B.S. Abdur Rahman

Crescent

Institute of Science & Technology

Deemed to be University u/s 3 of the UGC Act, 1956
GST Road, Vandalur, Chennai 600 048

REGULATIONS 2016

CURRICULUM AND SYLLABI

B.C.A

CLOUD TECHNOLOGY AND INFORMATION SECURITY

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 Engineering, Science, Technology and Management and to play a vital role in the Socio-Economic progress of the Country.

MISSION

The Department of Computer Applications, endeavors

- 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, teamwork 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.

VISION AND MISSION OFTHE 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, endeavors

- 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.

PROGRAMME EDUCATIONAL OBJECTIVES:

The students of BCA- Cloud Technology Programme would be able to

- Produce graduates who will be competent professionals in IT industry, academics, government, or entrepreneurs.
- Adapt to the fast changing world of Information Technology needs.
- Become effective collaborators and through innovative methodologies, they will be able to address the social, technical and business challenges.
- be a good team player and in course of time will be able to lead the team to find solutions and improvements in their field of expertise.
- Communicate efficiently and effectively.
- Function in multiple disciplinary teams.
- Understand the need for lifelong learning and IT skill up gradation, through taking up certifications or higher education.
- Understand professional and ethical responsibilities.

PROGRAMME OUTCOMES:

On successful completion of the programme, the graduates will have

- Enable students to appreciate the importance of Cloud Computing and assess the need of resources for a given scenario
- Implement a classroom + practical oriented curriculum that helps students understand the Security features which is required as part of Cloud offered by various providers
- Practically demonstrate various administrative features to be carried on Servers running on different platforms including Virtualization
- Provide a platform for students to understand and manage various infrastructure services of cloud like data centre and storage
- Equip students with learning on various Cloud Architectural Patterns which will help in providing solutions for various cloud platforms related scenarios
- Imparting the required knowledge that ensures understanding of fundamental concepts, design and controls strategy, application security in web technology, tools and techniques to secure information

- Training the students on non-technical skills necessary to enable their successful transition into corporate roles
- Emphasizing the importance of adherence to a high standard of ethical behaviour Emphasizing the importance of adherence to a high standard of ethical behaviour

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 Big Data Analytics

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 (Cloud Technology and Information Security)	120 - 126
2	B.C.A (Mobile Applications and Information Security)	120 - 126

3	B.C.A (Big Data Science)	120 - 130
4	B.Sc. (Computer Science)	120 – 126
5	B.Sc. (Bio Technology)	145 – 150
6	B.B.A (Financial Services)	120 - 125
7	B.Com	150 – 158
8	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 that 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 Ci, is the number of credits assigned for the ith course and GPi is the Grade Point in the ith 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 & TECHNOLOGY

B.C.A (BACHELOR OF COMPUTER APPLICATIONS

IN CLOUD TECHNOLOGY AND INFORMATION SECURITY

CURRICULUM & SYLLABUS, REGULATIONS 2016

SEMESTER I

Sl. No.	Course Code	Course Title	L	T	P	C	
1	ENC1182	General English – I	3	0	0	3	
2	MAC1187	Algebra ,Calculus and Trigonometry	3	1	0	4	
3	CAC1101	Communication Skills	3	0	0	3	
4	CAC1102	Computer Fundamentals & Organization	3	0	0	3	
5	CAC1103	Programming in C	3	0	0	3	
6	CAC1104	Introduction to Linux	3	0	0	3	
7	CAC1105	Programming in C Lab	0	0	3	1	
8	CAC1106	Linux Lab	0	0	3	1	**21**

SEMESTER II

Sl. No.	Course Code	Course Title	L	T	P	C	
1	ENC1283	General English – II	3	0	0	3	
2	MAC1288	Probability and Statistics	3	1	0	4	
3	CAC1201	Fundamentals of Storage Management	3	0	0	3	
4	CAC1202	Operating System	3	0	0	3	
5	CAC1203	OOPS with C++	3	0	0	3	
6	CAC1204	Data Structures using C	3	0	0	3	
7	CAC1205	OOPS with C++ Lab	0	0	3	1	
8	CAC1206	Data Structures Lab	0	0	3	1	
9	CAC1256	Environmental Studies	2	0	0	2	**23**

SEMESTER III

Sl. No.	Course Code	Course Title	L	T	P	C	
1	CAC2101	Reasoning and Thinking	3	0	0	3	
2	CAC2102	Information Security Fundamentals	3	0	0	3	
3	CAC2103	Software Engineering	3	0	0	3	
4	CAC2104	RDBMS	3	0	0	3	
5	CAC2105	Computer Networks	3	0	0	3	
6	CAC2106	Programming in JAVA	3	0	0	3	
7	CAC2107	RDBMS Lab	0	0	3	1	
8	CAC2108	Programming in JAVA Lab	0	0	3	1	**20**

SEMESTER IV

Sl. No.	Course Code	Course Title	L	T	P	C	
1	CAC2211	Server Operating System	3	0	0	3	
2	CAC2202	Ethical Hacking Fundamentals	3	0	0	3	
3	CAC2203	Cryptography Fundamentals	3	0	0	3	
4	CAC2212	Introduction to Cloud Technology	3	0	0	3	
5	CAC2213	Fundamentals of Datacenter	3	0	0	3	
6	CAC2214	Introduction to Public Speaking	2	0	0	2	
7	CAC2207	Ethical Hacking – Lab	0	0	4	2	
8	CAC2215	Server Operating System -Lab	0	0	4	2	**21**

SEMESTER V

Sl. No.	Course Code	Course Title	L	T	P	C	
1	CAC3101	Computer Forensics and Investigation	3	0	0	3	
2	CAC3102	Virtualization and Cloud Security	3	0	0	3	
3	CAC3103	IT Governance, Risk, & Information Security Management	3	0	0	3	
4	CAC3111	Linux Administration	3	0	0	3	
5	CAC3112	Introduction to Cloud Computing Solution	3	0	0	3	
6	CAC3113	Principles of Virtualization	3	0	0	3	
7	CAC3107	Computer Forensics and Investigation – lab	0	0	4	2	
8	CAC3114	Principles of Virtualization – Lab	0	0	4	2	**22**

SEMESTER VI

Sl. No.	Course Code	Course Title	L	T	P	C	
1	CAC3211	Mobile, wireless and VOIP Security	3	0	0	3	
2	CAC3202	Project and Viva-Voce	0	0	24	16	**19**

TOTAL CREDITS – 126

ENC1182	GENERAL ENGLISH - I	L	T	P	C
		3	0	0	3

OBJECTIVES:

To help the students acquire efficiency in Spoken English through role plays.

- To enable them to make Presentation effectively.

- To develop reading skills among students through extensive readers.

- To orient them in writing letters.

- To train them in appreciating and interpreting English literature.

MODULE I   7
Oral and Written Communication – implications in real life and workplace situations
Essential English Grammar - 1-6 units

MODULE II   8
One–minute Presentations (JAM) on concrete and abstract topics that test their creative thinking (ii) Prepared presentations and extempore presentations
Short Story ; O Henry - "Robe of Peace" (Extensive Reading)

MODULE III   8
Role-Play – establishing a point of view - convincing someone on social issues such as preservation of water, fuel, protection of environment, gender discrimination.
Poetry: William Shakespeare - "All the World's a Stage"

MODULE IV   8
Letter Writing- Letter of Invitation & Permission
Developing story from hints- Short Story : John Galsworthy - "Quality" (Extensive Reading)

MODULE V   8
Précis Writing- Writing instructions and recommendations
Reading Comprehension: Short Story--Rudyard Kipling – "The Miracle of Puran Bhagat"(Extensive Reading)

MODULE VI   **6**

Written correspondence - - e-mail writing

Prose : Education, Employment, Unemployment

TOTAL HOURS – 45

TEXT BOOKS:

'Prism: Spoken and Written Communication, Prose & Poetry', Orient Longman

REFERENCES:

1. Anderson, Kenneth & et.al. "Study Speaking : A Course in Spoken English for Academic Purposes" (Second Edition). Cambridge University Press, UK. 2004.

2. Sharma, R.C. & Krishna Mohan, "Business Correspondence and Report Writing". Tata MacGraw – Hill Publishing Company Limited, New Delhi. 2002

3. Hurlock, B. Elizabeth. "Personality Development". Tata McGraw Hill, New York. 2004.

4. Krishnaswamy. N, Sriraman T. Current English for Colleges. Hyderabad: Macmillan Indian Ltd,   2006.

5. Dahiya SPS. Ed. Vision in Verse- An Anthology of Poems. New Delhi: Oxford University Press,   2002

6. Murphy, Raymond. Essential English Grammar. New Delhi: Cambridge University Press, 2009.

7. Seshadri, K G Ed. Stories for Colleges. Chennai: Macmillan India Ltd, 2003.

OUTCOMES:

Students would be able to

- Actively take part in role plays
- Make effective presentation s
- Read and comprehend various texts.
- Write letters without making mistakes.
- Analyse literary texts.

MAC1187	ALGEBRA, CALCULUS AND TRIGONOMETRY	L	T	P	C
		3	1	0	4

OBJECTIVES:

The course is aimed at

• Developing the skills of students in applying basic concepts in chosen topics of mathematics that are imperative for effective understanding of application oriented topics.

• Laying the foundation for learning concepts of Differentiation, Integration and Trigonometry.

MODULE I   MATRICES   (9+3)

Symmetric – Skew-Symmetric - Orthogonal and Unitary matrices - Rank of a Matrix -Consistency - Characteristic equation – Eigen values 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 sinx and cosx - 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.

L : 45, T : 15, 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:

On completion of the course the students will be able to

• solve eigenvalue 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.

CAC1101	COMMUNICATION SKILLS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The course is aimed at

- Make students to feel the significance of communicating well and how it can have a profound effect in both our professional and personal lives.
- Students will learn various aspects of managerial writing including report writing.
- Business writing like Quote creation, Business letters, Orders, Complains and etc. are also taught to students.

MODULE I   INTRODUCTION TO COMMUNICATION   9

Purpose of Communication, Models of Communication, Components of Communication, Types of Communication, Methods of Communication, Advantages of Communication, 7 C's of Communication.

MODULE II   BASIC SKILLS-READING AND SPEAKING SKILLS   9

Jargons (Terms in relation to their course programme DS, Cloud, MAIS), Synonyms and Antonyms, Pronunciation (**Homonyms, Homographs and Homophones**), Rate of Speech (**Expanding Acronyms and Abbreviations)**, Intonation and Tones (**Direct and Indirect, Punctuation**).

MODULE III   BASIC SKILL: TECHNICAL WRITING SKILL   9

Listening and comprehending the conversations, Comprehension Passage, Correction of errors, Dialogue Conversations, Discourse Markers, Group activities (Role Plays and JAM)

MODULE IV   BASIC SKILL: LISTENING AND SPEAKING   9
**   SKILLS**

Reading and Interpretation, Intensive and Critical reading, Description and Process Descriptions, Instructions and Summarizing, Oral presentations, Debate, Group Discussion.

MODULE V   TECHNICAL WRITING AND COMMUNICATION   9

Memos and Checklists, Essay Writing, Note making and taking, Letter – formal, informal, Editing and Correction of errors, Definitions and extended definition, Resume Preparation, Review of books and films, Recommendation.

TOTAL HOURS – 45

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.Ashraf Rizvi, "Effective Technical Communication",Tata mcGraw-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:

Students would be able to:

- Overcome their inhibitions and limitations in communication and become effective communicators.
- Learn to compose letters in English error-free and communicate effectively with their peers, colleagues, managers and so on, via appropriate business communication forms.
- Increase their vocabulary.
- Get trained in writing skills
- Improve their reading skills

CAC1102 COMPUTER FUNDAMENTALS &ORGANIZATION

L	T	P	C
3	0	0	3

OBJECTIVES:

* The course is aimed at:
* Providing basic knowledge of how computer works, which is important for any networking or operating system professional.
* Providing functional knowledge of computers working and its main building parts are paramount.
* The computers of today may come with variety of features but the basic working principles remain the same.
* Explore the fundamentals of organization of a computer, principles and building units of a computer (its hardware).
* At the completion of this course students will be introduced to the basics of networking and MS Office.

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, OMR, OCR, MICR, scanner, mouse, .

MODULE III   COMPUTER HARDWARE AND SOFTWARE   9

Computer hardware and software, 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, 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   MS OFFICE   9

Word processing and electronic spread sheet, 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 BOOKS:

1. Rajaraman, V (1999): Fundamentals of Computers, Prentice Hall India
2. Hamacher, Computer Organization McGrawhill
3. Alexis Leon: Computers for everyone. Vikas, UBS

REFERENCE BOOKS:

1. Alexis Leon and Mathews Leon (1999) : Fundamentals of information Technology, Leon Techworld Pub.
2. Jain, S K (1999) : Information Technology "O" level made simple, BPB Pub
3. Jain V K (2000) "O" Level Personal Computer software, BPB Pub.
4. Anil Madaan : Illustrated Computer Encyclopedia. Dreamland Pub
5. Sinha. Computer Fundamentals BPB Pub.

