SACRED HEART COLLEGE (AUTONOMOUS), THEVARA

KOCHI, KERALA, 682013

CURRICULUM AND SYLLABUS

CHOICE BASED CREDIT AND SEMESTER SYSTEM

(CBCSS)

BACHELOR OF COMPUTER APPLICATIONS
[SPECIALIZATION IN MOBILE APPLICATIONS AND CLOUD TECHNOLOGY]

INTRODUCED FROM 2019 ADMISSION ONWARDS

BOARD OF STUDIES IN COMPUTER SCIENCE

Sacred Heart College, Thevara, Kochi, Kerala

Sl.No	Name & Address	Designation/Category
1	Ms. Regitha Baiju, HoD	Chairman
2	Dr. Sabu M K Assoc. Professor, Dept. of Computer Applications CUSAT, Thrikkakara Mob: 9446128197 Email-ID: sabumk@cusat.ac.in	Expert in the subject from outside the college, nominated by the academic council.
3	Rev. Dr. Jaison Paul Mulerikkal CMI Principal, Jyothi Engineering College Cheruthuruthy, Thrissur Mob: 9567611733 Email-ID: principal@jecc.ac.in	Expert in the subject from outside the college, nominated by the academic council.
4		Expert to be nominated by the Vice Chancellor from a panel of six recommended by the College Principal
5	Mr. Maxon C J, Associate Infrastructure Analyst, UST Global, Kochi, Mob. 9207456677	One post graduate meritorious alumnus nominated by the Principal
6	Mr. Sudhevan K J, Chief Consultant and Head Coach, ARISE, Kochi, Mob. 9388637322	Representative from industry, corporate – sector or allied area.
7	Ms. Tressa Shybe	Faculty Member
8	Ms. Achamma Cherian	Faculty Member
9	Ms. Jisha Soman	Faculty Member
10	Ms. Rency K. Renjith	Faculty Member
11	Fr. Nijo Antony	Faculty Member
12	Ms. Christy Jacqueline	Faculty Member
13	Mr. Shailesh Sivan	Faculty Member

CONTENTS

1. PREAMBLE

BCA, is the self-financing programme which was commenced in the year of 2016. To enhance academic standards and quality in higher education, several significant measures i.e. innovation and improvements in curriculum, teaching- learning process, and examination and evaluation system has been takes besides governance and other matters. In tune with the industrial requirements, the Board of studies has felt that the syllabus has to be revised and put in to the effect from the academic year 2019-20.

The Board of studies of Computer Science has framed the present syllabus to revise the curriculum in tune with the parent university. In this process care has been taken to give emphasis to various aspects such as the creativity of students, knowledge of current development in the discipline, the impacts due to the development of science and technology, employability and entrepreneur development.

As per the order of Hon'ble Supreme Court of India order and the subsequent UGC circular, the Academic Council of the college decided to incorporate Environmental studies in the UG curriculum. The BOS in Computer Science has decided to include the 'IT and Environment' as full course in semester V.

The Academic Council of the college decided to implement the revised syllabus with effect from the academic year 2019-20.

Thevara   Ms. Regitha Baiju
                                                                            Hod. Dept of CS

2. INTRODUCTION
BACHELOR OF COMPUTER APPLICATIONS
[SPECIALIZATION IN MOBILE APPLICATIONS AND CLOUD TECHNOLOGY]

2.1 PREAMBLE

The Department of Computer Science of Sacred Heart College started a new programme as Specialization on Mobile Application and Cloud Technology. As Sacred Heart College is granted academic autonomy in the year 2014 it has the privilege of restructuring the syllabus and introducing new career oriented industry ready programs. Keeping an eye on the industry and to modernize the curriculum, the Board of Studies of the Department of Computer Science, Sacred Heart College, has initiated an industry collaboration to impart Bachelor of Computer Application, specialized in Mobile Applications and Cloud Technology. This programme comprises complementary course **Mathematics** and vocational course **Cloud Technology**.

The main objective of this programme is to inculcate and horn up the skills of young minds in new generation technologies to compete in the knowledge era. This programme is designed in such a way that students can have a detailed knowledge of subjects as well as the knowledge of IT related applications. Throughout this programme the students will go through the IT scenario, its scope, career and the essentials of the IT world. This unique programme provides dual career options for the students in the latest and fast growing technology sectors of **Mobile Applications and Cloud Technology**.

The syllabus aims to focus on enabling the students to familiarize with the new technologies, and at the same time enhance and strengthen the fundamental knowledge in Computer Applications, and related fields.

2.2 OBJECTIVES:

This unique course provides dual career options for the students in the fast growing technology sectors of Mobile Applications and Cloud Technology. In addition to all the mandatory subjects of a traditional BCA, this specialized course offers in-depth practical know-how of the latest technology trends – Mobile Applications and Cloud Technology. These sectors have the

potential to grow exponentially and will provide challenging job opportunities for young professionals with the right skill sets.

On the Mobile Applications front, the course provides the students the fundamental knowledge of all aspects of mobile Technology with emphasis on application development for Android, with industry requirements in mind.

On the Cloud Technology front, the course provides the students the fundamental knowledge of all aspects of Cloud Technology. The course focuses on Virtualization Technology, Cloud Technology, Datacenters, Networking and Operating Systems.

2.3 LEARNING OUTCOMES

- It will equip the students with the necessary knowledge and skills for the existing and emerging Mobile Applications and Cloud technology fields.
- It prepares graduates to show high quality of independent thought, flexibility and maturity based on a sound technical knowledge of the field.
- It will enable the student to embark on a successful career in the area of Mobile Applications and Cloud Technology.

On completion of the Bachelor of Computer Applications in Mobile Applications programme, students should be able to:

- Use a range of programming languages and tools to develop computer programs and systems that are effective solutions to problems.
- Understand, design, and analyze precise specifications of algorithms, procedures, and interaction behavior.
- Apply mathematics, logic, and statistics to the design, development, and analysis of software systems.
- Equipped with a range of fundamental principles of Computer Science that will provide the basis for future learning and enable them to adapt to the constant rapid development of the field.
- Gain experience of working in teams to build software systems.
- Gain a strong ground in basic discipline of study

- Learn the practical implementation , as the learning of the practical subjects will happen in laboratories or on the field ,

- Have an insight to the situations in the existing field/market/industries because of the project work.

2.4 JOB OPPORTUNITIES:

2.4.1 Job Opportunities for Mobile App Developers

- Small, Medium and Large Professional Services IT Companies

- Enterprise Application Product and Service Companies

- Mobile Application Product and Service Companies

- VAS providers

- e-Commerce, m-Commerce companies

- Internet companies

2.4.1.1 Career Progression Path - Mobile Applications

Industry	Entry level (0-1 yrs exp.)	Mid Level (3-5 yrs exp.)	Advanced level (5 yrs plus exp.)
Job Role	UI Engineer	UI Designer	UI Development Lead
	Software Engineer / Developer	Sr. Software Engineer / Developer	Technical Lead / Technical Manager / Project Manager
	Test Engineer	Sr. Test Engineer	Test Manager
	Mobile Application Developer	Mobile Application Entrepreneur	CEO

2.4.2 Job Opportunities for Cloud Technology Professionals

By the enhancement of cloud technology students can obtain the opportunities as:

- Cloud architect in various companies

- Cloud infrastructure analyst

- Cloud sales specialist/ cloud brokerage

- Helps to work in cloud computing DevOps environment.

- Cloud support engineer

- Cloud administrator

2.4.2.1 Career Progression Path - Cloud Technology

Industry	Entry level (0-1 yrs exp.)	Mid Level (3-5 yrs exp.)	Advanced level (5 yrs plus exp.)
Job Role	Cloud Architect		Cloud Consultant
	Cloud Engineer	Sr. Cloud Engineer Manager Cloud Technology	Manager Cloud Technology
	Datacenter Technician	Datacenter Engineer	Datacenter Manager
	Remote Desktop Engineer	Cloud Provisioning Engineer	Datacenter Manager
	Cloud Security Specialist	Security Engineer	Manager Cloud Security

2.5. REGULATIONS FOR CHOICE BASED CREDIT AND SEMESTER SYSTEM (CBCSS) FOR UNDER GRADUATE PROGRAMMES -2019

2.5.1. Definitions

i. '**Programme**' means the entire course of study and examinations.

ii. 'Duration **of Programme'** means the period of time required for the conduct of the programme. The duration of under graduate programmes shall be 6 semesters, post-graduate programme shall be of 4 semesters and M Phil programmes shall be 2 semesters.

iii. **'Semester'** means a term consisting of a minimum of 90 working days, inclusive of examination, distributed over a minimum of 18 weeks of 5 working days, each with 5 contact hours of one hour duration

iv. **'Course'** means a segment of subject matter to be covered in a semester. Each Course is to be designed variously under lectures / tutorials / laboratory or fieldwork / study tour /seminar / project / practical training / assignments/evaluation etc., to meet effective teaching and learning needs.

v. '**Common Course I'** means a course that comes under the category of courses for English and '**Common Course II**' means additional language, a selection of both is compulsory for all students undergoing undergraduate programmes.

vi. '**Core course'** means a course in the subject of specialization within a degree programme.

vii. '**Complementary Course**' means a course which would enrich the study of core courses.

viii. '**Open course'** means a course outside the field of his/her specialization, which can be opted by a student.

ix. '**Additional core course**' means a compulsory course for all under graduate students (as per the UGC directive) to enrich their general awareness.

x. The U.G. programmes shall include (a) Common courses (b) Core courses (c) Complementary Courses (d) Open Course (e) Study tour and (f) Internship for selected programmes.

xi. '**Additional Course'** is a course registered by a student over and above the minimum required courses.

xii. **'Credit' (Cr)** of a course is the numerical value assigned to a course according to the relative importance of the content of the syllabus of the programme.

xiii. '**Extra credits**' are additional credits awarded to a student over and above the minimum credits required for a programme for achievements in co-curricular activities carried out outside the regular class hours OR curricular activities/courses completed for value addition, as directed by the College/ department. It is the numerical value assigned to Club activities, Social service, Internship etc. which is not added with the total academic credits of the students. Additional credit components

    (a) Talent & career club activity (optional)

    (b) Social service (mandatory)

    (c) Internship for Commerce, Communication and Computer applications (mandatory).

    (d) Internship (desirable for other programmes).

    (e) Add on courses (optional)

xiv. '**Programme Credit'** means the total credits of the UG Programme.

xv. **'Programme Elective course'** Programme Elective course means a course, which can be chosen from a list of electives and a minimum number of courses is required to complete the programme.

xvi. '**Programme Project**' Programme Project means a regular project work with stated credits on which the student undergoes a project under the supervision of a teacher in the parent department / any appropriate Institute in order to submit a dissertation on the project work as specified.

xvii. '**Internship**' is on-the-job training for professional careers.

xviii. '**Plagiarism**' Plagiarism is the unreferenced use of other authors' material in dissertations and is a serious academic offence.

xix. '**Tutorial**' Tutorial means a class to provide an opportunity to interact with students at their individual level to identify the strength and weakness of individual students.

xx. '**Seminar**' seminar means a lecture by a student expected to train the student in self-study, collection of relevant matter from the books and Internet resources, editing, document writing, typing and presentation.

xxi. '**Evaluation**' means every course shall be evaluated by 25% continuous (internal) assessment and 75% end course/end semester (external) assessment.

xxii. '**Repeat course**' is a course that is repeated by a student for having failed in that course in an earlier registration.

xxiii. '**Audit Course**' is a course for which no credits are awarded.

xxiv. '**Department**' means any teaching Department offering a course of study approved by the college / Institute as per the Act or Statute of the University.

xxv. '**Parent Department**' means the Department which offers a particular UG/PG programme.

xxvi. '**Department Council**' means the body of all teachers of a Department in a College.

xxvii. '**Faculty Advisor**' is a teacher nominated by a Department Council to coordinate the continuous evaluation and other academic activities undertaken in the Department.

xxviii. '**College Co-ordinator** means a teacher from the college nominated by the College Council to look into the matters relating to CBCS-PG System.

xxix. '**Letter Grade**' or simply '**Grade**' in a course is a letter symbol (O, A, B, C, D, etc.) which indicates the broad level of performance of a student in a course.

xxx. Each letter grade is assigned a '**Grade point**' (GP) which is an integer indicating the numerical equivalent of the broad level of performance of a student in a course.

xxxi. **'Credit point'** (CP) of a course is the value obtained by multiplying the grade point (GP) by the Credit (Cr) of the course CP=GP x Cr.

xxxii. '**Semester Grade point average'** (SGPA) is the value obtained by dividing the sum of credit points (CP) obtained by a student in the various courses taken in a semester by the total number of credits taken by him/her in that semester . The grade points shall be rounded off to two decimal places. SGPA determines the overall performance of a student at the end of a semester.

xxxiii. **Cumulative Grade point average'** (CGPA) is the value obtained by dividing the sum of credit points in all the courses taken by the student for the entire programme by the total number of credits and shall be rounded off to two decimal places.

xxxiv. '**Grace Marks'** means marks awarded to course/s, as per the orders issued by the college from time to time, in recognition of meritorious achievements in NCC/NSS/Sports/Arts and cultural activities.

