI, 2011

REFERENCES:

1. "Advances in Knowledge Discover and Data Mining", Usama M. Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth RamasamyUthurusamy, the M.I.T. Press, 2007.
2. "The Data Warehouse Toolkit", Ralph Kimball, Margy Ross, John Wiley and Sons Inc., 2002
3. "Building Data Mining Applications for CRM", Alex Berson, Stephen Smith, Kurt Thearling, Tata McGraw Hill, 2000.
4. "Data Mining: Introductory and Advanced Topics", Margaret Dunham, Prentice Hall, 2002.

"Discovering Knowledge in Data: An Introduction to Data Mining", Daniel T. Larose John Wiley & Sons, Hoboken, New Jersey, 2004

SEM V	ELECTIVE I	Lecture	Practical	Credit
CECS 54B	INFORMATION SECURITY	3	0	3

Objectives:

To enable the student to understand various methodologies available for securing information.

UNIT I: INFORMATION SECURITY BASICS

Objective: To understand the basic concepts of Information Security

Introduction – History – What is Information Security?– Critical Characteristics of Information– NSTISSC Security Model– Components of an Information System– Securing the Components– Balancing Security and Access– The SDLC– The Security SDLC.

UNIT II SECURITY INVESTIGATION

Objective: To understand the legal, ethical and professional issues in Information Security

Security– Business Needs– Threats– Attacks– Legal– Ethical and Professional Issues– Relevant U.S. Laws – International Laws and Legal Bodies – Ethics and Information Security – Codes of Ethics and Professional Organizations

UNIT III SECURITY ANALYSIS

Objective: To know about risk management

Risk Management – Introduction – An Overview of Risk Management – Risk Identification – Risk Assessment – Risk Control Strategies – Selecting a Risk Control Strategy – Quantitative versus Qualitative Risk Control Practices – Risk Management Discussion Points

UNIT IV SECURITY MODELS

Objective: To understand the technological aspects of Information Security

LOGICAL DESIGN– Blueprint for Security– Information Security Policy – Standards and Practices– ISO 17799/BS 7799– NIST Models– VISA International Security Model– Design of Security Architecture– Planning for Continuity – Security Physical Design –Firewalls –Security Technology– IDS–IPS–Honey Pots– Honey Nets–Padded cell Systems Scanning and Analysis Tools–Access Control Devices.

UNIT V: CRYPTOGRAPHY AND ETHICAL HACKING

Objective: To understand the concepts of Cryptography and Hacking methods

Cipher methods– Cryptographic Algorithms and Tools–Attacks on Cryptosystems–Hacking– Effects of Hacking– Hacker – Types of Hacker– Ethical Hacker–Hacktivism–Networking & Computer Attacks – Malicious Software (Malware) – Protection Against Malware– Intruder Attacks on Networks and Computers – Wireless Hacking– Windows Hacking– Linux Hacking Session.

TEXT BOOKS:

1. "Principles of Information Security", Michael E Whitman and Herbert J Mattord, 5th Edition, Vikas Publishing House, New Delhi, 2003.
2. "Fundamentals of Information Systems Security", David Kim,MichaelG.Solomon, 3rd Edition ,Jones & Bartlett Learning, October 2016.
3. "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Patrick Engebretson, 2nd Edition, Syngress Basics Series – Elsevier, 2011.
4. "Hands-On Ethical Hacking and Network Defense", Michael T. Simpson, Kent Backman, James E. Corley, Second Edition, CENGAGE Learning, 2010.

REFERENCES:

1. "Handbook of Information Security Management", Micki Krause, Harold F. Tipton, sixth Edition, CRC Press LLC, 2004.
2. "Hacking Exposed", Stuart McClure, Joel Scrambray, George Kurtz, Tata McGraw–Hill, 2003.
3. "Computer Security Art and Science", Matt Bishop, 2ndEdition , Pearson/PHI, 2002.

SEM V	ELECTIVE I	Lecture	Practical	Credit
CECS 54C	SOFTWARE TESTING	3	0	3

Objectives:

To study the concepts of software engineering with the aim of acquiring skills to develop Software applications, following all standardized procedures and techniques.

UNIT I: INTRODUCTION TO SOFTWARE TESTING

Objective: To understand the concept of software testing, and software quality

Fundamentals of software testing – need for software testing– Psychology of testing – various approaches – characteristics of testing – principles of testing – testing strategies – verification and validation – Defect and Prevention strategies.