OUTCOMES:

Students are provided learning experiences that enable them to:

- Gain in-depth knowledge about the general features of a computer,
- Introduce them to various features of computer, on which they can base their learning and design.
- Insight to the different software and hardware components of a computer will take them a step ahead in terms of what they can accomplish from their learning.
- Provides knowledge about fundamentals of organization of a computer.
- Provides knowledge of softwares in MS-Office.

CAC1103	**PROGRAMMING IN C**	L	T	P	C
		3	**0**	**0**	**3**

OBJECTIVES:

The aims of the course to :

- Provide introduction to several high level languages and frameworks, the development of procedural codes is important in several commercial app developments.

- Provides object oriented platforms and event driven systems which uses procedural languages for coding integral command content.

- Provide C language that was developed initially to write the UNIX operating system.

- Gives knowledge about UNIX operating system, C compiler and all UNIX application programs are written in C.

- Focus on all basic concepts, syntax and constructs of the C language

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 constructs**-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 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 retuning 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

REFERENCES:
1. The C programming Language by Richie and Kenninghan, 2nd Edition, BPB Publication
2. Programming in ANSI C by Balaguruswamy, 5th Edition, Tata McGraw Hill

OUTCOMES:

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

- Write simple programs using C Language and execute them.

- Study, analyze, understand logical structure and compare various programming methodologies of a computer program, and different construct to develop a program in 'C' language.

CAC1104   **INTRODUCTION TO LINUX**   L   T   P   C

                                          3   0   0   3

OBJECTIVES:

At the end of this course the learner is expected:

- To provide an overview of the Linux Operating System, geared toward new users as an exploration tour and getting started guide.
- To help the learners get a better understanding of the Linux system.
- To provide the guidelines for the learners to take up vendor certifications.
- To explore the basics of Linux, the underlying management of the Linux operating system and its network configuration.
- To complete system services of Linux is explained along with the troubleshooting.

MODULE I   **LINUX INTRODUCTION**   9

Introduction to Multi user System, History of UNIX, Features & Benefits, Versions of UNIX, Features of UNIX File System,, Commonly Used Commands like who, pwd, cd, mkdir, rm, rmdir, ls, mv, ln, chmod, cp, grep, sed, awk ,tr, yacc etc. getting Started (Login/Logout) . Creating and viewing files using cat, file comparisons, View files, disk related commands, checking disk free spaces. **Exploring Linux Flavors -** Introduction to various Linux flavors, Debian and rpm packages, Vendors providing DEBIAN & RPM distribution & Features. Ubuntu. History, Versions, Installation, Features, Ubuntu one, Fedora: History, Versions, Installation, Features.

MODULE II   **THE UNIX FILE SYSTEM**   9

Inodes - Structure of a regular file – Directories - Conversion of a path name to an inode - Super block - Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open – Read - Write - Lseek – Close - File creation - Creation of special files - Changing directory and root - changing owner and mode – stat and fstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link.

MODULE III   **UNIX PROCESS MANAGEMENT**   9

The Structure of Processes: Process States and Transitions - Layout of system memory - Context of a process. Process Control: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell.

MODULE IV   VI EDITOR

Vi Editor: Introduction to Text Processing, Command & edit Mode, Invoking vi, deleting & inserting Line, Deleting & Replacing Character, Searching for Strings, Yanking, Running Shell Command Macros, Set Window, Set Auto Indent, Set No. Communicating with Other Users: who, mail, wall, send, mesg, ftp.

MODULE V   SYSTEM ADMINISTRATION   9

Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of user's accounts, creating and mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command

TOTAL HOURS – 45

TEXT BOOKS:

1. The Design of Unix Operating System, Maurice J. Bach, Pearson Education, 2010
2. Advance UNIX, a Programmer's Guide, S. Prata, BPB Publications, and New Delhi, 2011
3. Unix Concepts and Applications, Sumitabh Das, 2010
4.

REFERENCES:

1. The UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice Hall of India. 2009
2. Guide to UNIX Using LINUX, Jack Dent Tony Gaddis, Vikas/ Thomson Pub. House Pvt. Ltd. 2010

OUTCOMES:

Students are provided learning experiences that enable them to:
- To have a hands on practical exposure to the Linux Red Hat Enterprise.
- To be able to learn basic commands in Linux.
- To get knowledge about File system.
- To write linux shell programs in Linux environment.
- To provide knowledge to prepare for the RHCE Certification.

CAC1105   **PROGRAMMING IN C LAB**   L   T   P   C

0   0   3   1

OBJECTIVES:

The aim of the course is

- To introduce basic concepts in C programming.
- To introduce the implementation of conditional and control statements.
- To get familiarized with the arrays and its implementation.
- To introduce the concepts of structures and files in C.
- To make students understand the implementation of Files using C.

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.
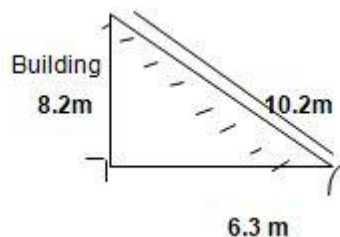
3. Write a C program to find whether a given number is Odd or Even. Also if entered number is even, print half of that number and if odd, print double the number as output.

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. Six among them had weights above 70 kg and they were recorded as 74 kg, 87kg, 79kg, 71 kg, 85 kg and 93kg. Write a C program to find the greatest weight using an array.

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 163cm, 171 cm, 158 cm, 167cm, 175cm, 160cm, 173 cm, 149 cm, 180cm and 154cm.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
Day 1	10	5	5
Day 2	8	4	2
Day 3	5	10	10
Day/Item	Notebook	Whitener	Marker

Day 1	3	6	5
Day 2	2	1	3
Day 3	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.

27. Create a scenario based on real time domain.

TOTAL HOURS :30

OUTCOMES:

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

- To apply good programming methods for program development.
- To design and implement simple programs.
- To write program using conditional and control constructs.
- To develop programs using recursive functions.
- To write simple applications using arrays, files and structures.

CAC1106	LINUX LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

The Students should be able to

- Explore Unix shell commands
- Be familiar with an editor on Unix
- Program in Shell script for any application.
- Write shell script with shell command for Linux platform.

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

   a. Get manual help and display the detailed information about bash
   b. Display the time to be taken for executing a file
   c. Change the mode of a fruits file to Read only to all users
   d. Count the number of words in vegetables file.
   e. Count the Number of Characters in Fruits file.

6. Create a file called marklist 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

   a. Print the 3rd and 4th column on the screen alone
   b. Print a row which has 'r' character
   c. Print all columns
   d. Search **Computer** from the marklist file
   e. Replace 'i' to 'x' in the file marklist
   f. Remove a marklist from the directory

7. Create a file in vi editor and do the following

   a) Type 1-10 numbers and repeat it for two times using macros
   b) Find the current working directory inside vi editor
   c) Open two files horizontally
   d) Add line numbers
   e) Split the window
   f) Search all the occurrences of the word TEXT

8. Create a file in vi editor and do the following

   a) Insert a line in the beginning and end of line
   b) Yank the last line of the text and paste as first line.
   c) List all the files with detailed information from this directory inside vi editor
   d) Change all the occurrences of the word TEXT to UNIX
   e) Swap first and second paragraph

9. Disk related commands and communication commands in Unix

    a) Find the disk used space in your directory .

    b)Find disk free space in your directory with options.

    c) 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 .

11. Write a shell program that prompts user for a starting value and counts up from there and execute it.

12. Write a shell program to execute shell program which displays the menu and executes the option selected by user.

Menu

- who
- pwd
- ls –l
- who am i
- ls -a

13. Write a shell program to accept user name and reports if user log has logged in.

14. Create a data file called employee in the format given below:

a. EmpCode   Character

b. EmpName   Character

c. Grade   Character

d. Years of experience   Numeric

e. Basic Pay   Numeric

$vi employee

A001	ARJUN	E1	01	12000.00
A006	Anand	E1	01	12450.00
A010	Rajesh	E2	03	14500.00

A002   Mohan   E2   02   13000.00

A005   John   E2   01   14500.00

A009   Denial SmithE2   04   17500.00

A004   Williams   E1   01   12000.00

Perform the following functions on the file:

a. Sort the file on EmpCode.

b.Sort the file on

    (i) Decreasing order of basic pay

    (ii) Increasing order of years of experience.

c. Display the number of employees whose details are included in the file.

d. Display all records with 'smith' a part of employee name.

e. Display all records with EmpName starting with 'B'.

f. Display the records on Employees whose grade is E2 and have work experience of 2 to 5 years.

g.Store in 'file 1' the names of all employees whose basic pay is between 10000 and 15000.

h.Display records of all employees who are not in grade E2.

15. Create a scenario based on real time domain.

TOTAL HOURS – 15

OUTCOMES:
At the end of the course the students should be able to
- Use Shell commands.
- Design and Implement Unix shell script.
- Have a hands on practical exposure to the Linux Red Hat Enterprise
- Prepare for RHCE Certification

SEMESTER II

ENC1283   **GENERAL ENGLISH-II**   L   T   P   C

                                          3   0   0   3

OBJECTIVES:

- To prepare students for Interviews and Group Discussions
- To train them in writing official letters, resume' writing and reports.
- To train them in analyzing different genre of literature.

MODULE I   7

Filling Money Order Challan and Bank Challan

Short Story :G.K.Chesterton – The Hammer of God (Extensive Reading)

Essential English Grammar – 7-12 units

MODULE II   8

Brainstorming – Think, pair and share activity

Poetry **:** Walt Whitman- I Celebrate Myself

MODULE III   8

Dialogue Writing- Discussion etiquette -Assigning different roles in a GD (Note-taker, Manager, Leader and Reporter)

Prose**:** Environment

MODULE IV   8

Interview skills- SWOT Analysis

Letter Writing- Letter to the Editor- Letter of Application and CV

MODULE V   8

Report Writing- feasibility report and survey report

Short Story : Katherine Mansfield—A Cup of Tea (Extensive Reading)

MODULE VI   6

Technical reports –Writing a technical report – format and content

TOTAL HOURS – 45

TEXT BOOKS

1. English Vocabulary Made Easy,Prof. Shrikant Prasoon,Excel Series
2. English Grammar,Wren & Martin,Chand
3. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.
4. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, & Applications, Pearson Education.

REFERENCES:

1. M. Ashraf Rizvi 'Effective Technical Communication". Tata McGraw – Hill Education, 2005. Gerson, Sharon & Steven M. Gerson, " Technical Writing : Process and Product"
2. Pearson Education, New Delhi, 2004. 6. Riordan & Pauley. 'Report Writing Today'. 9th Edition. Wadsworth Cengage Learning, USA. 2005.
3. Krishnaswamy. N, Sriraman T. **Current English for Colleges.** Hyderabad: Macmillan Indian Ltd,   2006.
4. Dahiya SPS. Ed. **Vision in Verse- An Anthology of Poems**. New Delhi: Oxford University Press, 2002.
5. Murphy, Raymond. **Essential English Grammar**. New Delhi: Cambridge University Press, 2009.
6. Seshadri, K G Ed. **Stories for Colleges.** Chennai: Macmillan India Ltd, 2003.

OUTCOMES:

Students would be able to:

- Take part in group discussions and interviews with confidence.
- Write official letters, their application letter with CV and reports.
- Analyse various genre of literature.

MAC1288	PROBABILITY AND STATISTICS	L	T	P	C
		3	1	0	4

OBJECTIVES:

This course is 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   (10+3) FUNCTIONS

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   (8+3) FUNCTIONS

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

MODULE III   TWO DIMENSIONAL RANDOM VARIABLES   (6+3)

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

MODULE IV   DESCRIPTIVE STATISTICS   (8+3)

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   (9+3)

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, Prentice Hall, 2011.

2. Dr. P. Kandaswamy, Dr. K. Thilagavathy and Dr. K. Gunavathy, Probability and Queuing Theory, Revised edition, S. Chand Publishing, 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, New Delhi, 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 Book Co., 1974.
5. Sheldon M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, Fourth Edition, Elsevier.

OUTCOMES:

On completion of the 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.

CAC1201	FUNDAMENTALS OF STORAGE	L	T	P	C
	MANAGEMENT	3	0	0	3

OBJECTIVES:

The aim of the course is to:

- Get introduced with advance computing like cloud computing, data storage has also undergone many transformations in terms of techniques and hardware used for the same.
- Learn different aspects of data storage.
- Learn fundamentals of data storage, covering topics like demands on data, how storage techniques have evolved over a period of time and vital information about storage topologies like DAS, NAS and SAN, along with their comparison features.
- Get knowledge about the different hardware required for storage like adapters, connectors, cables and their individual features.
- Learn about different storage protocols used like ATA, SATA, SPI and its sub-categories will be taught to students in the following units.