2.6 ATTENDANCE

Being a regular college, physical presence in the regular activities, especially, classes and exams, is mandatory for the students. However, if a student secures 75% of attendance s/he is eligible to appear for the exams, provided there are no other impediments like disciplinary proceedings, malpractice record etc.

  i.   A maximum of 5 marks (5%) for a course is given for attendance

 ii.   **Absence:** A student found absent for one hour in the forenoon or afternoon session is deprived of the attendance for the entire session as far as eligibility for final exam is concerned.

iii.   The hour related calculation in a course is meant for awarding marks for the course concerned.

 iv.   **Late entry**: A student is supposed to be in time in the class. Late arrival related treatment is left to the discretion of the individual teacher. However, as a norm, a late arriving student may be permitted to the class, if it is not inconvenient or distraction to the class as such; though attendance MAY NOT BE GIVEN. Late arrival

beyond 5 minutes is treated as ABSENCE; though the teacher may consider permitting the student to sit in the class.

v.   **Leave**: A student has to formally report his/her absence with reasons either in advance, or immediately after the absence for obtaining an approved leave. This applies to all sorts of leave – medical, on duty or other.

vi. The student is supposed to report in prescribed format on the very next day of the absence; however, upto a week's time is permitted. Afterwards, the leave applications will not be considered.

vii. The student has to retain a copy/section of the approved leave form and produce the same as proof, in case there is any confusion regarding the leave sanctioning. In the absence of such proof, the claims will not be entertained.

viii. **Duty Leave**: A student representing the college in sports, arts, social service or academic matters, has to get sanction from the class teacher concerned and submit the leave application form duly endorsed by teacher concerned & the class teacher, and submit it to the faculty Dean (or Vice Principal). The same will be forwarded by the Dean/Vice Principal for attendance entry.

ix. **SPORTS**: The approval of the Department of Physical Education and the class teacher is required. The time limit for submission mentioned above is applicable in the case of duty leave as well.

x.   **CONDONATION**: A student may have the privilege of condonation of attendance shortage (upto a maximum of 10 days) on the basis of genuineness of the grounds of absence (medical reasons or college duty), duly recommended by the department. This is not a matter of right. It is a matter of privilege based on Principal's discretion and the good conduct of the student on the campus. A student of UG programme may have a maximum of two such opportunities and that of PG programmes only one opportunity.

xi. **RE-ADMISSION**: A student whose attendance is inadequate will have to discontinue the studies. Such students, whose conduct is good, may be re-admitted with the approval of governing council, on the basis of recommendation from the

department, and assurance from the student and the guardian regarding good conduct and compliance in academic and discipline matters. For this the prescribed re-admission fee has to be paid.

As a condition for re-admission, the student should have cleared all academic arrears, or should have appeared for the exams in which he/she is having an arrear (if the results are not out), and should have fulfilled all academic assignments prescribed by the department for compensating for his lack of attendance.

xii. **UNAUTHORISED ABSENCE & REMOVAL FROM ROLLS**: A student absent from the classes continuously for 10 consequent days without intimation or permission, shall be removed from the rolls, and the matter intimated to the student concerned. On the basis of recommendation of the department concerned, re-admission process may be permitted by the Principal.

2.7 PROGRAMME REGISTRATION

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

ii. A UG student who registered for the programme shall complete the same within a period of 12 continuous semesters and a PG student within a period of 8 continuous semesters from the date of commencement of the programme.

2.8 **PROMOTION:**

A student who registers for the end semester examination shall be promoted to the next semester. However, in extreme circumstances, a student having sufficient attendance who could not register for the end semester examination may be allowed to register notionally by the Principal with the recommendation of the Head of the department concerned and , by paying the prescribed fee.

2.9 UNDER GRADUATE PROGRAMME STRUCTURE - Model III

A	Programme Duration	6 Semesters
B	Total Credits required for successful completion of the Programme	120
C	Total Credits for Common course	8
D	Total Credits for Complementary Course	8
E	Credits for Core Courses	79
F	Credits for Vocational Courses	22
G	Open Course	3
H	Minimum attendance required	75%

2.10 SCHEME OF PROGRAMME

SEM	COURSE CODE	TITLE OF THE COURSE	NO. HRS./ WEEK	CREDITS	TOTAL HRS./SEM	EXAM DURATION	TOTAL MARKS	
							INTERNAL	EXTERNAL
1	19U1CCENG1	Homo Loquens: Effective Listening and Speaking	5	4	90	3	25	75
1	19U1CPCMT1	Foundation of mathematics	4	4	72	3	25	75
1	19U1CRBCA1	Computer fundamentals & organization	4	4	72	3	25	75
1	19U1CRBCA2	Programming in 'C'	4	3	72	3	25	75
1	19U1CRBCA3	Introduction to Linux	4	3	72	3	25	75
1	19U1PRBCA1	Programming in 'C' – Practical	2	1	36	3	25	75
1	19U1PRBCA2	Introduction to	2	1	36	3	25	75

14

2		Linux - Practical						
			25	20	450		175	525
2	19U2CCENG03	Text and Context: A Guide to Effective Reading and Writing	5	4	90	3	25	75
2	19U2CPCMT2	Discrete Mathematics and Numerical Analysis	4	4	72	3	25	75
2	19U2CRBCA4	Operating system	4	3	72	3	25	75
2	19U2CRBCA5	OOPS with C++	4	3	72	3	25	75
2	19U2CRBCA6	Data structures using 'C'	4	3	72	3	25	75
2	19U2ARESC1	Environmental Studies	5	4	75	3	25	75
2	19U2PRBCA3	OOPS with C++ - Practical	2	1	36	3	25	75
2	19U2PRBCA4	Data structures using 'C' - Practical	2	1	36	3	25	75
			30	23	525		200	600
3	19U3CRBCA7	Basic Statistics	4	4	72	3	25	75
3	19U3CRBCA8	Software engineering	4	3	72	3	25	75
3	19U3CRBCA9	RDBMS	4	3	72	3	25	75
3	19U3CRBCA10	Computer networks	5	3	90	3	25	75
3	19U3CRBCA11	Programming in JAVA	4	3	72	3	25	75
3	19U3PRBCA5	RDBMS – Practical	2	1	36	3	25	75
3	19U3PRBCA6	Programming in JAVA – Practical	2	1	36	3	25	75

			25	18	450		175	525
4	19U4CRBCA12	Web Technologies	5	4	90	3	25	75
4	19U4VCBCA1	Introduction to Cloud Technology	4	4	72	3	25	75
4	19U4VCBCA2	Fundamentals of Data Centre	4	4	72	3	25	75
4	19U4CRBCA13	Basic Android	4	4	72	3	25	75
4	19U4CRBCA14	Mobile Device and Network Architecture	4	4	72	3	25	75
4	19U4PRBCA7	Basic Android – Practical	2	1	36	3	25	75
4	19U4PVBCA1	Introduction to Cloud Technology – Practical	2	1	36	3	25	75
			25	22	450		175	525
5	19U5VCBCA3	Principles of Virtualization	4	4	72	3	25	75
5	19U5VCBCA4	Server Operating System	4	4	72	3	25	75
5	19U5CRBCA15	IT and Environment	4	4	72	3	25	75
5	19U5OCBCA1	Security Threats and Trends (Open)	4	3	72	3	25	75
5	19U5CRBCA16	Advanced Android	5	4	90	3	25	75
5	19U5PVBCA2	Server Operating System – Practical	2	1	36	3	25	75
5	19U5PRBCA8	Advanced Android – Practical	2	1	36	3	25	75
			25	21	450		175	525

6	19U6CRBCA17	Introduction to Mobile UI and UX	3	2	54	3	25	75
6	19U6VCBCA5	Fundamentals of Storage	4	4	72	3	25	75
6	19U6CRBC18	Web Technology and Value added services in Mobile	4	4	72	3	25	75
6	19U6CRBCA19	Mobile Testing	4	4	72	3	25	75
6	19U6PJBCA1	Project and Viva-Voce	10	6	150	3	40	60
			25	**20**	**420**		**140**	**360**

2.11   EXAMINATIONS

All the End Semester Examinations of the college will be conducted by the Controller of Examination. The Principal will be the Chief Controller of Examinations. An Examination committee consists of the Chief Controller of Examinations, Controller of Examinations, Additional Chief Superintendent, Deans, IQAC Coordinator and other faculty members nominated by the Principal will act as an advisory body of the matters relating to the conduct of examinations.

2.12   EVALUATION AND GRADING

The evaluation scheme for each course shall contain two parts;

   a. Continuous Internal Evaluation (CIA) and

   b. End Semester Examination (ESE).

The internal to external assessment ratio shall be 1:3, for both courses with or without practical. For courses without practical, there shall be a maximum of 75 marks for external evaluation and maximum of 25 marks for internal evaluation. For courses with practical, generally external evaluation shall be for a maximum of 60 marks and internal evaluation for 20 marks. Both internal and external evaluation shall be carried out in the mark system and the marks are to be rounded to the nearest integer.

2.12.1 **Continuous Internal Assessment (CIA)/ Continuous Assessment**:

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

Components of Internal Evaluation (for theory without practical)

	Components	Marks
i.	Assignments	5
ii	Seminar/Quiz/Field survey /Viva etc.	5
iii	Attendance	5
iv	Two Test papers(2x5)	10
	Total	25

i. **Assignments**: Every student shall submit one assignment as an internal component for every course.

Components	Marks
Punctuality	1
Content	2
Conclusion	1
Reference/Review	1
Total	**5**

ii. **Seminar**: The seminar lecture is expected to train the student in self-study, collection of relevant matter from the books and Internet resources, editing, document writing, typing and presentation.

Components	Marks
Content	2
Presentation	2
Reference/Review	1
Total	**5**

iii. Evaluation of Attendance

2.10 The attendance of students for each course shall be another component of internal assessment.

% of attendance	Mark
Above 90%	5
Between 85 and below 90	4
Between 80 and below 85	3
Between 76 and below 80	2
Between 75 and below 76	1

Components of Internal Evaluation (for theory with practical)

Components of Theory – Internal Evaluation	Marks
Attendance	5
Seminar/ Assignment (Written assignments, preparation of models, charts, posters etc., field survey, field work)	5
Test paper(s)	10
Total	20

Components of Practical- Continuous internal assessment

Components	Marks
Attendance and Lab involvement	2
Record	2
Viva/Model Exam	1
Total	5

iv. Class Tests: Every student shall undergo **two class tests** as an internal component for every course.

2.12.2 End Semester Examination (ESE): The End Semester Examination in theory courses shall be conducted by the college with question papers set by external experts/ question bank. The evaluation of the answer scripts shall be done by the examiners based on a well-

defined scheme of evaluation given by the question paper setters/Prepared as per the direction of the Chairman, Board of Examiners. The evaluation of the End Semester Examinations shall be done immediately after the examination preferably through the centralised valuation.

2.12.3 **Project**

Project work is a part of the syllabus of most of the programmes offered by the college. The guidelines for doing projects are as follows:

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

ii. Project work shall be carried out under the supervision of a teacher in the concerned department or an external supervisor.

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

iv. There should be an internal assessment and external assessment for the project work in the ratio 1:3

v. The external evaluation of the project work consists of valuation of the dissertation (project report) followed by presentation of the work and viva voce.

vi. The mark and credit with grade awarded for the program project should be entered in the grade card issued by the college.

Components of Internal Evaluation for Projects

Components	Marks
Topic/Area selected	2
Experimentation/Data collection	5
Punctuality-Regularity	3
Compilation	5
Content	5
Presentation	5
Total	**25**

2.12.4 **Comprehensive Viva-voce**

Comprehensive Viva-voce shall be conducted at the end of the programme, which covers questions from all courses in the programme as per the syllabus.

2.12.5 Grade and Grade Points

For all courses (theory & practical), Letter grades and grade point are given on a 10-point scale based on the total percentage of marks, (CIA+ESE) as given below:-

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

Grades for the different semesters and overall programme are given based on the corresponding SGPA/CGPA as shown below:

SGPA/CGPA	Grade
Equal to 9.5 and above	*O Outstanding*
Equal to 8.5 and below 9.5	*A+ Excellent*
Equal to 7.5 and below 8.5	*A Very Good*
Equal to 6.5 and below 7.5	*B+ Good*
Equal to 5.5 and below 6.5	*B Above Average*
Equal to 4.5 and below 5.5	*C Average*
Equal to 3.5 and below 4.5	*D Pass*
Below 3.5	*F Failure*

A separate minimum of 30% marks each for internal and external (for both theory and practical) and aggregate minimum of 35% are required for a pass for a UG programme. A candidate who has not secured minimum marks/credits in internal examinations can re-do the same registering along with the end semester examination for the same semester, subsequently. A student who fails to secure a minimum marks/grade for a pass in a course can be permitted to write the examination along with the next batch.

After the successful completion of a semester, Semester Grade Point Average (SGPA) of a student in that semester is calculated using the formula given below. For the successful completion of semester, a student should pass all courses and score at least the minimum CGPA grade **'D'**. However, a student is permitted to move to the next semester irrespective of her/his SGPA.

