



REGULATIONS 2016

CURRICULUM AND SYLLABI

B.Sc.
COMPUTER SCIENCE
(Amendments updated upto Jan 2020)

VISION AND MISSION OF THE INSTITUTION

VISION

B.S. Abdur Rahman Crescent Institute of Science and Technology aspires to be a leader in Education, Training and Research in multidisciplinary areas of importance and to play a vital role in the Socio-Economic progress of the Country in a sustainable manner.

MISSION

- To blossom into an internationally renowned Institute.
- To empower the youth through quality and value-based education.
- To promote professional leadership and entrepreneurship.
- To achieve excellence in all its endeavors to face global challenges.
- To provide excellent teaching and research ambience.
- To network with global Institutions of Excellence, Business, Industry and Research Organizations.
- To contribute to the knowledge base through Scientific enquiry, Applied Research and Innovation.

**VISION AND MISSION OF THE
DEPARTMENT OF COMPUTER APPLICATIONS**

VISION

Aspires to provide quality education in the field of computer applications with state-of-the-art computational facilities and undertake quality research in collaboration with industries and universities to produce committed professionals and academicians to meet the needs of the industries and society.

MISSION

The Department of Computer Applications, endeavours

- To disseminate knowledge through education and training of graduates in the field of computer applications.
- To focus on teaching - learning, research and consultancy to promote excellence in computer applications.
- To foster graduates with opportunities required to explore, create and face challenges of IT related industries.
- To equip the graduates with the necessary skills in communication, team work and leadership qualities to meet the needs of the IT related sector globally.
- To disseminate the outcome of projects and research work undertaken by the department through appropriate measures for the benefit of society and industry.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

The Programme Educational Objectives of B.Sc. (Bachelor of Science in Computer Science) are listed below:

- PEO-1:** To give good foundation in mathematics and computing sciences for acquiring computational knowledge level understanding of systems modeling and algorithm development.
- PEO-2:** To give technical knowledge in various high-level and systems level programming languages to comprehend, analyze, design and create innovative computing solutions for information technology projects.
- PEO-3:** To empower the students for self learning by providing quality environment to upgrade their skill in creating and maintaining data centers, system resources and infrastructure for the organizations in their information technology projects.
- PEO-4:** To create awareness in the young minds of the students and motivate them to qualify academically with further studies with research acumen and serve the society with creative ideas and inventions.

PROGRAM OUTCOMES:

- PO1:** Computational knowledge for mathematical and systems modeling through effective teaching and learning processes.
- PO2:** Prepare requirement engineering metrics with scientific diagrams for system software/application software product development.
- PO3:** Design and development of solution methodologies and implementation of simple computational algorithms.
- PO4:** Conduct literature survey and summarize the inferences from the authentic e-resources.

- PO5:** Ability to select appropriate software tools for development as well as testing for successful implementation.
- PO6:** Become a software professional with social responsibilities and ethical values.
- PO7:** Provide the necessary skill set to solve societal and environmentally sensitive problems in professional manner.
- PO8:** Manage technology and configuration change management in the working places.
- PO9:** Function as individual member or leader of team and able to manage projects in the software development and project automation processes.
- PO10:** Comprehend and write effective project reports.
- PO11:** Improve professional affiliation with national and international societies and additional certifications through self learning mode.
- PO12:** Become an entrepreneur with enterprising attitude and serve the society.

PROGRAMME SPECIFIC OUTCOMES

- PSO1:** To enrich the graduates with necessary design and development skills for exclusive systems oriented or application software products.
- PSO2:** To enhance the productivity level in providing software automation skills with computer and mobile network specialization.

**B.S. ABDUR RAHMAN CRESCENT INSTITUTE OF
SCIENCE & TECHNOLOGY,
REGULATIONS - 2016
FOR
BACHELOR OF COMPUTER APPLICATIONS (B.C.A)/
BACHELOR OF SCIENCE (B.Sc)/
BACHELOR OF BUSINESS ADMINISTRATION (B.B.A)/
BACHELOR OF COMMERCE (B.Com)
DEGREE PROGRAMME (Semester Scheme)
(Candidates to be admitted from the academic year 2016-2017 onwards)**

1.0 PRELIMINARY DEFINITIONS & NOMENCLATURE

In these Regulations, unless the context otherwise requires:

- i) **"Programme"** means Under Graduate Degree Programme (B.C.A/B.Sc/B.Com/B.B.A).
- ii) **"Course"** means a theory or practical subject that is normally studied in a semester.
- iii) **"Institution"** means B.S. Abdur Rahman Crescent Institute of Science & Technology.
- iv) **"Dean (Academic Affairs)"** means the Dean (Academic Affairs) of B.S. Abdur Rahman Crescent Institute of Science & Technology.
- v) **"Dean (Student Affairs)"** means the Dean (Students Affairs) of B.S. Abdur Rahman Crescent Institute of Science & Technology.
- vi) **"Controller of Examinations"** means the Controller of Examination of B.S. Abdur Rahman Crescent Institute of Science & Technology, who is responsible for conduct of examinations and declaration of results.

2.0 PROGRAMME OFFERED, DURATION AND ELIGIBILITY CRITERIA

2.1 U.G. Programmes Offered

Degree	Mode of Study
B.C.A	Full Time
B.Sc	Full Time
B.B.A	Full Time
B.Com	Full Time

2.2 Duration of the Programme

The duration of the undergraduate program shall be six semesters (three academic years).

2.3 Eligibility Criteria

2.3.1 Students for admission to the first semester of the under graduate degree programme must have passed the Higher Secondary Certificate examination or any other examination of any authority accepted by this Institution as equivalent thereto.

S.No	Programme	Eligibility Criteria
1	B.C.A	10 +2 (Higher Secondary) with Mathematics or equivalent subject
2	B.Sc Computer Science	10 +2 (Higher Secondary) with Mathematics or equivalent subject
3	B.Sc Bio Technology	10 +2 (Higher Secondary) with Chemistry as one of the subjects.
4	B.B.A (Financial Services)	10 +2 (Higher Secondary) with any stream or equivalent
5	B.Com General	10 +2 (Higher Secondary) with Mathematics, Physics and Chemistry/Physics, Chemistry, Botany and Zoology /Commerce /Statistics as subjects.
6	B.Com (Accounts and Finance)	

2.3.2 Eligibility conditions for admission such as marks obtained, number of in the qualifying examination and physical fitness will be as prescribed by this Institution from time to time.

2.4 Streams of Study

Taking into consideration the rapid developments in technology and to cater the needs of the industry, the following programmes are offered

S.No	Program	Streams of Study
1.	B.C.A	i. Specialization in Cloud Technology and Information Security

		ii. Specialization in Mobile Applications and Information Security iii. Specialization in Data Science, iv. Specialization in Multimedia and Web Application Development
2.	B.Sc	i. Computer Science ii. Bio Technology
3.	B.B.A	i. Financial Services
4.	B.Com	i. General ii. Accounts and Finance

3.0 STRUCTURE OF THE PROGRAMME

3.1 The UG Programme consists of the following components as prescribed in the curriculum

- Core Courses
- Allied Courses
- Elective Courses
- Laboratory courses
- Laboratory integrated theory courses
- Value added Courses
- Project Work

3.2 The curricula and syllabi of all UG programmes shall be approved by Board of Studies of the respective department and Academic Council of this Institution.

3.3 Each course is normally assigned certain number of credits :

- One credit for one lecture period per week.
- One credit for one tutorial period per week.
- One credit each for lab sessions/project of two or three periods per week.
- One credit each for value added courses of two or three periods per week.

3.4 The medium of instruction, examinations and project report shall be English, except for courses in languages other than English.

3.5 The minimum number of credits to be earned for the successful completion of the program shall be normally in the range as follows:

S.No	Programme	Credits
1	B.C.A	120 - 126
2	B.Sc. (Computer Science)	120 – 126
3	B.Sc. (Bio Technology)	145 – 150
4	B.B.A (Financial Services)	120 - 125
5	B.Com	150 – 158
6	B.Com (Accounts and Finance)	150 – 158

3.6 The number of credits registered by a student in non-project semester and project semester shall be normally in the range as follows:

Non Project Semester: 20-28

Project Semester: 19-27

3.7 Elective courses from the curricula are to be chosen with the approval of the Head of the Department/ Dean of School

4.0 DURATION OF THE PROGRAMME

4.1 The minimum and maximum periods for the completion of the UG programmes are three years (6 semesters) and five years (10 semesters) respectively.

4.2 Each semester shall consist of a minimum of 90 working days.

4.3 Semester end examination will normally follow within a week after the last working day of the semester.

5.0 CLASS ADVISOR AND FACULTY ADVISOR

5.1 Class Advisor

A faculty member will be nominated by the HOD/Dean of School as Class Advisor for the class throughout the period of study.

The Class Advisor shall be responsible for maintaining the academic, curricular and co-curricular records of students of the class.

5.2 Faculty Advisor

To help the students in planning their courses of study and for general counseling, the Head of the Department / Dean of School of the students will attach a maximum of 20 students to a faculty member of the department who shall function as faculty advisor for the students throughout their period of

study. Such faculty advisor shall guide the students in taking up the elective courses for registration and enrolment in every semester and also offer advice to the students on academic and related personal matters.

6.0 COURSE COMMITTEE

Each common theory course offered to more than one group of students shall have a "Course Committee" comprising all the teachers teaching the common course with one of them nominated as course coordinator. The nomination of the course coordinator shall be made by the Head of the Department / Dean of School / Dean (Academic Affairs) depending upon whether all the teachers teaching the common course belong to a single department or to several departments. The Course Committee shall meet as often as possible and ensure uniform evaluation of the tests and arrive at a common scheme of evaluation for the tests. Wherever it is feasible, the Course Committee may also prepare a common question paper for the test(s).

7.0 CLASS COMMITTEE

A class committee comprising faculty members handling the courses, student representatives and a senior faculty member not handling the courses as chairman will be constituted semester-wise by the head of the department.

7.1 The composition of the class committee will be as follows:

- One senior faculty member preferably not handling courses for the concerned semester, appointed as chairman by the Head of the Department
- Faculty members of all courses of the semester
- Six student representatives (male and female) of each class nominated by the Head of the Department in consultation with the relevant faculty advisors
- All faculty advisors and the class advisors
- Head of the Department - Ex-Officio Member

7.2 The class committee shall meet at least four times during the semester. The first meeting will be held within two weeks from the date of commencement of classes, in which the nature of continuous assessment for various courses

and the weightages for each component of assessment will be decided for the first and second assessment. The second meeting will be held within a week after the date of first assessment report, to review the students' performance and for follow up action. The third meeting will be held within a week after the second assessment report, to review the students' performance and for follow up action.

- 7.3** During these three meetings the student members representing the entire class, shall meaningfully interact and express opinions and suggestions to improve the effectiveness of the teaching-learning process.
- 7.4** The fourth meeting of the class committee, excluding the student members, shall meet within 5 days from the last day of the semester end examination to analyze the performance of the students in all the components of assessments and decide their grades in each course. The grades for a common course shall be decided by the concerned course committee and shall be presented to the class committee(s) by the concerned course coordinator.

8.0 REGISTRATION AND ENROLMENT

- 8.1** Except for the first semester, every student shall register for the ensuing semester during a specified week before the semester end examination of the ongoing semester. Every student shall submit a completed registration form indicating the list of courses intended to be enrolled during the ensuing semester. Late registration with the approval of the Dean (Academic Affairs) along with a late fee will be permitted up to the last working day of the current semester.
- 8.2** From the second year onwards, all students shall pay the prescribed fees for the year on or before a specific day at the beginning of the semester confirming the registered courses. Late enrolment along with a late fee will be permitted up to two weeks from the date of commencement of classes. If a student does not enroll, his/her name will be removed from rolls.
- 8.3** The students of first semester shall register and enroll at the time of admission by paying the prescribed fees.
- 8.4** A student should have registered for all preceding semesters before registering for a particular semester.

9.0 COURSE CHANGE/ WITHDRAWAL

9.1 Change of a Course

A student can change an enrolled course within 10 working days from the commencement of the course, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department/ Dean of School of the student.

9.2 Withdrawal from a Course

A student can withdraw from an enrolled course at any time before the first assessment test for genuine reasons, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department/ Dean of School of the student.

10.0 TEMPORARY BREAK OF STUDY FROM A PROGRAMME

A student may be permitted by the Dean (Academic Affairs) to avail temporary break of study from the programme up to a maximum of two semesters for reasons of ill health or other valid grounds. A student can avail the break of study before the start of first assessment of the ongoing semester. However the total duration for completion of the programme shall not exceed the prescribed maximum number of semesters (vide clause 4.1). If any student is debarred for want of attendance or suspended due to any act of indiscipline, it will not be considered as break of study. A student who has availed break of study has to rejoin in the same semester only.

11.0 ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

11.1 Every theory course shall have a total of three assessments during a semester as given below:

Type of Assessment	Course Coverage in Weeks	Duration	Weightage of Marks
Assessment 1	1 to 6	1.5 hours	25%
Assessment 2	7 to 12	1.5 hours	25%
Semester End Exam	Full course	3 hours	50%

11.2 The components of continuous assessment for theory/practical/laboratory

integrated theory courses shall be finalized in the first class committee meeting.

- 11.3** Appearing for semester - end examination for each course is mandatory and a student should secure a minimum of 40% marks in each course in semester end examination for the successful completion of the course.
- 11.4** Every practical course will have 60% weightage for continuous assessments and 40% for semester end examination. However a student should secure a minimum of 50% of the marks in the semester end practical examination.
- 11.5** For laboratory integrated theory courses, the theory and practical components shall be assessed separately for 100 marks each and consolidated by assigning a weightage of 75% for theory component and 25% for practical component. Grading shall be done for this consolidated mark. Assessment of theory component shall have a total of three assessments with two continuous assessments carrying 25% weightage each and semester end examination carrying 50% weightage. The student shall secure a separate minimum of 40% in the semester end theory examination. The evaluation of practical component shall be through continuous assessment.
- 11.6** In the case of Industrial training /Internship, the student shall submit a report, which will be evaluated along with an oral examination by a committee of faculty members, constituted by the Head of the Department/ Dean of School. The weightage for report shall be 60% and 40% for Viva Voce examination.
- 11.7** In the case of project work, a committee of faculty members constituted by the Head of the Department/ Dean of School will carry out three periodic reviews. Based on the project report submitted by the student(s), an oral examination (viva-voce) will be conducted as the semester end examination, for which one external examiner, approved by the Controller of Examinations, will be included. The total weightage for all periodic reviews will be 50%. Of the remaining 50%, 20% will be for the project report and 30% for the Viva Voce examination.
- 11.8** Assessment of seminars and comprehension will be carried out by a committee of faculty members constituted by the Head of the Department/ Dean of School.
- 11.9** For the first attempt of the arrear theory examination, the internal assessment marks scored for a course during first appearance will be used for grading

along with the marks scored in the arrear examination. From the subsequent appearance onwards, full weightage shall be assigned to the marks scored in the semester end examination and the internal assessment marks secured during the course of study shall be ignored.

12.0 SUBSTITUTE EXAMINATIONS

12.1 A student who has missed, for genuine reasons, a maximum of one of the two continuous assessments of a course may be permitted to write a substitute examination paying the prescribed substitute examination fees. However, permission to write a substitute examination will be given under exceptional circumstances, such as accidents, admission to a hospital due to illness, etc. by a committee constituted by the Dean of School for that purpose. However there is no Substitute Examination for Semester End examination.

12.2 A student who misses any continuous assessment test in a course shall apply for substitute exam in the prescribed form to the Head of the Department / Dean of School within a week from the date of missed assessment test. However the Substitute Examination will be conducted after the last working day of the semester and before Semester End Examination.

13.0 ATTENDANCE REQUIREMENT AND SEMESTER / COURSE REPETITION

13.1 A student shall earn 100% attendance in the contact periods of every course, subject to a maximum relaxation of 25% (for genuine reasons such as medical grounds or representing the Institution in approved events etc.) to become eligible to appear for the semester-end examination in that course, failing which the student shall be awarded "I" grade in that course. For the courses in which "I" grade is awarded, the student shall register and repeat the course when it is offered next.

13.2 The faculty member of each course shall cumulate the attendance details for the semester and furnish the names of the students who have not earned the required attendance in that course to the Class Advisor. The Class Advisor will consolidate and furnish the list of students who have earned less than 75% attendance, in various courses, to the Dean (Academic Affairs) through the Head of the Department/ Dean of School. Thereupon, the Dean (Academic Affairs) shall announce the names of such students prevented from writing the

semester end examination in each course.

- 13.3** A student who has obtained 'I' grade in all the courses in a semester is not permitted to move to next higher semester. Such student shall repeat all the courses of the semester in the subsequent academic year.
- 13.4** A student should register to re-do a core course wherein "I" or "W" grade is awarded. If the student is awarded, "I" or "W" grade in an elective course either the same elective course may be repeated or a new elective course may be taken with the approval of Head of the Department / Dean of School.
- 13.5** A student who is awarded "U" grade in a course will have the option either to write the semester end arrear examination at the end of the subsequent semesters, or to redo the course in the evening when the course is offered by the department. Marks scored in the continuous assessment during the redo classes shall be considered for grading along with the marks scored in the semester-end (redo) examination. If any student obtained "U" grade in the redo course, the marks scored in the continuous assessment test (redo) for that course will be considered as internal mark for further appearance of arrear examination.
- 13.6** If a student with "U" grade, who prefers to redo the course, fails to earn the minimum 75% attendance while redoing that course, then he / she will not be permitted to write the semester end examination and his / her earlier "U" grade and continuous assessment marks shall continue.

14.0 REDO COURSES

- 14.1** A student can register for a maximum of two redo courses per semester in the evening after regular college hours, if such courses are offered by the concerned department. Students may also opt to redo the courses offered during regular semesters.
- 14.2** The Head of the Department, with the approval of Dean Academic Affairs, may arrange for the conduct of a few courses during the evening, depending on the availability of faculty members and subject to a specified minimum number of students registering for each of such courses.
- 14.3** The number of contact hours and the assessment procedure for any redo course will be the same as those during regular semesters except that there is no provision for any substitute examination and withdrawal from an evening

redo course.

15.0 PASSING AND DECLARATION OF RESULTS AND GRADE SHEET

15.1 All assessments of a course will be made on absolute marks basis. The Class Committee, without the student members, shall meet within 5 days after the semester-end examination and analyze the marks of students in all assessments of a course and award suitable letter grades. The letter grades and the corresponding grade points are as follows:

Letter Grade	Grade Points
S	10
A	9
B	8
C	7
D	6
E	5
U	0
W	0
I	0
AB	0

"W" denotes withdrawal from the course.

"I" denotes inadequate attendance and hence prevention from semester-end examination

"U" denotes unsuccessful performance in the course.

"AB" denotes absence for the semester-end examination.

15.2 A student who earns a minimum of five grade points in a course is declared to have successfully completed the course. Such a course cannot be repeated by the student for improvement of grade.

15.3 The results, after awarding of grades, shall be signed by the Chairman of the Class Committee and Head of the Department/Dean of Schools and the results shall be declared by the Controller of Examinations.

15.4 Within one week from the date of declaration of result, a student can apply for revaluation of his / her semester-end theory examination answer scripts of one or more courses, on payment of prescribed fee, through proper application to

Controller of Examination. Subsequently the Head of the Department/ Dean of School offered the course shall constitute a revaluation committee consisting of Chairman of the Class Committee as Convener, the faculty member of the course and a senior member of faculty knowledgeable in that course. The committee shall meet within a week to revalue the answer scripts and submit its report to the Controller of Examinations for consideration and decision.

15.5 After results are declared, grade sheets shall be issued to each student, which will contain the following details:

- credits for each course registered for that semester.
- performance in each course by the letter grade obtained.
- total credits earned in that semester.
- Grade Point Average (GPA) of all the courses registered for that semester and the Cumulative Grade Point Average (CGPA) of all the courses taken up to that semester.