**MODULE I   INTRODUCTION TO INFORMATION STORAGE AND   9
MANAGEMENT**

Information Storage: Data – Types of Data –Information - Storage , Evolution of Storage Technology and Architecture, Data Center Infrastructure - Core elements- Key Requirements for Data Center Elements -Managing Storage Infrastructure, Key Challenges in Managing Information, Information Lifecycle - Information Lifecycle Management - ILM Implementation -ILM Benefits ,Summary

MODULE II   STORAGE SYSTEM ENVIRONMENT   9

Components of a Storage System Environment – Host –Connectivity – Storage, Disk Drive Components –Platter – Spindle - Read/Write Head - Actuator Arm Assembly - Controller - Physical Disk Structure - Zoned Bit Recording - Logical Block Addressing , Disk Drive Performance -1 Disk Service Time , Fundamental Laws Governing Disk Performance , Logical Components of the Host - Operating System - Device Driver -Volume Manager - File System – Application , Application Requirements and Disk Performance, Summary

**MODULE III   RAID   AND   STORAGE   NETWORKING   9
TECHNOLOGIES**

Implementation of RAID - Software RAID - Hardware RAID -RAID Array Component

-RAID Levels - Striping -Mirroring -Parity RAID 0 RAID 1 -Nested RAID -RAID 3 - RAID 4 -RAID 5 --RAID 6 -RAID Comparison -RAID Impact on Disk-Performance - Application IOPS and RAID Configurations - Introduction to Direct Attached Storage – Types of DAS – Introduction to SAN – Components of SAN – FC connectivity – FC topologies – Introduction to NAS – NAS components – NAS Implementation – NAS File sharing

MODULE IV   BACKUP AND RECOVERY   9

Introduction to Business Continuity - Backup Purpose   -Disaster Recovery - Operational Backup –Archival,   Backup Considerations,   Backup Granularity, Recovery Considerations,   Backup Methods , Backup Process,   Backup and Restore Operations,   Backup Topologies -   Server less Backup , Backup Technologies -Backup to Tape - Physical Tape Library - Backup to Disk - Virtual Tape Library

MODULE V   REPLICATION – LOCAL AND REMOTE   9
Source and Target -Uses of Local Replicas, Data Consistency - Consistency of a Replicated File System - Consistency of a Replicated Database , Local Replication Technologies - Host-Based Local Replication - Storage Array-Based Replication , Res tore and Restart Considerations - Tracking Changes to Source and Target , Creating Multiple Replicas, Management Interface – Remote Replication Modes – Remote Replication Technologies – Network Infrastructure

TOTAL HOURS – 45

TEXT BOOKS:

1. Storage Networks: The Complete Reference, Robert Spalding, Tata McGraw Hill Publication, 2003

REFERENCES:

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley; 2nd edition (2012) .

OUTCOMES:

At the end of the course the student will be able to:
- Get knowledge of data storage techniques using various storage topologies and their comparisons.

- Provide students to choose the best suitable data storage method for their programs and applications.
- Be trained in different storage protocols.
- Gain in knowledge in different hardware required for storage.
- Be able to understand the fundamentals of data storage.

CAC1202	OPERATING SYSTEM	L	T	P	C
		3	0	0	3

OBJECTIVES:

The course aims to:

- Provide an introduction to operating system that is the most important program that runs on a computer.
- Learn basic tasks of Operating systems, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.
- Provide knowledge about the concept of operating system and its applications.
- Learn about Process Management in Operating systems
- Understand Memory Management and its uses.

MODULE I   INTRODUCTION TO OPERATING SYSTEM   7

Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines

MODULE II   PROCESS MANAGEMENT   11

Processes: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems. **Threads:** Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, Threading issues. **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models. **Process Synchronization:** Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions **Deadlocks:** System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

MODULE III   MEMORY MANAGEMENT   9

Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging. **Virtual Management**: Demand paging, Process creation, Page Replacement Algorithms, Allocation of

Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation

MODULE IV   FILE-SYSTEM AND DISK MANAGEMENT   10

File concept, Access Methods, Directory structure, File- system Mounting, File sharing, Protection and consistency semantics File-System Implementation: File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery Disk Management: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation

MODULE V   PROTECTION AND SECURITY   8

Protection: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Acess Matrix, Revocation of Access Rights, Capability- Based Systems, Language – Based Protection. **Security:** Security Problem, User Authentication, One – Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications

                                                     TOTAL HOURS –   45

TEXT BOOKS:

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 10 April 2010.
2. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
3. Silberschatz / Galvin / Gagne, Operating System,9th Edition(2016).

REFERENCES:

1. William Stallings,Operating System, 9th Edition,2011 Pearson Education.
2. H.M.Deitel, Operating systems, 3rd Edition ,Pearson Education
3. Abraham Silberschatz and peter Baer Galvin, Operating System Concepts, 8th Edition, Pearson Education   (Chapter   1,3.1,3.2,3.3,3.4,3.6,4,5,6 (Except 6.8,6.9), 7, 8,9,10,11,13, (Except 13.6) 19 (Except 19.6),20(Except 20.8, 20.9), 22,23)
4. Nutt: Operating Systems, 3/e Pearson Education 2012.

OUTCOMES:

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

- Understand the fundamental concepts in Operating system including how OS has

evolved over the years.

- Be familiar with different components of OS, and significant functions of OS like Process management, storage and memory management etc.
- Provide the necessary information about the maximum benefits out of the OS while developing programs, working with applications and etc.
- Understand the basic tasks of Operating systems.
- Gain knowledge about Protection and Security in operating system.

CAC1203   **OOPS WITH C++**   **L   T   P   C**

                                                3   0   0   3

OBJECTIVES:

The aim of the course is to:

- Learn the basic concept and techniques which form the object oriented programming paradigm.
- Understand Object-oriented programming using models organizes around real world concept.
- Understand the Fundamental construct which is the object that combines both data-structure and behaviour in a single entity which is in contrast to conventional programming in which data-structure and behaviour are loosely connected.
- Create programs using Virtual Function.
- Create Templates and uses Exception Handling concept.

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 stido.h and iostream.h, cin and cout. **Decision and loop:** Conditional statement - if-else statement, nested if-else statement, switch, break, continue, and goto 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   OPERATOR OVERLOADING   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   TEMPLATES AND EXCEPTION HANDLING   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, specifying the object, tellg() function, seekg() function. Command line arguments.

Total Hours=45

TEXT BOOKS:

1. E. Balaguruswamy: Object Oriented Programming with C++, 6th Edition 2013, Tata McGraw Hill Publications
2. Strousstrup: The C++ Programming Language, Pearson Edition, 4th Edition 2015
3. C++ completer reference by Herbert Schildt, Tata McGraw Hill Publications.

REFERENCES:

1. Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications
2. Lippman: C++ Primer, 3/e Pearson Education
3. Let us C++ by Yeshwanth Kanetkar.

OUTCOMES:

After completion of this course, the students would be able to

- Understand concepts of objects and their significance in real world.
- Learn to write program in C++.
- Design classes and inheritances.
- Learn to co-relate relationship among different entities involved in a system.
- Understand Real life problem formulation in terms of objects and classes.

CAC1204	DATA STRUCTURES USING C	L	T	P	C
		3	0	0	3

OBJECTIVES:

The course aims at:

- Providing knowledge about data structure is a particular way of storing and organizing data in a computer so that it can be used efficiently.
- Learning different kinds of data structures are suited to different kinds of applications and some are highly specialized to specific tasks.
- Understanding the basic concepts of different data structures which are the basic building blocks of Programming and problem solving.
- Comprehensing the significance of sorting algorithms.
- Demonstrate the understanding of various searching algorithms.

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   TREE GRAPHS AND THEIR APPLICATIONS: 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

TEXT BOOKS

1. Weiss, Data Structures and Algorithm Analysis in C, 3rd Edition, Pearson Education.
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'
4. Trembley and Sorenson Data Structures

REFERENCE BOOKS

1. andyopadhyay, Data Structures Using C Pearson Education,2nd Edition.
2. Tenenbaum, Data Structures Using C. Pearson Education,
3. Kamthane: Introduction to Data Structures in C. Pearson Education .
4. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media
5. Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron   Data Structures using C and C++ Pearson Education.

OUTCOMES:

On completion of this course, students will be able to

*   Gain knowledge of Data Structures and different operations one can perform on

these like searching, sorting, stacking and etc.

- Understand the strong foundation for programming in different languages.

- Describe common applications for arrays,

- Apply Stack and Queue data structures for real time applications.

- Analyse, evaluate and choose appropriate abstract data types and algorithms to solve particular problems

CAC1205	OOPS with C++ LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

The aim of the course is 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 skill of 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 zeros maller () 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 with default arguments for the following problems :

a) To find whether a given number is prime.

b) To find the factorial of a number

10. 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.

11. Create a class to hold information of a husband and another for the wife. Using friend functions give the total salary of the family.

12. Write a program to overload the following operators (any 3)

a) Binary operator '+' to concatenate 2 strings

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.

13. 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.

14. 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.

15. Using operator overloading concept implement arithmetic manipulation on two complex numbers.

16. Create a scenario based on real time domain.

TOTAL HOURS –15

OUTCOMES:

After completion of this course, the students would be able to

- Create classes and objects in C++.

- Implement inheritance, polymorphism and object relationship in C++.

- Design methods and procedure.

- Manipulate data through file in C++.

- Trained to write programs to produce the desired result

CAC1206	DATA STRUCTURES LAB	L	T	P	C
		0	0	4	2

OBJECTIVES:

The aim of the course is 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 PROGRAMS

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 n 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

      ii. At the back of the list

      iii. 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

- Insertion sort
- Selection Sort
- Merge Sort

9. Write a C program to implement the following operations in stacks:

- Push
- Pop
- 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 –15

OUTCOMES:

- At the end of the course, the students will be able to:
- Design and implement programs using recursive functions and strings.
- Implement linear data structures like stack, queue and linked list.
- Develop programs to implement Binary Search Tree.
- Implement searching algorithms.
- Implement and compare various sorting algorithms.
- Sort N numbers using merge sort

CAC1256   **ENVIRONMENTAL STUDIES**   L   T   P   C
                                            2   0   0   2

OBJECTIVES:

To impart knowledge on

- 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   6
                          DISASTER

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

5. Venugopala Rao P, Principles of Environmental Science and Engineering, Prentice Hall India Learning Private Limited; India, 2006.

6. Anubha Kaushik and Kaushik C.P., Environmental Science and Engineering, New Age International Pvt Ltd., New Delhi, India, 2009.

7. Rajah G, Basic Environmental Studies, Margham Publications, Chennai, 2016.

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.

SEMESTER III

CAC2102	INFORMATION SECURITY	L	T	P	C
	FUNDAMENTALS	3	0	0	3

OBJECTIVES:

At the end of this course the learner is expected to:

- Learn Types of Threats, Vulnerabilities, Risks and various terminologies in Information Security.

- Understand the formation of Security policy at various levels inside the Organization and provides the definition Procedures, Standard and Guidelines.

- Understand the need of Performing Asset Classification and Declassification, Retention and Disposal of Information Asset.

- Identify the various levels of Authorization for access Viz., Owner, Custodian and User.

- Learn the different types of Access Controls and Physical security measures to safeguard the Assets.

MODULE I   INTRODUCTION TO INFORMATION SECURITY   9

Definition of Information Security, Evolution of Information Security; Basics Principles of Information Security; Critical Concepts of Information Security; Components of the Information System; Balancing Information Security and Access; Implementing IT Security, The system Development Life cycle, Security professional in the organization.

MODULE II   THE NEED FOR IT SECURITY   9

Business Needs-Protecting the functionality, Enabling the safe operations, Protecting the data, safe guarding the technology assets; Threats-compromises to Intellectual property, deliberate software attacks, Espionage and trespass, sabotage and vandalism; Attacks-Malicious Codes, Back Doors, Denial of Service and Distributed Denial of Service, Spoofing, sniffing, Spam, Social Engineering.

MODULE III   RISK MANAGEMENT   9

Definition of risk management, risk identification, and risk control, Identifying and Accessing Risk, Assessing risk based on probability of occurrence and likely impact, the fundamental aspects of documenting risk via the process of risk assessment, the various risk mitigation strategy options, the categories that can be used to classify controls.

**MODULE IV   NETWORK INFRASTRUCTURE SECURITY AND   9
                    CONNECTIVITY**

Understanding Infrastructure Security- Device Based Security, Media-Based Security, Monitoring and Diagnosing; Monitoring Network- Firewall, Intrusion Detection System, Intrusion Prevention system; OS and Network Hardening, Application Hardening; Physical and Network Security- Policies, Standards and Guidelines.

MODULE V   INFORMATION ASSET CLASSIFICATION   9

Classification of Information, Information Assets – Owner, Custodian, User, Information   Classification in terms of Secret, Confidential, Private and Public, Declassification. Retention and Disposal of Information Assets. Provide Authorization for Access – Owner, Custodian and User

TOTAL HOURS – 45

TEXT BOOKS:
1. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerba, 2012
2. Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013)
3. Principles of Information Security by Michael E. Whitman, Cengage Learning India Private Limited; 5 edition (2015)
4. Cryptography and Network Security Principles and Practices, by William Stallings, Pearson Education; Seventh edition (30 June 2017)

REFERENCES:
1. Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – by Deven N. Shah, Wiley.
2. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 2nd edition

OUTCOMES:
The student will be able to:
- Understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures.
- Familiarize with Asset management along with the objective to create awareness in Digital Rights management.