Credit Point (CP) of a course is calculated using the formula
CP = Cr x GP, where Cr = Credit; GP = Grade point
Semester Grade Point Average (SGPA) of a Semester is calculated using the formula
SGPA = TCP/TCr, where
TCP = Total Credit Point of that semester $= \sum_1^n CP_i$;
TCr = Total Credit of that semester $= \sum_1^n Cr_i$
Where n is the number of courses in that semester
Cumulative Grade Point Average (CGPA) of a Programme is calculated using the formula
$$CGPA = \frac{\sum(SGPA \times TCr)}{\sum TCr}$$
SGPA/CGPA shall be round off to two decimal places

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

The course teacher and the faculty advisor shall maintain the academic record of each student registered for the course which shall be forwarded to the controller of examinations through the Head of the Department and a copy should be kept in the department for at least two years for verification.

2.13   Registration for the examination

a. All students admitted in a programme with remittance of prescribed fee are eligible for the forthcoming semester examinations.

b. Online application for registration to the various End Semester Examinations shall be forwarded to the CE along with prescribed fee for each course in prescribed format.

c. The eligible candidates who secure the prescribed minimum attendance of the total duration of the course and possess other minimum qualification prescribed in the regulations for each course shall be issued the hall tickets. The hall ticket shall be downloaded by the students from the college website.

d. The mode of fee remittance shall be through the prescribed bank.

2.15 Supplementary Examinations

Candidates who failed in an examination can write the supplementary examination conducted by the College along with regular examinations.

2.16 Improvement of Examination

A candidate can improve his/her marks once by appearing again for the examination with the subsequent batch with the remittance of prescribed fee. In such cases the better of the two marks shall be taken as the marks awarded to him.

Internal assessment marks shall be carried over to the subsequent semester examination. There shall not be any provision for improving internal assessment marks.

There will be no improvement examinations for PG programmes

2.17 Promotion to the Next Higher Semester

A candidate shall be eligible for promotion from one semester to the next higher semester if,

a. He / she secures a minimum 75 % attendance and registered for the End Semester Examination of the programme for which he/she is studying.

b. His / her progress of study and conduct are satisfactory during the semester completed, as per the assessments recorded by the course teachers and the Head of the Department concerned.

2.18 Certificates

1. Diploma and Degree certificates are issued by the Mahatma Gandhi University, Kottayam as per the act and statues of the University on the submission of the consolidated mark / score cards of the students by the College.

2. A consolidated mark / scored card shall be issued to the candidates after the publication of the results of the final semester examination taken by the candidate.

3. A Course Completion Certificate with classification shall be issued to students till the provisional certificate is issued by the university.

2.19 Monitoring

There shall be a Monitoring Committee constituted by the principal consisting of faculty advisors, HoD, a member from teaching learning evaluation committee (TLE) and the Deans to monitor the internal evaluations conducted by college. The Course teacher, Class teacher and the Deans should keep all the records of the internal evaluation, for at least a period of two years, for verification.

Every Programme conducted under Choice Based Credit System shall be monitored by the College Council under the guidance of IQAC Coordinator, Controller of Exams, academic deans and HoDs.

2.20   Grievance Redressal Mechanism

In order to address the grievance of students regarding Continuous internal assessment (CIA) a three-level Grievance Redressal mechanism is envisaged. A student can approach the upper level only if grievance is not addressed at the lower level.

Level 1: At the level of the concerned course teacher

Level 2: At the level of a department committee consisting of the Head of the Department, a coordinator of internal assessment for each programme nominated by the HoD and the course teacher concerned.

Level 3: A committee with the Principal as Chairman, Dean of the Faculty concerned, HOD of the department concerned and one member of the Academic council nominated by the principal every year as members.

Undergraduate Programme Outcomes (POs)

PO1   Critical Thinking & Deep Domain Knowledge

PO2   Effective Communication

PO3   Contribute to Nation Building

PO4   Care for the Environment

PO5   Ethical Values

PO6   Global Perspective

Programme Specific Outcomes (PSOs)

At the end of the programme a student should be able to:

PSO1

Apply the theoretical foundations of computer science in modelling and developing solutions to complex and real-world problems.

PSO2

Comprehend, explore and build computer programs and applications in allied areas like Algorithms, Multimedia, Web Design and Android; efficiently designing computer-based systems that meet the needs of industry and society.

PSO3

Develop skills in Android and cloud technology development so as to employment or self-employment in the global technical market.

PSO4

Apply knowledge of layered network models, protocols, technologies, topologies and security policies for building network and internet-based applications.

3. SYLLABUS OF CORE COURSES

SEMESTER I
HOMO LOQUENS: EFFECTIVE LISTENING AND SPEAKING

COURSE DETAILS

Course Code	19U1CCENG01
Semester in which the course is to be taught	1
No: of Credits	4
No: of Hours	90

Course Aim:

- To develop the students' ability to use English language accurately and effectively by enhancing their communication skills.

Course Objectives:

- To introduce the students to the speech sounds of English in order to enable them to listen to English and speak with global intelligibility.
- To enable the students to speak English confidently and effectively in a wide variety of situations.
- To help the students to improve their reading efficiency by refining their reading strategies.

Module I: Speech Sounds   **18 hours**

Phonemic symbols - Vowels - Consonants - Syllables - Word stress - Stress in polysyllabic words – Stress in words used as different parts of speech -   Sentence stress – Weak forms and strong forms – Intonation – Awareness of different accents: American, British and Indian – Influence of the mother tongue

Module II: Listening   **18 hours**

Active listening – Barriers to listening – Listening and note taking– Listening to announcements – Listening to news on the radio and television

Module III: Speaking   **36 hours**

Word stress and rhythm – Pauses and sense groups – Falling and rising tones –Fluency and pace of delivery – Art of small talk – Participating in conversations – Making a short formal speech – Describing people, place, events and things – Group discussion skills and telephone skills

Module IV: Reading   18 hours

Reading: theory and Practice – Scanning - Surveying a textbook using an index - reading with a purpose – making predictions – Understanding text structure – Locating main points – Making inferences - Reading graphics - reading critically – Reading for research

Main Reading Books:

Sasikumar.V, Kiranmai Dutt P and Geetha Rajeevan, . *Communication Skills in English*. Cambridge University Press and Mahatma Gandhi University.

SEMESTER I
FOUNDATION OF MATHEMATICS

COURSE DETAILS

Course Code	19U1CPCMT1
Semester in which the course is to be taught	1
No: of Credits	4
No: of Hours	72

Course Aim:

      The course aims:
- to explain the fundamental ideas of sets and functions;
- to introduce basic logic;
- to introduce basic Number Theory;

Brief Description of the Course

      This course introduces the concepts of sets and functions, mathematical logic, and methods of proof. A brief introduction of theory of Numbers is also included. These topics are foundations of most areas of modern mathematics, and are applied frequently in the succeeding semesters.

Learning Outcomes

On completion of this course, successful students will be able to:
- prove statements about sets and functions;
- analyze statements using truth tables;
- Construct simple proofs.
- Familiarize mathematical Symbols and standard methods of proofs.

Module 1: Set theory: **(15 hours)**

Sets, set operations, functions, sequences and summations
(Text - 1 Chapter - 2)

Module 2: Relations: **(20 hrs)**

Relations and their properties, n-ary relations and their applications, representing relations, equivalence relations, partial orderings.
(Text – 1 Chapter 7 excluding Section 7.4)

Module 3: Basic Logic   **(20 hrs)**

Pre-requisite: Nil.

Syllabus: Propositional logic, Propositional equivalences, Predicates and quantifiers nested quantifiers, Rules of inference, Introduction to proofs, Proof methods and strategy.
 (Text book 1, Chapter - 1).

Module 4: Theory of Numbers   (17 hrs)

Syllabus: Divisibility theory in the integers, the greatest common divisor, the Euclidean algorithm (division algorithm), Primes. The fundamental theorem of arithmetic. The theory of congruence. Basic properties of congruence. Fermat's little theorem Wilson's theorem. Euler's phi-function. Euler's generalization of Fermat's theorem.
(Text – 2 , Chapter – 1 and 26)

Text Books:

- K.H. Rosen: Discrete Mathematics and its Applications (Sixth edition), Tata McGraw Hill Publishing Company, New Delhi.
- S. Bernard and J.M Child: Higher Algebra, AITBS Publishers, India,2009

References:

[1] Lipschutz, (2009) Set Theory and related topics. 2nd ed, Schaum Outline Series, Tata McGraw-Hill Publishing Company, New Delhi.
[2] P.R. Halmos (1974) Naive Set Theory, 1st ed, Springer-Verlag New York.
[3] George E. Andrews (1971), Number Theory. W.B. Saunders Company.
[4] Ian Chiswell & Wifrid Hodges (2007) Mathematical Logic. Oxford university press.
[5] Graham Everest and Thomas Ward (2005) An Introduction to Number Theory. Springer, London.
[6] Fernando Rodriguez Villegas (2007) Experimental Number Theory, Oxford University Press.
[7] Richard Johnsonbaugh   Discrete Mathematics (Pearsons)
[8] C.Y Hsiung Elementary Theory of Numbers, Allied Publishers

COMPUTER FUNDAMENTALS & ORGANIZATION

COURSE DETAILS

Course Code	**19U1CRBCA1**
Semester in which the course is to be taught	**1**
No: of Credits	**4**
No: of Hours	**72**

Course Aim:

This course will introduce students to the fundamental concepts underlying modern computer organization and architecture.

Course Objectives:

1. To understand the basics of computer hardware and how software interacts with computer hardware
2. Analyze and evaluate computer performance
3. Understand how computers represent and manipulate data
4. Understand computer arithmetic and convert between different number systems.
5. To understand a computer with hardware design including data format, instruction format, instruction set, addressing modes

Module 1: General Features of a Computer   (10 Hrs)

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 2: Computer Organization   (15 Hrs)

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, modem.

Module 3: Computer Hardware and Software   (15 Hrs)

Basic Gates (Demorgan's theorems, duality theorem, NOR, NAND, XOR, XNOR gates), Boolean expressions and logic diagrams, Types of Boolean expressions

Combinational Circuits: Encoder, Decoder, Multiplexer, Adder

Sequential Circuits: Flip Flops S-R, J-K, D and T Flip Flop, Counters: Johnson, Ring and Sequence counter.

Module 4: Instruction Sets   (15 Hrs)

Addressing Modes**:** Immediate Addressing, Direct Addressing, Indirect Addressing, Register Addressing, Register Indirect Addressing, Displacement Addressing, Stack Addressing.

Instruction Formats: Instruction Length, Allocation of Bits, Variable-Length Instructions.

Module 5: Introduction to Networking   (17 Hrs)

Network of computers. Types of networks, LAN, Intranet and Internet. Internet applications. World wide web, E-mail, browsing and searching, search engines, multimedia applications. Network Devices: Switch, Hub, Repeater, Gateway, Router.

Books for Reference:

[1] William Stallings (1999 *), Computer Organization and Architecture (Designing for Performance*), 9th ed,Pearson Education Inc.

[2] Alexis Leon and Mathews Leon (1999), *Fundamentals of information Technology*, Leon Techworld Pub.

[3] Jain S K (1999 *), Information Technology "O" level made simple*, BPB Pub

[4] Jain V K (2000), "*O" Level Personal Computer software*, BPB Pub.

[5] Rajaraman V (1999), *Fundamentals of Computers*, Prentice Hall India

[6] Hamacher (2001), *Computer Organization*, McGrawhill

COURSE DETAILS

Course Code	19U1CRBCA2
Semester in which the course is to be taught	1
No: of Credits	3
No: of Hours	72

Course Aim:

The course aim is to introduce to students to the field of programming and also gives an exposure to problem-solving through programming.

Course Objectives:

1. Identify situations where computational methods and computers would be useful.
2. Given a computational problem, identify and abstractthe programming task involved.
3. Approach the programming tasks using techniques learned and write pseudo-code.
4. Choose the right data representation formats based on the requirements of the problem.
5. Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
6. Write the program on a computer, edit, compile, debug, correct, recompile and run it.

Module 1: Overview of Programming: (10 Hrs)

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 2: Fundamentals of C programming: (15 hrs)

Overview of C, Data Types, Constants & Variables, Operators & Expressions, Branching and Looping, **Arrays**- single & multidimensional arrays, **Functions**-fundamentals – general form, function arguments, return value, **Basic I/O**-formatted and Unformatted I/O.

Module 3: Advanced programming techniques: (15 Hrs)

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 4: Dynamic data structures in C: (15 Hrs)

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 5: Additional features: (17 Hrs)

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

Books for Reference

[1] Yashwant Kanetka Let us C , 6th Edition, PBP Publication.

[2] Richie and Kenninghan, (2004), The C programming Language , BPB Publication.

[3] Balaguruswamy (2005), Programming in ANSI C, 3rd Edition, Tata McGraw Hill.

COURSE DETAILS

Course Code	19U1CRBCA3
Semester in which the course is to be taught	1
No: of Credits	3
No: of Hours	72

Course Aim: Perform system administration tasks to manage files, software, storage, users, processes and services.

Course Objectives:

    i.   Ability to perform system administration tasks

    ii. Ability to develop and execute shell script

Module 1: Linux Introduction   **(10 hrs)**

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-2: The Unix File System   **(15 Hrs)**

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 3: Unix Process Management (15 hrs)

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 4: Vi Editor (15 hrs)

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.   Nano Editor and its commands.