If C_i is the number of credits assigned for the i^{th} course and GPI is the Grade Point in the i^{th} course, GPA will be calculated according to the formula

$$GPA = \frac{\sum_{i=1}^n (C_i)(GPI)}{\sum_{i=1}^n C_i}$$

Where n = number of courses

The Cumulative Grade Point Average CGPA shall be calculated in a similar manner, considering all the courses enrolled from first semester.

"I" and "W" grades will be excluded for calculating GPA.

"U", "I", "AB" and "W" grades will be excluded for calculating CGPA.

The formula for the conversion of CGPA to equivalent percentage of marks shall be as follows:

Percentage Equivalent of Marks = CGPA X 10

15.6 After successful completion of the programme, the Degree will be awarded with the following classifications based on CGPA.

Classification	CGPA
First Class with Distinction	8.50 and above and passing all the courses in first appearance and completing the programme within

	the Prescribed period of 6 semesters.
First Class	6.50 and above, having completed within a period of 8 semesters.
Second Class	Others

However, to be eligible for First Class with Distinction, a student should not have obtained 'U' or 'I' grade in any course during his/her study and should have completed the U.G. programme within 6 semesters (except break of study). To be eligible for First Class, a student should have passed the examination in all the courses within 8 semesters reckoned from his/her commencement of study. For this purpose, the authorized break of study will not be counted. The successful students who do not satisfy the above two conditions will be classified as second class. For the purpose of classification, the CGPA will be rounded to two decimal places. For the purpose of comparison of performance of students and ranking, CGPA will be considered up to three decimal places.

16.0 ELECTIVE CHOICE:

16.1 Apart from the various elective courses listed in the curriculum for each programme, the student can choose a maximum of two electives from any stream of the same program during the entire period of study, with the approval of the Head of the parent department and the Head of the other department offering the course.

16.2 Online / Self Study Courses

Students are permitted to undergo department approved online/ self study courses not exceeding a total of six credits with the recommendation of the Head of the Department / Dean of School and with the prior approval of Dean Academic Affairs during his/ her period of study. In case of credits earned through online mode ratified by the respective Board of Studies, the credits may be transferred following the due approval procedures. The students shall undergo self study courses on their own with the mentoring of a member of the faculty. The online/ self study courses can be considered in lieu of elective courses.

17.0 SUPPLEMENTARY EXAMINATION

Final Year students can apply for supplementary examination for a maximum of two courses thus providing an opportunity to complete their degree programme. The students can apply for supplementary examination within three weeks of the declaration of results.

18.0 PERSONALITY AND CHARACTER DEVELOPMENT

18.1 All students shall enroll, on admission, in any of the personality and character development programmes, NCC / NSS / NSO / YRC / Rotaract and undergo practical training.

- **National Cadet Corps (NCC)** will have to undergo specified number of parades.
- **National Service Scheme (NSS)** will have social service activities in and around Chennai.
- **National Sports Organization (NSO)** will have sports, games, drills and physical exercises.
- **Youth Red Cross (YRC)** will have social service activities in and around Chennai.
- **Rotaract** will have social service activities in and around Chennai.

19.0 DISCIPLINE

19.1 Every student is required to observe disciplined and decorous behavior both inside and outside the campus and not to indulge in any activity which will tend to affect the prestige of the Institution.

19.2 Any act of indiscipline of a student, reported to the Dean (Student Affairs), through the HOD / Dean will be referred to a Discipline and Welfare Committee nominated by the Vice-Chancellor, for taking appropriate action.

20.0 ELIGIBILITY FOR THE AWARD OF DEGREE

20.1 A student shall be declared to be eligible for the award of 3 year Bachelor provided the student has:

- i) Successfully completed all the required courses specified in the programme curriculum and earned the number of credits prescribed for the specialization, within a maximum period of 10 semesters. from the date of

admission, including break of study

ii) no dues to the Institution, Library, Hostels

iii) no disciplinary action pending against him/her.

20.2 The award of the degree must have been approved by the Institution.

21.0 POWER TO MODIFY

Notwithstanding all that has been stated above, the Academic Council has the right to modify the above regulations from time to time.

**B.S. ABDUR RAHMAN CRESCENT INSTITUTE OF SCIENCE AND
TECHNOLOGY
CURRICULUM & SYLLABI FOR
BACHELOR OF COMPUTER SCIENCE
(SIX SEMESTERS / FULL TIME)**

SEMESTER I

Sl. No	Course Code	Course Title	L	T	P	C
1.	ENC 1183	General English – I	3	0	0	3
2.	MAC 1187	Algebra, Calculus and Trigonometry	3	1	0	4
3	CAC 1108	Communication Skills	0	0	2	1
4	CAC 1102	Computer Fundamentals and Organization	3	0	0	3
5	CAC 1103	Programming in C	3	0	0	3
6	CAC 1107	Operating Systems and Introduction to Linux	3	0	0	3
7	CAC 1109	Programming in C -Laboratory	0	0	4	2
8	CAC 1110	Linux Laboratory	0	0	4	2
Total Credits						21

SEMESTER II

Sl. No	Course Code	Course Title	L	T	P	C
1	ENC 1284	General English - II	3	0	0	3
2	MAC 1288	Probability and Statistics	3	1	0	4
3	CAC 1203	OOPS with C++	3	0	0	3
4	CAC 1204	Data Structures Using C	3	0	0	3
5	CAC 1256	Environmental Studies	2	0	0	2
6	CAC 1257	System Analysis and Design	3	0	0	3
7	CAC 1208	OOPS with C++ - Laboratory	0	0	4	2
8	CAC 1209	Data Structures Using C - Laboratory	0	0	4	2
Total Credits						22

SEMESTER III

Sl. No	Course Code	Course Title	L	T	P	C
1	CAC 2101	Reasoning and Thinking	3	0	0	3
2	CAC 2152	Digital Electronics	3	0	0	3
3	CAC 2103	Software Engineering	3	0	0	3
4	CAC 2104	RDBMS	3	0	0	3
5	CAC 2105	Computer Networks	3	0	0	3
6	CAC 2106	Programming in Java	3	0	0	3
7	CAC 2109	RDBMS –Laboratory	0	0	4	2
8	CAC 2110	Programming in Java -Laboratory	0	0	4	2
Total Credits						22

SEMESTER IV

Sl. No	Course Code	Course Title	L	T	P	C
1	CAC 2216	Introduction to Python	3	0	0	3
2	CAC 2231	Web Design and Development	3	0	0	3
3	CAC 2257	Data Mining and Data Warehousing	3	0	0	3
4		Elective – 1	3	0	0	3
5	CAC 2258	Object Oriented Analysis and Design	3	0	0	3
6	CAC 2217	Organizational Behaviour	3	0	0	3
7	CAC 2218	Python Laboratory	0	0	4	2
8	CAC 2233	Web design Laboratory	0	0	4	2
Total Credits						22

SEMESTER V

Sl. No	Course Code	Course Title	L	T	P	C
1	CAC 3116	Digital Marketing	3	0	0	3
2	CAC 3117	Artificial Intelligence	3	0	0	3
3	CAC 3151	C# and .NET Programming	3	0	0	3
4	CAC 3115	R Programming	3	0	0	3
5	CAC 3153	Software Testing	3	0	0	3
6		Elective –III	3	0	0	3
7	CAC 3154	C# and .NET Programming - Laboratory	0	0	4	2
8	CAC 3156	R Programming - Laboratory	0	0	4	2
Total Credits						22

SEMESTER VI

Sl. No.	Course Code	Course Title	L	T	P	C
1.	CAC 3254	Software Project Management	3	0	0	3
2.	CAC 3204	Enterprise Application Development	3	0	0	3
3	CAC 3205	Project	0	0	0	16
Total Credits						22

LIST OF ELECTIVES

Sl. No.	Course Code	Course Title	L	T	P	C
SEMESTER IV						
1	CACX 04	E-Commerce	3	0	0	3
2	CACX 47	Information Retrieval	3	0	0	3
3	CACX 48	Social Media Analysis	3	0	0	3
4	CACX 49	Online Computer Advertising	3	0	0	3
5	CACX 50	PHP Programming	3	0	0	3
6	CACX 51	Web Mining	3	0	0	3
7	CACX 52	Human Computer Interaction	3	0	0	3
SEMESTER V						
1	CACX 55	Healthcare Analytics	3	0	0	3
2	CACX 56	Agile Methodology	3	0	0	3
3	CACX 57	Human Resource Management	3	0	0	3
4	CACX 58	Employability Skills	3	0	0	3

SEMESTER – I

ENC 1183	GENERAL ENGLISH-I	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To expose students to English literary texts.
- To help them interpret literary texts.
- To exhibit the effective use of the four skills of communication.
- To demonstrate the range of vocabulary and communicate effectively using grammatically correct language.

MODULE I **8**

Prose	Education
Poem	P.B.Shelley—"Ozymandias"
Letter Writing	Formal Letter - Seeking permission for official purpose (attending conferences, symposium, etc.)
Short Story	O Henry - "Robe of Peace" (Extensive Reading) Language Focus—Present Tense

MODULE II **8**

Prose	Employment & Unemployment Letter of Invitation
Short Story	Rudyard Kipling – "The Miracle of Puran Bhagat" (Extensive Reading) Language Focus – Past & future tense.

MODULE III **8**

Prose	A Dead Planet
Poem	Robert Herrick - "Gather Ye Rosebuds" Note Making Language Focus – Affixes.

MODULE IV **7**

Prose	Riddles
Poem	Oliver Goldsmith - "The Village Schoolmaster" Language Focus - Prepositions & Articles.
Short story	William Somerset Maugham- "Mabel" (Extensive Reading).

MODULE V **7**

Prose	Galloping Growth
Poem	William Blake - "From Auguries of Innocence"
Précis Writing	Language Focus subject verb Agreement.

MODULE VI **7**

Poem	Robert Browning- "The Last Ride Together"
Developing story from hints	
Short story	John Galsworthy- "Quality" (Extensive reading) Language Focus-Voice

Total Hours - 45**REFERENCES:**

1. Krishnaswamy.N, Sriraman T., **Current English for Colleges**. Hyderabad: Macmillan Indian Ltd, 2006.
2. Dahiya SPS. Ed. **Vision in Verse- An Anthology of Poems**. New Delhi: Oxford University Press, 2002.
3. Swan, M. (2005). **Practical English Usage**. Oxford University Press. UK
4. Seshadri, K G Ed. **Stories for Colleges**. Chennai: Macmillan India Ltd, 2003.

OUTCOMES:

After completing the course the students would be able to Respond to literary texts efficiently.

- Appreciate and critically analyse literary texts.
- Use the four skills of the language
- Use vocabulary and grammatical expressions effectively.

MAC 1187	ALGEBRA, CALCULUS AND TRIGONOMETRY	L T P C
		3 1 0 4

OBJECTIVES:

The objective of the course is to help students to:

- Develop the skills of students in applying basic concepts in chosen topics of mathematics that are imperative for effective understanding of application oriented topics.
- Lay the foundation for learning concepts of Differentiation, Integration and Trigonometry.
- Introduce the concept of Eigen values and eigenvectors of matrix algebra.
- Familiarize the students with the functions of several variables.
- Demonstrate the applications of Differential Calculus and Trigonometry.

MODULE I MATRICES (9+3)

Symmetric – Skew-Symmetric - Orthogonal and Unitary matrices - Rank of a Matrix - Consistency - Characteristic equation - Eigenvalues and Eigenvectors - properties - Cayley Hamilton's Theorem (proof not needed) - Simple applications.

MODULE II THEORY OF EQUATIONS (9+3)

Partial Fractions - Theory of equations- Polynomial Equations with real Coefficients - Irrational roots - Complex roots - Symmetric functions of roots - Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations.

MODULE III DIFFERENTIAL CALCULUS (9+3)

Rules of differentiation - Derivative of implicit function - Successive differentiation nth derivatives - Leibnitz theorem (without proof) and applications - maxima and minima of functions of two variables - Partial differentiation - Euler's Theorem.

MODULE IV INTEGRAL CALCULUS (9+3)

Integration of rational functions - algebraic expressions involving only one irrational quantity- rational functions of $\sin x$ and $\cos x$ - Trigonometric substitutions - Bernoulli's formula for integration by parts - reduction formulae - properties of definite integral - Evaluation of double and triple integrals.

MODULE V TRIGONOMETRY**(9+3)**

De Moivre's theorem and its application - Circular and Hyperbolic functions – Inverse circular and hyperbolic functions - Expansion of trigonometric functions in terms of power and multiples - Separation of real and imaginary parts of logarithmic - trigonometric and inverse trigonometric functions - Summation of series including C+iS method.

TOTAL HOURS – 60**TEXT BOOKS:**

1. Narayanan, S. and Manicavachagom Pillay, T.K. (2015) Calculus Vol. I, II & III S. Viswanathan (Printers & publishers) Pvt. Ltd., Chennai.
2. Venkataraman, M.K., "Higher Mathematics for Engineering and Science", Third Edition, The National Publishing Co., Madras, 1986.
3. Kandasamy P, K. Thilagavathi and K. Gunavathy- Allied Mathematics aper-I, First semester, 1/e, S. Chand & Co., New Delhi, 2003

REFERENCES:

1. Stewart J - Single Variable Calculus (4th edition) Brooks / Cole, Cenage Learning 2010.
2. Tom M. Apostol - Calculus, Vol. I (second edition) John Wiley and Sons, Inc., Jan 2007.
3. Burnside W.S. and A.W. Panton - The Theory of Equations, Dublin University Press, 1954.
4. MacDuffee, C.C. - Theory of Equations, John Wiley & Sons Inc., 1954.
5. Ushri Dutta, A.S. Muktibodh and S.D. Mohagaonkar: Algebra and Trigonometry, PHI India, 2006.

OUTCOMES:

After completing the course students would be able to

- Solve Eigen value and eigenvector problems.
- Classify and solve polynomial equations of different types.
- Differentiate different types of functions.
- Integrate rational and trigonometric functions and to evaluate definite integrals (double and triple).
- Demonstrate the application of Demoivre's theorem and find the sum of series of trigonometric functions.

CAC 1108	COMMUNICATIONSKILLS	L	T	P	C
		0	0	2	1

OBJECTIVES:

The objective of the course is to help students to:

- Make the students feel the significance of communicating well and how it can have a profound effect in both our professional and personal lives.
- Develop professional skills like work ethics, analytical skills, presentation skills
- Train them in problem solving skills and leadership skills pertaining to industries.
- Train them in teambuilding skills.
- Train in setting up career goal

MODULE I TECHNICAL VOCABULARY 6

Technical Vocabulary, Punctuation, Numerical Expressions, Expanding Acronyms and Abbreviations, Concord, 'If' clauses, Infinitives. Homonyms, Homographs and Homophones, Telephone conversations, Reading Comprehensions, Making of an advertisement.

MODULE II BASIC SKILLS-READINGANDSPEAKINGSKILLS 6

Reading and interpretation, Intensive reading, Writing reviews on books and films, Descriptions, Process description, Summarizing, Instructions, Oral presentations. Debate.

MODULE III BASIC SKILL:TECHNICALWRITING SKILL 6

Letters – formal, informal, Cover Letter and CV, Synonyms and Antonyms, Indefinite Adjectives, Non-verbal communication, Interactive sessions. Role Plays, Critical reading, Listening and Note taking.

MODULE IV BASIC SKILL:LISTENINGANDSPEAKINGSKILLS 6

Active and Passive Voice, Impersonal Passive, Essay Writing, Comprehension Passage, Editing, Correction of errors, Direct and Indirect, Conversations, Dialogue writing, Discourse Markers. Group activities.

MODULE V TECHNICAL WRITING AND COMMUNICATION 6

Reports – Types, structure, data collection, content, form, Definitions, extended definition, Recommendations, Memos, and Checklists. Group Discussions, Listening and comprehending the conversations.

TOTAL HOURS –30**TEXT BOOKS:**

1. Department of English, Anna University, Mindscapes, 'English for Technologists and Engineers', Orient Longman Pvt. Ltd, Chennai:2012.
2. Department of Humanities and Social Sciences, Anna University, "English for Engineers and Technologists" Combined Edition (Volumes 1 and 2), Chennai: Orient Longman Pvt.Ltd.,2006.
3. M.AshrafRizvi, "Effective Technical Communication", TataMcGraw-Hill Publishing Company Limited, New Delhi.2009.

REFERENCES:

1. Sumant. S, 'Technical English', Second Edition, McGraw-Hill Education (India) Pvt. Ltd.,2008.
2. Dr. M. Hariprasad," Communicative English "Third Edition, Neelkamal Publications, PVT.LTD.,2007.
3. Sangeeta Sharma, Binod Mishra, 'Communication Skills for Engineers and Scientists, PHI Learning Private Limited., New Delhi,2009.

OUTCOMES:

At the end of the course students will be able to,

- Students shall overcome their inhibitions and limitations in communication and become effective communicators.
- Develop reading, listening and speaking skills.
- Have Technical writing and communication,
- Exhibit critical reading skills through review of industry specific articles.
- Provide solutions to problem based situations.
- Exhibit leadership qualities by debating over industry specific issues.

CAC 1102	COMPUTER FUNDAMENTALS AND ORGANIZATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to:

- Identify the historical development of computer science and technologies and their applications
- Provide functional knowledge of working of computers with its score components.
- Understand how computer represent and manipulate different data types and how to communicate with peripheral devices.
- Distinguish different number systems and its conversion.
- Provide the knowledge of computer memory and memory organization.
- Provide in-depth knowledge on basic gates,
- Understand constructions and operation of computer networks, applications of networks, Internet and security.

MODULE I GENERAL FEATURES OF A COMPUTER 9

General features of a computer, Generation of computers, Personal computer, workstation, mainframe computer and super computers. Computer applications – data processing, information processing, commercial, office automation, industry and engineering, healthcare, education, graphics and multimedia.

MODULE II COMPUTER ORGANIZATION 9

Computer organization, central processing unit, computer memory – primary memory and secondary memory, Secondary storage devices – Magnetic and optical media, Input and output units, DMA, Hit/Miss ratio, OMR, OCR, MICR, scanner, mouse, modem.

MODULE III COMPUTER HARDWARE AND SOFTWARE 9

Computer hardware and software, Computer arithmetic, Binary, octal and hexadecimal number systems, Algorithm and flowcharts, illustrations, elements of a database and its applications, Basic Gates (Demorgans theorems, duality theorem, NOR, NAND, XOR, XNOR gates), Boolean expressions and logic diagrams, Types of Boolean expressions.

MODULE IV COMPUTER LANGUAGES AND SOFTWARE PACKAGES 9

Introduction of Computer Languages, Machine language and high level language, Application software, computer program, operating system, Computer virus, antivirus and computer security, Elements of MS DOS and Windows OS, An overview of MSWORD, MSEXCEL And MSPOWERPOINT.

MODULE V INTRODUCTION TO NETWORKING 9

Network of computers, Types of networks, LAN, Intranet and Internet, Internet applications, World Wide Web, E-mail, browsing and searching, search engines, multimedia applications

TOTAL HOURS – 45**TEXT BOOK:**

- 1- Rajaraman V. And Neeharika Adabala "Fundamentals of Computers" 6th Edition, from BBT books, New Delhi 2017
- 2- Michael D. Ciletti, Morris Mano M. "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog" (6th Edition), 2017

REFERENCE BOOKS:

1. Charles H. Roth, Jr., Kinney, "Fundamentals of Logic Design", Brooks Publications, Seventh Edition, 2013
2. E. Balagurusamy "Fundamental of Computing and programming" 2nd edition, Tata McGraw-Hill, 2012
3. P.K. Sinha "Computer Fundamentals" BPB Publications; Reprint Edition 2018
4. Hamacher "Computer Organization" McGraw Hill Education, 2011

OUTCOMES:

At the end of the course students will be able to

- Discuss the general features of computer and applications of computer
- Explain the concept of computer memory and internal working of memory management and various modes of data transfer.
- Illustrate binary, octal number and hexadecimal numbers and their arithmetic and also understand how logic circuits and Boolean algebra forms the basis of digital computer
- Compile the computer high-level languages and application software packages.