- Analyse various levels of Authorization
- Be aware of Threats, Vulnerabilities and Risks in Information Security.
- Create Security policy at various levels inside the Organization.

CAC2103   **SOFTWARE ENGINEERING**   **L T P C**

                                                                       3 0 0 3

OBJECTIVES:

At the end of this course the learner is expected to:

* Introduce Software engineering and various accepted methodologies to design software.
* Enable students to understand the entire process of developing a software project and also the issues associated after development.
* Introduce the concepts of software engineering and its design.
* Understand Software Requirements in a project.
* Learn the use of Software Testing.

MODULE I   **SOFTWARE PRODUCT AND PROCESS**   **9**

Introduction – S/W Engineering Paradigm – Verification – Validation – Life Cycle Models – System Engineering – Computer Based System – Business Process Engineering, Overview – Product Engineering Overview

MODULE II   **SOFTWARE REQUIREMENTS**   **9**

Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioural Models – Structured Analysis and Data Dictionary.

MODULE III   **ANALYSIS, DESIGN CONCEPTS AND PRINCIPLES**   **9**

Systems Engineering - Analysis Concepts - Design Process And Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring And Control System

MODULE IV   **TESTING**   **9**

Taxonomy Of Software Testing – Types Of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques

MODULE V   **SOFTWARE PROJECT MANAGEMENT**   **9**

Measures And Measurements – ZIPF's Law – Software Cost Estimation – Function Point Models – COCOMO Model – Delphi Method – Scheduling – Earned Value Analysis – Error Tracking – Software Configuration Management – Program Evolution Dynamics – Software Maintenance – Project Planning – Project Scheduling– Risk Management – CASE Tools

TOTAL HOURS =45

TEXT BOOKS:

1. Ian Sommerville, "Software engineering", Seventh Edition, Pearson Education Asia.2009
2. Roger S. Pressman, "Software Engineering – A practitioner's Approach", Sixth Edition, McGraw-Hill International Edition.2005

REFERENCES:

1. K.K. Aggarwal, "Software engineering", New Age International.
2. Schach, "Software Engineering (Sie) 7E", Tata McGraw-Hill Education.

OUTCOMES:

    The student will be able to:

- Enable students to develop knowledge about Software Development Life Cycle.
- Train Students in Software testing which forms an essential part of SDLC
- Create a project based on methodologies to design software.
- Understand the Software Project Management.
- Provide Software Requirements in a project.

CAC2104	RDBMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The aim of the course is to

- Provide an introduction to the management of database systems.
- Understand the fundamentals of relational systems including data models, database architectures, and database manipulations.
- Provide 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   SQL VIEWS, INDEX AND TRIGGERS   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, Tata McGraw Hill,2006
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Pearson/Addision Wesley.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.

CAC2105   **COMPUTER NETWORKS**

L	T	P	C
3	0	0	3

OBJECTIVES:

This course provides a comprehensive introduction to

- Basics of networking and networking technology
- Networking and its underlying principles.
- Fundamentals of layered models, devices used in networks and their wireless connectivity.
- The ways to troubleshoot network related issues.
- Protocols, standards and the models associated with networking technology and their troubleshooting mechanisms.

MODULE I   **NETWORKING FUNDAMENTALS**   **9**

Basics of Network & Networking, Advantages of Networking, Types of Networks, Network Terms- Host, Workstations, Server, Client, Node, Types of Network Architecture- Peer-to-Peer & Client/Server, Workgroup Vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, selecting the Right Topology, Types of Transmission Media, Communication Modes, Wiring Standards and Cabling- straight through cable, crossover cable, rollover cable, media connectors (Fiber optic, Coaxial, and TP etc.) Introduction of OSI model, Seven layers of OSI model, Functions of the seven layers, Introduction of TCP/IP Model, TCP, UDP, IP, ICMP, ARP/RARP, Comparison between OSI model & TCP/IP model. Overview of Ethernet Addresses

MODULE II   **BASICS OF NETWORK DEVICES**   **9**

Network Devices- NIC- functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways, And Other Networking Devices, Repeater, CSU/DSU, and modem, Data Link Layer: Ethernet, Ethernet standards, Ethernet Components,Point-to-Point Protocol(PPP),PPP standards, Address Resolution Protocol, Message format, transactions, Wireless Networking: Wireless Technology, Benefits of Wireless Technology, Types of Wireless Networks: Ad-hoc mode, Infrastructure mode, Wireless network Components: Wireless Access Points, Wireless NICs, wireless LAN standards: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, wireless LAN modulation techniques, wireless security Protocols: WEP,WPA, 802.1X, Installing a

wireless LAN

MODULE III BASICS OF NETWORK, TRANSPORT AND APPLICATION LAYERS　　　9

Network Layer: Internet Protocol (IP), IP standards, versions, functions, IPv4 addressing, IPv4 address Classes, IPv4 address types, Subnet Mask, Default Gateway, Public & Private IP Address, methods of assigning IP address, IPv6 address, types, assignment, Data encapsulation, The IPv4 Datagram Format, The IPv6 Datagram Format, Internet Control Message Protocol (ICMP), ICMPv4, ICMPv6, Internet Group Management Protocol (IGMP),Introduction to Routing and Switching concepts, Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets, Application Layer: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP

MODULE IV WAN TECHNOLOGY　　　9

What Is a WAN?, WAN Switching, WAN Switching techniques Circuit Switching, Packet Switching etc., Connecting to the Internet : PSTN, ISDN, DSL, CATV, Satellite-Based Services, Last Mile Fiber, Cellular Technologies, Connecting LANs : Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up Remote Access, Virtual Private Networking, SSL VPN, Remote Terminal Emulation, Network security: Authentication and Authorization, Tunneling and Encryption Protocols, IPSec, SSL and TLS, Firewall, Other Security Appliances, Security Threats

MODULE V NETWORK OPERATING SYSTEMS AND TROUBLESHOOTING NETWORK　　　9

Network Operating Systems: Microsoft Operating Systems, Novell NetWare, UNIX and Linux Operating Systems, Macintosh Networking, Trouble Shooting Networks: Command-Line interface Tools, Network and Internet Troubleshooting, Basic Network Troubleshooting : Troubleshooting Model, identify the affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools.

TOTAL HOURS =45

TEXT BOOKS:

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011
2. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013.

REFERENCE:

1. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008

2. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

OUTCOMES:

The student will be able to:

- Develop knowledge and skills required to take up vendor certifications in the networking domain.
- Understand how communication works in data networks
- Learn the role of protocols in networking.
- Analyze the services and features of the various layers of data networks

CAC2106 **PROGRAMMING IN JAVA** L T P C

3 0 0 3

OBJECTIVES:

The aim of the course is

- Create Systems/applications using java programming language
- Learn advantages of Java.
- Focus on the concepts of object oriented programming language and the different constructs for creating applications in java.
- Provide students with an understanding of the object oriented concepts which helps in the field of programming, management of data, etc. and of Java programming
- Explore the object oriented nature of the language and the multi-platform versatility offered by it.

MODULE I INTRODUCTION 9

History, Overview of Java, Object Oriented Programming, A simple Program, Two control statements - if statement, for loop, using Blocks of codes, Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words. Data types: Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting, Automatic type promotion in Expressions Arrays. **Operators:** Arithmetic operators, The Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. Control Statements: Selection Statements - if, Switch: Iteration Statements - While, Do-while, for Nested loops, Jump statements.

MODULE II CLASSES 9

Class Fundamentals, Declaring objects, Assigning object reference variables, Methods, constructors, "this" keyword, finalize ( ) method A stack class, Over loading methods, using objects as parameters, Argument passing, Returning objects, Recursion, Access control, Introducing final, understanding static, Introducing Nested and Inner classes, Using command line arguments. Inheritance: Inheritance basics, Using super, method overriding, Dynamic method Dispatch, using abstract classes, using final with Inheritance.

MODULE III PACKAGES 9

Definition, Access protection importing packages, Interfaces: Definition implementing interfaces. Exception Handling: Fundamental, Exception types, Using

try and catch, Multiple catch clauses, Nested try Statements, throw, throws, finally, Java's Built - in exception, using Exceptions.

MODULE IV   MULTITHREADED PROGRAMMING   9

The Java thread model, The main thread, Creating a thread, Creating multiple thread, Creating a thread, Creating multiple threads, Using isalive() and Join(), Thread - Priorities, Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi threading. 1/0 basics, Reading control input, writing control output, Reading and Writing files, Applet Fundamentals, the AWT package,AWT Event handling concepts The transient and volatile modifiers, using instance of using assert.

MODULE V   JAVA DATABASE CONNECTIVITY (JDBC)   9

Database connectivity: JDBC architecture, JDBC Drivers, the JDBC API: loading a driver, connecting to a database, Creating and executing JDBC statements, Handling SQL exceptions, Accessing result sets: Types of result sets, Methods of result set interface. An example JDBC application to query a database

TOTAL HOURS =45

TEXT BOOKS:
1. The complete reference Java –2: V Edition By Herbert Schildt Pub. TMH.
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

REFERENCES:
1. Joyce Farrell, "Java Programming", Cengage Learning, 20-Jan-2015
   2. Balagurusamy, "Programming With Java:A Primer 3E", Tata McGraw-Hill Education.

OUTCOMES:
The student will be able to:

- Learn how to write Programs using Java
- Understand Java and object-oriented programming language concepts.
- Write, debug, and document well-structured Java applications
- Implement Java classes from specifications

CAC2107	**RDBMS LAB**	L	T	P	C
		0	0	3	1

OBJECTIVES:

The aim of the course is to:

- Learn SQL (Structured Query Language)
- Learn how to create tables which are fundamental storage blocks of data.
- Learn how to place constraints on data that is entered on tables to ensure data integrity.
- Learn how to add, change and remove data from tables.

LIST OF PROGRAMS

1. Create User in Oracle Database and grant and revoke the privileges and use of commit save point rollback 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 the 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.Consider the insurance database given below. The primary keys are made bold and the data types are specified.

S.No	Table	Attributes
1	PERSON	**driver_id**:string , name:string , address:string
2	CAR	**regno**:string , model:string , year:int
3	OWNS	**driver_id**:string , **regno**:string
4	ACCIDENT	**report_number**:int , accd_date:date , location:string
5	PARTICIPATED	**driver_id**:string , **regno**:string , **report_number**:int , damage_amount:int

a) Create the above tables by properly specifying the primary keys and foreign keys.Enter at least five tuples for each relation.

b)Find the total number of people who owned cars that were involved in accidents in the year 2008.

c)Find the number of accidents in which cars belonging to a specific model were involved.

14.Consider the following relations for a order processing database application in a company.

S.No	Table	Attributes
1	CUSTOMER	**custno**:int , cname:string , city:string
2	ORDER	**orderno**:int , odate:date , custno:int , ord_amt:int
3	ORDER_ITEM	**orderno**:int , **itemno**:int , quantity:int
4	ITEM	**itemno**:int , unitprice:int
5	SHIPMENT	**orderno**:int , **warehouseno**:int , ship_date:date
6	WAREHOUSE	**warehouseno**:int , city:string

a) Create the above tables by properly specifying the primary keys and foreign keys.Enter at least five tuples for each relation.

b) Produce a listing: custname ,No_of_orders , Avg_order_amount , where the

middle column is the total number of orders by the customer and the last column is the average order amount for that customer.

c)Demonstrate the deletion of an item from the ITEM table and demonstrate a method of handling the rows in the ORDER_ITEM table that contains this particular item.

15. Consider a Book dealer with the following maintained:

S.No	Table	Attributes
1	AUTHOR	**author_id**:int , name:string , city:string , country:string
2	PUBLISHER	**publisher_id**:int , name:string , city:string , country:string
3	CATALOG	**book_id**:int , title:string , author_id:int , publisher_id:int , category_id:int , year:int , price:int
4	CATEGORY	**category_id**:int , description:string
5	ORDER_DETAILS	**order_no**:int , **book_id**:int , quantity:int

a)Create the above tables by properly specifying the primary keys and foreign keys.Enter at least five tuples for each relation.

b)Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.

c)Demonstrate how you increase the price of books published by a specific publisher by 10%.

16. Consider the following database for a banking enterprise.

S.No	Table	Attributes
1	BRANCH	**branch_name**:string , branch_city:string , assets:real
2	ACCOUNT	**accno**:int , branch_name:string , balance:real

3	DEPOSITOR	**customer_name**:string , **accno**:int
4	CUSTOMER	**customer_name**:string , customer_street:string , customer_city:string
5	LOAN	**loan_number**:int , branch_name:string , amount:real
6	BORROWER	**customer_name**:string , **loan_number**:int

Create the above tables by properly specifying the primary keys and foreign keys.Enter at least five tuples for each relation.

a)Find *all* the customers who have at least two accounts at the *main* branch..

b)Demonstrate how you delete all account tuples at every branch located in a specific city.