Module 5: System Administration (17 hrs)

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

Books for Reference

[1] Maurice J. Bach (2010), The Design of Unix Operating System, Pearson Education

[2] S. Prata (2011), Advance UNIX a Programmers Guide, BPB Publications New Delhi

[3] Sumitabh Das (2010), Unix Concepts and Applications, Tata McGrawHill Education

[4] B.W. Kernighan & R. Pike (2009), The UNIX Programming Environment, Prentice Hall of India.

[5] Jack Dent Tony Gaddis (2010), Guide to UNIX Using LINUX, Vikas/ Thomson Pub. House Pvt. Ltd.

SEMESTER I
PROGRAMMING IN C- PRACTICAL

COURSE DETAILS

Course Code	19U1CRBCA3
Semester in which the course is to be taught	1
No: of Credits	1
No: of Hours	36

List of Programs

Part A

1　Printing the reverse of an integer.

2　Printing the odd and even series of N numbers.

3　Get a string and convert the lowercase to uppercase and vice--versa using getchar() and putchar().

4　Input a string and find the number of each of the vowels appear in the string.

5　Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.

6　Printing the reverse of a string.

Part B

1　Searching an element in an array using pointers.

2　Checking whether the given matrix is an identity matrix or not.

3　Finding the first N terms of Fibonacci series.

4　Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.

5　Define a structure with three members and display the same.

6　Declare a union with three members of type integer, char, string and illustrate the use of union.

7　Recursive program to find the factorial of an integer.

8　Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.

9　Arranging N numbers in ascending and in descending order using bubble sort.

10 Addition and subtraction of two matrices and Multiplication of two matrices.

COURSE DETAILS

Course Code	19U1CRBCA3
Semester in which the course is to be taught	1
No: of Credits	1
No: of Hours	36

List of Programs

1. Execute 25 basic commands of UNIX.

2. Basics of functionality and modes of VI Editor.

3. WAP that accepts user name and reports if user is logged in.

4. WAP which displays the following menu and executes the option selected by user:

1. ls   2. Pwd   3. ls –l   4. ps –fe

5. WAP to print 10 9 8 7 6 5 4 3 2 1 .

6. WAP that replaces all "*.txt" file names with "*.txt.old" in the current.

7. WAP that echoes itself to stdout, but backwards.

8. WAP that takes a filename as input and checks if it is executable, if not make it executable.

9. WAP to take string as command line argument and reverse it.

10. 1.   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 Smith	E2	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.

TEXT AND CONTEXT: A GUIDE TO EFFECTIVE READING AND WRITING

COURSE DETAILS:

Course Code	19U2CCENG03
Semester in which the course is to be taught	2
No: of Credits	4
No: of Hours	90

Course Aim:

- To develop the critical and analytical faculty of students and to improve their proficiency in reading, writing and presentation.

Course Objectives:

- To make the students aware of the fundamental concepts of critical reasoning and to enable them to read and respond critically, drawing conclusions, generalizing, differentiating fact from opinion and creating their own arguments.
- To assist the students in developing appropriate and impressive writing styles for various contexts.
- To help students rectify structural imperfections and to edit what they have written.
- To equip students for making academic presentations effectively and impressively.

Module – I
Critical Thinking   **15 hours**
Introduction to critical thinking – Benefits - Barriers – Reasoning - Arguments - Deductive and inductive arguments – Fallacies - Inferential comprehension- Critical thinking in academic writing - Clarity - Accuracy – Precision - Relevance

Module – II
Research for Academic Writing and the Writing Process   **20 hours**
Data collection - Use of print, electronic sources and digital sources -
Selecting key points - Note making, paraphrasing, summary – Documentation - Plagiarism –
Title – Body paragraphs - Introduction and conclusion – Revising - Proof-reading

Module – III
Accuracy in Academic Writing   **20 hours**
Articles - Nouns and prepositions - Subject-verb agreement - Phrasal verbs - Modals - Tenses -
Conditionals – Prefixes and suffixes – Prepositions - Adverbs – Relative pronouns - Passives -
Conjunctions - Embedded questions - Punctuation – Abbreviations

Module – IV
Writing Models   **20 hours**

Letters - Letters to the editor - Resume and covering letters - e-mail - Seminar papers - Project
reports - Notices - Filling application forms - Minutes, agenda - Essays

Module – V
Presentation Skills   **15 hours**

Soft skills for academic presentations - Effective communication skills – Structuring the
presentation - Choosing appropriate medium – Flip charts – OHP - PowerPoint presentation –
Clarity and brevity - Interaction and persuasion - Interview skills –Group Discussions

4.   CORE TEXT

Marilyn Anderson, Pramod K Nayar and Madhucchandra Sen. *Critical Thinking, Academic
Writing and Presentation Skills*. Pearson Education and Mahatma Gandhi University.

COURSE DETAILS

Course Code	19U2CPCMT2
Semester in which the course is to be taught	2
No: of Credits	4
No: of Hours	72

COURSE AIM/RATIONALE:

- to explain the fundamental ideas of combinatorials
- to introduce graph theory concepts;
- to introduce Numerical methods

OBJECTIVES OF THE COURSE:

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

- To apply the basic concepts in combinatorial graph theory in science, business and industry.

- To apply graph theoretical algorithms to solve problems in daily life.

- Methods to solve system of equations.

- Apply numerical methods for solving mathematical problems that arise in Science and Engineering

MODULE I: Combinatorics   (15 hrs)

The theory counting. The multiplication rule, ordered sample and permutations, unordered samples without repetition, permutations involving indistinguishable objects, multinomial co-efficient, unordered samples with repetition, permutation involving indistinguishable objects.

MODULE II: Graphs and Algorithms   (25 hrs)

Leonhard Euler and the seven bridges of Konigsberg, trees and spanning trees, minimal spanning trees, binary trees and tree searching. Planar graphs and Euler's theorem, the shortest path problem, Dijkstras Algorithm, two "all-pairs" Algorithm, Floyd's Algorithm and Marshal's Algorithm.

MODULE III: Solution of equations (25 hrs)

Solution of equation: Fixed point iteration: x=g(x) method -Newton's method –Solution of linear system by Gaussian elimination and Gauss-Jordon method –Iterative method -Gauss-Seidel method - Inverse of a matrix by Gauss Jordon method.

MODULE IV: Numerical solutions for Calculus (25 hrs)

Numerical Differentiation and Integration: Differentiation using interpolation formulae – Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules.

Ordinary differential equations: Single step methods: Taylor series method–Euler method for first order equation–Fourth order Runge–Kutta method for solving first and second order equations.

Textbooks:

1. Engineering Mathematics, N.P. Bali, Manish Goyal

2. Petergray – Logic, Algebra and databases (chapter 3), Affiliated East West press pvt Ltd.

3.Robert J mcEliece, Robert B Ash and Carol Ash – Introduction to discrete mathematics (chapter 1,2 and 4) , Mc.Graw Hill.

References:

 [1] James Ward Brown, Ruel V. Churchill (2008), Complex Variables and Applications, 8th edition

[2] S. Lipschutz (1967), Set Theory and related topics, 2nd Edition., Schaum Outline Series, Tata McGraw-Hill Publishing Company, New Delhi.

[3] R.G.Stoll (1963), Set Theory and Logic, Dover Publications.

[4] John Clark, Derek Allen Holton(1991), A first look at graph theory , Allied Publishers

[5] Douglas B west (1995), Introduction to Graph Theory, 2nd edition, Pearson Education

COURSE DETAILS:

Course Code	19U2CRBCA4
Semester in which the course is to be taught	2
No: of Credits	3
No: of Hours	72

Course Aim:

To study and apply concepts relating to operating system

Course Objectives:

1. To understand the services provided by and the design of an operating system.

2. To understand the structure and organization of the file system.

3. To understand what a process is and how processes are synchronized and scheduled.

4. To understand different approaches to memory management.

5. Students should be able to use system calls for managing processes, memory and the file system.

Module 1 – Introduction to Operating System   (15 Hours)

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

Module 2 – Process Management   (20 Hours)

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 3: Storage Management   **(20 Hours)**

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

File-System Interface: 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 4: Protection and Security   **(17 Hours)**

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.3 Hrs

Books for Reference

[1] Milan Milonkovic (1992),   Operating System Concepts and design, 2nd Edition

[2] Tanenbaum (2015), Operation System Concepts, 2nd Edition, Pearson Education

[3] Silberschatz Galvin Gagne (1998),   Operating System, 6th Edition WSE WILEY Publication

[4] William Stallings (2002), Operating System, 4th Edition , Pearson Education

[5] H.M.Deitel (2004), Operating systems, 2nd Edition, Pearson Education

COURSE DETAILS

Course Code	19U2CRBCA5
Semester in which the course is to be taught	2
No: of Credits	3
No: of Hours	72

Course Aim:

   The aim is to gain a better understanding of OO design and program implementation by using Objects Oriented language features.

Course Objective:

- To understand how C++ improves C with object-oriented features.
- To learn how to write inline functions for efficiency and performance.
- To learn the syntax and semantics of the C++ programming language.
- To learn how to design C++ classes for code reuse.
- To learn how to implement copy constructors and class member functions.
- To understand the concept of data abstraction and encapsulation.
- To learn how to overload functions and operators in C++.
- To learn how containment and inheritance promote code reuse in C++.
- To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
- To learn how to design and implement generic classes with C++ templates.
- To learn how to use exception handling in C++ programs.

Module 1: Introduction   **(10 hours)**

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 2: (15 hours)

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, 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 3: (15 hours)

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 4: (15 hours)

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 5: (17 Hours)

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.

Books for References:

- E. Balaguruswamy *Object Oriented Programming with C++,* Tata McGraw Hill. Publications
- Strousstrup, *The C++ Programming Language*, 3rd Edition ,Pearson Edition.
- Lafore Robert *Object Oriented Programming in Turbo C++,* Galgotia Publications
- Lippman*: C++ Primer*, 3 rd edition, Pearson Education
- Herbert Schildt *C++ completer reference*, Tata McGraw Hill Publications.
- Yeshwanth Kanetkar *Let us C++ .*

DATA STRUCTURES USING C

COURSE DETAILS

Course Code	19U2CRBCA6
Semester in which the course is to be taught	2
No: of Credits	3
No: of Hours	72

Course Aim:

The course is intended to provide the foundations of the practical implementation and usage of Algorithms and Data Structures.

Course Objectives:

1. To design and analyze programming problem statements.
2. To choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.
3. To understand the necessary mathematical abstraction to solve problems.
4. To come up with analysis of efficiency and proofs of correctness
5. To comprehend and select algorithm design approaches in a problem specific manner.

Module 1: Introduction to Data structures   **(10 Hours)**

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 2: Searching and Sorting   **(15 Hours)**

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 3: Stack and Queue   (15 hours)

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 4: Linked List   (15 Hours)

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 5: Tree Graphs and their Applications: (17 Hours)

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.

Books for References:

[1] Weiss (2001) *Data Structures and Algorithm Analysis in C*, 2 nd 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.*

[5] E. Balaguruswamy , *Programming in ANSI C.*

[6] Bandyopadhyay (1999) *Data Structures Using C,* Pearson Education

[7] Tenenbaum (2005) *Data Structures Using C,* Pearson Education

[8] Kamthane(2005) *Introduction to Data Structures in C*. Pearson Education

[9] Hanumanthappa M.(2006) *Practical approach to Data Structures*, Laxmi Publications, Fire Wall media

[10] Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron , *Data Structures using C and C++* , Pearson Education

SEMESTER II
OOPS WITH C++ - PRACTICAL

COURSE DETAILS

Course Code	19U2PRBCA3
Semester in which the course is to be taught	2
No: of Credits	1
No: of Hours	36

List of Programs

Part A

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.

Part B

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.

SEMESTER II
DATA STRUCTURES USING C - PRACTICAL

COURSE DETAILS

Course Code	19U2PRBCA4
Semester in which the course is to be taught	2
No: of Credits	1
No: of Hours	36

List of Programs

Part A

1. Use a recursive function to find GCD of two numbers.

2. Use a recursive function to find the Fibonacci series.

3. Use pointers to find the length of a string and to concatenate two strings.

4. Use pointers to copy a string and to extract a substring from a given a string.

5. Use a recursive function for the towers of Hanoi with three discs.

6. Insert an integer into a given position in an array.

7. Deleting an integer from an array.

8. Write a program to create a linked list and to display it.

9. Write a program to sort N numbers using insertion sort.

10.   Write a program to sort N numbers using selection sort.

Part B

1. Inserting a node into a singly linked list.

2. Deleting a node from a singly linked list.

3. Pointer implementation of stacks.

4. Pointer implementation of queues.

5. Creating a binary search tree and traversing it using in order, preorder and post order.

6. Sort N numbers using merge sort.

SEMESTER III
BASIC STATISTICS

COURSE DETAILS

Course Code	19U3CRBCA7
Semester in which the course is to be taught	3
No: of Credits	4
No: of Hours	72

Bridge course

Introduction to Statistics, Population and Sample, Various Statistical Organization, Collection of Data, Various methods of data collection, Census and Sampling Methods of Sampling – Simple Random Sampling (with and without replacement) – stratified sampling – systematic sampling (Method only), Types of data – quantitative, qualitative, discrete and continuous frequency and non-frequency, Classification and Tabulation, Diagrammatic representation – Bar diagram, pie diagram; pictogram and cartogram, Graphical representation – histogram; frequency polygon; frequency curve; ogives and stem and leaf chart.