UNIT II: SOFTWARE DEVELOPMENT MODEL AND TESTING

Objective: To learn to inspect and detect errors by going through each and every code segment

Water fall model– V–model– Spiral model– Agile model – Life cycle of testing– Static Testing – dynamic testing – White box testing – Block box testing – Regression testing – Integration Testing – System and Performance Testing – Usability Testing

UNIT III: FUNCTIONAL AND STRUCTURAL TESTING

Objective: To gain knowledge of various functional and structural testing techniques

Boundary Value Analysis – Equivalence Class Testing – Decision Table – Based Testing – Cause Effect Graphing Technique – Path testing –Cyclomatic Complexity –Graph Metrics – Data Flow Testing – Slice based testing

UNIT IV: TEST MANAGEMENT AND TOOLS

Objective: To understand basic concept of Software Management tools and object oriented testing

Test planning – cost–benefit analysis of testing – monitoring and control–Test reporting –Test control – Specialized testing – Object Oriented Testing – Automated Tools for Testing – Tool Selection and Implementation – Challenges in test automation – GUI Testing

UNIT V: SOFTWARE QUALITY AND SOFTWARE QUALITY ASSURANCE

Objective: To understand basic concept of Software quality and software quality assurance

Introduction to software quality and software quality assurance – basic principles about the software quality and software quality assurance – Planning for SQA – various models for software product quality and process quality – SCM – RAD – System Documentation

TEXT BOOKS:

1. "Software Testing– A Craftsman's Approach" – Paul C. Jorgensen – Second Edition – CRC Press 2008

2. “Software Testing”, – Ron Patton, Second Edition –Sams Publishing, Pearson Education, 2007.

3. “Software Testing– A Craftsman’s Approach” – Paul C. Jorgensen, Second Edition – CRC Press, 2008

REFERENCES:

1. “Software Testing and Analysis: Process, Principles and Techniques” – Mauro Pezze, Michal Young – Wiley India , 2008

2. “Software Engineering” – K.K. Aggarwal&Yogesh Singh – New Age International Publishers – New Delhi, 2003.

3. “Software Testing – Principles and Practices” –SrinivasanDesikan and Gopalaswamy Ramesh, Pearson Education, 2006.

SEM V	SKILL BASED SUBJECT III	Lecture	Practical	Credit
CSCS 55	SOFTWARE ENGINEERING	3	0	3

SOFTWARE ENGINEERING

Objectives:

This course is intended to provide the students with an overall view over Software Engineering discipline and with insight into the processes of software development.

UNIT–I: INTRODUCTION TO EVOLVING SOFTWARE

Objective: Introduces the concepts and methods required for the construction of large software intensive systems.

Evolving Role of Software – Nature of Software – Software Engineering – The Software Process– Software Engineering Practices – Software Myths – A Generic View of Process Model – Process Assessment and Improvement – Process Models : Waterfall Model – Incremental Process Models – Evolutionary Process Models – Concurrent Models.

UNIT–II: REQUIREMENTS ENGINEERING

Objective: Gets the idea of choosing the Requirements in Software Engineering.

Requirements Engineering: Establishing the Groundwork – Initiating the Requirements Engineering Process – Eliciting Requirements – Collaborative Requirements Gathering – Quality Function Deployment – Usage Scenarios – Elicitation work Products – Building the Requirements Model – Elements of

Requirements Model – Analysis Pattern – Requirements Analysis – Data Modeling Concepts.

UNIT–III: DATA ENGINEERING

Objective: Gives an understanding the concept of Data Engineering.

Data Engineering: Design Process and Design Quality – Design Concepts – The Design Model– Creating an Architectural Design – Software Architecture – Data Design – Architectural style – Architectural Design – Architectural Mapping Using Data Flow – Performing User Interface Design – Golden Rules.

UNIT–IV: TESTING STRATEGIES

Objective: To impart knowledge on Testing and Debugging.

Testing Strategies: Strategic Approach to Software Testing – Strategic Issues – Test Strategies for Conventional and Object Oriented Software – Validation Testing – System Testing – Art of Debugging. Software Testing Fundamentals – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing – Model Based Testing.

UNIT–V: PROJECT MANAGEMENT

Objective: To enable the students to learn the basic of Project Management & Scheduling.

Project Management: Management Spectrum – People – Product – Process – Project – Critical Practices – Estimation: Project Planning Process – Software Scope and Feasibility – Resources – Software Project Estimation – Project Scheduling – Quality Concepts – Software Quality Assurance – Elements of Software Quality Assurance – Formal Technical Reviews.

TEXT BOOKS:

1. ”Software Engineering – A Practitioner’s Approach”, Roger S Pressman, McGraw Hill International Edition, New York: 2005, Seventh Edition
2. ” Software Engineering”, Mall Rajib, PHI Learning, 2009, 3 Third Edition.

REFERENCES:

1. “Software Engineering”, Ian Somerville, Pearson Education, 2006, 7th Edition.
2. “Software Engineering Concepts” Richard Fairley, Tata McGraw–Hill Education, 2011.
3. “Software Engineering: Theory and Practice “, Pfleeger and Lawrence,

Pearson Education, 2001, Second Edition.

SEM VI	CORE THEORY	Lecture	Practical	Credit
CCS 61	OPEN SOURCE PROGRAMMING	7	0	5

OPEN SOURCE SOFTWARE

Objectives:

To study the concepts of open source techniques that can be effectively applied in practice about HTML5, JavaScript, PHP, and PERL.