17. Create a scenario based on real time domain.

TOTAL HOURS =15

OUTCOMES

At the end of this course, a student will be able to

• Knowledge about database and uses in real time business activities.

• create a database application.

• Work with table by using PL/SQL Program.

• get a clear idea about database transaction activities..

CAC2108	**PROGRAMMING IN JAVA LAB**	L	T	P	C
		0	0	3	1

OBJECTIVES:

The aim of the course is to:

- Provide practical experience to students and reinforce the theory concepts.
- Teach the basic concepts and techniques which form the object oriented programming paradigm.
- Make use of Java in a variety of technologies and on different platforms.

LIST OF PROGRAMS

1. When a user wants to login into web application, there are certain details needs to be verified from the user. Once the user gives his/her credentials such as username and password. These credentials from the user have to be validated from the server end in order to have successful login. Write a Java program about the validation process to compare user's credentials. (Username and Password consists of String)

2. A user enters username as login credential to enter into a laptop. The used password is the reverse of the username. Write a Java program to find the password of the user.

3. A user enters 3 digit ATM pin number. An OTP is generated which is the sum of digits of pin number entered. Write a Java program to find the OTP generated.

4. Ram has a magical pot in which he keeps N number of things for M days. The specialty of pot is that it will increase the number by N every day. Write a Java program to print the increased amount of M days.

5. Write a Java program to print total count of numbers between 1 to 1000 that are divisible by 1 and by the number itself.

6. A group of students are standing in an Assembly line. A new student randomly enters the line. Write a Java program to implement the above scenario using array.

7. In a class, a teacher tries to make the students stand in a queue on the basis of their weight. Write a Java program to implement the above scenario using an array.

8. Write a program to create object for Tree Set and Stack and use all methods.

9. Write a 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).

12. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.

13. Write a program to get file name at runtime and display number f lines and words in that file.

14. Write a program to list files in the current working directory depending upon a given pattern.

15. Create a text field that allows only numeric value and in specified length.

16. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

17. Create a scenario based on real time domain.

TOTAL HOURS =15

OUTCOMES:

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

- Work on the tasks provided to them in the form of experiments and write programs to produce the desired result.
- Write Java application programs using OOP principles and proper program structuring.
- Understand how to model real world scenario using Java programming.

CAC2101   **REASONING AND THINKING** | L | T | P | C |

                                                          3   0   0   3

OBJECTIVES:

The objective of the course to introduce to the students :

- The concepts like Synonyms, Antonyms
- To understand how to solve problems with Logical Reasoning
- About the Knowledge of techniques used in Quantitative Aptitude

MODULE I   **VERBAL ABILITY**   **9**

Synonyms**,** AntonymsandOne 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 - I**   **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 percentileMode - 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, NewDelhi, 5th Ed.

REFERENCES:

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

OUTCOMES:

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

- Understand Verbal ability activities and concepts
- Participate in solving questions in aptitude
- Solve logical reasoning questions.

SEMESTER IV

CAC2211   **SERVER OPERATING SYSTEM**   L   T   P   C

     3   0   0   3

OBJECTIVES:

The aim of the course are as follows

- Provide knowledge about Windows Server 2012 R2.
- Students will be familiar in Windows user experience that helps you manage users and safeguard business information.
- Student explores the method to install, upgrade, and deploy the Windows Server.
- Students will have the functional knowledge of configuring core network services and the active directory of Windows Server.
- Provides the knowledge and skills necessary to plan and implement a Windows Server 2012 and Windows Server 2012 R2 environment.
- It provides Students the most important job tasks for Server Administrators who are responsible for the planning, operations, and day-to-day maintenance of Windows Server 2012 and Windows Server 2012 R2 servers in the enterprise

MODULE I   **INSTALLING AND CONFIGURING SERVERS**   **9**

Selecting a Windows Server 2012:- Edition, Supporting Server Role, Supporting Server Virtualization, Server Licensing. **Installing Windows Server 2012:** System Requirement, Performing a Clean Installation, Installing Third-Party Drivers, Working with Installation Partitions, Using Server Core, Server Core Defaults, Server Core Capabilities, Using the Minimal Server Interface, Upgrade paths, Preparing to Upgrade Installation, Installing Windows Server Migration Tools. **Configuring Servers:** Completing Post-Installation Tasks and GUI Tools, Converting Between GUI and Server, Configuring NIC Teaming, Using Roles, Features, and Services, Using Roles Manager, Adding Roles and Features, Deploying Roles to VHDs, Configuring Services

MODULE II   **CONFIGURING LOCAL STORAGE**   **9**

Planning Server Storage, Determining the Number of Servers Needed, Estimating Storage Requirements, Selecting a Storage Technology, Selecting a Physical Disk Technology, Using External Drive Arrays, Planning for Storage Fault Tolerance, Using Disk Mirroring, Using RAID, Using Storages Spaces, Understanding Windows Disk setting, selecting a Partition style, understanding disk and Volume Types, Choosing a Volume Size, Understanding File System, Working with Disks,

Adding a New Physical Disk, Creating and Mounting VHDs, Storage Pool, Virtual Disks, Simple Volume, Creating a Striped, Spanned, Mirrored, or RAID-5 Volume, Extending and Shrinking Volumes and Disks

MODULE III   CONFIGURING FILE AND SHARE ACCESS   9

Designing a File-Sharing Strategy, Arranging Shares, Controlling Access, Mapping Drives, Creating Folder Shares, Assigning Permissions, Understanding the windows Permission Architecture and Basic, Advanced Permissions, Allowing and Denying Permissions, Inheriting Permissions, Understanding Effective Access, Setting Share Permissions, Understanding NTFS Authorization, Assigning Basic NTFS Permissions, Understanding Resource Ownership, Combining Share and NTFS Permissions

**MODULE IV   CONFIGURING   PRINT,   DOCUMENT   SERVICES,   9
                 SERVERS FOR REMOTE MANAGEMENT.**

Understanding the Windows Print Architecture and Printing, Server Printing Flexibility, sharing a Printer Drivers and Managing Printer Drivers, Using Remote Access Easy Print, Configuring Printer Security, Adding Printer Servers, Deploying Printers with Group Policy, Adding Server and Workgroup Servers, Calibrating Server Manager Performance, Configuring WinRM and Windows Firewall, Creating Server Groups,   Using Remote Server Administration Tools, Using Windows PowerShell Web Access, Installing Windows PowerShell Web Access, Configuring the Windows PowerShell Web Access Gateway, Configuring a Test Installation, Customizing a Gateway Installation, Creating Authorization Rules, Working with Remote Servers

**MODULE V   CREATING AND CONFIGURING VIRTUAL MACHINE   9
                SETTINGS AND STORAGE**

Virtualization Architectures, Hyper-V Implementations and Licensing, Hyper-V Hardware Limitations and Server, Installing Hyper-V, Using Hyper-V Manager, Creating a VM, Installing an Operating System, Configuring Guest Integration Services, Allocating Memory, Using Dynamic Memory, working with Virtual Disks, Understanding Virtual Disk Formats, Creating Virtual Disks, Creating a New Virtual Disk, Adding Virtual Disks to Virtual Machines, Creating Differencing Disks, Configuring Pass-Through Disks, Modifying Virtual Disks, Creating Snapshots, Connecting to a SAN, Connecting Virtual Machines to a SAN

TOTAL HOURS – 45

TEXT BOOKS:

1. Windows Server 2012: A Handbook for Professionals by Aditya Raj (Author)
2. MCSA 70-410 Cert Guide R2: Installing and Configuring Windows Server 2012 (Certification Guide) Hardcover – Import, 12 Sep 2014 by Don Poulton (Author), David Camardella (Author)

REFERENCES:

1. Windows Server 2012: A Handbook for Professionals by Aditya Raj (Author)
2. Administering Windows Server 2012 (Certification Guide) by Orin Thomas

OUTCOMES:

At the end of the course, Students will be able to :

- Acquire knowledge and skills needed to install and configure windows server 2012 and configure local storage and other services like file sharing and print sharing.
- Take up the certification exams in windows server 2012.
- Plan about the server infrastructure and key aspects of the implementation, management and maintenance of Active Directory and Network Infrastructure

CAC2202   **ETHICAL HACKING FUNDAMENTALS**   **L   T   P   C**

                                                               3   0   0   3

OBJECTIVES:

The aim of the course is to

- Learn Ethical hacking methodology and its different stages which include the Foot printing, Scanning, Enumeration and System hacking techniques and a broad knowledge about white box and black box testing.
- Understand the wide range of attacks that can cause adverse negative effects on IT systems that include Denial of service, Session hijacking and severe vulnerabilities that can be seen in Web Applications.
- Provides hacking attacks caused in other Operating System environment like Linux and the secret techniques to Evade Firewalls.
- It provides students valuable information on vulnerabilities and threats.

MODULE I   INTRODUCTION TO ETHICAL HACKING   9

Ethical Hacking, why is it necessary, scope and limitations, skills required, phases of ethical hacking, tools and techniques, Black Box, Gray Box and White Box techniques, differences between vulnerability assessment, ethical hacking and penetration testing, Reverse engineering, Ethical hacking terminology, Exploit, Vulnerability – Zero-day, manual PT, Case Studies on data breaches and cybercrimes involving hacking

**MODULE II   ETHICAL HACKING THROUGH ATTACKS AND   9
                      EXPLOITS**

EH methodology, attacks, exploits, Denial of Service, Sniffers, malware, Session Hijacking and ethical hacking of Web Servers and applications, Password Cracking, Key Logger, Hash Injection attack, replay and man-in-the-middle attacks, rainbow table attack, distributed network attack, spoofing, phasing, spyware, rootkits, hiding files, counter measures

MODULE III   WEB AND NETWORK HACKING   9

Enumeration and scanning, host discovery, type of scanning – TCP SYN, ACK, XMAS & UDP Port scanning, SQL Injection, Social Engineering, Buffer Overflows, Input data validation, physical penetration attacks, Hacking Wireless Networking, Hacking mobile platforms, Windows and Linux Hacking, Evading IDS, Firewalls and Honeypots, DDoS attacks, using metasploit, counter measures

MODULE IV   REPORT WRITING & MITIGATION   9

Introduction to Report Writing & Mitigation, requirements for low level reporting & high-level reporting of Penetration testing results, Demonstration of vulnerabilities and mitigation of issues identified including tracking, CVSS scoring for vulnerabilities, rating and prioritization, impact of these in reporting

MODULE V   ETHICAL HACKING AND LEGAL SYSTEM   9

Overview of India's Information Technology Amendment Act 2008 (IT Act 2008), hacker vs cracker, liabilities – civil and penal, cyber theft and IPC sec 378, IT Act 2008 – sections 43, 65 and 66, how to file a complaint of suspected hacking, Case Studies, understanding how hacking is legally dealt with among BRICS countries

TOTAL HOURS – 45

TEXT BOOKS:

1. Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition Paperback – 1 Jul 2017 by Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, McGraw Hill Education; 3 ed (1 July 2017)

2. CEH v9: Certified Ethical Hacker Version 9 Study Guide by Sean-Philip Oriyano, Sybex; Stg edition (17 June 2016)

3. Hacking for Beginners: Ultimate 7 Hour Hacking Course for Beginners. Learn Wireless Hacking, Basic Security, Penetration Testing by Anthony Reynolds, CreateSpace Independent Publishing Platform (10 April 2017)

4. An Ethical Guide To WI-FI Hacking and Security by Swaroop Yermalkar, BecomeShakespeare.com; First edition (15 August 2014)

5. Hands-On Ethical Hacking and Network Defense by Michael T. Simpson | Kent Backman | James Corley, Cengage India 1st edition (2016)

REFERENCES:

1. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy by Patrick Engebretson, Syngress; 2 edition (12 September 2013)

2. Hacking With Python: The Complete Guide to Ethical Hacking, Basic Security, Botnet Attack, Python hacking and Penetration Testing Kindle Edition by John C. Smalls

OUTCOMES:

The students will be able to

- learn the ethical hacking concepts
- Get a deep understanding of the web application vulnerabilities and

exploitation techniques.

- Get familiar with the wide range of attacks in a networking environment and
- Prepare a well-defined vulnerability report along with remediation techniques.

CAC2203   **CRYPTOGRAPHY FUNDAMENTALS**   **L   T   P   C**

3   0   0   3

OBJECTIVES:

The aim of the course is to:

- Introduction to need for development of secured systems.
- The knowledge of Types of Algorithms in Cryptography.
- To ensure the confidentiality and integrity of information.
- Learn about several forms of attack.
- Knowledge about basic concepts of Cryptography, certain cryptographic algorithms and its applications.