Module I   (15 Hours)

Measures of Central Tendency – Mean; Median; Mode; Geometric Mean; Harmonic Mean and Properties, Combined mean, Partition values- quartiles, percentiles, deciles.

Module II   (20 Hours)

Absolute and Relative measures of Dispersion – Range, Quartile Deviation, Percentiles, Deciles, Box Plot, Mean Deviation, Standard Deviation, Coefficient of Variation.

Correlation and Regression – Basic Concepts , Pearson Correlation Coefficient, Rank Correlation Coefficient, Regression equations (without derivation)

Module III   (20 Hours)

Idea of Permutations and Combinations, Probability Concepts – Random Experiment, Sample Space, Events, Probability Measure, Approaches to Probability – Classical, Statistical and Axiomatic, Addition Theorem (upto 3 evens) Conditional Probability, Independence of events, Multiplication theorem (upto 3 events), Total Probability Law, Baye's Theorem and its applications

Module IV   (17 Hours)

Index Numbers – definition, Simple Index Numbers; Weighted Index Numbers – Laspeyer's Paasche's and Fisher's Index Numbers, Test of Index Numbers, Construction of Index Numbers, Cost of Living Index Numbers – Family Budget Method, Aggregate Expenditure Method.

Time Series – Components of time series and measures of time series Analysis.

<u>Assignments</u>

1. Diagrammatic and graphic representation using (excel/R) software(Bardiagram, pie chart. Histogram, ogives, e,t,c)
2. Correlation and regression , trend line using statistical soft wares,

Core Reference

[1] S.P. Gupta (1987), *Statistical Methods ,* Sultan Chand & Sons Delhi

[2] S.C. Gupta and V.K. Kapoor (1999), *Fundamentals of Mathematical Statistics,* Sultan Chand and Sons.

Additional References

[1] Parimal Mukhopadhya , *Mathematical Statistics,* New Central Book Agency (p) Ltd, Calcutta

[2] Murthy M.N,   *Sampling theory and Methods,* Statistical Publishing Society Calcutta.

[3] Agarwal B L.,   *Basic Statistics*

SOFTWARE ENGINEERING

COURSE DETAILS

Course Code	19U3CRBCA8
Semester in which the course is to be taught	3
No: of Credits	3
No: of Hours	72

Course Aim:

The aim of the course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

Course Objectives:

1. To perform background research and a feasibility study prior to embarking on a development project

2. To apply the software development life cycle model to a development project.

3. To know how and when to adapt or replace the lifecycle model by other alternatives

4. To collect and analyze user requirements

5. To identify and apply appropriate software architectures and patterns to carry out high level design of a system.

UNIT I: SOFTWARE PRODUCT AND PROCESS   **(10 Hours)**

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

UNIT II: SOFTWARE REQUIREMENTS   **(15 Hours)**

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

UNIT III: ANALYSIS, DESIGN CONCEPTS AND PRINCIPLES   (15 hours)

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.

UNIT IV: TESTING   **(17 Hours)**

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

UNIT V: SOFTWARE PROJECT MANAGEMENT   **(15 Hours)**

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

Text Books:

[1] Ian Sommerville (2007), *Software engineering 7th Edition,* Pearson Education Asia.

[2] Roger S. Pressman (2005), *Software Engineering A practitioner Approach,* 6th Edition

COURSE DETAILS

Course Code	19U3CRBCA9
Semester in which the course is to be taught	3
No: of Credits	3
No: of Hours	72

Course Aim:

This course is intended to provide a strong formal foundation in database concepts, technology and practice to groom students into well-informed database application developers.

Course Objective:

1. List and explain the fundamental concepts of a relational database system.

2. Utilize a wide range of features available in a DBMS package.

3. Analyze database requirements and determine the entities involved in the system and their relationship to one another.

4. Develop the logical design of the database using data modeling concepts such as entity-relationship diagrams.

5. Create a relational database using a relational database package.

6. Manipulate a database using SQL.

7. Assess the quality and ease of use of data modeling and diagramming tools.

UNIT I INTRODUCTION   (15 Hours)

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

UNIT II RELATIONAL MODEL   (20 Hours)

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, 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

UNIT III DATABASE DESIGN   (20 hours)

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

UNIT IV TRANSACTIONS   (17 hours)

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.

TEXT BOOKS:

[1] Abraham Silberschatz, Henry F. Korth, S. Sudharshan (2006), *Database System Concepts 5th Edition,* Tata McGraw Hill

[2] Ramez Elmasri, Shamkant B. Navathe (2007), *Fundamentals of Database System 4th Edition,* Pearson Addision Wesley

[3] Raghu Ramakrishnan (2003), *Database Management Systems 3rd Edition,* McGraw Hill

COURSE DETAILS

Course Code	19U3CRBCA10
Semester in which the course is to be taught	3
No: of Credits	3
No: of Hours	90

Course Aim:

To uncover and understand the current directions of computer networks

Course Objectives:

i. Independently understand basic computer network technology

ii. Identify the different types of network topologies and protocols

iii. Enumerate the layers of TCP/IP and explain the functions of each layer

iv. Identify the different types of network devices and their functions within a network

Module 1: Networking Fundamentals   **(15 hours)**

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 2: Basics of Network Devices   **(20 Hours)**

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 3: Basics of Network, Transport and Application Layers   (20 hours)

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 4: WAN Technology   (20 hours)
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 5: Network Operating Systems and Troubleshooting Network   (15 Hours)

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

Books for References:

[1] CCNA (2011), *Cisco Certified Network Associate: Study Guide (With CD) , 5th Edition*

[2] CCENT/CCNA ICND1 (2013), *Official Cert Guide,* 3rd Edition (Paperback)

[3] CCNA (2008), *Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback),* Pearson

[4] CCNA (2010),   *Exploration Course Booklet Routing Protocols and Concepts Version 4.0 (Paperback),* Pearson

PROGRAMMING IN JAVA

COURSE DETAILS

Course Code	19U3CRBCA10
Semester in which the course is to be taught	3
No: of Credits	3
No: of Hours	72

Course Aim:

To understand the fundamentals of programming in java

Course Objectives:

i.   To impart the basic concepts of Java Programming

ii. To develop understanding about object oriented programming in Java, including defining classes, invoking methods, using libraries.

iii. To learn experience of designing, implementing, testing and debugging graphical user interfaces in Java

iv. To understand Java Swings for designing GUI applications

Unit 1 – Introduction   (15 Hours)

History, Overview of Java, Object Oriented Programming, A simple Programme, 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.

Unit 2 – Classes: (10 hours)

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.

Unit 3 – Packages: **(10 Hours)**

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.

Unit 4- Multithreaded Programming: **(17 hours)**

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.

Unit 5 – JAVA Database Connectivity (JDBC) :   **(20 hours)**

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.

Books for Reference:

[1] Herbert. *The complete reference Java –2*, 5th Edition, Schildt Pub. TMH.

[2] Rogers Cedenhead and Leura Lemay, *SAMS teach yourself Java – 2*, 3rd Edition, Pearson Education.

SEMESTER III
RDBMS PRACTICAL

COURSE DETAILS

Course Code	19U3PRBCA5
Semester in which the course is to be taught	3
No: of Credits	1
No: of Hours	36

1. SQL Commands

    a. Data Definition Language commands,

    b. Data Manipulation Language commands,

    c. Data Control Language commands and

    d. Transaction Control Language commands

2. Select Statements with all clauses/options

3. Nested Queries

4. Join Queries

5. Views

6. High level programming language extensions (Control structures, Procedures and Functions)

7. Database Design and implementation (Mini Project)

PROGRAMMING IN JAVA-PRACTICAL

COURSE DETAILS

Course Code	19U3PRBCA6
Semester in which the course is to be taught	3
No: of Credits	1
No: of Hours	36

List of Programs

Part A

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1t000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing 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).

Part B

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 textfileld 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.

SEMESTER IV
WEB TECHNOLOGIES

COURSE DETAILS

Course Code	19U4CRBCA12
Semester in which the course is to be taught	4
No: of Credits	4
No: of Hours	90

Course Aim:

Introduces programming technologies, design and development related to mobile applications.

Course Objectives:

i. To understand mobile application principles
ii. To impart knowledge about mobile platform and NW environment
iii. To understand the web architecture

Module 1: Mobile Application Principles (15 Hours)

Mobile Application Development Paradigm, What is an application?, Mobile Application, Programming rules and Challenges, Mobile Programming Tools, Mobile Application Evolution, Thin Client, Fat Client, Future of Mobile App Development.

Module 2: Mobile Programming Languages and Practices (20 Hours)

Mobile App Programming in Java, Introduction to Java, Java Compiler, Java Interpreter, Advantages of Java, Disadvantages of Java, Programming Methodology, Mobile App Programming in C++, Introduction to C++, Symbian C++, Microsoft embedded VC++, Mobile Programming best practices, User Analysis, Organizational Analysis,

Module 3: Mobile platform and NW environment (20 hours)

Mobile App Testing Environment, OTA App Provisioning. Mobile Applications: What is Web App?, Context of Mobile Applications, Pros and Cons of Mobile Web App, SIM based Mobile

App Development, What is SIM?, SIM as a Platform, SIM as Service Differentiator, Introduction to UI, Principles for UI development, Application Servers

Module 4: Architecture   **(20 Hours)**

World Wide Web, Basics of WWW, Web Application, Web Application Architecture, Web Server, Web Server Features, Web Application Server. **Web Technologies and Standards**: HTTP, HTML, HTML Tags, CSS (Cascading Style Sheets), XML, introduction to Cookies, how to create web pages using HTML, and CSS.

Module 5: Web Architecture, Standards and Tools   **(15 Hours)**

 Mobile Internet Access, Mobile Web browser Evolution, Mobile Web Standards and development time, WAP and WAP Standards, XHTML, WML and WMLScript, Mobile Web Development Approaches, Content Adaption and Adaption Strategies, How to recognize end user device, Device Detection in PHP, Tools Available for mobile web development, Conversion Engines, Emulators, Mobile Web Checkers.

Books for References

1] Jeff McWherter (2012), Professional Mobile Application Development , Scott Gowell

[2] Reza B'Far (2005), Mobile Computing Principles Designing and Developing Mobile Applications, Cambridge University

[3] Valentino Lee, Heather Schneider and Robbie Schell (2004), Mobile Applications: Architecture, Design, and Development , Pearson Education

COURSE DETAILS

Course Code	19U4VCBCA1
Semester in which the course is to be taught	**4**
No: of Credits	**4**
No: of Hours	**72**

Course Aim:

To impart fundamentals concepts and applications in the area of cloud computing

Course Objective:

1. To understand the basics of cloud computing.
2. To know the Key concepts of Cloud Infrastructure Mechanisms
3. Different Cloud Computing Architecture
4. To understand the fundamentals of Cloud security
5. Cloud Providers and case studies.

Module 1: Introduction (15 hours)

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 2: Cloud Infrastructure Mechanisms (10 hours)

Cloud Infrastructure Mechanisms: Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud Usage Monitor, Resource Replication.

Specialized Cloud Mechanisms: Automated Scaling Listener, Load Balancer, SLA Monitor, Pay-per-Use Monitor, Audit Monitor, Failover System, Hypervisor, Resource Cluster, Multi-Device Broker- State Management Database

Module 3: Different Cloud Architecture (15 Hours)

Cloud Architectures: Workload Distribution Architecture, Resource Pooling Architecture, Dynamic Scalability Architecture, Elastic Resource Capacity Architecture, Service Load

Balancing Architecture, Cloud Bursting Architecture , Elastic Disk Provisioning Architecture , Redundant Storage Architecture , Hypervisor Clustering Architecture, Load Balanced Virtual Server Instances Architecture

Non-Disruptive Service Relocation Architecture , Zero Downtime Architecture , Cloud Balancing Architecture, Resource Reservation Architecture, Dynamic Failure Detection and Recovery Architecture, Bare-Metal Provisioning Architecture, Rapid Provisioning Architecture, Storage Workload Management Architecture

Module 4: Fundamentals of Cloud Security **(15 hours)**

API Logging and Auditing, Fundamental Cloud Security : Basic Terms and Concepts: Threat Agents, Cloud Security Threats, Additional Considerations

Module -5 Cloud Providers and Case Studies **(17 Hours)**

Cloud Providers, Study of OpenStack and AWS clouds. Case Studies of Cloud Management Software.

Books for Reference:

[1] Thomas Erl, Zaigham Mahmood, and Ricardo Puttini(2013), *Cloud Computing: Concepts , Technology & Architecture*, Prentice Hall, ISBN-13: 978-0-13-338752
[2] John W.Rittinghouse and James F.Ransome(2010)*, Cloud Computing: Implementation, Management, and Security*, CRC Press
[3] Toby Velte, Anthony Velte, Robert Elsenpeter(2009), *Cloud Computing, A Practical App roach*,TMH
[4] Kumar Saurabh(2011), *Cloud Computinginsights into NewEra Infrastructure,* Wiley India
[5] George Reese, *Cloud Application Architectures: Building Applications and Infrastructur e in the Cloud,* O'Reilly
[6] Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, John Wiley (2011), *Cloud Computing: Principles and Paradigms*, Sons Publications

FUNDAMENTALS OF DATA CENTER

COURSE DETAILS

Course Code	19U4VCBCA2
Semester in which the course is to be taught	**4**
No: of Credits	**4**
No: of Hours	**72**

Course Aim:

To attain basic ideas and principles in data center design and management

Course Objectives:

1. Apply the fundamental concepts in data centers to understand the tradeoffs in power, efficiency and cost.

2. Discuss Virtualization and outline its role in enabling the cloud computing system model.

Module 1: Overview of Data Centers   (15 hours)

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

Module 2: Cloud Data Center Networking Topologies: (15 hours)

Cloud Data Center Networking Topologies: Traditional Multi-tiered Enterprise Networks- Data Center Network Switch Types, Flat Data Center Networks, Rack Scale Architectures, Network Function Virtualization.