UNIT I: INTRODUCTION TO HTML, CSS

Objective: To understand the concept of HTML, HTML5 and CSS.

Need of Open Source –Advantages of Open source –Application of Open Source – HTML – HTML tags –Dynamic Web content– HTTP Request and Response Procedure–Introduction to HTML5– HTML5 Canvas – HTML5 Audio and Video– Introduction to CSS – CSS Rules –Style Types – CSS Selectors– CSS Colors.

UNIT II: LINUX

Objective: To learn to inspect and detect errors by going through each and every code segment.

Introduction: Linux Essential Commands – Kernel Mode and user mode –File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions Creation – Shell Introduction – String Processing – Investigation and Managing Processes – Network Clients – Installing Application.

UNIT III:JAVA SCRIPT AND MYSQL

Objective: To understand basic concept of Java Script and MySQL.

Java script :Advantages of JavaScript –JavaScript Syntax–Data type– Variable– Array – Operators and Expressions– Loops – functions – Dialog box– MySQL – The show Databases and Table – The USE command –Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement.

UNIT IV: PHP

Objective: To understand basic concept of PHP

PHP Introduction – General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions Control Statement – Array – Functions – Basic Form Processing – File and Folder Access – Cooking – Sessions – Database Access with PHO.

UNIT V: PERL

Objective: To understand basic concept of PERL

PERL : Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules– Working with Files – Data Manipulation.

TEXT BOOKS:

1. "The Complete Reference Linux", Peterson, Tata McGraw HILL–2010

2. "Perl: The Complete Reference", Martin C. Brown, Tata McGraw Hill Publishing Company Limited, Indian Reprint 2009.
3. "MYSQL: The Complete Reference", VikramVaswani, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009
4. "PHP: The Complete Reference", Steven Holzner, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.
5. "Complete Reference HTML", T. A. Powell, 3rd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2002.
6. "Mastering Java script" – J. Jaworski, BPB Publications, 1999

REFERENCES:

1. "Fundamentals of Open Source Software", by M.N. Rao, PHI publishers.
2. "MySQL Bible", Steve Suchring, John Wiley, 2002
3. "The Linux Kernel Book", Remy Card, Eric Dumas and Frank Mevel, Wiley Publications, 2003

Ivan Byross, HTML, DHTML, Javascript, Perl, BPB Publication

SEM VI	CORE THEORY	Lecture	Practical	Credit
CCS 62	PYTHON PROGRAMMING	6	0	4

UNIT I:

Identifiers – Keywords - Statements and Expressions – Variables – Operators – Arithmetic operators – Assignment operators – Comparison operators – Logical operators – Bitwise operators - Precedence and Associativity – Data types - Number – Booleans – Strings - Indentation – Comments – Single line comment –

Multiline comments - Reading Input – Print Output – Type Conversions – int function – float function – str() function – chr() function – complex() function – ord() function – hex() function – oct() function - type() function and Is operator – Dynamic and Strongly typed language.

UNIT II:

Control Flow Statements – If statement – If else statement – If elif else statement – nested if statement - while loop – for loop – continue and break statements – catching exceptions using try and except statement – syntax errors – exceptions – exception handling – Strings – str() function - Basic string operations – String comparison – Built in functions using strings – Accessing characters in string – String slicing – String joining – split() method – string traversing.

UNIT III:

Functions – Built in functions – function definition and calling - return statement – void function – scope and lifetime of variables – args and kwargs – command line arguments - Tuples – creation – basic tuple operations – tuple() function – indexing – slicing – built-in functions used on tuples – tuple methods – packing – unpacking – traversing of tuples – populating tuples – zip() function - Sets – Traversing of sets – set methods – frozenset.

UNIT IV:

Lists: Using List- List Assignment and Equivalence – List Bounds- Slicing - Lists and Functions- Prime Generation with a List.List Processing: Sorting-Flexible Sorting- Search- List Permutations- Randomly Permuting a List- Reversing a List.

UNIT V:

Objects: Using Objects- String Objects- List Objects. Custom Types: Geometric Points- Methods- Custom Type Examples- Class Inheritance. Handling Exceptions: Motivation- Exception Examples- Using Exceptions - Custom Exceptions.

TEXT BOOKS:

1. Gowrishankar S, Veena A, "Introduction to Python programming", 1st Edition, CRC Press/Taylor & Francis, 2008. (Units 1-3)

2. Learn to Program with Python, 3th Edition, Richard L. Halterman, Southern Adventist University. (Units 4-5)

REFERENCE BOOKS:

1. Core Python Programming, 2thEdition, Wesley J. Chun, Prentice Hall.
2. Jake VanderPlas,"Python Data Science Handbook:Essential Tools for working with Data",1st edition, O'Reilly Media, 2016.