MODULE I   INTRODUCTION TO CRYPTOGRAPHY   9

The Confidentiality, Integrity & Availability (CIA) Triad, Cryptographic concepts, methodologies &practices, Symmetric& Asymmetric cryptography, public& private keys, Cryptographic algorithms and uses, Construction& use of Digital signatures

MODULE II   TYPES OF ALGORITHMS   9

The basic functionality of hash/crypto algorithms (DES, RSA, SHA, MD5, HMAC, DSA) and effects on key length concepts in Elliptical Curve Cryptography & Quantum Cryptography

MODULE III   KEY MANAGEMENT   9

The basic functions involved in key management including creation, distribution, verification, revocation and destruction, storage, recovery and life span and how these functions affect cryptographic integrity

MODULE IV   APPLICATION OF CRYPTOGRAPHY   9

Major key distribution methods and algorithms including Kerberos, ISAKMP etc., Vulnerabilities to cryptographic functions, the Use and functions of Certifying Authorities (CAs),Public Key Infrastructure (PKI) and System architecture requirements for implementing cryptographic functions

MODULE V   CRYPTOGRAPHY IN USER AUTHENTICATION   9

Basics of authentication, tokens, certificate-based and biometric authentication, extensible authentication protocols, message digest, security handshake pitfalls, SSO, attacks on authentication schemes, email security

TOTAL HOURS – 45

TEXT BOOKS:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley.2008
2. Cryptography and Security by C K Shyamala, N Harini and Dr T R Padmanabhan, Wiley India, 1st ed; 2011
3. Cryptography and Network Security by Atul Kahate, McGraw Hill India, 3rd ed; July 2017
4. Cryptography and Network Security by S. Bose, Pearson India, 1st ed; Mar 2016
5. Cryptography and Information Security by V. K. Pachghare, Prentice Hall India, 2nd rev ed; 2015

REFERENCES:

1. Understanding Cryptography: A Textbook for Students and Practitioners Hardcover, Springer, 1st ed; 2010
2. Introduction to Modern Cryptography by Jonathan Katz, Chapman & Hall/CRC Cryptography, 2nd ed; 2014
3. Everyday Cryptography: Fundamental Principles and Applications by Keith Martin, OUP Oxford, 2nd ed; 2017

OUTCOMES:

At the end Students will learn as follows:
- The basics of Cryptography,
- Cryptographic algorithms and its applications
- Knowledge about Cryptography In User Authentication

CAC2212   **INTRODUCTION TO CLOUD TECHNOLOGY**   L   T   P   C
                                                              3   0   0   3

OBJECTIVES:

The course aim at :

- Introducing Cloud computing and different computing concepts that involve a large number of computers
- In science, cloud computing is a synonym for distributed computing over a network and means the ability to run a program on many connected computers at the same time.
- Provides knowledge about basic concepts of cloud types, services and security etc.
- Introduces the Governance In The Cloud.

MODULE I   **INTRODUCTION**   **9**

Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing, , Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.

MODULE II   **CLOUD COMPUTING COMPANIES AND MIGRATING**   **9**
                                            TO CLOUD

Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies

MODULE III   **CLOUD COST MANAGEMENT AND SELECTION OF**   **9**
                                            CLOUD PROVIDER

Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, Selecting the right scalable application. Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with Cloud Computing, Commercial and Business Consideration

MODULE IV GOVERNANCE IN THE CLOUD 9

Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations

MODULE V TEN CLOUD DO AN DO NOTS 9

Don't be reactive,do consider the cloud a financial issue, don't go alone, do think about your architecture, don't neglect governance, don't forget about business purpose, do make security the centerpiece of your strategy, don't apply the cloud to everything, don't forget about Service Management, do start with a pilot project.

TOTAL HOURS – 45

TEXT BOOKS:

1. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011

REFERENCES:

1. Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010
2. Handbook on Cloud Computing, Borivoje Furht, Armando Escalante, Springer, 2010

OUTCOMES:

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

- Learn the underlying principles of Cloud Technology and various types of cloud computing architecture and types.
- Learn to evaluate between different cloud solutions offered by various providers based on their merits and demerits.
- Gain the knowledge about cloud computing companies and migrating to cloud.

CAC2213   **FUNDAMENTALS OF DATACENTER**

L	T	P	C
3	0	0	3

OBJECTIVES:

The aim of the course is to provide:

- Knowledge in setting-up and Services provided by data centers.
- Datacenter fundamentals
- students to understand the basic concepts of Datacenter architecture
- Network infrastructure in a Datacenter, server frames fault tolerance, Datacenter availability, network implementation and disaster recovery.

MODULE I   OVERVIEW OF DATA CENTERS   9

Datacenters Defined, Datacenter Goals, Datacenter Facilities, Roles Datacenters in the Enterprise, Roles of Datacenters in the Service Provider Environment, Application Architecture Models. The Client/Server Model and Its Evolution, The n-Tier Model, Multitier Architecture Application Environment, DataCenter Architecture

MODULE II   DATA CENTER REQUIREMENTS   9

DataCenter Prerequisites, Required Physical Area for Equipment and Unoccupied Space, Required Power to Run All the Devices, Required Cooling and HVAC, Required Weight, Required Network Bandwidth, Budget Constraints, Selecting a Geographic Location, Safe from Natural Hazards, Safe from Man-Made Disasters, Availability of Local Technical Talent, Abundant and Inexpensive Utilities Such as Power and Water, Selecting an Existing Building (Retrofitting), tier standard

MODULE III   DATACENTER DESIGN   9

Characteristics of an Outstanding Design, Guidelines for Planning a Data Centre, Data Centre Structures, No-Raised or Raised Floor, Aisles, Ramp, Compulsory Local Building Codes, Raised Floor Design and Deployment, Plenum, Floor Tiles, Equipment Weight and Tile Strength, Electrical Wireways, Cable Trays, Design and Plan against Vandalism. Data Centre Design Case Studies, Modular Cabling Design, Points of Distribution, ISP Network Infrastructure, ISP WAN Links, Data Centre Maintenance

MODULE IV   INTRODUCTION TO SERVER FARMS   9

Typesof server farms and data centre, internet server farm, intranet server farm, extranet server farm , internet datacentre, corporate datacentre, software defined

datacenter, datacenter topologies, Aggregation Layer, Access Layer, Front-End Segment, Application Segment, Back-End Segment, Storage Layer, DataCenter Transport Layer, DataCenter Services, IP Infrastructure Services, Application Services, Security Services, Storage Services

| MODULE V | BUSINESS CONTINUITY AND DISASTER RECOVERY FUNDAMENTALS | 9 |

Business continuance infrastructure services, the need for redundancy, Information availability , BC terminology , BC planning life cycle , BC technology solutions , backup and recovery considerations , backup technologies , Uses of local replicas , Local replication technologies , Restore and restart considerations , Modes of remote replications , remote replication technologies

TOTAL HOURS – 45

TEXT BOOKS:

1. Mauricio Arregoces,Maurizio Portolani, "Data Center Fundamentals", Cisco Press.2008

2. Kailash Jayaswal, "Administering Data Centers – Servers, Storage and Voice over IP", Wiley Publishing Inc.2011

REFERENCES:

1. IP Storage Networking by : Gary Oreinstein, Addison Wesley Professional, 2006

2. Information Storage and Management, G. Somasundaram – Alok Srivastava, Wiley.2012

3. Administering Data-Centers, Kailash Jayswal, Wiley.2015

OUTCOMES:

- Students will learn the history of datacentres, how they have evolved over the years, different facilities and their requirements.
- They will also learn different aspects that have to be considered while designing a datacentre and various server farms.
- Students will be able to understand Business Continuity and Disaster Recovery Fundamentals.

CAC2214   **INTRODUCTION TO PUBLIC SPEAKING**   **L   T   P   C**
     3   0   0   2

OBJECTIVES:

The aims of the course are as follows

- Introduce students to various important aspects of nonverbal communication
- To train students in the art of speech and develop negotiation capabilities.
- To support students in their effort to perform satisfactorily in job interviews by talking to them, encouraging them and building their self-confidence

MODULE I   ORAL COMMUNICATION   9

Principles of nonverbal communication - through clothes and body language, Types of managerial speeches - speech of introduction, speech of thanks, occasional speech, theme speech.

MODULE II   INTERVIEWS TECHNIQUES: 9

Mastering the art of giving interviews in selection or placement interviews, discipline interviews, appraisal interviews, exit interviews, Building Persuasion & Negotiation abilities.

MODULE III   BODY LANGUAGE & GROOMING   9

Introduction to Body Language, Postures, Gestures, Eye contact, Personality styles, Grooming, Dress code

MODULE IV   ART OF COMMUNICATING IN GROUPS   9

Reading Comprehension, Group communication by way of meetings &group discussions, Business presentation - Features of good presentations –Planning.

MODULE V   STRUCTURING AND DELIVERING PRESENTATIONS   9

Structuring and Delivering presentations - Handling questions - Coping with nervousness.

TOTAL HOURS – 45

TEXT BOOKS:

1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.
2. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, & Applications, Pearson Education.

REFERENCES:

1. Shirley Taylor, Communication for Business, Pearson Education.
2. Lesiicar and Flatley, BasicBusiness Communication, Tata McGraw-Hill.
3. Courtan L. Bovee et al., Business Communication Today, Pearson Education.

OUTCOMES:

On successful completion of this course:

- Students will be able to Prepare managerial speeches of the appropriate nature and also to speak freely without a script,
- Students will be able to watch on their bogy-language and Grooming aspects while communication with others.
- Students will be able to perform dryr exceedingly well while in a group, actively participating in group discussion and forums and Fare well in job interviews by preparing and presenting themselves with greater confidence

CAC2207	**ETHICAL HACKING LAB**	L	T	P	C
		0	0	4	2

OBJECTIVES:

The aim of the course is to :

- Provide practical experience to find the vulnerability in applications, network and in systems.
- Gain knowledge about the value of the public and private information of an individual and organization.
- Get knowledge to crack password of a Network, Operating System and application.

LIST OF EXPERIMENTS:

1. Our University Website is cloned and hosted with a different domain name which results to many security issues. As an ethical hacker, without having a direct contact to the website hosted anonymously, find the information such as hosted domain information, place, ownership, DNS records.
2. Active Reconnaissance using "Sampad" and web site details
3. UDP and Ping Scanning using "Advance Lan Scanner" and "Superscan"
4. Packet crafting using "Packet creator" tools
5. Password Revelation from browsers and social networking application
6. Creating and Analyzing Trojans.
7. OS password cracking.
8. As an attacker, you need to get the data present in a particular system present within the organization. In order to retrieve the data, make use of nmap tool and perform all the three types of scan like full scan, half scan and stealth scan.
9. Being a script kiddie, you have entered into an organisation network and found an particular system to attack. Now perform a task of getting an access to the system by finding the vulnerability present in the NetBIOS, exploit it and take the control of the victim system.
10. CTO of Symantec organization received an email from a technical manager stating the problem of employees. At the time Enquiry the security professionals came to know that the manager hasn't sent such kind of an email. Now analyse how this email would have been gone to CTO without manager's knowledge.

11. One of the student from our university took the financial information by exploiting the vulnerability of database design. Demonstrate how he would have exploited by injecting queries.
12. Create a scenario based on real time domain.

TOTAL HOURS – 30

OUTCOMES:

At the end of the course the students will learn to:

- Collect information about a person, organization without their knowledge.
- Exploit vulnerability in application, operating systems and in network.
- Exploit vulnerability which in turnhelps them to provide a patch to prevent certain attacks.

CAC2215 **SERVER OPERATING SYSTEM –LAB** | L | T | P | C |
| 0 | 0 | 4 | 2 |

OBJECTIVES:

Aim of the course is to provide:

- Network foundation from which you can centrally manage settings on your computers that are based on the Windows® operating system.
- The students will have the functional knowledge of configuring core network services and the active directory of Windows Server.

LIST OF EXPERIMENTS:

1. Installation of Windows Server 2012
2. Installation of Active Directory domain services and adds a client to the domain.
3. Administrator of a company named XXX needs to create a group by assigning file permissions to specific users and configure in a way that the file should be made available even in offline mode.
4. Consider two physical disk of 1 TB each, where one disk has been damaged due natural calamities. Configure a high availability storage technique having fault tolerance to overcome the above scenario.
5. Creating Virtual machine in windows server.
6. A company named XYZ had started its branch office in Bangalore and Coimbatore. Configure in such that they should come under the head office and able to access their resources from the same.
7. Configuration of windows server for remote management.
8. Rahul wants to host a file in such a way that the changes made by the client has to be updated in the database of the server. Configure the information service technique that performs the above activity.
9. Create a scenario based on real time domain

TOTAL HOURS – 45

OUTCOMES:

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

- Install and configure windows server 2012.
- Configure local storage and other services like file sharing.

CAC3101	COMPUTER FORENSICS AND	L	T	P	C
	INVESTIGATIONS	3	0	0	3

OBJECTIVES:

Aim of the course is to :

- Provide Basics of Computer Forensics
- Gain knowledge about complexities in the crimes are on the rise and it has become imperative to treat each cybercrime with diligence. .
- Teach about different forms of cybercrime and its implications and duties of professionals employed at different levels towards analysing and controlling cybercrime.
- Get familiar with the methods to recover data from storage devices are covered in following chapters.
- Learn Different forensic techniques and cyber laws are also dealt in detail.