Data Center Networking Standards: Ethernet Data Rate Standards, Virtual Local Area Networks- Data Center Bridging- Improving Network Bandwidth- Remote Direct Memory Access.

Module 3: Server Virtualization and Networking   (10 hours)

Server Virtualization and Networking: VM Overview- Virtual Switching- PCI Express- Edge Virtual Bridging- VM Migration.

Network Virtualization: Multi-tenant Environments- Traditional network Tunneling Protocols- VXLAN- NVGRE- Tunnel Locations- Load Balancing.

Module 4: Storage Networks **(15 Hours)**

Storage Networks Storage Background- Advanced Storage Technologies- Storage Communication Protocols- Network Convergence- Software Defined Storage- Storage in Cloud Data centers..

Module 5: Software Defined Networking **(17 Hours)**

Software-Defined Networking: Data Center Software Background- OpenStack- OpenFlow- Network Function Virtualization- SDN Deployment.

Books for Reference:

[1] Gary Lee (2014), Cloud Networking Understanding Cloud based Data Center Networks, Elsevier

[2] Gary Oreinstein (2006), IP Storage Networking, Addison Wesley Professional

[3] G. Somasundaram , Alok Srivastava (2009), Information Storage and Management 1st edition, Wiley

[4] Kailash Jayswal (2005), Administering Data Centers 1st edition, Wiley

SEMESTER IV
BASIC ANDROID

COURSE DETAILS

Course Code	19U4CRBCA13
Semester in which the course is to be taught	**4**
No: of Credits	**4**
No: of Hours	**72**

Course Aim:

To introduce Android platform and its architecture

Course Objectives:

i. To learn activity creation and Android UI designing

ii. To design user interface and develop activity for Android App.

iii. To work with SQLite Database and content providers

Module 1: Introduction to Android **(15 Hours)**

Introduction to Android Architecture: Introduction, History, Features and Android Architecture. Android Application Environment, SDK, Tools: Application Environment and Tools, Android SDK. Programming paradigms and Application Components - Part 1: Application Components, Activity, Manifest File, Programming paradigms and Application Components Part 2: Intents, Content providers, Broadcast receivers, Services

Module 2: User Interface Design **(10 Hours)**

User Interface Design part 1: Views &View Groups, Views : Button, Text Field, Radio Button, Toggle Button, Checkbox, Spinner, Image View, Image switcher, Event Handling, Listeners, Layouts : Linear, Relative, List View, Grid View, Table View, Web View, Adapters. User Interface Design part 2: Menus, Action Bars, Notifications : Status, Toasts and Dialogs, Styles and Themes, Creating Custom Widgets, Focus, Touch Mode, Screen Orientation. Designing for Tablets – Working with tablets: Developing for different android platforms, Fragments, Manipulating objects with drag and drop, Optimizing applications for high screen resolution,

combining fragments into a multilane UI. Resources, Assets, Localization: Resources and Assets, Creating Resources, Managing application resources and assets, Resource-Switching in Android. Localization, Localization Strategies, Testing Localized Applications, Publishing Localized Applications

Module 3: Mobile Data Management **(15 Hours)**

Content Providers: Contents provider, Uri, CRUD access, Browser, CallLog, Contacts, Media Store,   and Setting. Data Access and Storage: Shared Preferences, Storage External, Network Connection. SQLite - SQLite Databases

Module 4: Native Capabilities **(15 hours)**

Camera, Audio, Sensors and Bluetooth: Android Media API: Playing audio/video, Media recording. Sensors - how sensors work, listening to sensor readings. Bluetooth. Maps & Location: Android Communications: GPS, Working with Location Manager, Working with Google Maps extensions, Maps via intent and Map Activity, Location based Services. Location Updates, location-based services (LBS), Location Providers, Selecting a Location Provider, Finding Your Location, Map - Based Activities, How to load maps, To finding map API key.

Module 5: Testing **(17 hours)**

Testing: Testing and Commercializing Applications - Basics of Testing, Testing from an IDE (Eclipse), Activity testing, Service testing, Content provider testing, Test Classes, Debugging using DDMS, How to get your app on the app store.

Books for References:
[1] Reto Meier, John Wiley (2012) *Professional Android 4 Development*
[2] W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz(2012), *Android in Action*, 3rd Edition
[3] Wei-Meng Lee, John Wiley(2013), *Android Application Development Cookbook*
[4] Grant Allen(2011), *Beginning Android 4*

MOBILE DEVICE AND NETWORK ARCHITECTURE

COURSE DETAILS

Course Code	19U4CRBCA14
Semester in which the course is to be taught	**4**
No: of Credits	**4**
No: of Hours	**72**

Course Aim:

The course is designed to understand the Mobile and wireless communication technology.

Course Objectives:

i. To understand the wireless standards

ii. To know the communication principles and mobile cellular network

iii. To identify the handset features and characteristics

Module 1: Communication Principles   **(15 Hours)**

Wireless Communication Principles, Radio Communication, Analog and Digital Communication, Benefits of Digital Signals, Computer Network, OSI Model, Mobile Network OSI layer functions, Mobile Network Protocol Layers. Introduction to Basic Telephony, POTS (Plain Old Telephone Service), Telephony Networks, PSTN (Public Switched Telephone Network), Telephone Network Hierarchy, Telecommunication Networks, Fixed Networks, Mobile Networks

Module 2: Mobile Cellular Networks   **(10 hours)**

Cellular Network Concepts, Cells and Base Stations, Frequency and Interface in Cells, Access Channels, Mobile Network Architecture, Mobile Network, Mobile Network Subsystems, Mobile Station, Base Station Subsystems, Network Switching Subsystems, Mobile Network Protocol Stacks, Core Networks, PLMN (Public Land Mobile Network), Mobile Network Fundamentals, Mobile Network Features, Mobility, Registration, Handoff, Roaming, Mobile

Network Fundamentals (SMS), SMS (Short Message Service), SMS Network Architecture, SMS Network Elements, SMS Protocols, SMS Applications & Short Codes

Module 3: GSM and CDMA Networks: **(15 Hours)**

GSM History, GSM RF Channels, 2G Network Architecture, GSM Protocol Stack, GPRS Standards, CS and PS Domains, GPRS Architecture, GPRS Network Architecture, GPRS Protocols, CDMA Evolution, 2G CDMAOne, CDMA 2G Standards, 3GPP2 Network Architecture, Mobile IP, UMTS Spectrum, UMTS Radio Access Network, UMTS Protocol Stacks, SIP Network, UMTS Multiple Access Network Architecture, 4G

Module 4: Handset Evolution, Handset Characteristics and Features   **(15 Hours)**

Mobile Phone and Network Evolution, Cellular Networks, Cell Phones, Mobile Phones, Mobile Handset Characteristics, Wireless Cellular, Bluetooth , Display, Keypad, Camera, Mobile Handset Categories, Low end Phones, Feature Phones, Smart phones, Handset Components, Handset Design, Handset Manufacture, Handset Bill of Materials, assembling handsets.

Module 5: Hardware Architecture and Subsystems   **(17 Hours)**

Handset hardware architecture, Primary Hardware Subsystems, Element inside a Mobile Handset, Hardware Architecture Evolution, Processing Subsystem architecture, Hardware architectural trends, CPU and Memory, Memory, Internal storage, Hardware evolution, Introduction to the Radio subsystems, Function of the RF Subsystems**,** Handset Power Requirements, Power Management, Power reduction techniques, Power Subsystem components, Introduction and Definition to the SIM, Smartcards in general and concept of Mobile Identity , Functions and usage of the SIM , Phones without SIMs,

Books for References:

[1] Yi-Bang Lin and Imrich Chlamtac, Wiley(2008),*Wireless and Mobile Network Architectures*

[2] Andre Perez, Wiley (2012), *Mobile Networks Architecture*

[3] Asoke. K Talukder, Roopa R. Yavagal, Asoke K. Talukder(2005), *Mobile Computing* Technology Application & Service, Tata McGraw-Hill, 2005

[4] Jörg Eberspächer, Hans-JoergV ögel, Christian Bettstetter (2008), *GSM Architecture, Protocols and Services*, Christian Hartmann John Wiley & Sons

SEMESTER IV
BASIC ANDROID- PRACTICAL

COURSE DETAILS

Course Code	19U4PRBCA7
Semester in which the course is to be taught	4
No: of Credits	1
No: of Hours	36

Lab Experiments for Basic Android are:

1. Display Hello World
2. Add two Edit Text. When a number is entered in Edit Text 1, the square of that number should be displayed in Edit Text 2.
3. Add an Edit Text and a button. When the button is clicked, the text inputted in Edit Text should be retrieved and displayed back to the user.
4. Add two Edit Text and a button. When the button is clicked, the text inputted in Edit Text 1 should be retrieved and displayed in EditText2.
5. Program a calculator
6. Create a Unit convertor for height
7. Create a Unit convertor for height and weight in the same application. Selection of height/weight can be done using a spinner.
8. Add a spinner. When the spinner is selected, there should be three options (e.g., android, java, testing). When you click on each option, it should go to another page containing some other components. Each of these pages should have a "back" button, which on pressing will take you back to the page with the spinner.
9. Create applications to include ActionBar, Menus, Dialogs and Notifications
10. Create a user login form and registration form. First time users have to register through the registration form and the details should be stored in the database. Then they can login using the login page.
11. Create a camera application, where you can click a picture and then save it as the wallpaper.
12. Create a media recorder which will record the sound.
13. Testing applications

COURSE DETAILS

Course Code	19U4PVBCA1
Semester in which the course is to be taught	**4**
No: of Credits	**1**
No: of Hours	**36**

The Experiments include:

1. Study the basic cloud architecture and represent it using a case study

2. Enlist Major difference between SAAS PAAS & Iaas also submit a research done on various companies in cloud business and the corresponding services provided by them , tag them under SAAS , Paas & Iaas.

3. Study and present a report on Jolly cloud.

4. Present a report on obstacles and vulnerabilities in cloud computing on generic level

5. Present a report on Amazon cloud services.

6. Present a report on Microsoft cloud services.

7. Present a report on cost management on cloud

8. Enlist and explain legal issues involved in the cloud with the lelp of a case study

9. Explain the process of migrating to cloud with a case study.

10. Present a report on google cloud and cloud services.

COURSE DETAILS

Course Code	19U5VCBCA3
Semester in which the course is to be taught	5
No: of Credits	4
No: of Hours	72

Course Aim:

        The aim of the course is to equip the learner with knowledge skills in virtualization technologies.

Course Objectives

   i. Expose the basics of Virtualization
  ii. Explore the deploying and managing an Enterprise Desktop Virtualization Environment and presentation virtualization Environment
 iii. To understand the Virtualization software

Module 1: Basics of Virtualization   **(15 Hours)**

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 2: Deploying and Managing an Enterprise Desktop Virtualization Environment
            (20 Hours)

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 3: Deploying and Managing a Presentation Virtualization Environment (20 Hours)
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. Access published applications: configuring Remote Desktop Web Access,

configuring role-based application provisioning, configuring Remote Desktop client connections. Configure client settings to access virtualized desktops: configuring client settings,

Module 4: Understanding Virtualization Software   **(17 Hours)**

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

Books for Reference:

[1] Twan Grotenhuis, Rogier Dittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule,

Andy Jones, Matthijs ten Seldam (2006) *Virtualization with Microsoft Virtual Server 2005*,

Syngress Publications

[2] Ivanka Menken, Gerard Blokdijk (2008) *Virtualization the complete cornerstone guide to*

virtualization best practices, Lightning Source Incorporated

[3] Chris Wolf, Erick M. Halter (2005) *Virtualization: From the Desktop to the Enterprise*,

EBook.

COURSE DETAILS

Course Code	19U5VCBCA4
Semester in which the course is to be taught	5
No: of Credits	4
No: of Hours	72

Course Aim:

To learn the fundamentals of Server Operating System

Course Objectives

i. To gain knowledge on installing and configuring windows server 2008

ii. Students will be familiar with configuring networking and network services

iii. To gain insight on to the configuring and managing active directory domain services

Unit 1: Installing and Configuring Windows Server 2008   **(15 hours)**

History of Server OS, Introduction to windows server 2003 & 2008, Overview of Windows Server 2008, Installing Windows Server 2008, Managing Server Roles and Features, Configuring and Managing Windows Server 2008 Server Core, Choosing a Deployment Technology, Deploying Windows Server 2008, Introduction and Creation of Users accounts

Unit 2: Configuring Networking and Network Services   **(20 hours)**

Configuring IPv6 Addressing, Migrating from IPv4 to IPv6, DHCP and DNS Enhancements in Windows Server 2008, Configuring zones, Configuring DNS server settings, Configuring zone transfer and Replication, Configuring and Managing Windows Firewall with Advanced Security.