SEM VI	CORE PRACTICAL	Lecture	Practical	Credit
CPCS 66	PYTHON PROGRAMMING LAB	0	4	3

Write a Python program to find the area and perimeter of a circle.

1. Write a Python program to generate Fibonacci series.
2. Write a Python program to compute the GCD of two numbers.
3. Write a Python program to generate first n prime numbers.
4. Write a Python program to find the sum of squares of n natural numbers.
5. Write a Python program to find the sum of the elements in an array.
6. Write a Python program to find the largest element in the array.
7. Write a Python program to check if the given string is a palindrome or not.
8. Write a Python program to store strings in a list and print them.
9. Write a Python program to find the length of a list, reverse it, copy it and then clear it.

SEM VI	CORE PRACTICAL	Lecture	Practical	Credit
CPCS 67	OPEN SOURCE LAB	0	4	3

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets).
3. Write a shell program to find the factorial of an integer positive number.
4. Write a shell program to find the details of a user session.
5. Create a simple calculator in JavaScript.

6. Write a JavaScript program to scroll your name in the scrollbar.
7. Develop a program and check message passing mechanism between pages.
8. Application for Email Registration and Login using PHP and MySQL.
9. Program to Create a File and write the Data into it using PHP.
10. Program to perform the String Operation using Perl.

SEM VI	ELECTIVE II	Lecture	Practical	Credit
CECS 63A	BIG DATA ANALYTICS	3	0	3

Objectives:

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

UNIT–I: INTRODUCTION TO BIG DATA

Objective: To explore the fundamental concepts of big data analytics.

Introduction to big data: Introduction to Big Data Platform – Challenges of Conventional Systems – Intelligent data analysis – Nature of Data – .Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – Volume, Velocity, Variety – Other Characteristics of Data – Need for Big Data– Analytic Processes and Tools – Analysis vs. Reporting.

UNIT–II: MINING DATA STREAMS
Objective:To learn to use various techniques for mining data stream.

Mining data streams: 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.

UNIT III: BIG DATA FROM DIFFERENT PERSPECTIVES

Objective: To learn the Big data Business Perspective

Big data from business Perspective: Introduction of big data–Characteristics of big data–Data in the warehouse and data in Hadoop– Importance of Big data– Big data Use cases– Patterns for Big data deployment. Big data from Technology Perspective– Application Development in Hadoop–Getting your data in Hadoop.

UNIT –IV:HADOOP AND MAP REDUCE

Objective: To understand the applications using Map Reduce Concepts.

Hadoop: The Hadoop Distributed File System – Components of HadoopAnalysing 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–Hadoop environment.

UNIT – V: FRAMEWORKS

Objective:To introduce programming tools HIVE in Hadoop echo system.

Frameworks: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive – fundamentals of HBase and ZooKeeper– IBM InfoSphereBigInsights and Streams.

TEXT BOOKS:

1. “Intelligent Data Analysis”, Michael Berthold, David J. Hand, Springer, 2007.

2. “Hadoop: The Definitive Guide “, Tom White Third Edition, Oreilly Media, 2012.

REFERENCES:

1. “Big Data and Analytics" SeemaAcharya, SubhasiniChellappan, Wiley 2015.
2. “Mining of Massive Datasets”,AnandRajaraman and Jeffrey David Ullman,CUP,2012.
3. “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data” .Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,McGrawHill Publishing, 2012.
4. “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, Bill Franks, John Wiley& sons, 2012.
5. “Making Sense of Data”, Glenn J. Myatt, John Wiley & Sons, 2007.

SEM VI	ELECTIVE II	Lecture	Practical	Credit
CECS 63B	CRYPTOGRAPHY	3	0	3

Objectives:

- Understand various Security practices and System security standards
- Understand different cryptographic operations
- Understand the various Authentication schemes to simulate different applications.

UNIT–I: COMPUTER AND NETWORK SECURITY

Objective: Understand OSI security architecture and classical encryption techniques**.**

Computer Security Concepts – OSI security architecture –Security trends – Security attacks – Security Services – Security Mechanisms – Fundamental Security Design Principles – Attack Surfaces and Attack Trees – Model for Network Security – Network Standards.

UNIT–II:SYMMETRIC CRYPTOGRAPHY

Objective: Understand the different cryptographic operations of symmetric cryptographic algorithm**s.**

Symmetric Cipher – Classical Encryption Technique – Symmetric Cipher Model – Substitution Techniques, Transposition Technique – Steganography – Block Cipher and the Data Encryption Standard – The Data Encryption Standard – Differential and Linear Cryptanalysis – Block Cipher Principles. Advanced Encryption Standard – AES Structure – AES Transformation Function.

UNIT–III: PUBLIC KEY CRYPTOGRAPHY

Objective: Understand the different cryptographic operations of Public key cryptographic algorithms.