CAC1103**PROGRAMMING IN C**

L	T	P	C
3	0	0	3

OBJECTIVES:

The objective of the course is to help students to:

- Provide introduction to several high level languages and frameworks, the development of procedural codes is important in several commercial app developments.
- Provide object oriented platforms and event driven systems which uses procedural languages for coding integral command content.
- Develop skill to programs using the UNIX operating system.
- Provide knowledge about UNIX operating system, C compiler and all UNIX application programs written in C.

MODULE I OVERVIEW OF PROGRAMMING 9

Introduction to computer based problem solving, Program design and implementation issues- Flowcharts & Algorithms, Top down design & stepwise refinement, Programming environment – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters.

MODULE II FUNDAMENTALS OF C PROGRAMMING 9

Overview of C, Data Types, Constants & Variables, Operators & Expressions, Control structures - if then, for, while, Arrays- single & multidimensional arrays, Functions- fundamentals – general form, function arguments, return value, Basic I/O- formatted and Unformatted I/O, Advanced features- Type modifiers and storage class specifiers for data types, Bit operators, ?operator, &operator, * operator, Type casting, type conversion.

MODULE III ADVANCED PROGRAMMING TECHNIQUES 9

Control constructs- Do while, Switch statement, break and continue, exit() function, go to and label, Scope rules- Local & global variables, scope rules of functions, Functions- parameter passing, call by value and call by reference, calling functions with arrays, argc and Control constructs- Do while, Switch statement, break and continue, exit() function, go to and label, Scope rules- Local & global variables, scope rules of functions, Functions-parameter passing, call by value and call by reference, calling functions with arrays, argc and argv, recursion- basic concepts, ex-towers of Hanoi.

MODULE IV DYNAMIC DATA STRUCTURES IN C 9

Pointers- The & and * operator, pointer expression, assignments, arithmetic, comparison, malloc vs calloc, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function returning pointers, Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, Unions – Declaration, uses, enumerated data-types, typedef

MODULE V ADDITIONAL FEATURES 9

File Handling –The file pointer, file accessing functions, fopen, fclose, puc,getc, fprintf, C Preprocessor- #define, #include, #undef, Conditional compilation directives, C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions.

TOTAL HOURS – 45**TEXT BOOKS:**

1. Let us C by Yashwant Kanetka, 6th Edition, PBP Publication, 1999

REFERENCES:

1. The C programming Language by Richie and Kenninghan, BPB Publication, 2004
2. Programming in ANSI C by Balaguruswamy, 3rd Edition, Tata McGraw Hill, 2005

OUTCOMES:

At the end of the course students will be able to

- Discuss about algorithm design and implementation.
- Explain different data structures and programming environment.
- Learn how to write simple programs using C Language and execute them.
- Understand the development of procedural codes importance in several commercial app developments.
- Develop simple and complex applications.

CAC1107	OPERATING SYSTEMS AND INTRODUCTION TO LINUX	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to:

- Learn fundamental concepts in the operating system.
- Understand the concepts of process management and deadlocks.
- Develop skills in memory management.
- Understand different file system and security management.
- Gain knowledge in Linux operating system.

MODULE I INTRODUCTION TO OPERATING SYSTEM AND THREADS 9

Objectives and Functions of OS, OS Structures, OS Components, OS Services, System calls, Process: Process concept, Process scheduling, Co-operating processes, Introduction to Threads, Single and Multi-threaded processes

MODULE II PROCESS MANAGEMENT AND DEADLOCKS 9

CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling Algorithms. Process Synchronization: Mutual Exclusion, Critical – section problem, Semaphores, Critical Regions, Monitors. Deadlocks: System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

MODULE III MEMORY MANAGEMENT 9

Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging. Virtual Memory Management: Demand paging, Process creation, Page Replacement Algorithms, Thrashing.

MODULE IV FILE SYSTEM AND SECURITY MANAGEMENT 9

File-System Interface: File concept, Access Methods, Directory structure, File system implementation: File structure, Allocation Methods, Free-space Management, and Recovery. Disk Management: Disk Structure, Disk Scheduling, Swap-Space Management, Disk Attachment, stable-storage Implementation. Security: Security Problem, User Authentication, One – Time Password, Program Threats, System Threats.

MODULE V INTRODUCTION TO LINUX**9**

What Is Linux? -The Problems with Windows -The Benefits of Linux - Proprietary Software and the GPL- GNU and Linux Together- Different Flavors of Linux- Who Uses Linux?- Understanding How Linux Differs from Windows- Using Ubuntu - Working with Files-Listing Files-Copying Files and Directories -Moving Files and Directories -Deleting Files and Directories -Changing and Creating Directories-Users and File Permissions

TOTAL HOURS – 45**TEXT BOOKS:**

1. Operating System by Silberschatz / Galvin / Gagne, 6th Edition, Wiley publication,
2. Beginning Ubuntu Linux, Keir Thomas , Andy Channelle and Jaime Sicam, 4th edition, 2009

REFERENCES:

1. Operating System by William Stallings, 4th Edition, Pearson Education, 2012
2. Operating System by H.M.Deitel , 2nd Edition, Pearson Education, 2002
3. Operating System by Abraham Silberschatz and peter Baer Galvin, 8th Edition, Pearson Education, 1989
4. Operating Systems by Nutt, 3/e Pearson Education 2004

OUTCOMES:

At the end of the course students will be able to

- Explain the fundamental concepts in Operating system including how OS has evolved over the years and different components of OS.
- Discuss Process management and analyze the different CPU scheduling algorithms
- Use appropriate schemes for providing process synchronization.
- Illustrate how the deadlock can be managed/avoided.
- Discuss storage and memory management.
- Explain the concepts of file and disk management

CAC1109**PROGRAMMING IN C LABORATORY**

L	T	P	C
0	0	4	2

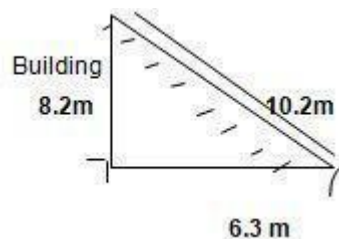
OBJECTIVES:

The objective of the course is to help students to:

- Provide programming skill in c language.
- Develop programs using control structures and functions,
- Develop programs using different data types and arrays.
- Develop programs the dynamics of memory by the use of pointers.
- Develop programs using unions and structures.
- Create programs using files.

LIST OF PROGRAMS

1. A cow is tied to a pole centered in field using 45 m rope. Write a C program to compute the total area that the cow is capable of grazing.
2. A ladder is laid onto a building such that the distance between the ladder and building is 6.3 m. The length of ladder is 10.2 m as shown below. Write a C program to calculate the area of triangle so formed.



3. Write a C program to find whether a given number is Odd or Even. Also if entered number is even, print half of that number and if odd, print double the number as output.
4. Rahul's birthday falls on 28th February 1994. Write a C program to check if given year is a leap year or not.
5. Heights of two classmates Priya and Lavanya are 163 cm and 171 cm respectively. Write a C program to find the person who is shorter among the two.
6. A patient is suffering from high fever with 104.2 F. Write a C program to find his body temperature in Celsius.
7. Write a C program to find Odd & Even numbers in n series.
8. A user has password 4221899 as his login credential for a banking

- website. His password is about to expire. He has to change his password and has decided that the new password would be the reverse of the existing one. Write a C program to display the newly changed password.
9. Write a C program to display a series such that the sum of two consecutive numbers equals the next number in series. Let the first two numbers be 0 and 1.
 10. Write a C program to find sum and average of first 99 numbers.
 11. Write a C program to multiply consecutive numbers in series beginning from 1 till any n value as input.
 12. Write a C program to find the sum of digits in a debit card's cvv number.
 13. 5 passengers travelling to Bangalore have booked tickets in bus. The names of those members are Ajay, Pooja, Rohan, Arun and Sukanya and their respective age are 23, 21, 19, 25 and 30. Write a C program to display these data using an array.
 14. Rainfall received in few areas in Chennai were recorded as 31 cm, 11.64 cm, 16.87 cm, 28 cm and 23.5 cm. Write a C program to calculate total amount of rainfall and average rainfall received that day.
 15. A health survey was conducted to record the weights of students in a class.
 16. Consider an array in following order: 58, 51, 35, 78, 15, 22 and 85. Write a C program to search the value 35.
 17. The heights of ten students were marked as 163 cm, 171 cm, 158 cm, 167 cm, 175 cm, 160 cm, 173 cm, 149 cm, 180 cm and 154 cm. Write a C program to sort the given heights in ascending or descending order.
 18. Consider the CAT 1 exam marks of 5 subjects for 5 students. Similarly CAT 2 exam marks as 2nd matrix. Write a C program to find the total marks obtained in CAT1 and CAT2 by those 5 students.
 19. Ayisha has 5 five stars and 4 kitkats. Ashwin has 10 five stars and 3 kitkats. Both of them ate 2 five stars and 2 kitkats each. Write a C program to find the remaining chocolates left using matrix.
 20. The quantity of stationary sold for 3 days are shown. Write a C program to find the product of the quantity of items mentioned below in the form of matrix.

Day/Item	Pen	Pencil	Eraser
Day1	10	5	5
Day 2	8	4	2

Day3	5	10	10
Day/Item	Notebook	Whitener	Marker
Day1	3	6	5
Day 2	2	1	3
Day3	5	4	15

21. A faculty entered marks of 6 students for 6 subjects in form of matrix. Later she realized that the order was incorrect (the rows and columns were interchanged). Write a C program to find the correct matrix of marks.
22. Write a C program to find factorial of a given number using Recursion.
23. Consider an array in following order: 25, 33, 53, 65, 83, 87 and 92. Write a C program to search the value 83.
24. Write a C program to check if a given string is read the same both from the beginning as well as when read backwards.
25. Write a C program to store and display the student mark details for 3 students including name, department, subjects and respective marks using Structure.
26. Write a C program to input details (name, department, salary) for 3 employees into a file created and read the contents from the file to display all the details along with average salary of those employees on output terminal using suitable file handling functions. Create a scenario based on real time domain.

TOTAL HOURS – 60

TEXT BOOKS:

1. Reema Thareja, Computer Fundamentals and Programming in C, Oxford Press, 2012

REFERENCES:

1. Programming in C , Pradip Dey, Manas Ghosh, 2nd edition Oxford University Press, 2013
2. Programming in ANSI C, E. Balaguruswamy, 5th Edition, McGraw-Hill, 2010.

OUTCOMES:

At the end of the course students will be able to

- Write, compile and debug programs in C language.
- Apply and use different data types in a computer program

- Write programs using structures, loops and functions.
- Demonstrate applications using different data structures.
- Handle different operations on files.

CAC 1110**LINUX LABORATORY****L T P C**
0 0 4 2**OBJECTIVES:**

The objective of the course is to help students to:

- Execute the basic commands of UNIX.
- Understand the functionality and modes of VI Editor.
- Implement the concepts of UNIX.
- Create shell program in UNIX.
- Develop simple to complex programs in UNIX.

LIST OF PROGRAMS

1. Execute 25 basic commands of UNIX.
2. Basics of functionality and modes of VI Editor.
3. Create a file called vegetables and add the contents as follows

- ❖ Brinjal
- ❖ Carrot
- ❖ Onion
- ❖ Potato
- ❖ Tomato

Create one more file called Fruits and add the contents as follows

- ❖ Apple
- ❖ Banana
- ❖ Cherry
- ❖ Kiwi
- ❖ Peach

- a) Display the contents of the vegetables file on screen
 - b) Concatenate vegetables and fruits file and display the result
 - c) Show the difference between fruits and Vegetables
 - d) Add the content in the Fruits file as Mango, Grape
4. Create a directory called foods
 - a) Move vegetables and fruits to foods directory
 - b) Remove vegetables files from foods
 - c) Comes out from foods
 - d) List all the files from this directory
 - e) Display all hidden files from the directory

5. Display the detailed result for the below
- Get manual help and display the detailed information about bash
 - Display the time taken for executing a file
 - Change the mode of a fruits file to Read only to all users
 - Count the number of words in vegetables file.
 - Count the Number of Characters in Fruits file.
6. Create a file called mark list and add the following data

SNo	Name	Subject	Marks
1.	ABCD	Physics	100
2.	XYZ	Chemistry	90
3.	MNO	Biology	88
4.	EFG	Computer	88

- Print the 3rd and 4th column on the screen alone
 - Print a row which has 'r' character
 - Print all columns
 - Search Computer from the mark list file
 - Replace 'i' to 'x' in the file mark list
 - Remove a mark list from the directory
7. Create a file in vi editor and do the following
- Type 1-10 numbers and repeat it for two times using macros
 - Find the current working directory inside vi editor
 - Open two files horizontally
 - Add line numbers
 - Split the window
 - Search all the occurrences of the word TEXT
8. Create a file in vi editor and do the following
- Insert a line in the beginning and end of line
 - Yank the last line of the text and paste as first line.
 - List all the files with detailed information from this directory inside vi editor
 - Change all the occurrences of the word TEXT to UNIX Swap first and second paragraph.
9. Disk related commands and communication commands in Unix
- Find the disk used space in your directory.
 - Find disk free space in your directory with options.
 - Send message to all users, "To shutdown the System"

- d) Block other user from writing in your terminal
 - e) Find the disk usage
10. Write a shell program to print all odd numbers between 10-30.

TOTAL HOURS – 60

REFERENCES:

1. The operating system Linux and programming languages An introduction Joachim Puls and Michael Wegner, 2010, 1st edition ..
2. Beginning Ubuntu Linux, Keir Thomas , Andy Channelle and Jaime Sicam, 4th edition, 2009.

OUTCOMES:

At the end of the course students will be able to

- Implement basic commands of UNIX
- Develop skills on the concepts of UNIX.
- Create shell program in UNIX.
- Develop simple and complex programs in Linux.
- Implement GNU tool chain with Eclipse IDE.

SEMESTER II

ENC 1284	GENERAL ENGLISH - II	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To expose students to English literary texts.
- To help them interpret literary texts.
- To exhibit the effective use of the four skills of communication.
- To demonstrate the range of vocabulary and communicate effectively using grammatically correct language.

MODULE I **8**

Prose	Qahwah
Poem	William Wordsworth – “Nutting” Letter to Editor
Short Story	G.K. Chesterton – The Hammer of God (Extensive Reading) Language Focus-- Modals & Auxiliary Verbs

MODULE II **7**

Prose	Environment
Poetry	John Keats – “La Belle Dame Sans Merci”
Short Story	Katherine Mansfield—A Cup of Tea (Extensive Reading) Dialogue Writing Language Focus If Clauses

MODULE III **8**

Prose	A Dilemma
Poetry	Robert Frost—“Design”
Short Story	Thomas Wolfe—The Far and the Near (Extensive Reading) Conversations Language Focus Question Tags

MODULE IV **7**

Prose	Computeracy
Poetry	Sarojini Naidu – “The Gift of India”
Short Story	R.K. Narayan – “Half a Rupee Worth”(Extensive Reading) Language Focus ‘Wh’ & Yes/No Questions

MODULE V		7
Prose	War Minus Shooting	
Poetry	Nissim Ezekiel – “The Night of the Scorpion” Report Writing Language Focus Direct to Indirect	
MODULE VI		8
Poetry	Mathew Arnold–Dover Beach	
Short Story	Ruskin Bond – “The Boy Who Broke the Bank” (Extensive Reading) Language Focus—Common Errors	

TOTAL HOURS – 45

REFERENCES:

1. Krishnaswamy. N, Sriraman T. Current English for Colleges. Hyderabad:Macmillan Indian Ltd, 2006.
2. Dahiya SPS. Ed. Vision in Verse- An Anthology of Poems. New Delhi: Oxford University Press, 2002.
3. Swan,M.(2005). Practical English Usage. Oxford University Press. UK
4. Seshadri, K G Ed. Stories for Colleges. Chennai: Macmillan IndiaLtd,2003.

OUTCOMES:

After completing the course the students would be able to

- Respond to literary texts efficiently.
- Appreciate and critically analyze literary texts.
- Use the four skills of the language
- Use vocabulary and grammatical expressions effectively

MAC 1288	PROBABILITY AND STATISTICS	L	T	P	C
		3	1	0	4

OBJECTIVES:

The objective of the course is to help students to:

- Impart knowledge about the basic concepts of probability in solving application oriented problems
- Provide an understanding on the concepts of statistics

RECAP INTRODUCTION TO PROBABILITY 4

Sample space - events - algebraic operations on events - definition of probability - Conditional probability - addition and multiplication theorems of probability – Baye's theorem.

MODULE I RANDOM VARIABLES AND DISTRIBUTION FUNCTIONS 13

Discrete and continuous random variables - distribution function and its properties - probability mass function and probability density function - discrete and continuous probability distributions - Binomial, Geometric, Poisson, Uniform, Exponential and Normal distributions.

MODULE II MOMENTS AND MOMENT GENERATING FUNCTIONS 11

Expectation of a random variable – probability generating function – properties – moment generating function.

MODULE III TWO DIMENSIONAL RANDOM VARIABLES 9

Joint, marginal and conditional distribution functions - independence of random variables.

MODULE IV DESCRIPTIVE STATISTICS 10

Types of data - primary and secondary data - classification and representation of data - formation of frequency distribution - various measures of central tendency, dispersion - and their merits and demerits - concept of skewness and kurtosis.

MODULE V CORRELATION AND CURVE FITTING 12

Correlation coefficient and regression - rank correlation - curve fitting by least square methods - fitting a straight line, parabola, power curve and exponential curves. (no derivation, numerical problems only)

TOTAL HOURS – 60**TEXT BOOKS:**

1. Richard Arnold Johnson, Irwin Miller, John E. Freund, Miller & Freund's, Probability and Statistics for Engineers, PrenticeHall,2011.
2. Dr. P. Kandaswamy, Dr. K. Thilagavathy and Dr. K. Gunavathy, Probability and Queuing Theory, Revised edition, S. ChandPublishing,2013.
3. T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw Hill, 2nd edition.

REFERENCES:

1. Goon, A.M., M. K. Gupta and B. Das Gupta Fundamentals of Statistics- Vol. I, World Press Ltd, Kolkata,2002.
2. Gupta, S.C. and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, NewDelhi,2002.
3. Hogg, R.V. and A. Craig, Introduction to Mathematical Statistics, McMillan Publishing co.,Inc.1978.
4. Mood A.M., F.A. Graybill and D.C. Boes, Introduction to Theory of Statistics McGraw Hill BookCo.,1974.
5. Sheldon M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, Fourth Edition, Elsevier.

OUTCOMES:

On completion of this course the students will be able to:

- Solve basic problems in probability and fundamentals of statistics.
- Solve problems using standard probability distributions.
- Find the marginal and conditional distributions of two dimensional random variables.
- Calculate rank correlation and fitting curves for the given data.
- Use method of moments and moment generating functions.

CAC 1203**OOPS WITH C++**

L	T	P	C
3	0	0	3

OBJECTIVES:

The objective of the course is to help students to:

- The basic concept and techniques which form the object oriented programming paradigm.
- Way of thinking about problem using models organized around real world concept.
- The concepts of operator overloading
- The concepts of defining data members and member functions in a class

MODULE I INTRODUCTION**9**

Evolution of programming methodologies-Procedure oriented versus Object Oriented Programming-characteristics of OOP, Basics of OOP, Merits and Demerits of OOP. Data Types: Different data types, operators and expressions in C++, Keywords in C++. Input and Output: Comparison of stdio.h and iostream.h, cin and cout. Decision and loop: Conditional statement - if-else statement, nested if-else statement, switch, break, continue, and go to statements, Looping statements- for loop, while loop, Do-while loop. Arrays, String and Structures : fundamentals-Single dimensional, multi-dimensional arrays, fundamentals of strings, different methods to accept strings, different string manipulations, array of strings, Basics of structures-declaring and defining structure- Accessing structure members, array of structures, Unions difference between structures and Unions, Enumerated data types-declaration and their usage.

MODULE II CLASS**9**

Class: Definition-defining the class, defining data members and member functions, Access specifier-private, public, protected, objects as function arguments, returning objects from the function, scope resolution operator, and member function defined outside the class, difference between class and structure, array as class member data, Array of objects. Functions in C++ : Function definition, function declaration, Built-in functions, user defined functions, calling the function, passing parameter-actual and formal, different methods of calling the function call by value, call by reference using reference as parameter and pointer as parameter, overload function-different types of arguments-different number of arguments, inline function, default argument, storage classes-automatic, external, static, register. Constructor and Destructor: Constructors-constructor with argument, constructor without arguments,

constructor with default arguments, Dynamic constructor, constructor overloading, copy constructor, destructors, Manipulating private data members.