Unit 3: Configuring and Managing Active Directory Domain Services   **(20 Hours)**

Active Directory Enhancements in Windows Server 2008 and 2008 R2, Installing and Configuring Domain Controllers, Configuring Read-Only Domain Controllers, Configuring Fine-Grained Password Policies, Sites and Global Catalog, Managing Active Directory Objects

with Windows PowerShell, Active Directory Database Management, Replication between the Domain Controllers.

Unit 4: Managing Group Policy in Active Directory Domain Services   (17 Hours)

Group Policy Enhancements in Windows Server 2008, Managing Security with Group Policy, Managing Clients with Group Policy Preferences, Server Management in Windows Server 2008: Managing Windows Server with Server Manager, Managing Server Updates by Using WSUS, Managing Backup and Restore by Using Windows Server Backup, Managing Event Logs and Auditing, Performance and Resource Management.

Books for Reference:

[1] Michael Turner and Steve Shah-McGraw-Hill Companies (2010), *Red hat Linux Administration*, Inc Publisher

[2] Naba Barkakati (2011) *Redhat Fedora linux for Dummies,* Wiley Publishing Inc

[3] Michael Jang (2011) *RHCSA/RHCE Red Hat Linux Certification Study Guide* (Exams EX200 & EX300). 6th Edition, McGraw-Hill Osborne Media.

COURSE DETAILS

Course Code	19U5CRBCA15
Semester in which the course is to be taught	5
No: of Credits	4
No: of Hours	72

Course Aim:

- To Understand legal and professional obligations regarding the environment and how information technology can contribute to reducing the environmental damage arising from human activities

Course Objectives

- Be familiar with the main legislative provisions affecting the environmental impact of human activities;
- To understand the need for a holistic approach in assessing environmental impact and be able to Incorporate environmental considerations into a cost/benefit analysis;
- To understand the environmental impact of information systems and be able to draw up realistic plans for reducing this impact;
- Be familiar with a range of applications of information technology that enable the environmental impact of human activity and natural changes to be monitored and possibly reduced;
- Be able to assess the potential for using information technology to reduce the environmental impact of specific activities.

Module 1 (18 Hours)

Multidisciplinary nature of environmental studies : Definition, scope and importance, Need for public awareness. (2 hrs) Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies. f) Land resources: Land as a resource, land degradation, man

induced landslides, soil erosion and desertification. Role of individual in conservation of natural resources. Equitable use of resources for sustainable life styles.

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

Module 2   **(26 Hours)**

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

Environmental Pollution :Definition, Causes, effects and control measures of: - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management: Causes, effects and control measures of urban and industrial wastes., Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.

Social Issues and the Environment :Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns, Case studies, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and holocaust, Case studies, Consumerism and waste products, Environment Protection Act , Air (Prevention and Control of Pollution) Act, Water 91 (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

Module 3   **(10 Hours)**

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

Module 4   **(10 Hours)**

 IT & Society- issues and concerns- digital divide, IT & development, the free software movement , IT industry: new opportunities and new threats, software piracy, cyber ethics, cyber crime, cyber threats, cyber security, privacy issues, cyber laws, cyber addictions, information overload, health issues- guide lines for proper usage of computers, internet and mobile phones.

ewastes and green computing, impact of IT on language & culture-localization issues- Unicode-IT and regional languages, Green Computing Concept.

Module 5   **(8 Hours)**

Human Rights– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights). Human Rights and United Nations – contributions, main human rights related organs - UNESCO,UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights. Human Rights in India – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities Environment and Human Rights - Right to Clean

Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment Conservation of natural resources and human rights: Reports, Case studies and policy formulation. Conservation issues of western ghats- mention Gadgil committee report, Kasthurirengan report. Over exploitation of ground water resources, marine fisheries, sand mining etc.

Books for Reference:

1[1] Alan Evans, Kendall Martin, Mary Anne Poatsy *Technology in Action*, Pearson

[2] Bharucha Erach (2013) *Text Book of Environmental Studies for undergraduate Courses*. 2nd Edition, University Press.

[3] Clark.R.S Marine Pollution, Clanderson Press Oxford

[4] Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T (2001) *Environmental Encyclopedia*, Jaico Publication.

[5] Dc A.K *Environmental Chemistry*, Wiley Eastern Ltd.

[6] Heywood, V.H & Watson, R.T. (1995) *Global Biodiversity Assessment,* Cambridge University Press.

SEMESTER V
SECURITY THREATS AND TRENDS (OPEN COURSE)

COURSE DETAILS

Course Code	19U5OCBCA1
Semester in which the course is to be taught	5
No: of Credits	4
No: of Hours	72

Module 1: Understand about the viruses & worms   **(15 Hours)**

Viruses & Worms

Introduction to Viruses &Worms**,** the concept of how Viruses & Worms work, the various types of Viruses &Worms, the infection vectors of Viruses &Worms, managerial, technical & procedural controls to address Viruses & Worms

Module 2: Understand about the malware & botnets   **(20 Hours)**

Malware & Botnets

Introduction to Malware & Botnets, the concept of how Malware, Trojans & Botnets work, the concept of Honeynets and Honeypots, Managerial, technical& procedural controls to address Malware, Trojans & Botnets

Module 3: Understand about the trojans & rootkits   **(20 Hours)**

Trojans & Rootkits

Introduction to Remote Access Trojans & Rootkits, concepts, their working methods , their security implications and the managerial , technical and procedural controls to address RATs

Module 4: Learn to identify the advanced persistent threats & threat warfare

Cyber Warfare   **(17 Hours)**

Introduction to Advanced Persistent Threats &Information Warfare, concepts, their working methods, their security implications and the managerial, technical and procedural controls to address these threats

COURSE DETAILS

Course Code	19U5CRBCA16
Semester in which the course is to be taught	**5**
No: of Credits	**4**
No: of Hours	**90**

Course Aim:

To learn skills for creating and deploying Android applications

Course Objectives:

    i. To create make android apps.

    j. To use the development tools in the Android development environment.

    ii. To create custom advanced android applications

Module 1: App Development Topics   **(15 Hours)**

Services: Services and Notifications – bound/unbound services, Starting and stopping services, Android Interface Definition Language, Handler and Messenger, Passing objects over IPC, Scheduling of services, Remote service communication, Setting up notifications, Notification manager, Networking: Introduction Android networking capabilities, Android SDK networking packages, Android Socket programming, Proxy Settings, Broadcasting, SMS application using Broadcast Receiver. Android Xml remote procedure calls on android, what is XML-RPC, History, Data types, using web services on android phones. Integrating with Embedded Applications: Embedded Apps: Telephony, SMS, etc.

Module 2: Graphics & Multimedia   **(20 Hours)**

Graphics & Multimedia – Introduction to Graphics, Frame Animations, Tweening, scale, rotate, translate, alpha, Interpolation, Canvas/Drawing into a view, Surface View/Surface Holder.

Module 3: Threads & Processes   **(20 Hours)**

Tasks & Processes: Tasks, Switching between Task, Process, Process lifecycle. Threads, Thread Life cycle, Worker Threads, Thread Handlers, Threads & Loopers and IPC.

Module 4: Web Applications   **(20 Hours)**

Web Apps & Web Services: Web Applications - Web View, ViewPort, Page navigation, Debugging web applications Web Services – Android Server Communication: communication protocols, interacting with server-side applications, develop clients for web services, Exchanging Data over the Internet data parsing using json and xml parsing. Integrating with 3rd party Apps using Web Services

Module 5: Commercializing your application   **(15 hours)**

Security, Performance - Kernel, Application level Security, Using permissions, designing for Performance & Designing for Performance

Books for References:

[1] Reto Meier (2012) *Professional Android 4 Development*, John Wiley and Sons.

[2] W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz (2012) *Android in Action*. 3rd Edition.

[3] Wei-Meng Lee (2013) *Android Application Developmen*t Cookbook, John Wiley and Sons.

[4] Grant Allen (2011) *Beginning Android 4*, Apress.

[5] Robbie Matthews (2011) *Beginning Tablet Programming,* by Apress.

COURSE DETAILS

Course Code	19U5PVBCA2
Semester in which the course is to be taught	5
No: of Credits	1
No: of Hours	36

List of Programs

1. Configure your system such that SE Linux must be in enforcing mode and firewall is enables and ssh service is not allowed through your firewall.
2. Configure ftp server such that anonymous can download and upload the data to ftp server. Deny users John and Carel to access the ftp server. Note that your ftp server must be accessible in your private network only. It can't be accessible in another network.
3. Create a RAID level 1 on /dev/md0 device by creating two equal partitions of 100MB size and mount it on /data. The RAID device must be mounted at the time of system startup.
4. Configure LVM in volume group named volgrp by creating 2 partitions of 100MB size and mount it on /exam directory. The initial size of LVM is approximately 40MB and after extending the size of LVM is 80MB.
5. Configure a NIS domain RHCE.COM for user authentication on server.example.com. Note the following:
    a. nisuser should be able to log into client.example.com but will not have a home directory until you have completed the autofs requirements.
    b. NIS user has a password of password.
    c. Configure autofs on client.example.com to auto mount the home directories of NIS users where nisuser's home directory is server.example.com:/rhome/server/nisuser.
    d. nisuser's home directory should be auto mounted on client.example.com on /rhome.

6. Configure the DHCP server such that your DHCP server will able to provide IP configuration to 65 systems in your network.
7. Configure the station as NFS server such that /share directory is shared & only accessible in your network. This NFS share should be automatically mounted on remote client using autofs. On remote client system, NFS share should be mounted on /data/share directory.

8. Configure stationx.example.com for quota such that when user neo type
   dd if=/dev/zero of=/quota/somefile bs=1024 count=30, he succeed. When he type
   dd if=/dev/zero of=/quota/somefile bs=1024 count=70 he fails.

9. Implement a stationx.example.com as a web server for the site http://wwwx.rhce.com, then perform the following steps:
    a. Download ftp://server.rhce.com/pub/rhce/station.html.
    b. Rename the downloaded file to index.html.
    c. Copy this index.html to the DocumentRoot of your web server.
    d. Do not make any modification to the content of index.html.
    e. Extend your web server to include a virtual host for the site http://wwwy.rhce.com/.

    f. Set the DocumentRoot to /var/www/virtual for this virtual host.
    g. Download ftp://server.rhce.com/pub/rhce/www.html.
    h. Rename the downloaded file to index.html and place it to the DocumentRoot of the virual host. Don't change the contents of index.html.

10. Configure the sendmail server for your local LAN. As well as the mail of user john should get by the jane user. If any mail coming from outside of the local LAN block all mails.

11. Configure the system to allow the pop3 and imap connection from your domain and deny all other domains.

12. Configure the DNS for rhce.com domain, where 192.168.0.20 is associated IP for www and NS is 192.168.0.254.

13. There are systems running on Linux as well as windows os. Some users are working on windows os. Your printer is connected on linux server and you want to share the printer using samba so that users working on windows also can print. Configure samba server to share printer.

14. Share the internet using squid for your local LAN. Proxy server should be run on 8080 port. Using squid block internet to 192.168.1.0/24 network and allow to 192.168.0.0/24 network. Also block the msn.com site.

15. Ssh service is enabled in your server. Your LAN is connected to WAN also. Configure to match following conditions:
    a. Deny the ssh from outside your domain.

If any denied host tried for ssh then send the information through mail with clients information.

SEMESTER V
ADVANCED ANDROID – PRACTICAL

COURSE DETAILS

Course Code	19U5PRBCA8
Semester in which the course is to be taught	**5**
No: of Credits	**1**
No: of Hours	**36**

The experiments List for Advanced Android include:

1. Write a Program to Start a service

2. Write a Program to Stop a service

3. Demonstrate startService(), stopService() and on BindService()

4. Manipulate notifications

5. Android socket programming

6. Create web services

7. Working with processes and threads

    a. Create a thread which performs a single task

    b. Perform multithreading

8. Graphics apps in android

    a. Create an application where different shapes of different colors are displayed.

    b. Create an application where

    c. Create an application to show a cyclist moving from one direction to another

9. Animation apps like

    a. Bouncing ball

    b. Moving arrow, etc

10. Game creation in android like

    a. Shooting bubbles

    b. Shooting arrows

    c. Simple snake game, etc.

SEMESTER VI
INTRODUCTION TO MOBILE UI AND UX

COURSE DETAILS

Course Code	19U6CRBCA17
Semester in which the course is to be taught	6
No: of Credits	2
No: of Hours	54

Course aim:

To develop skills in the use and application of user experience design

Course Objectives:

i. To improve individual and collaborative skills in design problem solving

ii. To learn and appreciate the skills as a process for user experience design

iii. To understand the difference between usability and user experience

Module I: Introduction to HCI   **(15 hours)**

Human-Computer Interaction Foundations

Models & Theories

Programming interactive systems

Module II: User Interface Design   **(10 hours)**

The Design Process

Interaction Styles

Naming & Abbreviations

Module III: Mobile UI Design   **(15 hours)**

Disruption & Innovation

Mobile Interaction Styles: Keypads, Touchpads, Gestures

Design Tools

Module IV: Best Practices in UI Design   **(15 hours)**

Mobile UI Best practices – JS

Mobile UI Best practices – HTML & CSS

Module V: Case Studies   **(17 hours)**

    Effective UI Design examples

    Common Errors

Text Books:

[1] Alan Dix, Janet Finlay (2004) *Human Computer Interaction,* Pearson Education.