Public Key Cryptography and RSA Principles– RSA Algorithm, Key Management and other Public Key Cryptosystems Key Management, Diffie–Hellman Key Exchange, Elliptic Curve Arithmetic – Elliptic Curve Cryptography – Psedorandom Number Generation**.**

UNIT –IV:HASH FUNCTIONS AND DIGITAL SIGNATURES

Objective: To make use of application protocols to design and manage a secure system.

Cryptographic Hash Functions – Application of Hash Functions – Two Simple Hash Functions – Secure Hash Algorithm(SHA) –Message Authentication Codes – Authentication requirement – Authentication function – MAC – HMAC – CMAC – Digital signature and authentication protocols – Digital Signature Standards – Digital Signatures Schemes– Digital Certificate – Key Management and Distribution.

UNIT – V: SECURITY APPLICATIONS

Objective: To learn the configuration and manage E–mail and WLAN Security.

Intrusion Detection System – Password Management – Introduction to Firewall – Firewall Generations– Web Security – Wireless network Security – Electronic Mail Security– Internet Mail Architecture–S/MIME – Pretty Good Privacy (PGP).

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TEXT BOOKS:

1. “Cryptography and Network security Principles and Practices”,William Stallings,Pearson/PHI,Seventh Edition, 2017.
2. “CRYPTOGRAPHY & NETWORK SECURITY” – Principles and Practices, William Stallings, Pearson Education, Third Edition.

REFERENCES:

1. "Modern Cryptography Theory and Practice", Wenbo Mao, Pearson Education, 2004.
2. "Cryptography and Network Security ",BehourzForouzan, DebdeepMukhopadyay,Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2010.
3. "Quantum Cryptography and Secret–Key Distillation", Gilles van Assche, CambridgeUniversity Press, 2010.

SEM VI	ELECTIVE II	Lecture	Practical	Credit
CECS 63C	DIGITAL IMAGE PROCESSING	3	0	3

Objectives:

This course enables the student knowledge about various image processing concepts like enhancement, restoration, segmentation, compression and recognition.

UNIT I: FUNDAMENTALS

Objective: To know the basics of Digital image and techniques.

Introduction – Origin – Steps in Digital Image Processing – Components – Applications of DIP – Elements of Visual Perception – Light and Electro Magnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Images in Matlab– Pixels – Color models – Digital Image Processing in Multimedia.

UNIT II: IMAGE ENHANCEMENT

Objective: To understand various Image enhancement ideas.

Spatial Domain – Gray level transformations – Histogram Quantization – Histogram matching and processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering – Introduction to Fourier Series – Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal – Butterworth and Gaussian filters.

UNIT III: IMAGE RESTORATION AND SEGMENTATION

Objective: To understand Image restoration techniques.

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse

Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation– Active Contour Models – Snakes – Fuzzy Connectivity – Morphological processing– erosion and dilation.

UNIT IV: WAVELETS AND IMAGE COMPRESSION

Objective: To understand degrees of image resolution and compression methods.

Wavelets – Subband coding – Multi resolution expansions – Compression: Fundamentals – Image Compression models – Error Free Compression – Predictive Compression Methods – Vector Quantization – Variable Length Coding – Bit–Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT V: IMAGE REPRESENTATION AND RECOGNITION

Objective: To understand concepts of image representation and recognition.

Knowledge Representation – Statistical Pattern Recognition – Neural Nets – Fuzzy Systems – Chain Code – Polygonal approximation, signature, boundary segments – Shape number – Fourier Descriptor moments– Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.

TEXT BOOKS

1. "Digital Image Processing," Rafael C. Gonzalez, Richard E.Woods, Prentice Hall, Third Edition, 2008.
2. "Digital Image Processing and Computer Vision," Sonka, Hlavac, Boyle, Cengage Learning, 2009
3. "Fundamentals of Digital Image Processing", Anil Jain K, PHI Learning Pvt. Ltd., 2011.

REFERENCES:

1. "Digital Image Processing", S. Sridhar, Oxford University Press; Second edition, 2016.
2. "Digital Image Processing", Gonzalez & woods, Pearson Education India, 2016.

SEM VI	ELECTIVE III	Lecture	Practical	Credit
CECS 64A	ARTIFICIAL INTELLIGENCE	3	0	3

Objectives:

To induce the innovative ideas of students, related to Robotics, Artificial Intelligence and Machine Learning. This course enables the student's level to compete in the world of information and technology era.

UNIT I: INTRODUCTION TO ARTIFICIAL INTELLIGENCE:

Objective: To know the basics of Artificial Intelligence.

History of AI – Artificial Narrow Intelligence (ANI) – Artificial General Intelligence (AGI) – Artificial Super Intelligence (ASI) – Characteristics – Types of AI – Domains – Programming Languages of AI – Applications of AI – Future of AI.

UNIT II: AI – PROBLEM SOLVING METHODS:

Objective: To Understand the Methods and algorithms in AI.