MODULE III OPERATOROVERLOADING 9

Operator overloading: Defining operator overloading, overloading unary operator,overloading binary operator, manipulation of string using overloaded operator, rules for overloading operator.Data conversion: conversion between Basic types, conversion between objects & Basic types, conversion between objects of different classes. Inheritance: Base Class & derived class, defining derived classes, protected access specifier, public inheritance and private inheritance-member accessibility, constructors and destructors in derived classes, Level of inheritance-single inheritance, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance.

MODULE IV POINTER 9

Pointer: Pointer declaration and Access, Pointer to void, pointer and arrays, pointer constant and pointer variable, pointer and functions, pointer, call by pointer arrays, array of pointers to string, printer sort, memory management-new and delete, pointer to object-referencing members using pointers, self-containing class, this pointer, returning values using this pointer. Virtual function: Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract class, virtual base class. Friend functions and static function :Purpose, defining friend functions, friend classes, static function, accessing static function numbering positive objects.

MODULE V TEMPLATESANDEXCEPTIONHANDLING 9

Templates and Exception Handling: Introduction to templates, class templates, function templates, Member function templates, Template arguments, Exception handling. Console IO Operator: C++ stream and C++ stream classes, unformatted I/O operators, formatted I/O operators-manipulators-user defined manipulators. Files: Class for file stream operators, opening and closing a file, file nodes, writing an object to disk, reading an object from disk, binary versus character files, I/O with multiple object, stream class, file pointer-specifying the position,

TOTAL HOURS – 45

TEXT BOOKS:

1. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill. Publications ,6th edition2013

2. Stroustrup: The C++ Programming Language, Pearson Edition, 3rd Edition
3. Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications, 4th edition

REFERENCES:

1. Lippman: C++ Primer, 3/e Pearson Education
2. C++ complete reference by Herbert Schildt, Tata McGraw Hill Publications.
3. Let us C++ by Yeshwanth Kanetkar

OUTCOMES:

On completion of this course the students will be able to:

- Describe the Merits and Demerits of OOP.
- Implement the concepts of arrays, strings & structure in the applications.
- Analyze the pointer declaration & addressing of variables.
- Write programs using inheritance and polymorphism.
- Develop the template and exception handling programs.

CAC 1204	DATA STRUCTURES USING C	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to:

- Storing and organizing data in a computer so that it can be used efficiently.
- Different kinds of data structures suited to different kinds of applications and
- The basic concepts of different data structures which are the basic building blocks of programming and problem solving.

MODULE I INTRODUCTION TO DATA STRUCTURES 9

Definition, Classification of data structures: primitive and non primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers: Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: malloc(), calloc(), free() and realloc(). Recursion: Definition, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.

MODULE II SEARCHING AND SORTING 9

Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort

MODULE III STACK AND QUEUE 9

Stack – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, Applications of stacks. Queue: Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue , Operations on all types of Queues

MODULE IV LINKED LIST 9

Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list: creation, insertion, deletion, search and display.

MODULE V TREEGRAPHS ANDTHEIRAPPLICATIONS 9

Definition: Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and postorder. Graphs, Application of Graphs, Depth First search, Breadth First search.

TOTAL HOURS – 45**TEXTBOOKS:**

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education,2001
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill, 1st edition (1July2017)
3. Robert Kruse, Data Structures and program designing using 'C',3rdedition,2007

REFERENCES:

1. Bandyopadhyay, Data Structures Using C Pearson Education,1999
2. Tenenbaum, Data Structures Using C. Pearson Education, 2nd edition2015
3. Kamthane: Introduction to Data Structures in C. PearsonEducation2005.
4. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wallmedia2006

OUTCOMES:

The completion of this course the students will be able to:

- Benefit from the knowledge of Data Structures.
- Understand the data structure different operating one can perform on these like searching, sorting, stacking.
- Understand the concepts of Stack Queue.
- Analyze which sorting technique will be used.
- Get the knowledge of tree graphs and their applications

CAC1256	ENVIRONMENTAL STUDIES	L	T	P	C
		2	0	0	2

OBJECTIVES:

The objective of the course is to help students to:

- Various natural resources, availability, utilization and its current scenario.
- Different ecosystems, energy transfer.
- Values, threats and conservation of biodiversity.
- Levels of different pollutants and its impact and the causes and effects of natural disasters

MODULE I NATURAL RESOURCES 8

Land resources: land degradation, soil erosion and desertification - Forest resources: use and over-exploitation, deforestation - Water resources: use and over-utilisation of surface and ground water, water conservation (rainwater harvesting and watershed management) - Food resources: world food problems, changes in land use by agriculture and overgrazing, modern agriculture and its effects - Energy resources: increasing energy needs, renewable and non-renewable, use of alternate energy sources.

MODULE II ECOSYSTEM 8

Ecosystem- energy flow in the ecosystem - food chains, food webs and ecological pyramids - characteristics, structure and function of (a) Terrestrial ecosystems (forest, grassland, desert) and (b) Aquatic fresh water ecosystems (pond, lake, river) (c) Aquatic salt water ecosystems (ocean, estuary) -ecological succession.

MODULE III BIODIVERSITY AND ITS CONSERVATION 8

Biodiversity - genetic, species and ecosystem diversity – hot-spots of biodiversity – bio geographic classification of India - endangered, endemic, extinct and invasive species of India - red data book - values of biodiversity: consumptive, productive, social, ethical, aesthetic and option values - threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts - conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

MODULE IV ENVIRONMENTAL POLLUTION AND NATURAL DISASTER 6

Definition, cause, effects and control measures of (a) air pollution (b) water pollution.

soil pollution (d) marine pollution (e) noise pollution (f) thermal pollution (g) nuclear hazards ill-effects of fireworks and upkeep of clean environment - solid waste management: types (urban, industrial, biomedical and electronic wastes), collection, processing and disposal (incineration, composting and land-fill). Natural disaster and management: flood, cyclone, drought, landslide, earthquake and tsunami .Case studies related to current situation.

TOTAL HOURS – 30

TEXT BOOKS:

1. Erach Bharucha, Textbook for Environmental Studies For Undergraduate Courses of all Branches of Higher Education for University Grants Commission, Orient Blackswan Pvt Ltd, Hyderabad, India, 2013.
2. Benny Joseph, Environmental Studies, Tata McGraw-Hill Education, India, 2009.
3. Ravikrishnan A, Environmental Science and Engineering, Sri Krishna Publications, Tamil Nadu, India, 2015.
4. Raman Sivakumar, Introduction to Environmental Science and Engineering, McGraw Hill Education, India, 2009.

REFERENCE BOOKS:

1. Masters G.M. and Wendell P., Introduction to Environmental Engineering and Science, 3rd Edition, Prentice Hall, New Delhi, 2007.
2. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. Boston, USA, 2016.

OUTCOMES:

At the end of the course the student will be able to

- Predict the scenario of various natural resources and suggest remedies to curb the exploitation of these resources.
- Identify food chain and web and its role in various ecosystems.
- Assess the impacts on biodiversity and provide solutions to conserve it.
- Analyze the impacts of pollutants in the environment and propose suitable method to alleviate the pollutants and the natural disasters.

CAC 1257	SYSTEM ANALYSIS AND DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to:

Describe the concepts of systems analysis and information systems development

Describe the project selection and management techniques

Develop and analyze the systems requirements documentation

Identify use case analysis elements and alternatives

Analyze systems process modeling and Describe process modeling techniques

MODULE I INTRODUCTION 9

Define Data, Information, System, System component, System Analysis, Business system concepts, Categories of Information System, Scope of Information System, System Development Life Cycle, system prototype.

MODULE II INFORMATION SYSTEMS 9

Role of information system, Information system planning, Fact finding techniques, Tools for documenting procedure and decisions, Structured Analysis, Data flow analysis, Features and tools of data flow strategy, Advantage of data flow analysis, Physical and Logical data flow diagrams.

MODULE III SYSTEM DESIGN 9

Data dictionary features, Processes in the Data dictionary, Application Prototype, Steps in prototype methods, Use of Prototypes, A Prototyping example, System Design, Objectives in Designing an information system, software development specification.

MODULE IV DATABASE DESIGN 9

Elements of the design, Design of output, Design of files, Design of Database Interaction, Design of Input, Design of control, Design of Procedure, Design of Program specification.

MODULE V INPUT AND OUTPUT DESIGN 9

Design of computer output, types of output, how to present information – Tabular format Graphics format, color presentation, screen design, Design of Input and

Output controls, data capture guideline, design of source documents.

TOTAL HOURS : 45

TEXT BOOKS

1. Systems Analysis and Design, Kenneth E. Kendall and Julie E. Kendall
Prentice Hall PTR, 5th Edition, 2001

REFERENCE BOOKS:

1. Analysis & Design of Information system, James A. Senn –McGraw-Hill
Education (ISE Editions); 2ndedition
2. System Analysis and Design - 10th Edition by Harry J Rosenblatt, Shelly
Cashman Series, 2014, ISBN: 978-1-285-17134-0, ISBN10: 1-285-
17134-9, ISBN13:978-1-285-17134-0
3. R. S. Pressman, “Software Engineering – A practitioner’s approach”, 3rd
ed., McGraw Hill Int. Ed.1992
4. K. K. Aggarwal & Yogesh Singh, “Software Engineering”, 2ndEd., New
Age International. 2005.

OUTCOMES:

Upon successful completion of this course, the student will be able to

- Identify and describe the phases of the systems development life cycle.
- Analyze the existing system and design a new system.
- Develop and evaluate system requirements.
- Use tools and techniques for process and data modeling.
- Work effectively in a team environment.

CAC1208**OOPS WITH C++-LABORATORY****L T P C**
0 0 4 2**OBJECTIVES:**

The objective of the course is to help students to:

- Understand and solve logical & mathematical problems through C++ language
- Strengthen knowledge of a procedural programming language.
- Design and develop solutions to intermediate level problems
- Develop their skills in software development using a procedural language
- Get programming in skill the object oriented technology with the usage of C++.

LIST OF PROGRAMS

1. Number of vowels and number of characters in a string.
2. Write a function called zero smaller () that is passed with two introduce arguments by reference and set the smaller of the number to zero. Write a man() program to access this function.
3. Demonstration of array of object.
4. Using this pointer to return a value (return by reference).
5. Pointer sort.
6. Demonstration of virtual function.
7. Demonstration of static function.
8. Accessing a particular record in a student's file.
9. Using different methods to write programs to implement function overloading.
10. Default arguments for the following problems:
 - a) To find whether a given number is prime.
 - b) To find the factorial of a number
11. Write a program to create a database for a bank account contains Name, Account no, Account type, Balance, Including the following a) Constructors b) destructors call) default constructors d) input and output function; input and output for 10 people using different methods.
12. Create a class to hold information of a husband and another for the wife. Using friend functions give the total salary of the family.
13. Write a program to overload the following operators(any3)

- a) Binary operator '+' to concatenate 2 string
 - b) Relational operator '<' to find whether one data is less than the other
 - c) Unary operator '++' to find the next date of a given date.
14. Create a base class for a stack and implement push and pop operation. Include a derived class to check for stack criteria such as a) stack empty b) stack full c) stack overflow d) stack underflow.
 15. Create a database using concepts of files for a student including the following fields : Student- name, Student's Reg No, Student's Attendance (overall % of attendance); and enter data for 10 students and output the same in proper format.
 16. Using operator overloading concept implement arithmetic manipulation on two complex numbers.
 17. Create a scenario based on real time domain.

TOTAL HOURS – 60

REFERENCES:

1. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill. Publications, 6th edition 2013.
2. Stroustrup: The C++ Programming Language, Pearson Edition, 3rd Edition 2010.

OUTCOMES:

On completion of this course the students will be able to:

- Implement inheritance, polymorphism and object relationship in C++
- Design methods and procedure
- Manipulate data through file in C++
- Debug and test software.
- Develop a minor software in C++ language

CAC 1209	DATA STRUCTURES USING C–LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

The objective of the course is to help students to:

- Understand the implementation of recursive functions and strings.
- Introduce the implementation of linked list and the various operations.
- Implement stack and queue using dynamic memory allocation.
- Introduce the Binary Search Tree implementation using C.
- Learn to implement various sorting and searching algorithms.

LIST OF PROGRAM

1. Given with two numbers 36 and 60, write recursive function using C to find GCD of two numbers.
2. Write a recursive function using C program to display a series such that the sum of two consecutive numbers equals the next number in series. Let the first two numbers be 0 and 1.
3. Use a recursive function for the towers of Hanoi with three discs.
4. Two strings “Welcome” and “World” are provided. Write a program using pointers to find the length of a string and to concatenate the two strings.
5. String1 is stored with “Greater”. Write a program using pointers to copy string1 to string2 and to extract “Great” from string2.
6. Consider an array in following order: 25, 33, 53, 65, 83, 87 and 92. Write a C program to insert the value 88 and remove 65.
7. Write a C Program using dynamic variables and pointers, to construct a singly linked list consisting of the following information in each node: student id (integer), student name (character string) and semester (integer). The operations to be supported are:
 - a. The insertion operation
 - i. At the front of a list
 - i. At the back of the list
 - ii. At any position in the list
 - b. Deleting a node based on student id. If the specified node is not present in the list an error message should be displayed. Both the options should be demonstrated.
 - c. Searching a node based on student id and updating the information content. If the specified node is not present in the list an error

- message should be displayed. Both situations should be displayed.
- d. Displaying all the nodes in the list.
8. The heights of ten students were marked as 163cm, 171 cm, 158 cm, 167cm, 175cm, 160cm, 173 cm, 149 cm, 180cm and 154cm. Find the difference while sorting the given heights in ascending or descending order using
 - a. Insertion sort
 - b. Selection Sort
 - c. Merge Sort
 9. Write a C program to implement the following operations in stacks:
 - a. Push
 - b. Pop
 - c. Display
 10. Write a C program to implement the following operations in queue: Insert, Delete, Display
 11. Create a binary search tree and traversing it using in order, pre order and post order.
 12. Create a scenario based on real time domain.

TOTAL HOURS – 60

TEXTBOOKS:

1. Magnifying Data Structures, Aprita Gopal, First Edition ,Prentice Hall India Learning Private Limited (2010)
2. Data Structures in C, Horowitz, Sahni, Anderson-Freed, Universities Press, Second edition(2008)
3. Narasimha Karumanchi, "Data Structures and Algorithms Made Easy: Career Monk Publications; Fifth edition, 2016.
4. Structure and Algorithmic Puzzles", 2nd Edition, Create Space Independent Publishing Platform, 2011.

REFERENCES:

1. Ashok N. Kamthane, "Introduction to Data Structures in C", 2nd Edition, Wiley Publications,2008.
2. Data Structures Using C - A.S.Tanenbaum, Y. Langsam, and M.J.Augenstein, Pearson Education India; 2nd edition, 2015.

OUTCOMES:

On completion of this course the students will be able to:

- Write and demonstrate recursive methods
- Implement stack and queue and evaluate various operations involved in it
- Implement and execute circular queue using array
- Develop an application using singly linked list and doubly linked list
- Implement and analyze various searching techniques and sorting techniques

SEMESTER III

CAC 2101	REASONING AND THINKING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of this course is to let the students

- Understand the concepts of Reasoning and thinking.
- Learn to take the right decisions, approach every problem with diligence and perform action accordingly.
- Understand the key mathematical concepts
- Apply the concepts learned to solve critical problems

MODULE I VERBAL ABILITY 9

Synonyms, Antonyms and one word substitutes

MODULE II BASIC QUANTITATIVE APTITUDE 9

Speed, Time and Distance, Time and Work, Linear Equations, Progressions (Sequences & Series), Permutation and Combination, Probability, Functions, Set Theory, Number Systems, LCM and HCF, Percentages, Collection and Scrutiny of data: Primary data, questionnaire and schedule; secondary data, their major sources including some government publications

MODULE III LOGICAL REASONING 9

Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism. Blood Relations; concept of a statistical population and sample from a population; qualitative and quantitative data.

MODULE IV MEASURES OF CENTRAL TENDENCY 9

Objective of averaging, characteristics of good average, types of average, arithmetic mean of grouped and ungrouped data, correcting incorrect values, weighted arithmetic mean- Median - median of grouped and ungrouped data merit and limitation of median, computation of quartile, decile and percentile Mode - calculation of mode of grouped and ungrouped data, merits and limitation of mode, relationship between mean, median and mode. Geometric mean and Harmonic mean.

MODULE V PRESENTATION OF DATA**9**

Construction of tables with one or more factors of classification; Diagrammatic and Graphical representation of non-frequency data; Frequency distribution, cumulative frequency distribution and their graphical representation - histogram, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Data Interpretation – Introduction and approach

TOTAL HOURS =45**TEXT BOOKS:**

1. Bajpai, N. Business Statistics, Pearson, 2010
2. Sharma J.K., Business Statistics, Pearson Education India, 2010.
3. Richard I Levin, David S. Rubin: Statistics for Management, Pearson Prentice Hall Education Inc. Ltd, New Delhi, 5th Ed. 2010

REFERENCES:

1. Anderson; David R, Dennis J. Sweeney and Thomas A. Williams, Quantitative Methods for Business, Prentice-Hall, West Publishing Company, 1996.
2. CAT Complete course, UPKAR publications

OUTCOMES:

On completion of this course the students will be able to,

- Acquire knowledge on the representation and reasoning techniques.
- Illustrate thinking as a computational problem.
- Model the way mind works as an information processor.
- Illustrate the way in which knowledge is represented.

CAC 2152	DIGITAL ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The main objective of this course is to let the students:

Learn the basics of Boolean Algebra and Number systems

Learn the fundamentals of combination logic design and sequential circuits (both synchronous and a asynchronous)

Understand how Flip Flops, Multiplexers, ADC and DAC works

MODULE I NUMBERSYSTEMS 9

Number Systems and Codes Decimal, binary, octal, hex numbers, conversion from one to another- codes, BCD, excess 3, gray codes conversion from one to another - Error detection codes.

MODULE II BOOLEAN ALGEBRAANDTHEOREMS 9

Boolean Algebra and Theorems: Basic, Universal logic gates - Boolean theorems - sum of products, products of sums expressions, simplification by Karnaugh Map method, simplification based on basic Boolean theorems - don't care conditions.

MODULE III COMBINATIONAL DIGITALCIRCUITS 9

Combinational Digital Circuits Arithmetic Building blocks, Basic Adders and subtractors, BCD adders - Data of processing circuits, multiplexers, demultiplexers, encoders, decoders - TTL, CMOS digital logic families.

MODULE IV SEQUENTIALDIGITALCIRCUITS 9

Sequential Digital Circuits: Flip-flops, RS, Clocked SR, JK, D, T, master-slave types-shift registers, ring counters - ripple counters - synchronous counters, timer IC 555, applications.

MODULE V DACAND ADC 9

DAC and ADC: Parameters, Accuracy, resolution - DAC, variable resistor network, R-2R ladder network types - ADC, counting continuous, successive approximation, dual - slope types - comparison of various types of DAC and ADC.

Total Hours –45

TEXT BOOKS:

1. M. Morris Mano and Michael D.Ciletti, "Digital Design with an introduction to the Verilog HDL", 5th Edition, Pearson Education, 2012.

REFERENCES:

1. Donald D. Givone, "Digital Principles and Design", 13th reprint, Tata McGraw Hill, 2003.
2. S.P. Bali, Solved Problems in Digital Electronic, Sigma Series, Tata McGraw- Hill, (2005)

OUTCOMES:

On completion of this course the students will be able to,

- Define different number systems, binary addition and subtraction, 2's complement representation and its operations.
- Demonstrate the use of Karnaugh map and perform an algorithmic.
- Evaluate the concepts of state and state transition for analysis and design.
- Design and develop simple projects Using flip flops after state machine.
- An ability to analyze and design a CMOS logic inverter.