MODULE I   COMPUTER FORENSICS   9

Introduction to Computer Forensics, Forms of Cyber Crime, First Responder Procedure- Non-technical staff, Technical Staff, Forensics Expert and Computer Investigation procedure, Case Studies

MODULE II   STORAGE DEVICES & DATA RECOVER METHODS   9

Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium, Working of Storage devices-Platter, Head assembly, spindle motor, Data Acquisition, Data deletion and data recovery method and techniques, volatile data analysis, Case Studies

MODULE III   FORENSICS TECHNIQUES I   9

Windows forensic, Linux Forensics, Network forensics – sources of network-based evidence, other basic technical fundamentals, Network forensic investigative strategies, technical aspects, statistical flow analysis, packet analysis, forensics of wireless networks, network intrusion detection analysis, event log aggregation and correlation analysis, switches, routers and firewalls, Case Studies, Mobile Forensics – data extraction & analysis, Steganography, Password cracking, Case Studies

MODULE IV   FORENSICS TECHNIQUES II   9

Cross-drive analysis, Live analysis, deleted files, stochastic forensics, Dictionary

attack, Rainbow attack, Email Tacking – Header option of SMTP, POP3, IMAP, examining browsers, Case Studies

MODULE V   CYBER LAW   9

Corporate espionage, digital evidences handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment), Case Studies, Incident specific procedures – virus and worm incidents, Hacker incidents, Social incidents, physical incident, Guidelines for writing forensic report

TOTAL HOURS – 45

TEXT BOOKS:
1. Computer Forensics: Computer Crime Scene Investigation by John Vacca, Laxmi Publications, 1st ed; 2015
2. Digital Forensic: The Fascinating World of Digital Evidences by Nilakshi Jain, et.al, Wiley, 1st ed; 2016
3. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics by John Sammons, Syngress, 2nd ed; 2014
4. Cyber Forensics in India: A Legal Perspective by Nishesh Sharma, Universal Law Publishing - an imprint of LexisNexis; First 2017 edition
5. Network Forensics:Tracking Hackers Throu by Davidoff, Pearson India, 1st ed; 2013

REFERENCES:
1. Hacking Exposed Computer Forensics by Aaron Philipp, David Cowen, McGraw Hill.
2. Mastering Mobile Forensics by Soufiane Tahiri, Packt Publishing, 1st ed; 2016
3. Computer Forensics: A Beginners Guide by David Cowen, McGraw Hill, 1st ed; 2013
4. Practical Digital Forensics Kindle Edition by Richard Boddington, Packt Publishing, 1st ed; July 2016.
5. Learning Network Forensics by Samir Datt, Packt Publishing, 1st ed; 2016

OUTCOMES:
On successful completion of the course, the students will be
- Able to understand latest trends and technologies used in the field of cyber forensics as applied to crime investigation and so on.
- able to provide Forensics Techniques
- having knowledge about storage devices & data recover methods

CAC3102	**VIRTUALIZATION AND CLOUD SECURITY**	L	T	P	C
		3	0	0	3

OBJECTIVES:

The aim of the course is to

- Providing knowledge about Server virtualization
- Learn the deployment and management of virtualized servers, deploying desktop, application and network virtualization.
- Understand the basic concepts of Cloud Data Security.
- Provides the basics of virtualization and Cloud Security.
- Providing knowledge in Cloud Trust Protocol & Transparency and Cloud Controls Matrix.

MODULE I   INTRODUCTION TO VIRTUALIZATION & CLOUD   9

Virtualization and Cloud computing concepts – private vs public cloud, IaaS, PaaS & SaaS concepts, Virtualization security concerns – hypervisor and host/ platform Security, Security communications between – guest instances, hosts and guests, security challenges and mitigation measures

MODULE II   CLOUD SECURITY   9

Cloud Security vulnerabilities and mitigating controls, top threats to Cloud security, mitigation through Cloud Controls Matrix

MODULE III   CLOUD TRUST PROTOCOL & TRANSPARENCY   9

Introduction to Cloud Trust Protocol & Transparency, Cloud Trust Protocol and Transparency, Transparency as a Service, Privacy & Compliance aspects of Cloud, CloudTrust 2.0, Security Content Automation Protocol, Case Study on building transparent cloud

MODULE IV   CLOUD DATA SECURITY   9

Lifecycle, storage architecture security, foundational principles and strategies, data masking, secure migration and traceability technologies, encryption for data at rest and data in transit, platform and software specific Cloud Security aspects

**MODULE V   LEGAL ASPECTS IMPACTING CLOUD SECURITY AND   9
PRIVACY**

Understanding legal challenges involved in Cloud, liability, copyright, data protection, IPR, data portability, inter-country legal frameworks, personal data protection and privacy, data controller and processor, contracts, provider's insolvency risk

TOTAL HOURS – 45

TEXT BOOKS:
1. Virtualization Security: Protecting Virtualized Environments by Dave Shackleford, Sybex (4 December 2012)
2. OpenStack Cloud Security by Fabio Alessandro Locati, Packt Publishing Limited (28 July 2015)
3. Cloud Security – A comprehensive Guide to Secure Cloud Computing by Ronald L. Krutz and Russel Dean Vines, Wiley, 2010
4. Cloud Security and Privacy by Mather Tim, Shroff Publishers & Distributers Private Limited - Mumbai; First edition (2009)

REFERENCES:
1. Securing the Cloud: Cloud Computer Security Techniques and Tactics by Vic (J.R.) Winkler, Syngress (1 June 2011)
2. Practical Cloud Security: A Cross-Industry View by Melvin B. Greer Jr., Kevin L. Jackson CRC Press; 1 edition (2 August 2016)
3. CCSP (ISC)2 Certified Cloud Security Professional Official Study Guide 1st , Kindle Edition by Ben Malisow (Author)
4. www.cloudsecurityalliance.org

OUTCOMES:

By the end of this course students will be able to develop the following:
* Basics of virtualization and Cloud Security,
* Knowledge in Cloud Trust Protocol & Transparency and Cloud Controls Matrix.
* Understanding Legal Aspects in impacting Cloud Security And Privacy.

CAC3103   **IT GOVERNANCE, RISK & INFORMATION**   **L**   **T**   **P**   **C**

SECURITY MANAGEMENT   **3**   **0**   **0**   **3**

OBJECTIVES:

The aim of the course are as follows

- Understand the importance of IT and IS Governances and the best practices followed by the Role of Steering committee and Chief Information Security Officer.
- Learn Risk management and the Information Security Management Practices including Hiring, Training, Promotion, Performance Evaluation, Required Vacations and Termination Policies, Sourcing Practices and Strategy for Information Security.
- Knowledge ofRisk Management.

MODULE I   **IT GOVERNANCE-PART 1**   **9**

Introduction & Concepts, Origin of Governance, Corporate Governance, Best Practices for IT Governance, Role of Governance in Information Security, Six outcomes of effective Security Governance, benefits of good governance, Cultural aspects in governance

MODULE II   **IT GOVERNANCE-PART 2**   **9**

ITGovernance-Roles and Responsibilities, Role of IT Strategy Committee and Security Steering Committee, Standard IT Balanced Scorecard. Val-IT framework of ISACA, Governance in multi-department and multi-country enterprises, Importance of Governance in establishing a sustainable Security Culture in the organization

MODULE III   **INFORMATION SYSTEMS STRATEGY**   **9**

Role of Strategic Planning for IT, Strategic Direction and Alignment of Security Strategy with Business Objectives, Role of CISO, Security Metrics Program

MODULE IV   **RISK MANAGEMENT PROGRAM**   **9**

Develop a Risk Management Program. Risk Management Process, Roles and Responsibilities, Risk-IT Framework of ISACA, Strategic Security decisioning using Risk Management

MODULE V   **INFORMATION SECURITY MANAGEMENT**   **9**

Introduction, Performance Optimization, Management Information Security Forum, Segregation of Duties, Description of COBIT and other Frameworks, Security

Program Effectiveness, Continuous Assessment and Improvement, In-sourcing versus Out-sourcing, Impact of ISM program across organization

TOTAL HOURS – 45

TEXT BOOKS:

1. Information Security Governance by S.H. Solms, Rossouw Solms, Springer; 1st Edition. 2nd Printing, 2008 edition (12 December 2008)
2. IT Governance: How Top Performers Manage IT Decision Rights for Superior Results by Weill, Harvard Business Review Press; First edition (1 June 2004)
3. ISACA publications

REFERENCES:

1. Managing Risk and Information Security by Malcolm Harkins, Apress; 1 edition, 2012
2. IT Governance: An International Guide to Data Security and ISO27001/ISO27002 by Alan Calder, Steve Watkins, Kogan Page; 6 edition (3 September 2015)
3. ISACA publications on COBIT, RiskIT and ValIT
4. Information Security Governance: Guidance for Information Security Managers by W. Krag Brotby and IT Governance Institute, Isaca (2 June 2008)
5. COBIT 5 Framework Perfect by Isaca, (10 April 2012)
6. Cobit 5 Foundation-reference and Study Guide by Ana Cecilia Delgado, CreateSpace Independent Publishing Platform; Stg edition (20 June 2016)
7. Governance of Enterprise IT Based on COBIT 5: A Management Guide by Geoff Harmer (Author), IT Governance Publishing, (6 February 2014)

OUTCOMES:

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

- Understand the role of IT Governance and best practices that are used.
- Develop a risk management program within the framework of ISACA.
- Gain knowledge about Information Security Management

CAC3111	LINUX ADMINISTRATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

The aim of the course is to :

- Gain knowledge about RHEL 6, is the sixth generation of the long term and predictable operating platform.
- Provides knowledge about Red hat Enterprise Linux 6 which is the ideal foundation for next-generation datacenters.
- Students will learn strong functional knowledge of RHEL 6 in any current IT work environment.
- Student will explores the security and network access controls in Linux.
- Provides knowledge about organizing network system and Mail Services, Securing Data and Account Management.

MODULE I   INTRODUCTION TO LINUX :   9

Introduction to Operating system - Types of Operating system - Multi user operating system - Open source licensing   - History of Linux - Unix Vs Linux - Flavors of Linux - Benefits and characteristics of Linux - Installation of Linux - Linux booting process - Log in and switch users in multiuser run levels - Shell and bash features - Linux kernel - sudo vs su - Date and time configuration – Linux run levels

Directories and files : Directory structure - System directory - Absolute path and relative path -Creating and removing directory - Changing directory path - Creating - removing - copying and moving files - File Permissions - Links – hard link and soft link - Input and output redirection - Filters and pipes - Locate - read - and use system documentation including man page

MODULE II   PACKAGE, USER AND GROUP MANAGEMENT   9

RPM - YUM - Archive - Compress - unpack and uncompress files using tar - star - gzip - and bzip2 - Create - delete - and modify local user accounts - Change passwords for local user accounts - Create - delete - and modify local groups and group memberships - Changing owner and modes

**MODULE III   CONFIGURING LOCAL STORAGE AND   9
FILESYSTEM**

List - create - delete - and partition type for primary - extended - and logical partitions -   Create and remove physical volumes - assign physical volumes to

volume groups - Create and delete logical Volumes. - Create - mount - unmount - ext2 - ext3 - and ext4 file systems. - Mount - unmount - and LUKS-encrypted file systems - Access control list

MODULE IV   MANAGING SYSTEM AND INFRASTRUCTURE   9
**   SERVICES**

Managing system services - Shutting down - suspending and hibernating the system - Controlling systemd on remote machine - Creating and modifying systemd unit files – DHCP Configuration - HTTP server Configuration - FTP server Configuration - Mail server Configuration - Samba server Configuration - NTP server Configuration - NFS server Configuration

MODULE V   OPENSSH AND LINUX SECURITY   9

OPENSSH - The SSH Protocol - Configuring OpenSSH and Starting an OpenSSH Server Key-Based Authentication in OpenSSH - OpenSSH Clients - Using the ssh Utility - scp Utility and sftp Utility - Configure firewall settings using system-config-firewall or iptables - Set enforcing and permissive modes for SELinux - List and identify SELinux file and process context.

Total Hours – 45

TEXT BOOKS:
  1. Orsaria, Jang, "RHCSA/RHCE Red Hat Linux Certification Study Guide Exams EX200 & EX300", McGraw-Hill Education, July 2017.

REFERENCES:
  1. Sander Van Vugt, "Red Hat RHCSA/RHCE 7 Cert Guide: Red Hat Enterprise Linux 7 (EX200 and EX300)", Phi Learning Pvt Ltd, 2009.

OUTCOMES:
At the end of the course the students will be able to :

- Attain skills required to manage and administer systems and servers using Linux Operating System.
- Gain knowledge about Red hat Enterprise Linux 6(RHEL 6).
- Appear for RED HAT Certification exam in Linux Administration after the completion of this course.