Problem solving Methods – Search Strategies: Uninformed – Informed – Heuristics – Generate and test – hill climbing – Best first search – problem reduction – Local Search Algorithms and Optimization – Game Playing mini–max procedure – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games

UNIT III: AI – KNOWLEDGE REPRESENTATION:

Objective: To learn to represent knowledge in solving AI problems.

Procedural Versus declarative knowledge – logic programming – Forward Versus backward reasoning – Matching – Control knowledge – Ontological Engineering– Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories –Reasoning with Default Information.

UNIT IV: STATISTICAL REASONING AND AGENTS:

Objective: To Understand Statistical logics and know about Software agents.

Probability and Bayes Theorem – Certainty factors – Probabilistic Graphical Models – Bayesian Networks – Markov Networks – Fuzzy Logic. Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi–agent systems.

UNIT V: MACHINE LEARNING AND APPLICATIONS

Objective: To learn how Machine learning is related to AI.

Types of Machine Learning – Neural Networks – Deep Learning – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

TEXT BOOKS:

1. “Artificial Intelligence”, Elaine Rich, Kevin Knight, Tata McGraw Hill, II Edition.
2. "Artificial Intelligence: A Modern Approach," Stuart Russell, Peter Norvig, Third Edition, Prentice Hall of India, New Delhi, 2010.
3. “Prolog: Programming for Artificial Intelligence”, I. Bratko, Addison – Wesley Educational Publishers Inc., Fourth edition 2011.

REFERENCES:

1. “Machine Learning for Beginners 2019”, Matt Henderson, This Is Charlotte, 2019
2. “Introduction to Artificial Intelligence and Expert Systems”, Dan W. Patterson, Pearson, 2015

SEM VI	ELECTIVE III	Lecture	Practical	Credit
CECS 64B	SYSTEM SOFTWARE	3	0	3

Objectives:

To have an understanding the basic design of assemblers, loaders, linkers, macro processor.

UNIT I: INTRODUCTION TO SYSTEM SOFTWARE

Objective: To understand the basic concepts of system software

System software vs. Application software – Different types of system software – SIC& SIC/XE Architecture – traditional (CISC) machines – RISC machines.

UNIT II: ASSEMBLERS

Objective: Ability to trace the path of a source code to object code and to executable file

Basic assembler functions– Machine dependent and independent assembler features– Assembler design options–One pass assemblers–Multi pass assemblers– MASM assembler.

UNIT III: LOADERS AND LINKERS

Objective: To design and implementation of loaders and linkers

Basic loader functions–Simple bootstrap loaders – Machine dependent and independent loader features–Linkage editors– Dynamic linking.

UNIT IV: MACRO PROCESSOR

Objective: To understand the concepts of macro processor

Basic macro processor functions–Machine dependent and independent macro processor features–Macro processor design options.

UNIT V: COMPILERS

Objective: Ability to analyze the functions of compilers

Basic compiler functions–Machine dependent compiler features–Machine independent compiler features–Compiler design options the YACC compiler–Compiler.

TEXT BOOKS:

1. "System Software–An introduction to system programming", Leland L. Beck & D. Manjula, Pearson Education, 3rd edition, 2007.

2. "Compilers – Principles, techniques and tools", A.V. Aho, Ravi Sethi, J.D. Ullman, 2nd Edition, Pearson Education, 2011.

REFERENCES:

1. "Systems Programming and Operating Systems", D.M. Dhamdhere, Second Revised Edition, Tata McGraw Hill, 2000.

2. "Systems Programming", John J. Donovan, Tata McGraw Hill Edition, 2000.

3. "Systems Programming", Srimanta Pal, Oxford University Press, 2011.

SEM VI	ELECTIVE III	Lecture	Practical	Credit
CECS 64C	CLOUD COMPUTING	3	0	3

Objectives:

To enable the students to learn the basic functions, principles and concepts of cloud computing Systems.

UNIT I: UNDERSTANDING CLOUD COMPUTING

Objective: To understand the concepts in Cloud Computing.

Computing Paradigms – Cloud Computing Fundamentals – History of Cloud Computing – Cloud Computing Architecture & Management – Cloud Computing Deployment Models – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services.

UNIT II: DEVELOPING CLOUD SERVICES

Objective: To understand the concepts of Cloud Computing Services.

Cloud Service Models – SOA & Cloud – Multicore Technology – Memory and Storage Technologies – Networking Technologies – Web 2.0 – 3.0 – Software Process Models for Cloud – Agile SDLC for Cloud Computing – Pervasive Computing – Application Environment – Virtualization.

UNIT III: PROGRAMMING MODELS FOR CLOUD COMPUTING

Objective: To enable the Students to learn Programming Models in Cloud Computing and its Environments.