CAC2103	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of this course is to let the students:

- Understand the basic software engineering methods and practices
- Learn about the concepts of software products and software processes
- Understand the importance of SRS in software development
- Learn the need and importance of software testing.

MODULE I INTRODUCTION 9

Definition of software and software engineering – Software myths –Software Engineering paradigms: Linear Sequential Model & Prototyping Model Software Project Management – Software Metrics – Software Cost Estimation – Software Project Planning.

MODULE II SOFTWARE REQUIREMENT ANALYSIS 9

Software Risks – Software Configuration Management System Analysis – Modeling the System Architecture – System Specification –Fundamentals of Requirement Analysis – Software Prototyping – Prototyping methods and tools specification – Software requirements Specifications

MODULE III STRUCTURED ANALYSIS 9

Introduction – the elements of the analysis model – data objects, attributes and relationships – Cardinality and Modality – ERD – DFD – Classical Analysis Methods : DSSD, JSD, SADT.

MODULE IV SOFTWARE DESIGN 9

Software Design and Software Engineering – Design and Software Quality – Evolution of Software Design – Design Principles. Design Concepts, Abstraction, Refinement, Modularity – Effective Modular Design, Functional Independence, Cohesion, Coupling.

MODULE V SOFTWARE TESTING METHODS 9

Software Testing Fundamentals – White Box Testing – Black Box Testing – Debugging– Software Quality: McCall's Quality Factors

TOTAL HOURS – 45**TEXT BOOKS:**

1. Stephen Withal, "Software Requirement Patterns", 3rd Edition, Microsoft Press, 2011.

REFERENCES:

1. Karl & Joy Beatty, "Software Requirements", 3rd Edition, Microsoft Press, 2012.
2. S.K.Kataria, Rajiv Chopra, "Object Oriented Software Engineering", 3rd Edition, 2013.

OUTCOMES:

On completion of this course the students will be able to,

- Choose the appropriate process model for the software application to be developed.
- Collect requirements based on the type of the application and its need.
- Acquire knowledge on the structured analysis tools.
- Modify and improve the software product based on user needs and performance.
- Apply the appropriate testing strategies to the developed products.

CAC2104**RDBMS**

L	T	P	C
3	0	0	3

OBJECTIVES:

The objective of this course is to let the students

- Learn about the purpose of database systems.
- Understand the fundamentals of relational systems including data models, database architectures, and database manipulations.
- Obtain knowledge about relational database model.
- Learn the basic concepts of databases in general with an emphasis on relational databases, modeling techniques and writing queries.
- Understand Normalization techniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.

MODULE I INTRODUCTION**9**

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

MODULE II RELATIONAL MODEL**9**

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals, Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables, Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL. Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause.

MODULE III SQLVIEWS,INDEXANDTRIGGERS**9**

Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User, Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL-

Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases

MODULE IV DATABASE DESIGN 9

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

MODULE V TRANSACTIONS 9

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

TOTAL HOURS – 45

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Fifth Edition, TataMcGrawHill,2006
2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Pearson/AddisionWesley.2007
3. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill.2003.

REFERENCES:

1. S. Sumathi, S. Esakkirajan, "Fundamentals of Relational Database Management Systems", Springer Science &Business Media.
2. N. P. Singh, C.S. Gupta, "Relational Database Management Systems", Abhishek Publications,15-May-2014

OUTCOMES:

The student will be able to:

- Write queries, transactions and different modelling techniques in a relational database.
- Normalize data and know its techniques.
- Find the familiarity with relational database model.
- Understand fundamentals of relational systems including data models.

CAC 2105	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of this course is to let the students:

- Understand the underlying Network model and Communication principles.
- Learn about various Switching techniques and Multiplexing approaches
- Obtain knowledge about how various layers work
- Learn how High Performance Networks work

MODULE I NETWORK FUNDAMENTALS 9

A communications model - Data Communications - Data Communications Networking - computer communication architecture - standards Data Transmission - Concepts and terminology - Analog and Digital - Transmission - Transmission Impairments - Transmission media.

MODULE II PHYSICAL LAYER 9

Data encoding - Digital data Digital signals, Digital data Analog signals, Analog data Analog signals Data Communications Interface: Asynchronous and synchronous Transmission - Line configuration - Interfacing.

MODULE III DATALINK LAYER 9

Data link control: Flow controls - Error Detection - Error Control - High Level Data Link Control (HDLC) - MULTIPLEXING - Frequency Division multiplexing - Synchronous time Division multiplexing - Statistical time division multiplexing.

MODULE IV NETWORK LAYER 9

Circuit switching: Circuit switching networks switching concepts - Routing in circuit switched networks - Packet switching principles - Routing in packet switching - Congestion control.

MODULE V HIGH PERFORMANCE NETWORKS 9

Frame relay: Frame relay Protocol Architecture - Frame relay call control user data transfer - Networks functions - Congestion control, ASYNCHRONOUS TRANSFER MODE (ATM) Protocol Architecture – ATM logical connection - ATM Cells – Transmission of ATM cells - ATM adaption layer - Traffic and congestion control.

TOTAL HOURS – 45**TEXT BOOKS:**

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", 4th Edition, Elsevier, 2007.
2. Forouzan: Introduction to Data Communication & Networking, McGraw-Hill, 2007.

REFERENCE:

1. Andrew S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2003.
2. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 3rd Edition, Pearson Education, 2006.

OUTCOMES:

On completion of this course the students will be able to,

- Compare and contrast the OSI reference model and TCP/IP model.
- Examine the various application layer protocols and propose the solutions based on the need.
- Review the protocols, network interfaces, and performance issues in local area networks and wide area networks.
- Identify different congestion control techniques and critique upon them.
- Design and implement the routing and transport protocols for Wireless and Mobile networks.
- Analyze and interpret the effect of QoS Parameters in the multimedia networks.

CAC2106	PROGRAMMING IN JAVA	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of this course is to let the students :

- Write, compile and execute Java programs
- Build robust applications using Java's Object Oriented Programming
- Understand how exception handling works in java
- Read and write data using Java streams

MODULE I INTRODUCTION TO JAVA 9

Brief History of Java, Special Features of Java, Data Type & Operators in Java, Arrays, Objects, the Assignment Statement, Arithmetic Operators, Relational and Logical Operators in Java, control Structures, Constructor, Finalizes, Classes inside classes : composition.

MODULE II CLASS AND INHERITANCE 9

The Java Class- Inheritance, Deriving Classes, Method Over-riding, Method Overloading, Access Modifiers, Abstract Class and Method, Interfaces, Packages, Imports and Class Path.

MODULE III THREADS AND EXCEPTION HANDLING 9

Exception Handling, The Try-Catch Statement, Catching more than one Exception, Generating Exceptions, Threads: Introduction, Creating Threads in Applications- Thread Priority

MODULE IV INPUT STREAM CLASSES 9

IO Packages, Java Input Stream Classes, Java Output Stream Classes, File Class.

MODULE V APPLLET SANDAWT PACKAGES 9

Creating an Executable Applet, Applets Life Cycle, AWT and Graphic methods, Fonts, Loading and Viewing Images, Loading and Playing Sound, Event Handling, Layouts

TOTAL HOURS – 45

TEXT BOOKS:

1. Hortsman & Cornell, "Core Java Advance Features VOL II", 9th Edition, Pearson Education, 2013.

REFERENCES:

1. Patrick Naughton, "Complete Reference: JAVA 2", 8th Edition, Tata Mc Graw Hill, 2011.
2. Andrew Lee Rubinger, Bill Burke "Enterprise JavaBeans 3.1", 6th Edition, O'Reilly Publishers, 2010.

OUTCOMES:

On completion of this course, students would be able to,

- Identify classes, objects, members of a class and relationships among them needed for a specific problem.
- Write Java application programs using OOP principles.
- Demonstrate the concepts of polymorphism and inheritance.
- Write Java programs to implement error handling techniques using exception handling.

CAC 2109**RDBMS LABORATORY**

L	T	P	C
0	0	4	2

OBJECTIVES:

The objective of this course is to let the students:

- Understand the need for database
- Write queries to extract data
- Understand how triggers work

LIST OF PROGRAMS:

1. Create User in Oracle Database and grant and revoke the privileges and use of commit save point roll back command.
2. Create the following:
 - Synonym sequences and Index
 - Create alter and update views.
3. Create PL/SQL program using cursors, control structure, exception handling
4. Create following:
 - Simple Triggers
 - Package using procedures and functions.
5. Create the table for
 - COMPANY database
 - STUDENT database and Insert five records for each attribute.
6. Illustrate the use of SELECT statement
7. Conditional retrieval – WHERE clause
8. Query sorted - ORDER BY clause
9. Perform following:
 - UNION, INTERSECTION and MINUS operations on tables.
 - UPDATE, ALTER, DELETE, DROP operations on tables
10. Query multiple tables using JOIN operation.
11. Grouping the result of query - GROUP BY clause and HAVING clause
12. Query multiple tables using NATURAL and OUTER JOIN operation.
13. Create a scenario based on real time domain

TOTAL HOURS – 60

REFERENCES:

1. S. Sumathi, S. Esakkirajan, "Fundamentals of Relational Database Management Systems", Springer Science & Business Media.2013.
2. N. P. Singh, C.S. Gupta, "Relational Database Management Systems", Abhishek Publications, 15-May-2014.

OUTCOMES:

Upon completion of this course, students would be able to:

- *Identify* the basic concepts and various data model used in database design.
- Design and implement a database schema for a given problem-domain.
- Normalize a database.
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database.

CAC 2110	PROGRAMMING IN JAVA LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

The objective of this course is to let the students:

- Develop the programming skills using the object oriented programming methodology to produce quality computer based solutions to real problems.
- Utilize the advance features of Java technology.
- Work with collection API and develop fast programs.
- Develop good multithreaded programs.

LIST OF EXERCISES:

1. Programs using basic data types, operators and control structures.
2. Class definitions and usage involving variety of constructors and finalizes
3. Programs involving various kinds of inheritances,
4. Program to demonstrate creation and handling of packages, their imports and Class Path.
5. Programs involving a variety of Exception Handling situations
6. Program involving creating and handling threads in applications and applets.
7. Program to demonstrate AWT/Swing graphic methods
8. Program for Loading and Viewing Images, Loading and Playing Sound
9. Programs to demonstrate various Layouts
10. Programs to demonstrate event handling

TOTAL HOURS – 60

TEXT BOOKS:

1. Patrick Naughton, "Complete Reference: JAVA 2", 8th Edition, Tata McGrawHill, 2011.

REFERENCES:

1. Keyur shah, "Gateway to Java Programmer Sun Certification", Tata McGraw Hill 2002.
2. Herbert Schildt, The Complete Reference – Java 2, 4th Edition, Tata McGraw Hill,2007

OUTCOMES:

Upon completion of this course, students would be able to:

- Implement Java classes from specifications.
- Effectively create and use objects from predefined class libraries .
- Implement primitive data types and arrays .
- Write programs using interfaces, inheritance, and polymorphism.
- Develop programs using Applet.

SEMSTER IV

CAC2216	INTRODUCTION TO PYTHON	L	T	P	C
		3	0	0	3

OBJECTIVES:

The aim of the course is to

- Introduce the basic concepts of python programming with values and variables.
- Know the basic arithmetic operators syntax in program.
- Understand the conditional branching of programming flow.
- Understand the function parameters and their passing values.
- Apply the data structures and features in sorting and searching.

MODULE I INTRODUCTION 9

Introduction to Python Programming, development tools, values and variables, integer values, variables and assignment, identifiers, floating point types, control codes with strings, user input, Eval function, print function

MODULE II ARITHMETICEXPRESSION 9

Expression and arithmetic, operator precedence and associativity, comments and errors, syntax errors, run time errors, logic errors, arithmetic operators

MODULE III CONDITION STATEMENTS 9

Conditional execution, Boolean expressions, simple if statement, if/else, compound Boolean expressions, nested conditions, decision statements, conditional expressions. Iterations, while statement, definite vs indefinite loops, nested loops, abnormal loop termination

MODULE IV FUNCTIONS 9

Functions, standard mathematics functions, time function, random function, importing function, writing own functions, parameter passing, custom function vs standard functions. Global variables, default variables, recursion, reusable functions, functions as data.

MODULE V**LINEAR SEARCH****9**

Lists, List assignment, list bounds, slicing, list and functions, prime generation with list, sorting, flexible sorting, search, linear search, binary search, list permutation, random permutation, objects, string objects, list objects, Custom types - geometric, handling exceptions

TOTAL HOURS : 45**TEXT BOOKS:**

1. Learning to Program with Python by Richard L. Halterman.(2011)
2. Guttag, John. Introduction to Computation and Programming Using Python. Spring 2013 edition.MITPress,2013.

REFERENCES:

1. Programming Python, 4th Edition by Mark Lutz (2010) O'Reilly Media
2. Python Cookbook, 3rd Edition: Recipes for Mastering Python 3, by David Beazley and Brian K. Jones, on O'Reilly Atlas (2013)

OUTCOMES:

After completing this course, students will be able to

- Write code with basic data types and variable declarations.
- Perform calculations using arithmetic expressions.
- Perform control flow with conditional branching in program.
- Writes customized and standard function in a program.
- Stores data and performs sorting and searching operations

CAC2231	WEB DESIGN AND DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

The aim of the course is to

Introduce the concepts and technologies used in website design.

Learn the Hypertext mark up language's theoretical background of web site design of frames and forms.

Design web page with style sheet, bordering and image insertion.

Design client side request dialogue box using scripting languages

Design and generate server side response reports using scripting.

MODULE I INTRODUCTION 9

Introduction to WWW - Introduction to Network, Internet and Intranet, Application and Services, Internet Addressing – URL, Elements of Web – Web Page, Designing Principles-Web Site Building, Web Languages – HTML/DHTML, JavaScript,PHP.

MODULE II HYPER TEXT MARKUPLANGUAGE 9

Building Web Based Application using HTML-Html Document Structure, Various HTML Tags – Text Formatting Tag, Link Tag, List Tag, Image Tag, Table Tag, Line Breaks, Frames, Forms.

MODULE III CASCADINGSTYLESHEET 9

Introduction to Style sheet - Types of Style sheet, concept of class &ID - CSS Property– Background Property - Font property- Text - Borders -Margins- Padding.

MODULE IV CLIENT-SIDESCRIPTING LANGUAGE 9

Types of Scripting language, Introduction to JavaScript-How to develop JavaScript- Operators- Conditional Structure & Looping Structure-Dialog Boxes- Arrays- Built-in Functions (String, Math, Date, Array)- Form Objects and events.

MODULE V SERVER-SIDESCRIPTING LANGUAGE 9

Introduction to PHP-Basic PHP syntax-PHP tags, PHP statements and whitespace, comments, Operators, Conditional and Looping Structure, User Define Functions,

TOTAL HOURS – 45

TEXT BOOKS:

1. HTML: The Complete Reference ,Thomas A. Powell ,2000(I,II&III)
2. Beginning JavaScript 2nd Edition, Wrox, Nicholas C. Zakas,2004(IV)
3. PHP Bible, Wiley Publication, Tim Converse, Joyce Park,2002(V)

REFERENCES:

1. Developing Web Application, Wiley India Publication, Ralph Moseley, Wiley India,2007.
2. Web Enabled Commercial Application Development Using HTML, DHTML, PERL, Java Script, BPB Publications, Ivan Bayross,2005

OUTCOMES:

On completion of this course, students will be able to,

- Demonstrate the knowledge and ability to apply the design principles and techniques in creating websites.
- Identify HTML tags to construct the basic webpage.
- Incorporate CSS properties for layouts using a text editor to provide effective presentation of information in web pages.
- Design and develop basic web pages using XHTML and CSS.
- Design websites using appropriate security principles, focusing specifically on the vulnerabilities inherent in common web implementations.

CAC2257	DATA MINING AND WAREHOUSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The aim of the course is to

- Provide an overview of data mining and data warehousing.
- Learn the different preprocessing techniques
- Understand the association rules.
- Apply machine learning techniques such as Clustering and Classification
- Design an exclusive data warehouse.

MODULE I INTRODUCTION 9

Introduction - What is Data mining, Data mining – Importance of Data mining - various kinds of data: Relational databases – Data Warehouses - Transactional Databases – Advanced Data and Information Systems and Advanced Applications. Data mining Functionalities: Concept / Class Description, Characterization - Classification and Prediction – Cluster Analysis.

MODULE II DATA PREPROCESSING AND ASSOCIATION RULES 9

Why Preprocess Data – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation - Mining– Frequent Patterns, Associations Correlations - Basic Concepts - Efficient and Scalable Frequent Item set Mining.

MODULE III CLASSIFICATION TECHNIQUES 9

What is Classification? – Issues regarding Classification - Classification by Decision Tree Induction – Bayesian Classification – Rule Based Classification - KNN Classifiers.

MODULE IV CLUSTERING TECHNIQUES 9

Clusters Analysis: Types of Data In Cluster Analysis- Categorization of Major Clustering Methods: Partitioning Methods: k-Means, k-Medoids – Hierarchical Methods: BIRCH, Chameleon – Density based Methods: DBSCAN, OPTICS. Applications.

MODULE V DATAWAREHOUSING**9**

What is a Data Warehouse – A multidimensional Data Model – Data Warehouse Architecture - From Data Warehousing to Data Mining

TOTAL HOURS – 45**TEXT BOOK:**

1. Author: Jiawei Han and Micheline Kamber Data Mining Concepts and Techniques, Second Edition, Morgan Kaufmann Publishers (An imprint of Elsevier),2011

REFERENCES:

1. Author: Karguta, Joshi, Siva kumar & Yesha, Data Mining Next Generation Challenges and Future Directions, Prentice Hall of India,2007
2. G.K. Gupta, PHI Private limited, Introduction to Data mining with case studies, New Delhi, 2008. 2nd Edition, PHI,2011

OUTCOMES:

On completion of this course students will be able to:

- Select the appropriate data mining tool and methodology to preprocess the data.
- Select the functional variables and target vector of the dataset.
- Select the classification algorithm and implement for the given dataset
- Select the clustering algorithm and implement for the given dataset.
- Design exclusive data warehouse for a given business vertical.

CAC2258	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

The aim of the course is to

- Understand the necessity of object orientation and development methodologies
- Write scenarios for the business use cases.
- Design data model and system flow using UML diagrams.
- Design the interface and input screens
- Construct classes from the activity diagram and write test cases.

MODULE I INTRODUCTION 9

An overview – Object basics – Object state and properties – Behavior – Methods – Messages – Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Metaclasses – Object oriented system development life cycle.

MODULE II METHODOLOGY AND UML 9

Introduction – Survey – Rumbugh, Booch, Jacobson methods – Patterns – Frameworks – Unified approach – Unified modeling language – Static and Dynamic models – UML diagrams – Class diagram – Use case diagrams – Dynamic modelling – Model organization –Extensibility.

MODULE III OBJECT ORIENTED ANALYSIS 9

Identifying Use case – Business object analysis – Use case driven object oriented analysis – Use case model – Documentation – Classification – Identifying object, relationships, attributes, methods – Super-sub class – A part of relationships Identifying attributes and methods – Object responsibility.

MODULE IV OBJECT ORIENTED DESIGN 9

Design process – Axioms – Corollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – Databases – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface.

MODULE V SOFTWARE QUALITY**9**

Quality assurance – Testing strategies – Object orientation testing – Test cases– Test Plan –Debugging principles – Usability – Satisfaction –Usability testing– Satisfaction testing.

TOTAL HOURS: 45**TEXT BOOK:**

1. Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 1999.

REFERENCES:

1. Craig Larman, Applying UML and Patterns, 2nd Edition, Pearson, 2002.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Addison Wesley Long man, 1999.
3. Bernd Bruegge, Allen H. Dutoit, Object Oriented Software Engineering using UML, Patterns and Java, Pearson 2004.

OUTCOMES:

On completion of this course, students will be able to

- Describe basics of object orientation and development methodologies
- Identify the stakeholders as actors and develop sequence diagrams
- Construct classes from the activity diagram
- Design data base model and provide data base connectivity
- Write test cases and perform software testing.