CAC3112   **INFRASTRUCTURE SOLUTIONS ON**   **L   T   P   C**
                 CLOUD   **3   0   0   3**

OBJECTIVES:

Students will be able to:

- Understand the cloud computing platform and infrastructure of Windows Azure
- Build, deploying and managing applications and services through a global network of Microsoft-managed data centers.
- Learn how to manage infrastructure in azure

MODULE I   7

Getting Started with Azure : Overview of Cloud Computing – Various Cloud Offerings – Azure Basics – Azure Services – Azure Portals – Preview Portal, Management Portal, Subscription Management – Billing – Pricing Calculator -
Azure Virtual Machines : Virtual Machine(VM) Basics – Status, IP Address, Creating and Configuring Virtual Machines – Configuring VM disks – Virtual Machine Management

MODULE II   08

Azure Storage: Storage Basics – Storage Types – Azure Storage Offerings – Understanding Azure Regions – Using Storage Accounts – Enabling Larger and Faster Storage – Resizing Azure Disks – Using Premium Storage – Monitoring Azure Storage Accounts – Best Practices for Azure Storage – Azure VM Storage Types – Azure Files – Managing Azure Storage

MODULE III   10

Azure Networking : Basics of Virtual Networks – Address Spaces, Subnets, DNS Servers – Creating and Using Virtual Networks – Network Security Groups – Virtual Appliances – Load Balancer basics – Configuring Load Balancers – Creating and Using Load balancers – Azure VPN

MODULE IV   10

Azure Active Directory : Introduction to Active Directory(AD), Identity and Authentication in Public Cloud – Introduction to Azure AD – Extending Active Directory into Azure – Azure AD and applications – Reporting and Monitoring Azure AD.

MODULE V   10

Azure Databases: SQL Azure: Creating a SQL Server - Creating a SQL DB - Creating Tables - Adding Data to the Table - View Connection Strings - Security Configurations - Migrating on premise DB to SQL Azure.

Azure Websites: Creating a Website, Setting deployment credentials -Choosing a platform -Setting up Default page for website - Scaling - Auto Scaling by Time - Auto Scaling by Metric - Difference between Free, Shared, Basic and Standard websites - Creating a website using Visual studio

Total Hours – 45

TEXT BOOKS:

1. Michael Collier, Robin Shahan, "Fundamentals of Azure – Microsoft Azure Essentials", Microsoft Press, 2015.

REFERENCES:

1. Michael W, "Implementing Microsoft Azure Infrastructure Solutions", Phi Learning Pvt Ltd, 2009

OUTCOMES:

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

- Learn the basics of cloud technology in Windows Azure services like computer service,
- Understand Network service, data service and App service.
- Learn Programming with windows azure in depth.

CAC3113	**PRINCIPLES OF VIRTUALIZATION**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

Students will be able to understand

- Basic concepts of Virtualization
- Explores the implementation and usage of VMWare Virtualization, its installation process and the working of Windows Server hyper V.
- Deploying and managing an enterprise desktop virtualization environment

MODULE I   BASICS OF VIRTUALIZATION   9

Understanding Virtualization, Need of Virtualization and Virtualization Technologies: Server Virtualization, Storage Virtualization, I/O Virtualization, Network Virtualization, Client Virtualization, Application virtualization, Desktop virtualization, Understanding Virtualization Uses: Studying Server Consolidation, Development and Test Environments , Helping with Disaster Recovery

MODULE II   DEPLOYING AND MANAGING AN ENTERPRISE   9
**   DESKTOP VIRTUALIZATION ENVIRONMENT**

configure the BIOS to support hardware virtualization; Install and configure Windows Virtual PC: installing Windows Virtual PC on various platforms (32-bit, 64-bit), creating and managing virtual hard disks, configuring virtual machine resources including network resources, preparing host machines; create, deploy, and maintain images

MODULE III   DEPLOYING AND MANAGING A PRESENTATION   9
**   VIRTUALIZATION ENVIRONMENT**

Prepare and manage remote applications: configuring application sharing, package applications for deployment by using RemoteApp, installing and configuring the RD Session Host Role Service on the server.

MODULE IV   ACCESSING PUBLISHED APPLICATIONS   9

Access published applications: configuring Remote Desktop Web Access, configuring role-based application provisioning, and configuring Remote Desktop client connections. Configure client settings to access virtualized desktops: configuring client settings

MODULE V　　　UNDERSTANDING VIRTUALIZATION SOFTWARE　　9

List of virtualization Software available . Vmware- introduction to Vsphere, ESXi, VCenter Server and Vsphere client. Creating Virtual Machine.. Introduction to HYPER-V role. Create Virtual Machines. Create Hyper-v virtual networking, Use virtual Machine Snapshots. Monitor the performance of a Hyper-v server, Citrix XENDesktop fundamentals

Total Hours – 45

TEXT BOOKS:

1. Virtualization with Microsoft Virtual Server 2005 by Twan Grotenhuis, Rogier Dittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006.

REFERENCES:

1. Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source Incorporated, 2008
2. Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter, EBook, 2005

OUTCOMES:

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

- Understand Virtualization.
- Plan for a virtual implementation
- Prepare for different vendor technologies available in the field of Virtualization.

CAC3107	COMPUTER FORENSICS AND	L	T	P	C
	INVESTIGATION -LAB	0	0	4	2

OBJECTIVES:

The Aim of the course is to :

- Provide practical experience how to perform a forensic investigation, collect evidences according to the standards
- Analyse the different operating system, their file architecture and to retrieve data that in a forensically sound manner.

LIST OF EXPERIMENTS:

1. A carder has ordered products using hacked credit cards and he tried to be anonymous by using VPN, TOR etc. You have received a cyber complaint regarding such scenario. As a computer forensic expert, demonstrate the ways to collect electronic evidence using forensic standards.

2. Dismantling and re-building PCs in order to access the storage media safely

3. Boot sequence and Power on Self -Test mode analysis

4. Being a forensic analyst you have been given an assignment to examine the files present in the systems which was ceased in the crime scene that operates in different platform such as Windows and Linux. Examine the files and the file systems of each platform.

5. Analysing Word processing and Graphic file format

6. An attacker has got the access to the network of an organization by performing war diving attack and compromised critical asset of the company. As a forensic investigator find how the attacker would sniffed the network, also analyse the network packets which was compromised.

7. Password and encryption techniques

8. There was an cyber-attack on our university, where a malicious file spread through the network and compromised every system by encrypting each files present inside the system. Investigate the case and generate a report by analysing the malicious file and the network data.

9. An cyber expert took over an system by exploiting the vulnerability in it. Once the attacker took the data he needed and wiped the entire hard disk as a clean slate. Being a forensic investigator demonstrates how to cease the system and its parts, also analyse the external drive by recovering the data.

10. Data recovery techniques for Pen drive and CD

11. Create a scenario based on real time domain.

12. Create a scenario based on real time domain.

TOTAL HOURS – 30

OUTCOMES:

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

- Know the standards they have to follow in order to collect evidences from the cybercrime scene.

- Examine malicious files, logs of different operating system in a forensically sound manner.

- Analyse any kind of malicious file and also recover wiped data from any type of external drives.

CAC3114   **PRINCIPLES OF VIRTUALIZATION –LAB**   L   T   P   C
                                                      0   0   4   2

OBJECTIVES:

The Aim of this course is to :

- Provide practical experience to students and reinforce deploying and managing an enterprise desktop virtualization environment
- Explore the implementation and usage of VMWare Virtualization, its installation process and the working of Windows Server hyper V.

LIST OF EXPERIMENTS

1. Installation and configuration of Vmware ESXi server 6.5- a type-1 hypervisor on host machine to deploy a virtual machine.
2. Installation and deployment of Vmware vCenter in a virtual machine that runs on an ESXi host.
3. Creation of Virtual Machines using vCenter server on a machine that has access to ESXi host by installing Vsphere client.
4. Modify Virtual Machine settings by adjusting the configuration like hardware, adding new virtual hard disk, number of virtual processor and memory settings.
5. Using VMware Workstation, create a copy of virtual machine(clone) including all its settings, configured virtual devices and virtual machine disk contents.
6. Create a scenario based on real time domain.

Total Hours – 30

OUTCOMES:

At the completion of the course, students will be able to:
- Know about VMware Workstation Pro and virtualization software like Vsphere ESXi, vCenter server and Vsphere client, learn to install and configure them.
- Work on hypervisor and its role in virtualization.
- Deploy virtual machines, create virtual hard disks, configure virtual machine resources.

SEMESTER VI

CAC3211   **MOBILE, WIRELESS AND VOIP SECURITY**   L   T   P   C

                                                     3   0   0   3

OBJECTIVES:

The Course aims that, Student will be able to :

- Learn threats and vulnerabilities existing in Mobile communication environment.
- Understand about securing information and data in environments like wireless, VoIP and Bluetooth
- Provide knowledge about wireless security.

MODULE I   **INTRODUCTION TO MOBILE COMMUNICATION**   **9**

Introduction to Mobile communications, Important terminologies, Evolution in Mobile Communication,1G,2G,3G,4G,5G. Protocols in mobile communication. Representation of mobile communication with OSI model. GSM. GSM Protocol Architecture. GPRS. GPRS-features and benefits. GPRS – Applications, FDMA, TDMA, Multiplexing, CDMA. Overview of other protocols in Mobile Communication. DTAP (GSM), MM GSM, SM-TP, SS7, Important Security Considerations. Security Vulnerabilities. Security Attacks. Security Controls. Overview of 3G Security Architecture.4G Security Design Features. Threats, Risks and 4G Design Decisions. Security Features of GSM.GSM-Authentication. GSM-Key Generation and Encryption. Security Management in Mobile Communications. Security Standards.

MODULE II   **WIRELESS SECURITY**   **9**

Introduction to Wireless Security. Commonly used Terminologies in Wireless Security, WAP, What type of devices will use WAP? Why WAP? WAP Protocol Stack, WAP Architecture, How does WAP work, WML, Wireless services with which WAP works. WAP 2.0, WAP 2.0 SyncML synchronization. WAP 2.0 Improvements, Working, WAP's – Protocol Layer, Cellular Network, Wide Area Ethernet (WAE), Running an App using – WAE, Application, Wireless Telephony App (WTA) Protocol, Wireless Technology Standards, WiMAX, IEEE 802.11 standard, Global Wireless Standards, Bluetooth, Challenges of Wireless Security, Security Vulnerabilities, Security Attacks, Types of Attack, Confidentiality attacks, RADIUS, Integrity attacks, Authentication attacks, Availability attacks, Security Controls. Inbuilt Encryption Keys, Wireless

Security Devices, Security Awareness, Secure Configuration, Wireless Security Management, Commercial, OpenSource.

MODULE III   VOICE OVER INTERNET PROTOCOL (VOIP) SECURITY   9

Introduction to VOIP, VoIP Components, Signaling Gateway Controller, Media Gateway, Media Server, Application Server, VOIP Protocols, H,323Media Gateway Control Protocol (MGCP), Session Initiation Protocol (SIP), H.248 (also known as Media Gateway Control (Megaco), Real-time Transport Protocol (RTP), Real-time Transport Control Protocol (RTCP), Secure Real-time Transport Protocol (SRTP), Session Description Protocol (SDP), Jingle, Teamspeak, Skype, Security: VoIP vs POTS, Security: Threats, Attacks: SIP Attacks: Sniffing RTP, Security Threats and Defense Mechanisms, Challenges for IP Telephony, Security Controls Counter measures.

MODULE IV   MOBILE FORENSICS & DATA EXTRACTION   9

Mobile forensics process including seizure, data acquisition types like Physical, Logical, Manual, External & Internal memory, storage, analysis using tools & techniques

MODULE V   SECURITY IN MOBILE APPLICATION DEVELOPMENT   9

Introduction to secure mobile application development, methods of protecting sensitive data on mobile devices, Introduction to Android Security, iOS Security and Windows Security

Total Hours – 45

TEXT BOOKS:
1. Mobile Application Security by Himanshu Dwivedi, Chris Clark, David Thiel by McGraw Hill Education (1 July 2017)
2. Wireless Network Security A Beginner's Guide by Tyler Wrightson, McGraw Hill Education; 1 edition (25 June 2012)
3. Mobile Security: How to Secure, Privatize and Recover Your Devices Paperback by Tim Speed, Darla Nykamp, Mari Heiser, Joseph Anderson, Packt Publishing Limited (10 August 2013)
4. Mastering Mobile Forensics by Soufiane Tahiri, Packt Publishing Limited (30

May 2016)

5. Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013)

REFERENCES:

1. Mobile Forensics: Advanced Investigative Strategies by Oleg Afoninis, Vladimir Katalov, Packt Publishing Limited (30 September 2016)
2. Practical VoIP Security by Thomas Porter, Syngress (31 March 2006)
3. The Mobile Application Hacker's Handbook (MISL-WILEY) by Dominic Chell, Tyrone Erasmus, Shaun Colley, Wiley (2015)
4. Wireless Hacks 2e by Rob Flickenger, Roger Weeks, O'Reilly; 2 edition (9 December 2005)
5. Network Security Bible by Eric Cole, Wiley; Second edition (2009)
6. Security Aspects for Voip Systems by Alotaibi Mutlaq, LAP Lambert Academic Publishing (28 May 2015).

OUTCOMES:

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

- Learn how data secured in Wireless, VoIP and Bluetooth environment
- Gain knowledge about Mobile Forensics & Data Extraction
- Gain knowledge on mobile communication

CAC3202   **PROJECT AND VIVA-VOCE**   **24   16**

Details of the project will be provided later