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – CGL– Map Reduce – Programming models for Aneka – Hadoop Library from Apache – Mapping Applications – Programming Support – Google App Engine, Amazon AWS – Cloud Software Environments –Eucalyptus, Open Nebula, Open Stack, CloudSim – SAP Labs – EMC – Sales force – VMware.

UNIT IV: SOFTWARE DEVELOPMENT IN CLOUD

Objective: The student should be made to learn the basics of Software Development in Cloud.

Different Perspectives on SaaS Development – New Challenges in Cloud – Cloud Aware Software Development Using Paas Technology – Networking for Cloud Computing – Networking Issues in Data Centers – Transport Layer Issues in DCNs – TCP Enhancements for DCNs – Open Source Support for Cloud – Open Source Tools for Iaas Open Source Tools for Iaas – Open Source Tools for Paas – Open Source Tools for Research.

UNIT V: SECURITY IN CLOUD COMPUTING

Objective: At the end of the course, the student should be able to learn Security Aspects of Cloud Computing.

Security Aspects – Platform Related Security – Audit and Compliance – Cloud Security Challenges and Risks – Software–as–a–Service Security– Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security – Identity Management and Access Control – Autonomic Security – Advance Concepts in Cloud Computing.

TEXT BOOKS:

1. "Essentials of Cloud Computing "– K.CHANDRASEKARAN – CRC Press Taylor and Francis Group an Informal Business – 2015.

2. Cloud Computing – A Practical Approach for Learning and Implementation, A.Srinivasan and J.Suresh, Pearson India Publications, 2014

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

3. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009.

4. Kumar Saurabh, “Cloud Computing – insights into New–Era Infrastructure”, Wiley India, 2011.

5. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud” O'Reilly.

SEM VI	SKILL BASED SUBJECT IV	Lecture	Practical	Credit
CSCS 65	INTERNET OF THINGS	3	0	3

Objectives:

This course presents the Introduction to IoT, M2M,IoT Architecture, IoT Model And Views, IOT protocols and Real world design constraints enable the students to learn the concepts of IoT.

UNIT I: INTRODUCTION TO IoT

Objective: To understand the fundamentals of Internet of Things.

Introduction to Internet of Things –Definition and Characteristics of IoT– Physical Design– Logical Design–IoT Enabling Technologies –IoT Levels & Deployment Templates – Domain Specific IoTs – Home – City – Environment – Energy – Retail – Logistics – Agriculture – Industry – health and Lifestyle.

UNIT II: M2M and IoT ARCHITECTURE

Objective: To understand the M2M and IoT Architecture

IoT and M2M – Difference between IoT and M2M –SDN –IoT System Management with NETCONF–YANG–IoT Platforms Design Methodology – M2M high–level ETSI architecture – IETF architecture for IoT– OGC architecture – Service Oriented Architecture – IoT reference architecture

UNIT III: IoT MODEL AND VIEWS

Objective:To understand the IoT Model And Views

IoT reference model – Domain model – information model – functional model – communication model – Functional View – Information View – Deployment and operational View – other relevant architectural views – data representation and visualization.

UNIT IV: IoT PROTOCOLS

Objective: To learn about the basics of IOT protocols.

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN – CoAP – Security

UNIT V: REAL–WORLD APPLICATIONS

Objectives: Analyze applications of IoT in real time scenario.

Real world design constraints – Applications – Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities – participatory sensing – Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs – Cloud for IoT– Amazon Web Services for IoT.

TEXT BOOKS:

1. "Interconnecting Smart Objects with IP: The Next Internet", Jean–Philippe Vasseur, Adam Dunkels, Morgan Kuffmann, 2010.

2. Internet of Things – A Hands–on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015.

3. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014.

REFERENCES:

1. "Internet of Things – A hands–on approach||", ArshdeepBahga, Vijay Madisetti, Universities Press, 2015

2. "Architecting the Internet of Things||,"DieterUckelmann, Mark Harrison, Michahelles, Florian (Eds), Springer, 2011.

3. "The Internet of Things in the Cloud: A Middleware Perspective||", Honbo Zhou, CRC Press, 2012.

4. "From Machine–to–Machine to the Internet of Things – Introduction to a New Age of Intelligence", Jan Ho¨ ller, VlasiosTsiatsis, Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand, David Boyle, Elsevier, 2014.

5. "The Internet of Things – Key applications and Protocols", Olivier Hersent, David Boswarthick, Omar Elloumi ,Wiley, 2012.

CURRICULUM ENRICHMENT COURSES

PROFESSIONAL EDUCATION COURSES

These courses are career-oriented which provide exposure to recent technologies are offered by Bosco Institute of Information Technology (BIIT). All these courses are conducted from third semester to sixth semester, with three contact hours per week (12 weeks). A student can opt for any course. Combination of courses lead to a diploma program of study for the students.