CAC2217	ORGANIZATIONAL BEHAVIOUR	L	T	P	C
		3	0	0	3

OBJECTIVES:

The aim of the course is to

- Enable the students to understand the need of Organizational Behavior In the technical environment.
- Understand the concepts, principles and techniques relating to different functional areas of Organizational Behavior
- Make the students understand the need for applying the concepts of Organizational behavior to improve the overall system performance.

MODULE I LEADERSHIP 9

Technical Leadership - Leader's Goal, Conviction, Vision – Transformational and Transactional Leadership - Leader's Vision - Professionalism: Importance, Elements - Managing Awareness - Performance - Manager's Role in Professionalism

MODULE II MANAGING TECHNICAL AND PROFESSIONAL PEOPLE 9

Goals of Engineers and Scientists - Work Assignment - Need for Influence - Professional Career and Goals - Age and Creativity - Performance - Motivation- Employee Partnership - Career Risks - Technical Competence – Professional Discipline- Manager's Role in Professional Discipline - Guidelines.

MODULE III IDENTIFICATION AND DEVELOPMENT OF TALENTED PEOPLE 9

Talented Professionals – Importance - Characterization - Identification – Assessment and Recognizing Talent - Development – Development Needs- Counseling.

MODULE IV INNOVATION 9

The Importance of Innovation - Risk of Failure - Nature of Creativity - Imagination- Managing Innovative Teams - Needs of Creative Teams - Team Dynamics -A Software Development Example - Manager's Responsibility - Team's Personal Needs - Political versus Technical Solutions - Team Synergism.

MODULE V TEAM ENVIRONMENT AND RECOGNITION 9

Innovative Team Environment -Award Programs - Recognition Programs – An Example Award Plan - Industry Award Plans - Award Guidelines – Incentive Plans - A Caution on Recognition Programs

TOTAL HOURS: 45

TEXT BOOK:

1. Watts S. Humphrey, “Managing Technical People: Innovation, Teamwork, and the Software Process”, Addison-Wesley, 1996.

REFERENCES:

1. Saiyadain, M.S. Organizational Behavior, 2009, TataMcGrawHill.
2. Prasad C.M, Organizational Behavior, 2002, Publisher: Sultan Chand and Sons.

OUTCOMES:

On completion of this course, Students will be able to,

- Analyze the behavior of individuals and groups in organizations in terms of the key factors that influence organizational behavior.
- Assess the potential effects of organizational- level factors (such as structure, culture and change) on organizational behavior.
- Evaluate the potential effects of important developments in the external environment
- Describe the organizational behavioral issues in the context of organizational behavior theories, models and concepts.

CAC2218**PYTHON LABORATORY**

L	T	P	C
0	0	4	2

OBJECTIVES

The aim of the course is to

- Define and structure the program components
- Learn string operations
- Perform basic arithmetic operations

LIST OF PROGRAMS

1. Write a Python program to check whether two strings are equal or not.
2. Write a Python program to display reverse string.
3. Write a Python program to find the sum of digits of a given number.
4. Write a Python program to display a multiplication table.
5. Write a Python program to display all prime numbers between 1to10000.
6. Write a Python program to insert element in existing array.
7. Write a Python program to sort existing array.
8. Write a Python program to create object for Tree Set and Stack and use all methods.
9. Write a Python program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

TEXT BOOKS:

1. LEARNING TO PROGRAM WITH PYTHON by Richard L. Halterman.(2011)
2. Guttag, John. Introduction to Computation and Programming Using Python. Spring 2013 edition. MITPress,2013.

REFERENCES:

1. Programming Python, 4th Edition by Mark Lutz (2010) O'Reilly Media
2. Python Cookbook, 3rd Edition: Recipes for Mastering Python 3,byDavid Beazley and Brian K. Jones, on O'Reilly Atlas(2013)

OUTCOMES:

On completion of this course, Students will be able to,

- Define the structure and components of a Python program .
- Identify Python object types .
- Write loops and decision statements in Python.
- Implement lists, tuples, and dictionaries in Python programs.
- Explore Python code structure, including the use of functions.

CAC 2233**WEB DESIGN LABORATORY**

L	T	P	C
0	0	4	2

OBJECTIVES:

The aim of the course is to

Develop WebPages that present information, graphics and hypertext links to other WebPages in a cohesive manner

Identify HTML tags and CSS properties and use the text editor to construct the basic HTML and CSS structure for a webpage

Validate forms using JavaScript.

LIST OF PROGRAMS

1. Create a webpage to illustrate text formatting tags, order and unordered list
2. Develop a web page to display table and frames
3. Create a web page to embed an image map in a webpage.
4. Create a web page with all types of Cascading style sheets.
5. Design a web page using different CSS properties like border, background, text, and font.
6. Client-Side Scripts for Validating Web Form Controls
7. Develop a simple calculator using JavaScript
8. Designing a digital clock using JavaScript
9. Demonstrate string and math objects predefined methods available in JavaScript
10. To create a html registration form and perform validation.

TOTAL HOURS – 60**TEXT BOOKS:**

1. Developing Web Application, Wiley India Publication, Ralph Moseley, Wiley India,2007.
2. Web Enabled Commercial Application Development Using HTML, DHTML, PERL, Java Script, BPB Publications, Ivan Bayross,2005

REFERENCES:

1. HTML: The Complete Reference, Thomas A. Powell, 2000(I,II&III)
2. Beginning JavaScript 2nd Edition, Wrox, Nicholas C. Zakas,2004(IV)
3. PHP Bible, Wiley Publication, Tim Converse, Joyce Park,2002(V)

OUTCOMES:

On completion of the course, Students will be able to

- Demonstrate operations using HTML, CSS structures and JavaScript.
- Create a simple web site with tables and cascading style sheets.

SEMESTER V

CAC 3116	DIGITAL MARKETING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to,

- Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media
- Learn and develop, evaluate, and execute a comprehensive digital marketing strategy and plan
- Learn how to measure digital marketing efforts and calculate ROI
- Explore the latest digital ad technologies

MODULE I INTRODUCTION TO DIGITAL MARKETING 9

Digital marketing, Marketing v/s Sales, comparison between digital and traditional marketing, Benefits of Digital marketing, Digital marketing platforms and Strategies, Defining Marketing Goals, Latest Digital marketing trends, Case studies of Digital Campaigns

MODULE II SEARCH ENGINE OPTIMIZATION(SEO) 9

Components of Search Engines, SEO Keyword Planning, Meta Tags and Meta Description, Website Content Optimization, Back Link Strategies, Internal and External Links, Optimizing Site Structure Keywords in Blog and Articles, On Page SEO, Off Page SEO, Local SEO, Mobile SEO, Ecommerce SEO, Optimizing with Google Algorithms, Using Web Master Tool, Measuring SEO Effectiveness

MODULE III SOCIAL MEDIA MARKETING (SMM) 9

Introduction to social Media Marketing, Benefits of using SMM, Social Media Statistics, Social Media Strategy, Facebook Marketing, Word Press blog creation, Twitter marketing, LinkedIn Marketing, Google plus marketing, Social Media Analytical Tools

MODULE IV SEARCH ENGINE MARKETING (SEM) 9

Introduction to Search Engine Marketing, Tools used for Search engine Marketing, PPC/Google Adwords Tool, Display advertising techniques, Text Ads, CPC Bidding, CPC Bidding, Report generation

MODULE V APPLICATION**9**

Google Analytics, Online Reputation Management, E-Mail Marketing, Affiliate Marketing, Social Media Analytics, Ad designing

TOTAL HOURS: 45**TEXT BOOKS**

1. Ryan Deiss and Russ Hennesberry, "Digital Marketing for Dummies", 2017
2. Puneet Singh Bhatia, "Fundamentals of Digital Marketing", 2017

REFERENCES

1. Introduction to Programmatic Advertising By Dominik Kosorin, 2016
2. Blogging: A Practical Guide to Plan Your Blog: Start Your Profitable Home-Based Business with a Successful Blog by Jo and Dale Reardon, 2015
3. Email Persuasion: Captivate and Engage Your Audience, Build Authority and Generate More Sales With Email Marketing By Ian Brodie, 2013
4. Social Media Marketing All-In-One for Dummies By Jan Zimmerman and Deborah Ng, 2017

OUTCOMES:

On completion of this course, Students will be able to,

- Define and explain various terminologies associated with Digital Marketing.
- Apply the knowledge of Digital marketing concepts.
- Construct an appropriate marketing model.
- Analyze role and importance of digital marketing in a rapidly changing business landscape.
- Implement the key elements of a digital marketing strategy.

CAC3117	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to,

- Understand the importance and basic concepts of Artificial Intelligence.
- Know the important artificial intelligence algorithms in analysis.
- Understand the importance of knowledge representation in Artificial intelligence.
- Know the basic concepts of machine learning in Artificial intelligence.

MODULE I ARTIFICIAL INTELLIGENCE OVERVIEW 9

Overview: foundations, scope, problems, and approaches of AI. Intelligent agents: reactive, deliberative, goal-driven, utility-driven, and learning agents, Artificial Intelligence programming techniques

MODULE II PROBLEM SOLVING METHODS 9

Problem-solving through Search: forward and backward, state-space, blind, heuristic, problem-reduction, A, A*, AO*, minimax, constraint propagation, neural, stochastic, and evolutionary search algorithms, sample applications.

MODULE III KNOWLEDGE REPRESENTATION AND REASONING 9

Knowledge Representation and Reasoning: ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge, sample applications.

MODULE IV PLANNING AND CONSTRUCTION 9

Planning: planning as search, partial order planning, construction and use of planning graphs, Representing and Reasoning with Uncertain Knowledge: probability, connection to logic, independence, Bayes rule, Bayesian networks, probabilistic inference, sample applications.

MODULE V DECISION MAKING 9

Decision-Making: basics of utility theory, decision theory, sequential decision problems, elementary game theory, sample applications. Machine Learning and

Knowledge Acquisition: learning from memorization, examples, explanation, and exploration. Learning nearest neighbor, naive Bayes, and decision tree classifiers, Q-learning for learning action policies, applications.

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach, 3rd Edition, by Stuart Russell and Peter Norvig., 2009
2. Luger, G. F., & Stubblefield, W. A., Artificial Intelligence - Structures and Strategies for Complex Problem Solving. New York, NY: Addison Wesley, 5th edition (2005).

REFERENCES:

1. Nilsson, N. J., Principles of Artificial Intelligence. Palo Alto, CA: Tioga (1981).
2. Rich, E., & Knight, K., Artificial Intelligence. New York: McGraw-Hill (1991).

OUTCOMES:

After completing this course, students will be able to

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods.
- Implement basic AI algorithms Design and perform an empirical evaluation of different algorithms on a problem formalization

CAC3151	C# AND .NET PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to,

- Enable the students to learn and develop Web and Windows application for the .NETplatform.
- Gain a thorough understanding of the philosophy and architecture of .NET
- Acquire a working knowledge of the .NET programming model and.NET Security
- Learn how to implement database applications using.NET
- Learn how to debug .NET applications using .NET diagnostic classes and tools

MODULE I INTRODUCTIONTO .NET 9

Vision and goals of .NET, Building blocks of .Net, overview of .Net applications-.Net evolution- The .Net Framework Architecture- Intermediate Language(IL)- Common Language Runtime (CLR)- JIT Compilation- Common Type System (CTS)- Common Language System (CLS)- Assemblies- IL Disassembler (ILDasm.exe)- Namespaces. C# features Working with methods- understanding method structure- calling a method- understanding parameter types- overloading methods- virtual methods- over riding methods.

MODULE II METHODSANDEVENTS 9

Constants- fields- methods- properties- events- indexers- operators- constructors- destructors- static modifiers. Class Inheritance Compiling with multiple classes- virtual and override methods- abstract methods- sealed classes- Boxing and Un boxing- Working with namespaces- Understanding interfaces- handling exceptions.

MODULE III WINDOWSARCHITECTURE 9

Understanding Windows Forms Architecture- Windows controls: Common- Containers- Menus and Tool strips- Data- Reporting. Adding and using windows controls to the form.

MODULEIV DATA BASESANDOPERATIONS 9

Understanding the Dataset classes and their relatives- Understanding OLEDB and SQL Server Support- Understanding common database operations using ADO.NET

– Operations that don't return rows- Data operations that return single- row entities- data operations that affect single-row entities- data operations returning sets of rows- data operations affecting sets of rows- operations that return hierarchical data.

MODULE V ASP.NET ARCHITECTURE

9

Difference between ASP and ASP.Net- Defining a web application- ASP.NET architecture- ASP.net web forms- Code behind model- Validation controls in ASP.NET- Server controls and data binding- Grid view- data repeater- data list- Data binding in ASP.NET- Data source controls- sql data source- Data controls – grid view and details view- Login controls.

TOTAL HOURS: 45

TEXT BOOKS:

1. Jeff Ferguson, Brian Patterson, Jason Beres, C# Programming Bible, Wiley Publishing Inc., Reprint 2006.

REFERENCES:

1. Jeff Proise, Programming .Net, 2nd Edition, WP Publishers & Distributors Pvt Ltd, 2009.
2. Kevin Hoffman & Jeff Gabriel, Professional .Net Framework, 1st Edition, Wrox Press Publishers, 2006.

OUTCOMES:

On completion of this course, Students will be able to,

- Develop applications using ASP.NET.
- Build the client and server side programming using single call.
- Develop the experiment with the deployment of windows applications.
- Utilize the .NET framework to build distributed enterprise applications.
- Implement the concepts of object oriented programming.

CAC3115	R PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to,

- Understand the R programming environment and R Statistical Packages.
- Know the functions in R and important points in Comments and commands.
- Understand the important programming concepts of R, class and objects.
- Work with basic R commands, packages and accessing R packages

MODULE I INTRODUCTION TO SCIENTIFIC PROGRAMMING 9

Introduction to scientific programming, R basics, code editors for R, finding help, control structures, conditional executions, loops.

MODULE II FUNCTIONS AND COMMANDS 9

Functions in R, useful utilities, debugging utility, regular expressions, interpreting character string as expression, time-date-sleep, calling external software with system commands, running R commands.

MODULE III OBJECT ORIENTED PROGRAMMING IN R 9

Object oriented programming in R, define class and objects in R, assign generics and methods.

MODULE IV PACKAGES IN R 9

Packages in R, installation process of various packages in R, data science packages in R, Building R packages.

MODULE V USE CASES OF SCIENTIFIC PROGRAMMING USING R 9

Comparison of R with other scientific programming software, implementation of various industry use cases of scientific programming using R.

TOTAL HOURS – 45

TEXT BOOKS:

1. Mark Gardener, Beginning R: The Statistical Programming Language (2013).
2. Roger Peng R Programming for Data Science (2016)

REFERENCES:

1. Golemund, Garrett, Hands-On Programming with R(2014)
2. Garrett Wickham, Garrett Golemund, R for Data Science(2017)

OUTCOMES:

On completion of this course, students will be able to,

- Develop program in R and how to use R for effective data analysis.
- Use statistical packages for data analytics.
- Implement R packages in data analysis.
- Import external data into R for data processing and statistical analysis.

CAC 3153	SOFTWARE TESTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to,

Learn about the phases of software development lifecycle.

Understand various types of testing.

Understand the various design techniques and metrics of testing

Gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.

MODULE I INTRODUCTION TO SDLC 9

Phases in Software Development Life Cycle(SDLC) - Software Testing Life Cycle(STLC) - Requirement Analysis -Test Planning -Test Case Development - Environment Setup -Test Execution - Test Cycle Closure -Bug(Defect) Life Cycle.

MODULE II LEVELS OF TESTING 9

The need for Levels of Testing – Unit Testing – Integration testing –System Testing- User Acceptance testing(UAT) – Types of Testing -Black box testing and White box testing - Other Testing types – Regression Testing– Smoke testing - Sanity testing - Ad-hoc testing – Alpha, Beta Tests – Usability and Accessibility testing – Configuration testing –Compatibility testing.

MODULE III TEST CASE DESIGN TECHNIQUES 9

Test case Design Techniques – Using Black Box Approach to Test Case Design – Boundary Value Analysis – Equivalence Class Partitioning – Random Testing – Requirements based testing – Using White Box Approach to Test design – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Additional White box testing approaches- Evaluating Test Adequacy Criteria.

MODULE IV TEST MANAGEMENT AND CONTROL 9

Organization structures for testing teams – Test Planning – Test management tool – Test process – Defect Reporting and defect tracking - Reporting Test Results – Testing Metrics - project, process and productivity metrics.

**MODULE V TEST AUTOMATION FOR FUNCTIONAL TESTING
AND NON-FUNCTIONAL TESTING****9**

Software test automation – skills needed for automation – scope of automation requirements for a test tool- Selenium/QTP/J Meter - Performance/Load Testing – challenges in automation – Automation Test metrics and measurements.

TOTAL HOURS:45**TEXT BOOKS:**

1. Srinivasan Desikan and Gopalaswamy Ramesh, —Software Testing – Principles and Practices, Pearson Education, 2006.
2. Ron Patton, —Software Testing, Second Edition, Sams Publishing, Pearson Education, 2007. AULibrary.com

REFERENCE BOOKS:

1. Ilene Burnstein, —Practical Software Testing II, Springer International Edition, 2003.
2. Edward Kit Software Testing in the Real World – Improving the Process, Pearson Education, 1995.
3. Aditya P. Mathur, —Foundations of Software Testing _ Fundamental Algorithms and Techniques, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

OUTCOMES:

After completing this course, students will be able to,

- Apply software testing knowledge and engineering methods.
- Design test cases suitable for a software development.
- Identify suitable tests to be carried out and defect tracking.
- Prepare test planning based on the document.
- Document test plans and test cases designed.

CAC 3154	C# AND .NET PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

The objective of the course is to help students to,

- Obtain overall view of .NET technologies and its programming with C#
- Understand the concepts of interfaces and controls.

LIST OF PROGRAMS

1. To implement the concept of indexers
2. To implement the concept of sealed class
3. To implement the concept of namespace
4. To implement the concept of interfaces
5. To implement the concept of events
6. To implement exception handling
7. To design a calculator in windows form
8. To implement data controls in windows form
9. To implement validation controls in web form
10. To implement Data controls in web form
11. To implement SQL Data Reader in ADO.NET
12. To implement Dataset object in ADO.NET

TOTAL HOURS – 60**TEXT BOOKS:**

1. Jeff Ferguson, Brian Patterson, Jason Beres, C# Programming Bible, Wiley Publishing Inc., Reprint 2006.

REFERENCES:

1. Kevin Hoffman & Jeff Gabriel, Professional .Net Framework, 1st Edition, Wrox Press Publishers, 2006.
2. Jeff Prosise, Programming .Net, 2nd Edition, WP Publishers & Distributors Pvt. Ltd, 2009

OUTCOMES:

At the completion of this course, the student will be able to,

- Create and populate Windows Forms.
- Create and use user controls in a Windows Forms application
- Create menus in a Windows Forms application
- Add code to form and control event procedures in a Windows Forms application

CAC 3156**R PROGRAMMING LABORATORY****L T P C****0 0 4 2****OBJECTIVES:**

The objective of the course is to help students to ,

- Provide students a hands-on exposure to scientific programming using R.
- Provide wider knowledge to know about data structures in R and its types.
- Know about the statistical modeling with real time data.
- Know the customized graphical techniques in R using inbuilt graph packages.

LIST OF PROGRAMS:

1. Install and configure R, set working directory.
2. Implement basic R operations (data input, missing values, importing data into R)
3. Use R as a calculator
4. Explore various functionalities of data frames
5. Explore various functionalities of plots
6. Formal data exploration in R
7. Data summary in R
8. Sampling distribution and central limit theorem in R
9. Linear regression model in R
10. Data visualization using gg plots in R.
11. Create a scenario based on real time domain

Case Study - 1**Scientific Programming using R Lab**

The air pollution is one of the main causes of serious respiratory problem in the world especially difficulty in breathing in asthmatic patients. Several cities are on the radar of WHO (World Health Organization), which are about to touch the dangerous level. Sadly, India is one of the countries with maximum number of most polluted cities in the world.

Especially, on the onset of Diwali, the air quality index of Chennai soars to new heights. This year the air quality index has already crossed last year's post Diwali index.

To know the intricacies of the problem, we decided to do an analytical study for the factors that contribute most to air pollution in Chennai.

In this article, we share a case study on “Identifying Patterns in Chennai’s Air Pollution”, in which we closely studied the air quality data for Chennai, identified patterns, factors that lead to rise in air pollution across three key locations in Chennai. On this occasion of Diwali, we want to sensitize the readers towards celebrating environmentally safe Diwali this year. The rate at which urban air pollution has grown across India is alarming. A vast majority of cities are caught in the toxic web as air quality fails to meet health- based standards. Almost all cities are reeling under severe particulate pollution while newer pollutants like oxides of nitrogen and air toxics have begun to add to the public health challenge. According to WHO, India ranks among the world’s most polluted countries. Out of the 20 most polluted cities in the world, 13 are in India. In which, Chennai is the one among the most polluted city in India today.

Exposure to particulate matter for a long time can lead to respiratory and cardiovascular diseases such as asthma, bronchitis, lung cancer and heart attack. Last year, the Global Burden of Disease study pinned outdoor air pollution as the fifth largest killer in India, after high blood pressure, indoor air pollution, tobacco smoking, and poor nutrition. In 2010, about 620,000 early deaths in India occurred from air pollution-related diseases. The Central Pollution Control Board (CPCB) sponsored the study that links the pollutants, pm10 (particulate matter smaller than 10 microns), the cause of these diseases. The central regulatory authority recently regulated stricter norms for a number of air toxins and pollutants but omitted revision of the standard for pm 10.

We feel, if we closely study the Air Quality Data, we should be able to identify patterns (spike in air pollution levels) and identify correlating factors on key levels of Air Pollution across Chennai. Also as part of the exercise, we wanted to study the impact of Government sponsored Initiatives like ‘Odd-Even’ Pilot Project Phase II. The Phase I of the ‘Odd- Even’ experiment was a huge success in terms of people compliance and reduction of traffic congestion; it had very little impact on the Air Pollution levels during the Campaign period. It is also important to understand the behaviour of meteorological parameters in the planetary boundary layer because, atmosphere is the medium in which air pollutants are transported away from the source, which is governed by the meteorological parameters such as atmospheric wind speed, wind direction, and temperature. Air pollutants are being let out into the atmosphere from a variety of sources, and the concentration of pollutants in the ambient air depends not only on the quantities that are emitted but also the ability of the

atmosphere, either to absorb or disperse these pollutants. There were conflicting reports in media on the actual cause of air pollution in Chennai. Some sections claimed vehicles as the main source of pollution, while others held road dust & construction debris responsible. But the root cause of the problem is Industrial pollution.

Through this study, we hope to develop some insights that can help organizations (State / Central Pollution Control Boards & NGOs) to advocate more stringent policies to control air pollution.

- Study Air Pollution Data for various locations in Chennai to identify patterns of spike in Air Pollution levels w.r.t to various monitored parameters
- Identify the Meteorological factors that correlate with the air pollution levels for the respective locations using R Functions
- Explore the possibility of developing a Predictive Model for predicting the levels for key pollutants like PM 5 using suitable R predictive model.
- Explore the factors which most impact on air pollution PM 5 using R PCA analysis and Factor Analysis.

Case Study - 2

Scientific Programming using R Lab

High concentrations of certain harmful algae in rivers constitute a serious ecological problem with a strong impact not only on river life forms, but also on water quality. Being able to monitor and perform an early forecast of algae blooms is essential to improving the quality of rivers.

With the goal of addressing this prediction problem, several water samples were collected in different European rivers at different times during a period of approximately 1 year. For each water sample, different chemical properties were measured as well as the frequency of occurrence of seven harmful algae. Some other characteristics of the water collection process were also stored, such as the season of the year, the river size, and the river speed.

One of the main motivations behind this application lies in the fact that chemical monitoring is cheap and easily automated, while the biological analysis of the samples to identify the algae that are present in the water involves microscopic examination, requires trained manpower, and is therefore both expensive and slow. As such, obtaining models that are able to accurately predict the algae frequencies based on chemical properties would facilitate the creation of cheap and automated systems for monitoring harmful algae blooms.

Another objective of this study is to provide a better understanding of the

factors influencing the algae frequencies. Namely, we want to understand how these frequencies are related to certain chemical attributes of water samples as well as other characteristics of the samples (like season of the year, type of river, etc.).

The data available for this problem was collected in the context of the ERUDIT1 research Network and used in the COIL 1999 international data analysis competition. It is available from several sources, such as in the UCI Machine Learning Repository of data sets.² There are two main datasets for this problem. The first consists of data for 200 water samples. To be more precise, each observation in the available datasets is in effect an aggregation of several water samples collected from the same river over a period of 3 months, during the same season of the year. Each observation contains information on 11 variables. Three of these variables are nominal and describe the season of the year when the water samples to be aggregated were collected, as well as the size and speed of the river in question. The eight remaining variables are values of different chemical parameters measured in the water samples forming the aggregation.

Exercises:

1. Load the Data into R
2. Visualize and summarize data and interpret
3. Find Data normality assumptions
4. Remove the Observations with Unknown Values
5. Fill in the Unknowns with the Most Frequent Values
6. Fill in the Unknown Values by Exploring Correlations
7. Fill in the Unknown Values by Exploring Similarities between Cases

TOTAL HOURS – 60**REFERENCES:**

1. Golemund, Garrett, Hands-On Programming with R, 2014.
2. Garrett Wickham, Garrett Golemund, R for Data Science 2017.

OUTCOMES:

On completion of this course, students will be able to,

- Work on R, use its features in the field of data science.
- Explain the statistical model building and post testing.
- Apply the graphical techniques in R programming.

SEMESTER VI

CAC3254	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to

- Understand the fundamental principles of Software Project management
- Be familiar with the different methods and techniques used for project management.
- Understand the and gain knowledge of the issues and challenges faced while doing the Software project Management.
- do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques

MODULE I INTRODUCTION TO SOFTWARE PROJECT ANAGEMENT 9

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

MODULE II PROJECT EVALUATION 9

Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation – software effort estimation.

MODULE III ACTIVITY PLANNING 9

Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – forward Pass – backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature of Risk – Types of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning and Control.

MODULE IV MONITORING AND CONTROL 9

Resource allocation – identifying and scheduling resources – publishing resource and cost schedule – scheduling sequence – Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back to Target – change control – Managing Contracts – Introduction – Types of Contract – Stages In Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance

MODULE V MANAGING PEOPLE AND ORGANIZING TEAMS 9

Introduction – Understanding Behavior – Organizational Behaviour – Selecting the Right person. Instruction In The Best Methods – Motivation– The Oldman Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.

Total Hours- 45

TEXT BOOK:

1. Hughes, "Mike Cotterell, Rajib Mall, Software Project Management", 5th Edition, The McGraw-Hill Higher Education, ISBN :13:978-0-07-10724- 8 , 2011.

REFERENCE:

1. S. A. Kelkar, "Software Project Management: A Concise Study", 3rd edition, PHI learning pvt Ltd, ISBN: 9788120347021, 2013.
2. Robert K. Wysocki, "Effective Project Management – Traditional, Agile, Extreme", 6th Edition, Wiley Publication, ISBN: 1118080653, 2011.

OUTCOMES:

At the completion of this course, the student will able to

- Understand and practice the process of project management and its application in delivering successful IT projects
- Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities
- Identify the resources required for a project and to produce a work plan and resource schedule

CAC3204	ENTERPRISE APPLICATION DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to,

- Understand many domains those are providing enterprise services like banking, manufacturing and insurance etc.
- Develop an enterprise application, servers as well as supported servers commonly known as clusters
- Gain knowledge about various enterprise applications.
- Learn to use Java enterprise applications, enterprise architecture and enterprise mobility and provide training.

MODULE I INTRODUCTION TO ENTERPRISE APPLICATION 9

Enterprise Architecture - Life Cycle, Development Framework, architectural model- Conceptual Layers, Enterprise IT architecture domain, Enterprise Server- Introduction, different types of enterprise servers, set up clusters; Enterprise Resource Planning (ERP)-Customer Relationship management (CRM)-Supply Chain Management (SCM) and HRM; Enterprise Java- Introduction to web application and its life cycle; Different containers.

MODULE II WEB TIER 9

XML and Java API for XML processing – Introduction to JAXP; DOM, SAX and Stax Interface; XSLT; Serve lets- Introduction; Serve et Lifecycle; sessions; session tracking using hidden fields, user authentication, URL rewriting and cookies; Inter-serve let Communication; Java Server Pages (JSP) – Introduction to JSP tags; JSP life cycle; Directives; Custom JSP tags; Java Server Faces technology – Introduction to page navigation; tags, life cycle and architecture.

MODULE III ENTERPRISE INFORMATION SYSTEMSTIER 9

Java database connectivity – Introduction; Different types of drivers; Steps to establish a connection and query it; Java persistence API- JPA Architecture; Entities; Entity Relationship; Managing Entities; Java Transaction API (JTA) – Transactions in J2EE; Serializability; Concurrent Transactions; Distributed Transaction and Transaction manager; Mobile Database – Need for mobile database; Architecture; different products; Mobile transactions.

MODULE IV BUSINESS TIER 9

Enterprise java Beans (EJB) – EJB Container; Enterprise Beans; Session Beans; Message driven beans; JAX-WS Web service endpoints- Introduction to creating web service client; Business Intelligence and Data-warehousing – Data Model; Data Integrity, OLAP,Application in an enterprise, Model view controller MVC Architecture – Introduction , Model1,Model2architecture.

MODULE V ENTERPRISE MOBILITY 9

Introduction to Enterprise Mobility; Trends and Benefits, Drivers, Risks and analysis; Enterprise mobility architecture- High level architecture, Building MODULE s; Capability Model; Meta Model- Mobile Device security; Enterprise Mobility infrastructure; Secure VOIP; Enterprise Mobility Middleware solutions – MEAP s, Native Apps,HTML5

TOTAL HOURS: 45**TEXT BOOKS:**

1. Head First Servlets and JSP by Bryan Basham,Kathy Sierra and Bert Bates fromO'ReillyMedia,INC,2008
2. Java Server Faces: The complete Reference by Chris Schalk, Ed Burns and JamesHolmes,2006
3. A practical Guide to Enterprise Architecture byJamesMcGovern,2003

REFERENCES:

1. David R Heffelfinger, Java EE 6 Development using Glass Fish Application Server,PacktPublishing.2014
2. Ted Neward Effective Enterprisejava2004
3. Robert Eckstein and J.Steven Perry Java Enterprise Bestpractices2002

OUTCOMES:

At the end of course students will be able to ,

- Understand the concepts of enterprise application development and enterprise mobility
- Learn the various tiers in enterprise application development
- Develop java enterprise applications

CAC 3205**PROJECT**

L	T	P	C
0	0	32	16

OBJECTIVES:

The main objectives of the Project is,

- To understand the software engineering process including budgeting through Project.
- To plan for various activities of the project and distribute the work amongst team members.
- To cultivate hardware implementation skills using an appropriate tool.
- To practice and develop presentation skills by giving seminars on the Project.
- To understand the importance of document design by compiling Technical Report on the Project work carried out.

The students will undertake a project as part of their final semester. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.

If the student chooses to undertake an industry project, then the topic should be informed to the mentor, and the student should appear for intermediate valuations. Prior to undertaking this project the students undergo a bridge course.

Bridge Course:

The bridge course ensures that all the students have the correct prerequisite knowledge before their industry interface. The purpose of a bridge course is to prepare for a healthy interaction with industry and to meet their expectations. It would be difficult to establish standards without appropriate backgrounds and therefore to bridge this gap, students are put through week mandatory classroom participation where faculty and other experts will give adequate inputs in application based subjects, IT and soft skills.

The Project:

Each student will be allotted a Faculty Guide and an Industry Guide during the

internship/project work. Students need to maintain a Project Diary and update the project progress, work reports in the project diary. Every student must submit a detailed project report as per the provided template. In the case of team projects, a single copy of these items must be submitted but each team member will be required to submit an individual report detailing their own contribution to the project student/group should be allotted a supervisor and periodic internal review shall be conducted which is evaluated by panel of examiners.

Project Evaluation Guidelines:

The Project evaluator(s) verify and validate the information presented in the project report.

The break-up of marks would be as follows:

1. Internal Evaluation
2. External Assessment
3. Viva Voce

Internal Evaluation:

Internal Evaluator of project needs to evaluate Internal Project work based on the following criteria:

- Project Scope , Objectives and Deliverables
- Research Work, Understanding of concepts
- Output of Results and Proper Documentation
- Interim Reports and Presentations– Twice during the course of the project

External Evaluation:

The Project evaluator(s) perform the External Assessment based on the following criteria.

- Understanding of the Project Concept
- Delivery Skill
- The Final Project Report
- Originality and Novelty

The Final Project Report Details:

- The report should have an excel sheet that documents the work of every project member

Viva Voce

- Handling questions

Clarity and Communication Skill Marking Scheme:

1. Internal Evaluation: 35% of Total Marks
2. External Evaluation: 50% of Total Marks
3. Viva Voce: 15 % of Total Marks

For e.g., if the total mark for the project is 100, then Internal Evaluation = 35 marks

The break-up of marks is shown below:-

- Interim Evaluation 1:10marks
- Interim Evaluation 2:10marks
- Understanding of concepts:5marks
- Programming technique:5marks
- Execution of code : 5 marks

External Evaluation = 50 marks

The break-up of marks is shown below:-

- Project Report:15marks
- Explanation of project working:10marks
- Execution of code: 10 marks – (if done in industry, a stand-alone MODULE can be reprogrammed and submitted. Error rectification etc. can be included by the evaluator)
- Participation in coding:15marks
- Viva Voce =15marks

The break-up of marks is shown below: -

- Questions related to project:10marks
- Questions related to technology:5marks

The Project evaluator(s) verifies and validates the information presented in the project report.

OUTCOMES:

On completion of the Project, students will be able to

- Apply the practical knowledge to solve real time applications.
- Describe real time problem / research project scopes, objectives and deliverables.
- Design fundamental unified modeling language diagrams covering all modules of the project.
- Code effective programs to develop user interface design, processing logic and generate reports.
- Implement software/ electronic hardware by learning required testing and troubleshooting tools.
- Demonstrate the working project to the end user with consolidated project report.

ELECTIVES – IV SEMESTER

CACX 04	E-COMMERCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to ,

- Learn the E-Commerce Platform and its concepts
- Understand the Technology, infrastructure and Business in E-Commerce
- Understand the Security and Challenges in E-Commerce
- Build an Own E-Commerce using Open Source Frameworks

MODULE I INTRODUCTION 9

Traditional commerce and E commerce – Internet and WWW – role of WWW – value chains – strategic business and Industry value chains – role of E commerce - The Importance of the Internet for E-commerce - The Growth of the On-Demand Economy.

MODULE II BUILDING AN E-COMMERCE WEBSITE, MOBILE SITE AND APPS 9

Systematic approach to build an E-Commerce: Planning, System Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web Performance – Choosing hardware and software – Other E-Commerce Site tools – Developing a Mobile Website and Mobile App.

MODULE III E-COMMERCE SECURITY AND PAYMENT SYSTEMS 9

E-Commerce Security Environment – Security threats in E-Commerce – Technology Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Business Procedure and Public Laws - Payment Systems.

MODULE IV BUSINESS CONCEPTS IN E-COMMERCE 9

Digital Commerce Marketing and Advertising strategies and tools – Internet Marketing Technologies – Social Marketing – Mobile Marketing – Location based Marketing – Ethical, Social, Political Issues in E-Commerce.

MODULE V PROJECT CASESTUDY**9**

Case Study: Identify Key components, strategy, B2B, B2C Models of E-commerce Business model of any e-commerce website - Mini Project: Develop E-Commerce project in any one of Platforms like Woo-Commerce, Magento or Open cart

TOTAL HOURS - 45**TEXT BOOKS:**

1. E-commerce, Mamta Bhusry, Firewall Media, An Imprint of Laxmi Publications Pvt. Ltd. Edition: First 2005

REFERENCES:

1. E-Commerce, P. T. Joseph, S. J. Third edition, Prentice Hall of India Pvt. Lt, New Delhi, 2008.
2. Electronic Commerce, PeteLoshin/ JhonVacca Firewall Media, An Imprint of Laxmi Publications Pvt. Ltd, New Delhi , Fourth Edition: 2004
3. David Whiteley, " E-Commerce", Tata McGrawHill,2000
4. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce", PearsonEducation,2000

OUTCOMES:

At the completion of this course, the students will able to,

- Analyze the impact of E-commerce on business models and strategy.
- Recognize and discuss global E-commerce issues.
- Identify the legal issues and privacy in E-Commerce.
- Identify the strengths and weaknesses of different Electronic payment systems.
- Apply different cryptographic techniques.

CACX 47	INFORMATION RETRIEVAL	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to ,

- Learn the information retrieval models.
- Be familiar with Web Search Engine.
- Expose to Link Analysis.
- Understand Hadoop and Map Reduce.
- Learn document text mining techniques.

MODULE I INTRODUCTION 9

Introduction -History of IR- Components of IR – Issues –Open source Search engine Frameworks–The impact of the web on IR– The role of artificial intelligence (AI)in IRIR Versus Web Search – Components of a Search engine-Characterizing the web.

MODULE II INFORMATION RETRIEVAL 9

Boolean and vector-space retrieval models- Term weighting – TF-IDF weighting cosine similarity – Preprocessing – Inverted indices – efficient processing with sparse vectors – Language Model based IR – Probabilistic IR –Latent Semantic Indexing – Relevance feedback and query expansion.

MODULE III WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING 9

Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement – search engine optimization/spam – Web Search Architectures – crawling – meta-crawlers- Focused Crawling – web indexes – Near-duplicate detection – Index Compression – XML retrieval.

MODULE IV WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH 9

Link Analysis –hubs and authorities – Page Rank and HITS algorithms - Searching and Ranking – Relevance Scoring and ranking for Web – Similarity – Hadoop& Map Reduce Evaluation – Personalized search – Collaborative filtering and content-based recommendation of documents and products – handling “invisible” Web – Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.

MODULE V DOCUMENT TEXT MINING**9**

Information filtering; organization and relevance feedback – Text Mining -Text classification and clustering – Categorization algorithms: naive Bayes; decision trees; and nearest neighbor – Clustering algorithms: agglomerative clustering; k means; expectation maximization (EM).

TOTAL HOURS- 45**TEXT BOOKS:**

1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval, Cambridge University Press, 2008.
2. Ricardo Baeza -Yates and Berthier Ribeiro – Neto, Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books 2011.
3. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009.

REFERENCES:

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2. Ophir Frieder “Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series “, 2nd Edition, Springer, 2004.
3. Manu Konchady, “Building Search Applications: Lucene, Ling Pipe”, and First Edition, Gate Mustru Publishing, 2008.

OUTCOMES:

On Completion of the course the students will be able to,

- Apply information retrieval models.
- Design Web Search Engine.
- Use Link Analysis.
- Use Hadoop and Map Reduce.
- Apply document text mining techniques

CACX 48	SOCIAL MEDIA ANALYSIS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to ,

- Give an overview of social networks and its importance.
- Understand the social network concepts and various methods of analysis.
- Expose and train on various tools and techniques for analyzing and visualizing social media networks.

MODULE I INTRODUCTION TO SOCIAL NETWORKS AND SNA 8

Connected World – Networks: Actors, Relations and Attributes - Networks as Information Maps - Networks as Conduits – Leaders and Followers – Psychological foundations of social networks – Basic building Blocks – Brief history of Social Network Analysis.

MODULE II NETWORK CONCEPTS 8

Individual Members of the Network – Sociological Questions about Relationships – Whole Social Networks- Distributions – Multiplexity – Roles and Positions – Network Segmentation – Graph Theory – Notations for Social Network Data .

MODULE III SOCIAL NETWORK ANALYSIS FUNDAMENTALS 9

Points, Lines and Density – Centrality and Centralization – Components, Cores and Cliques – Positions, Roles and Clusters – Dimensions and Displays.