1. OPEN SOURCE PHP TOOLS
2. ROBOTICS
3. WEB DEVELOPMENT USING HTML (Basic Level)
4. .NET PROGRAMMING (C# and Win Apps)
5. PROGRAMMING WITH PYTHON
6. WEB TECHNOLOGY
7. LAMP TECHOLOGY
8. MULTIMEDIA AND WEB DESIGN
9. WEB DEVELOPMENT USING PYTHON
10. MS OFFICE APPLICATIONS
11. PYTHON PROGRAMMING
12. MASTERING MS-EXCEL
13. TALLY 9.0
14. TECHNICAL WRITING

Students who qualify in at least four courses are given additional post-graduate diploma in Computer Applications. The offered diplomas are:

Diploma in Software Technology (.Net, Python, LAMP)
Diploma in Multimedia and Web Design
Diploma in Technical Writing

ADDITIONAL ONLINE COURSES

Course Teachers exhort the students to do additional online course or supplementary courses through various online platforms offered by Ministry of Human Resource Department,

1 SWAYAM On-line Courses

SWAYAM (Study Webs of Active Learning for Young Aspiring Minds) is the online education platform https://swayam.gov.in/, developed by MHRD, Govt. Of India. It offers numerous courses with transferable credits. All courses are offered free of cost under this program; however, fees are levied in case the learner requires a certificate.The students register themselves in a course which they like and produce the certificate after their completion of the course. **Every BSc.,CSstudent is asked to undertake at least a single SWAYAM course per year.**

2 UG MOOCs

Students and learners can access UG courses through this link. These are learning material of the SWAYAM UG archived courses.
http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php

3 e-PG Pathshala

It provides great quality, curriculum-based, interactive e-content containing 23,000 modules (e-text and video) in various disciplines of social sciences, arts, fine arts and humanities, natural & mathematical sciences. **https://epgp.inflibnet.ac.in/**

4 e-Content courseware in UG subjects

It provides e-content in 87 UG courses with about 24,110 e-content modules.
http://cec.nic.in/

5 SWAYAMPRABHA

It is a group of 32 DTH channels delivering high quality educational curriculum based courses covering diverse disciplines such as arts, science, commerce, performing arts, social sciences & humanities subjects, engineering, technology, law, medicine, agriculture etc to all teachers, students and citizens across the country interested in lifelong learning. These channels are free to air and can also be accessed through your cable operator. The telecasted videos/lectures are also archived videos on the Swayamprabha

portal. **https://swayamprabha.gov.in/**

6 CEC-UGC YouTube channel

It provides free accessto unlimited educational curriculum based lectures.

https://www.youtube.com/user/cecedusat

7 National Digital Library

It is a digital repository of a vast amount of academic content in different formats and provides interface support for leading Indian languages for all academic levels including researchers and life-long learners,alldisciplines, all popular form of access devices and differently-abled learners.

https://ndl.iitkgp.ac.in/

BRIDGE COURSES

Bridge Courses for first year students are conducted intensely at the beginning of every year and throughout the year. It is based on the performance of the students in CIE and Semester examinations. The main objective is to enable the students to understand the basic concepts and frameworks related to English, Computing fundamentals and mathematics.

The following bridge courses are conducted in the department

English for Life (for all first-year students, two semesters)
PC Software (for first-year students, first semester as association activity)
Computer Fundamentals (for slow learners)
Mathematical Foundation (for slow learners)

VOCATIONAL COURSES

Vocational courses aim at equipping the students with practical skills for a specific profession or field which helps them to upgrade their skills for that particular career.

The following vocational courses are offered

Music
Craftwork
Bridal Making
Cell Phone Repairing
Tailoring
Mushroom Cultivation

VALUE ADDED COURSES

The university curriculum may not cover all areas of importance or relevance of industry. It is important for higher education institutions to supplement the curriculum to make students better prepared to meet industry demands as well as develop their own interests and aptitudes. These courses are conducted after the class hours to add value to their resume.

The following value-added courses are offered

Life Skills
Information Literacy (from second semester to sixth semester)
General Knowledge
Professional Aptitude

SEM - ALL	VALUE ADDED COURSES	Seminar	Workshop	Test
IL01-IL04	INFORMATION LITERACY	1	1	1

OVERVIEW

Information literacy is a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information. An information literate individual is able to:

Determine the extent of information needed.
Access the needed information effectively and efficiently
Evaluate information and its sources critically
Incorporate selected information into one's knowledge base
Use information effectively to accomplish a specific purpose
Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally

REALIZATION

This course is realized through Students@ITAssociation (Technology For Life – TFL) Meets which is organized by the students with a faculty member as its President.

STUDY DOMAINS

Technology, Systems, Applications, Environment

Evaluvation scheme	
Technical Report	30 Mks
Technical Notes	30 Mks
Participation	10 Mks
Online Test	30 Mks

REFERENCES

Information Literacy Competency Standards for Higher Education, American Library Association, 2000

http://www.ala.org/acrl/ilcomstan.html

BIIT Quality Manual-2009, BICS InfoTech, Yelagiri Hills