MODULE IV METHODS OF SOCIAL NETWORK ANALYSIS 10

Graphs – Matrices – Relationship Measures – Centrality and Prestiges – Cliques – Structural Equivalence – Visual Displays – Book models – Network Position Measures – Logit Models – Affiliation networks – Lattices- Levels of Analysis

MODULE V TOOLS AND TECHNOLOGIES 10

Twitter Analytics – Facebook Analytics – Google+ Analytics – Google+ Ripples – R for Social Network Analysis – Pajek – Network Visualization Tools – Analyzing Social Media Networks with NodeXL.

TOTAL HOURS: 45

TEXT BOOKS:

1. Charles Kadushin, "Understanding Social Networks: Theories, Concepts, and Findings", Oxford University Press, USA, 2011.
2. David Knoke, Song Yang, "Social Network Analysis", 2nd Edition, SAGE Publications, 2007.

REFERENCES:

1. Christina Prell, "Social Network Analysis: History, Theory and Methodology", 1st Edition, SAGE Publications Ltd, 2012.

OUTCOMES:

On Completion of this course the students will be able to,

- Analyze social network data using various software packages.
- Implement statistical models of social networks to analyze network formation and evolution.
- Implement the basic concepts and theories of network analysis in the social sciences.
- Use statistical software to visualize networks and analyze their properties.

CACX 49	ONLINE COMPUTER ADVERTISING	L	T	P	C
		3	0	0	3

OBJECTIVES

The objective of the course is to

- Provide an understanding of the Internet as advertising and the process of selling an online ad program
- Know the trends and issues concerning the current and evolving forms of Internet- based advertising and brand communication media;
- Provide an overview of the processes and elements considered in the Conceptualizing and production of integrated brand communication campaigns
- Learn how online ads are priced and delivered, along with key measurement metrics

MODULE I ONLINE ADVERTISING 9

Internet advertising- Definition-Advantage-Players in the Internet advertising Industry- Online Ad models-Advertising via email-web-testing-buttons-text links sponsorships-push technology-Interstitials-screensavers-bookmarks-cursorsUndervalued web space

MODULE II TARGETING APPROACHES 9

A Unique Element in Online Advertising-Demographic Targeting -Contextual Targeting- Behavioral Targeting-Geographic Targeting -Affinity Targeting - Purchase-Based Category Targeting-Key Considerations in Online Targeting - Direct Email-Banner advertising-Mini-page-Direct response piece-Loyalty programs-coupons-free samples- trials-contests and games

MODULE III DISPLAY ADVERTISEMENT ONLINE 9

Standard Online Advertising Formats-Creative Factors That Influence Display Advertising -Effectiveness-Rich Media Advertising on Broadband-Online Video Advertising Online Advertising Reach and Frequency Concepts-Strategies for Managing Online Reach and Frequency- Frequency of Online Advertising-Reach and Site Visiting-Winning Strategies in Online Advertising -Generate Leads and Acquire Customers- Generate Brand Preference to Stimulate Sales -Brand Growth, Rewards, and Loyalty

MODULE IV WEB MEASUREMENT 9

Terminology –Log Analysis-Web measurement Tools-Problems with Web measurement -Ad Management-Ad Management for Publishers–Advertisers – Targeting –Content and context-Registration Information-Database Mining Profiling and Personalization-Pricing Online Ads-Pricing Models-Trends in pricing

MODULE V BUYING AND SELLING ONLINE ADS 9

Buying Online Ads-Determine campaign goals-Site selection process –Paying for Media buys-Pricing for buys-Allocating campaign budget -Selling Online Advertising-Preparing site's infrastructure-Monitoring and measuring traffic-Ad models Ad management- Auditing-Media kit- selling strategies-Sales Staff

TOTAL HOURS: 45**TEXT BOOKS :**

1. Joe Plummer, Steve Rappaport, Taddy Hall, and Robert Barocci, The Online Advertising Playbook, John Wiley & Sons, Inc. (Hoboken, New Jersey), 2007.

REFERENCE BOOKS:

1. RobbinZeff and Brad Aronson (ZA book from here on), Advertising on the Internet, 2nd edition, John Wiley & Sons, Inc. (New York, NY),1999.

OUTCOMES

On Completion of this course the students will be able to,

- Analyze/measure/assess the relevant theories, practice, digital ads, legal issues, ethical challenges in the fields of advertising and marketing communication.
- Design effective visual communication for various advertising approaches that combine the use of print, online/digital and other multimedia communication.
- Create different strategies and execution of an ad campaign for a client(s).
- Develop advertising media buying and planning strategies.

CACX50	PHP PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to

- Learn how to build good web applications using PHP language.
- Install PHP and work with arrays and regular experiment.
- Handle the exceptions and file operations.

MODULE I INTRODUCTIONTOPHP 9

PHP installation and Introduction, Syntax, Variables-Data types- Operators and expressions-Decisions and Loops-Function- Arrays with attributes-Creating and String- String related Library functions- Regular Expression.

MODULE II ADVANCEDPHP 9

Introduction to OOPS- Class- methods- Constructors and Destructors, Access Modifiers-Inheritance-Abstract class-Interface-Error and Exceptional Handling-File Handling-PHP date and time.

MODULE III PHPFORMSANDIMAGES 9

Form Handling –PHP Interactive Forms-PHP GET & POST-Form Validation-PHP Form sanitization-PHP Form URL/E-mail –Basics of Computer Graphics-Creating Image- Manipulating Image-Using Text in Image-Watermarks to Image .

MODULE IV PHPWITH MYSQLANDCMS 9

Database Basics-My SQL Create-database operation-Executing Query-Joins-Order By- Group By-Advantages of a CMS, Different types of CMS, Examples , Drupal -- Installation – Content Management, Structure – Site Building – MODULE s – Theming.

MODULE V PHPAPPLICATIONFRAMEWORKS 9

Web Development Frameworks – Introduction – Yii – Model View Controller –Yii PHP framework– PHP XML Parsers-PHP XML Expat-PHP XML DOM-PHP Mail.

TOTAL HOURS: 45

TEXT BOOK:

1. Kevin Tatroe, Peter MacIntyre, Rasmus Lerdorf, "Programming PHP", Creating Dynamic Web Pages, O'Reilly Media, 3rd Edition, 2013

REFERENCES:

1. <http://php.net>
2. <http://www.tutorialspoint.com/php/index.html>

OUTCOMES:

On Completion of this course the students will be able to,

- Design a web project to use real-time processing capabilities to interact with a database.
- Test and debug PHP application.
- Apply the Model View controller pattern for web applications.
- Pass information from client browser to web server for transaction processing
- Work with high-performance PHP framework for developing Web2.0 applications.

CACX51	WEB MINING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to

- Provide students with a sound basis in Web data mining tasks and techniques.
- Ensure that students are able to implement and to use some of the important Web Mining algorithms.
- Evaluate Web Mining techniques in their workplace.

MODULE I INTRODUCTION TO WEB INTELLIGENCE 9

Historical Perspective - Towards Intelligent Web - Knowledge Web Mining- Building Better Web sites using Intelligent Technologies - Benefits of Intelligent Web

MODULE II WEB USAGE MINING 9

Introduction to Web Mining- Web usage Mining - Web Log Processing -Analyzing Web Logs- Web Usage Mining Applications

MODULE III WEB CONTENT MINING 9

Introduction- Data Collections - Search Engines - Robot Exclusion - Personalization of Web Content - MULTIMEDIA INFORMATION RETRIEVAL

MODULE IV WEB STRUCTURE MINING 9

Introduction - Modeling Web Topology - Other Approaches to Studying the Web-Link Structure.

MODULE V WEBMINING APPLICATIONS 9

Data integration for e-commerce - Web personalization - Web content and structure mining- Web data warehousing - Review of tools, applications, and systems

TOTAL HOURS: 45

TEXTBOOKS:

1. Data Mining Techniques for Marketing, Sales, and Customer Relationship Management, Third Edition, by Michael Berry and Gordon Linoff, JohnWiley,2011

2. Data Mining: Practical Machine Learning Tools and Techniques, by Ian Witten and Eibe Frank, 3rd Ed., Morgan Kaufmann, 2011
3. Web Data Mining: Exploring Hyperlinks, Content, and Usage Data, by Bing Liu, 2nd Edition, Springer, 2011.

REFERENCES

1. R. Akerkar & P. Lingras; Jones & Bartlett Building an Intelligent Web: Theory & Practice, 2007.
2. Mining the Web, Discovering Knowledge from Hypertext Data, Soumen Chakrabarti, Morgan Kaufmann Publishers, 2003

OUTCOMES:

On Completion of this course the students will be able to,

- Apply web mining techniques and analyze complex information and social networks.
- Become familiar with classic and recent developments in Web search and data mining skills.
- Implement the Search engine techniques and Page ranking methodology in web search.
- Describe several models to interpret emergent features such as the structure and evolution of the Web graph, its traffic patterns, and Information retrieval.
- Apply technical and analytic skills to develop significant Business Intelligence from online resources.

CACX 52	HUMAN COMPUTER INTERACTION	L	T	P	C
		3	0	0	3

OBJECTIVES

The objective of the course is to ,

- Determine the need for computers and evaluate the use of computers
- Identify the stages in software engineering that need to be modified for effectiveness of interacting with computers
- Discover the various models that can be used for designing system

MODULE I DESIGN PROCESS 9

Introduction : Importance of user Interface – definition, importance of good design. Benefits of good design. Need for Interaction – Models — Paradigms – Designing of Interactive systems – Usability — Interaction design basics – Complexity of design Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds

MODULE II DESIGN AND EVALUATION OF INTERACTIVE SYSTEMS 9

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, - Principles of user interface. Design rules – maximum usability – Principles – Standards and guidelines – design patterns

MODULE III SOFTWARE TOOLS AND COMPONENTS 9

Programming Tools – Windowing systems – Interaction tool kit –Evaluation techniques – evaluation design – Evaluating implementations – Observational Methods ,text and messages, Icons– Multimedia, colors, uses problems, choosing colors.

MODULE IV MODELS 9

Universal design principles – Multimodal systems – User Support – Presentation and Implementation Issues – types – requirements – approaches – Cognitive model – Hierarchical model – Linguistic model – physical and device models – Socio-technical models – Communication and Collaboration models – Task models – Task analysis and design

**MODULE V EXPERIMENTAL DESIGN AND STATISTICAL
ANALYSIS OF HCI****9**

Basic Design structure – Single independent variable – multiple independent variable – factorial design – split-plot design – random errors – experimental procedure – Statistical analysis – T tests – Analysis of Variance test – Regression – Chi-Square test – Survey – Probabilistic sampling – Non-probabilistic sampling – developing survey questions

TOTAL HOURS: 45**TEXT BOOKS:**

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale Human Computer Interaction, 3rd Edition PrenticeHall,2004.
2. Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, Research Methods in Human Computer Interaction,Wiley,2010.
3. The essential guide to user interface design, Wilbert O Galitz,Wiley Dreama Tech.

REFERENCES

1. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Ealg, Human – Computer Interaction.PEARSON,2003
2. Prece, Rogers Wiley Dream tech InteractionDesign,2011

OUTCOMES

On Completion of this course the students will be able to,

- Explain Computer components functions regarding interaction with human.
- Demonstrate Understanding of Interaction between the human and computer components.
- Implement Interaction design basics.
- Implement various test strategies in statistical analysis

ELECTIVES – V SEMESTER

CACX 55	HEALTH CARE ANALYTICS	L	T	P	C
		3	0	0	3

OBJECTIVES

The objective of the course is to help students to

- Learn about the basic concepts of health care system.
- Create and maintain health care information systems
- Gain knowledge about IT governance and assessment of health care information

MODULE I INTRODUCTION 9

Introduction to health care information – Health care data quality – Health care information regulations, laws and standards.

MODULE II HEALTHCARE INFORMATION SYSTEMS 9

History and evolution of health care information systems – Current and emerging use of clinical information systems – system acquisition – System implementation and support.

MODULE III INFORMATIONTECHNOLOGY 9

Information architecture and technologies that support health care information systems Health care information system standards – Security of health care information systems.

MODULE IV MANAGEMENT OF IT CHALLENGES 9

Organizing information technology services – IT alignment and strategic planning – IT governance and management.

MODULE V IT INITIATIVES 9

Management's role in major IT initiatives – Assessing and achieving value in health care information systems. Case study

TOTAL HOURS: 45

TEXT BOOKS:

1. Karen A Wager, Frances Wickham Lee, John P Glaser, "Managing Health Care Information Systems: A Practical Approach for Health Care Executives", John Wiley 2ndedition2009.
2. Marion J. Ball, Charlotte Weaver, Joan Kiel,"Healthcare Information Management Systems: Cases, Strategies, and Solutions", Springer, 2010, 3 rd edition
3. Rudi Van De Velde and Patrice Degoulet, "Clinical Information Systems: A Component based approach",Springer2005.

REFERENCE BOOKS:

1. Kevin Beaver, Healthcare Information Systems, Second edition Best Practices, CRCPress,2002
2. Marion J. Ball Healthcare Information Management Systems: A Practical Guide Springer-VerlagGmbH,1995

OUTCOMES:

On completion of this course, students will be able to

- Identify, analyze the computing requirements of a problem and Solve them using computing principles.
- Design and Evaluate a computer based system, components and process to meet the specific needs of applications.
- Use current techniques and tools necessary for complex computing practices.
- Use suitable architecture or platform on design and implementation with respect to performance Develop and integrate effectively system based components into user environment.
- Apply the understanding of management principles with computing knowledge to manage the projects in multidisciplinary environments.

CACX56	AGILE METHODOLOGY	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to,

- Understand the important basic concepts of agile methodology.
- Know the importance of agile values and principles.
- Understand the foundations of agile delivery methods and XP and AM.
- To know the agile project development phases and identifying scope of agile project.

MODULE I INTRODUCTION 9

Introduction to Disciplined Agile Delivery, Context Counts--The Agile Scaling Model, Disciplined Agile Delivery (DAD) Process Framework, People First approach, Learning Oriented approach, A Hybrid Process Framework, Goal-Driven Delivery Lifecycle, Enterprise Aware .

MODULE II AGILE PRINCIPLES 9

Introduction to Agile and Lean, Toward a Disciplined Agile Manifesto, Disciplined Agile Values, Disciplined Agile Principles, Lean Principles.

MODULE III AGILE MODELING 9

Foundations of Disciplined Agile Delivery, the Terminology Tar Pit, Scrum, Extreme Programming (XP), Agile Modeling (AM), Agile Data, Lean Software Development.

MODULE IV AGILE ROLE 9

People first approach, Roles, Rights, and Responsibilities, The Rights of Everyone, The Responsibilities of Everyone, The DAD Roles, Forming Disciplined Agile Delivery Teams.

MODULE V AGILE DELIVERY 9

Initiating a Disciplined Agile Delivery Project, the Inception Phase, Identifying a Project Vision, Identifying the Initial Scope, Identifying an Initial Technical Strategy, Initial Release Planning, Forming the Work Environment.

TOTAL HOURS: 45

TEXT BOOKS:

1. S.W. Ambler, M. Lines, Disciplined Agile Delivery: A Practitioner's Guide to Agile Software Delivery in the Enterprise, IBM Press, 2012.
2. K. Beck, Test Driven Development: By Example, Addison-Wesley, 2002.
3. K. Beck, C. Andres, Extreme Programming Explained: Embrace Change, 2nd Edition, Addison-Wesley, 2004.

REFERENCES:

1. M. Cohn, Succeeding with Agile: Software Development Using Scrum, Addison Wesley, 2010.
2. K.S. Rubin, Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison-Wesley, 2012.

OUTCOMES:

On Completion of this course the students will be able to,

- Describe agile software development methodologies and approaches.
- Identify the benefits and pitfalls of transition to agile.
- Apply various features and components of agile methodology in the field of data science.
- Analyze the teams rely less on up-front requirements and documentation than on face-to-face conversations.
- Identify the agile development accelerates the delivery of initial business value.

CACX57	HUMAN RESOURCES MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES

The objective of the course is to help students to,

- Understand about management issues related to staffing, training, performance, compensation,
- Understand human factors consideration and compliance with human resource requirements.
- Students will gain knowledge and skills needed for success as a human resources professional

MODULE I PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT 5

Evolution of human resource management – The importance of the human factor – Challenges – Inclusive growth and affirmative action -Role of human resource manager Human resource policies – Computer applications in human resource management – Human resource accounting and audit.

MODULE II THE CONCEPT OF BESTFIT EMPLOYEE 8

Importance of Human Resource Planning – Forecasting human resource requirement – matching supply and demand - Internal and External sources. Recruitment - Selection – induction – Socialization benefits.

MODULE III TRAINING AND EXECUTIVE DEVELOPMENT 10

Types of training methods –purpose- benefits- resistance. Executive development programmes – Common practices - Benefits – Self development – Knowledge management.

MODULE IV SUSTAINING EMPLOYEE INTEREST 12

Compensation plan – Reward – Motivation – Application of theories of motivation Career management – Development of mentor –Protégé relationships.

MODULE V PERFORMANCE EVALUATION AND CONTROL PROCESS 10

Method of performance evaluation – Feedback – Industry practices. Promotion, Demotion, Transfer and Separation – Implication of job change. The control process –Importance – Methods – Requirement of effective control systems grievances –

Causes Implications – Redressal methods.

TOTAL HOURS: 45

TEXTBOOKS

1. Dessler Human Resource Management, Pearson Education Limited, 2007
2. Decenzo and Robbins, Human Resource Management, Wiley, 8th Edition, 2007.

REFERENCES

1. Luis R. Gomez-Mejia, David B. Balkin, Robert L. Cardy. Managing Human Resource. PHI Learning. 2012
2. Bernadin, Human Resource Management, Tata McGraw Hill, 8th edition 2012.
3. Wayne Cascio, Managing Human Resource, McGraw Hill, 2007.
4. Ivancevich, Human Resource Management, McGraw Hill 2012.
5. Uday Kumar Haldar, Juthika Sarkar. Human Resource management. Oxford. 2012

OUTCOMES

After completing this course, students will be able to ,

- Develop, implement, and evaluate employee orientation, training, and development programs.
- Facilitate and support effective employee and labour relations in both non-union and union environments.
- Manage own professional development and provide leadership to others in the achievement of ongoing competence in human resources professional practice.

CACX58	EMPLOYABILITY SKILLS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of the course is to help students to,

- Qualify themselves for employment to work in a corporate sector
- Gain technical knowledge and experience and interpersonal skills like speaking skills.
- Acquire Professional etiquettes and so on.
- Everyday interactions with people, both in personal and professional lives.

MODULE I SPEAKINGSKILLS 9

Group Discussions; Importance of Group Discussions; Difference between Group Discussion, Panel Discussion and Debate; Format of GD as used in national level recruitment boards, Rules, ambience and normal practices, Dos and Don'ts in Group Discussions, Traits Evaluated in GDs

MODULE II MANNERISM 9

Introduction; Professional etiquette – Etiquette at meetings, Dining, Involuntary Awkward Actions; Technology Etiquette – Phone, Email, Social Media, Video Conferencing, Web interview

MODULE III PROFESSIONAL PRESENTATIONS 9

Nature of Oral Presentation; Planning a Presentation, Preparing the Presentation; Delivering the Presentation .

MODULE IV INTERVIEW ETIQUETTE 9

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview & panel interview – FAQs related to job interviews.

MODULE V STRESS MANAGEMENT 9

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long term career plan-making career changes

TOTAL HOURS: 45

TEXT BOOKS:

1. Edgar Thorpe and Showick Thorpe Objective English: 3 rd Edition, Pearson Publishers,2010
2. Patsy Mc Carthy& Caroline Hatcher Presentation skills. The essential guide for students, Sagepublications,2002.

REFERENCES:

1. Gajendra Singh Chauhan & Sangeeta Sharma Soft Skills – An integrated approach to Maximize Personality, WileyPublications2011

OUTCOMES:

On Completion of this course the students will be able to,

- Explore their values and career choices through individual skill assessments.
- Develop and practice self management skills for the work site.
- Explore and practice basic communication skills.
- Learn skills for discussing and resolving problems on the work site.
- Assess and improve personal grooming.