[2] Ben Shneiderman (2010) *Designing the User Interface - Strategies for Effective Human Computer Interaction*, Pearson Education.

[3] Wilbert O. Galitz (2007) *The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques*, Wiley Publishing.

Reference Books:

[1] Rosson, M. and Carroll, J (2002) *Usability Engineering: Scenario-Based Development of Human-Computer Interaction*.

[2] Cooper, et al (2007) *The Essentials of Interaction Design*, Wiley Publishing

[3] Nielsen, J. Morgan Kaufmann, San Francisco (1993), *Usability Engineering*, ISBN 0-12-518406-9

[4] Heim, S. , Addison (2007) *The Resonant Interface: HCI Foundations for Interaction Design,* Wiley Publishing.

[5] Rosson, M.B & Carroll. J.M., Morgan Kaufman (2002) *Usability engineering: scenario-based development of human-computer interaction*

SEMESTER VI
FUNDAMENTALS OF STORAGE

COURSE DETAILS

Course Code	19U6VCBCA5
Semester in which the course is to be taught	6
No: of Credits	4
No: of Hours	72

Course Aim:

To impart the knowledge about the fundamentals of storage

Course Objectives:

    i. To understand the fundamentals of information storage and management

    ii. To understand the storage system environment

    iii. To know backup and recovery

Module 1 Introduction to Information storage and Management   **(15 Hours)**

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 2 Storage System Environment   **(10 Hours)**

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 3 Backup and Recovery (15 Hours)

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

Module 4 Local Replication (15 Hours)

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

Module 5 Managing the storage Infrastructure (17 hours)

Monitoring *the* Storage Infrastructure -Parameters Monitored - Components Monitored - Monitoring Examples - Alerts, Storage Management Activities - Availability management - Capacity ma nagement - Performance management - Security Management - Reporting- Storage Management Examples, Storage Infrastructure Management Challenges

Text Book:

[1] Robert Spalding (2003*) Storage Networks: The Complete Reference*, Tata McGraw Hill Publication.

Reference Book:

[1] EMC Education Services (2009) *Information Storage and Managemen*t: Storing, Managing, and Protecting Digital Information, 1st edition, Wiley Publishing.

COURSE DETAILS

Course Code	19U6CRBCA18
Semester in which the course is to be taught	**6**
No: of Credits	**4**
No: of Hours	**72**

Course Aim:

To understand the fundamentals of web application development

Course Objectives:

i. To impart the knowledge of Mobile VAS

j. To understand the content based service

k. To know the fundamental of Javascript

Module 1: Introduction to Mobile VAS (15 hours)

Introduction to Mobile VAS – Definition, Characteristics, Mobile VAS in India, SMS, MMS, Mobile TV, OTT Services, Missed call alerts, Voice mailbox, Mobile money, M-commerce, Mobile advertisements

Module 2: Content-based Service (10 hours)

CMS – Definition, Users, CMS Architecture, CMS Platforms, MCMS – Content Based Mobile Services, Mobile Content, Content Ingestion, DRM – Digital Asset Management, DRM, Subscriber Management, Storefront/UI, CMS Billing, Reporting, Marketing Tools, Ring back tone

Module 3: Introduction to JavaScript (15 hours)

Data types, variables, operators, expressions, statements, functions, objects, arrays, date, math, error handling, flow control, loops

Module 4: JavaScript Object Model   **(15 hours)**

Regular expression, JavaScript object model, Standard Document Object Model - creating nodes, namespace, DOM and HTML, DOM and CSS, Event handling, Event types

Module 5: Windows, Frames and Overlay in JavaScript   **(17 hours)**

Window object, dialogs, Controlling windows, form handling, form fields, form validation. UI elements, browser management, media management

Books for Reference:

[1] Gwenaël Le Bodic (2005) *Mobile Messaging Technologies and Services*: SMS, EMS, and MMS, John Wiley and Sons.

[2] Rick Beasley, John, O'Reilly *Voice application development with Voice XML.*

[3] Paul Golding *Next generation wireless applications: creating mobile applications in a Web.*

[4] Friedhelm Hillebrand (2010) *Short Message Service (SMS): The Creation of Personal Global Text Messaging*, John Wiley & Sons.

[5] Thomas Powell, Fritz Schneider (2013) *JavaScript: The Complete Reference*

MOBILE TESTING

COURSE DETAILS

Course Code	19U6CRBCA19
Semester in which the course is to be taught	6
No: of Credits	4
No: of Hours	72

Course Aim:

To learn the different Mobile testing techniques

Course Objectives:

i. To explore the fundamentals of testing

j. To understand the Android testing framework

k. To impart the knowledge on Mobile apps testing

l. To explore the different mobile testing tools

Module 1: Testing Fundamentals   (15 hours)

SDLC, SDLC Phases, need of Testing, methods of Testing: Functional, Black Box, White Box, Regression, Stress, Monkey etc., TestCase, Rules to write TestCase, Testsuite and Test Runner

Module 2: Introduction to Android testing framework: (10 hours)

Junit: Junit Test Framework, Features of Junit Test Framework, Testing Fundamentals-TestCase, TestSuite, TestRunners, JUnit classes, Junit in Android, Android Testing Framework, Test Projects-Directory Structure, Android Testing API, Mock Objects, Activity Testing, what to Test, ContentProvider Testing, service Testing, choosing devices to test, Testing tools

Module 3: Mobile apps testing   (15 hours)

Need of testing, Mobile applications testing landscape, Common types of testing, UI and functional testing strategies of mobile applications, compatibilty testing need and methods, non-functional testing methods of mobile applications - Performance, security, types of operations

testing for mobile applications - Installation, un-installation, upgrade, methods of testing the mobile application integration with phone features, challenges in testing, difference between testing mobile web and testing native app

Module 4: Mobile testing tools (15 hours)

Testing lifecycle of mobile applications, alternatives of testing environments for mobile apps testing, Differentiate between testing on physical devices, cloud devices and emulators, different test automation tools for mobile applications, key features of monkey talk tool, installation and use of monkeytalk tool for a mobile application on emulator, installation and use of monkeytalk tool for a mobile application on PC connected device, installation and use of monkeytalk tool for a mobile web, installation and use of monkeytalk tool for a mobile application for cloud device.

Module 5: UI and functional testing: (17 hours)

Using monkey talk - creation of test project, test suite and test script, record and playback feature, different verification techniques, data driven testing methods, synchronization, script parameterization, reporting features. **Using Robotium -** creation of test project, test suite, Robotium Framework, data driven testing methods

Books for Reference:

[1] Diego Torres Milano (2010) *Android Application Testing Guide*.

[2] Hrushikesh Zadgaonkar (2011) *Robotium Automated Testing for Android.*

[3] Julian Harty, Mahadev Satyanarayanan (2011*) A Practical Guide to Testing Wireless Smartphone Applications.*

[4] Hung Q. Nguyen, Bob Johnson, Michael Hackett (2012) *Testing Applications on the Web: Test Planning for Mobile and Internet-Based Systems.*

COURSE DETAILS

Course Code	19U6PJBCA1
Semester in which the course is to be taught	6
No: of Credits	6
No: of Hours	180

The BCA programme prepares the students to take up positions as programmers, System Analysts, System Designers in the field related to the computer science and information technology or students may go for higher studies in this area. The students are encouraged to involve themselves completely on the project work in their final semester. It is advised to students to develop their project for solving problems of software industry or any research organization. Doing this will give more exposure to handle real life problems of project development.

This project work is kept in BCA programme to give the opportunity to enhance skills in mobile application development on the Android platform and propel students towards the exciting opportunities in Android's future. Apart from developing android applications, students who are interested in adopting cloud resources or frameworks can do their project work on cloud computing aspects to gain hands-on practical experience to improve their competitiveness in the big data/cloud job market.

The project topic shall be chosen from areas of current day interest using latest packages/ languages running on appropriate platforms, so that the student can be trained to meet the requirements of the industry. This is an individual project. The students can do project in any advanced language which is included in their syllabus.

A project report shall be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

MODEL QUESTION PAPERS
SEMESTER 1
COMPUTER FUNDAMENTALS AND ORGANIZATION

Time: 3 HRS   **Total Marks: 75**

PART A: (Answer all the questions. Each question carries 1 mark.)

1. What is Scale of Integration?
2. What is the expansion of OCR?
3. Name two different types of hardware devices?
4. Define flowchart?
5. Write shortcut commands for copy and paste?
6. What is Point-to-Point transmission?
7. How will you configure the addresses in the internet?
8. Expand PAN and CAN and briefly explain them?
9. Define Internet?
10. What is hub?

PART B: (Answer any 8 of the following questions. Each question carries 2 marks.)

11. What is a Computer?
12. List out the characteristics of a microcomputer?
13. Give a note on ALU?
14. What is virtual memory?
15. Define an algorithm with a simple example?
16. Convert the binary whole number 110010 to its corresponding decimal number?
17. List any four characteristics of 'Microsoft Office 2013'?
18. Explain how to apply a theme in 'Microsoft PowerPoint'?
19. Expand CAN and PAN and briefly explain them?
20. What do you mean by virtual network?

PART C: (Answer any 5 of the following questions. Each question carries 5 marks.)

21. Explain the overview of a computer system?
22. Explain in detail, the instruction steps to execute CPU cycle?
23. What is RAID? Explain the RAID Levels?
24. Write a short note on Machine language with an example?
25. Briefly explain about 'Interpreters' and 'Assemblers'?
26. Explain the 'Security' feature in MS-Office?
27. Write a short note on search engines?

PART D: (Answer any 2 of the following questions. Each question carries 12 marks.)

28. Discuss the generations of computer with suitable examples?
29. Explain the memory Hierarchy?
30. What are Basic Gates? Explain with truth tables?
31. Explain different types of Networks along with their advantages and disadvantages?

PROGRAMMING IN C

Time: 3Hours   **Total Marks: 75**

PART A: (Answer all the questions. Each question carries 1 mark.)

1.   List out two features of 'C' Language?
2.   What are the data types in 'C' programming?
3.   Write the syntax of switch statement?
4.   What is a '*' in pointer?
5.   What is a 'typedef' in 'C' programming?
6.   Define #include?
7.   Define Qualifier?
8.   What do you mean by enumerator?
9.   Differentiate between Keyword and token?
10.   State the difference between = and == operator?

PART B: (Answer any 8 of the following questions. Each question carries 2 marks.)

11. What is an Algorithm?
12. Define 'Compiler' and 'Interpreter'.
13. What is character set in C?
14. Explain the different types of arrays.
15. Write a program to print 'Hello C Programming'.
16. What are local and global variables in 'C' programming?
17. Differentiate between structure and union?
18. Define structures in 'C' programming.
19. What do you mean by 'Call by value'?
20. What are the preprocessors?

PART C: (Answer any 5 of the following questions. Each question carries 5 marks.)

21. Write a flowchart and algorithm to simulate a calculator.
22. Explain the Machine language and High-level language.
23. What are operators in 'C' programming? Explain.
24. State the differences between 'while' and 'do while' loop with example?
25. Write a 'C' function to find the largest number among three numbers.
26. Write down a program to use structure within union, and display the contents of structure elements.
27. Mention instruction codes to print details of 50 students using structures in 'C' programming.

PART D: (Answer any 2 of the following questions. Each question carries 12 marks.)

28. Write a program to find transpose of a given square matrix.
29. Write down the algorithm and program to print 'Fibonacci' series using recursion.
30. What is DMA? Explain DMA with example.
31. Explain the string and mathematical functions in detail with examples

SEMESTER I
INTRODUCTION TO LINUX

Time: 3 Hours   **Total Marks: 75**

PART A: (Answer all the questions. Each question carries 1 mark.)

1. What is the command used in to create a file in Linux?
2. List out four flavors of Linux?
3. What is lseek()?
4. Define a Process?
5. List out two modes of vi editor?
6. What is the syntax of a command to install a package using rpm?
7. Define process?
8. List out any two duties of system administrator?
9. Define System call?
10. Expand YACC command?

PART B: (Answer any 8 of the following questions. Each question carries 2 marks.)

11. Define 'grep' command?
12. Explain 'chmod' command?
13. What is 'inode'?
14. Define link and unlink?
15. Explain PID and PPID?
16. What is pipe?
17. What are the different commands used to create a file?
18. Write the syntax of search and replace command in vi editor?
19. Write the syntax of "wall" and "who" command?
20. Define kernel?

PART C: (Answer any 5 of the following questions. Each question carries 5 marks.)

21. Explain any five system calls in Linux?
22. Describe the concept of hard link and soft link?
23. Explain the structure of file system in Linux?
24. Explain mounting and unmounting process in detail?
25. Write short notes on daemon process and background process?
26. Explain about yanking?
27. Write down the parameters of uname?

PART D: (Answer any 2 of the following questions. Each question carries 12 marks.)

29. Discuss various distributions of Linux?
30. Explain the /(root) file system with a neat diagram?
31. Describe process states and transitions with the help of a diagram?
32. Discuss the concept of managing groups and modifying group attributes?

SEMESTER II

DATA STRUCTURES USING C

PART A: Answer *all* questions. Each question carries **1** mark.

1. Define Data structure?
2. What is the time complexity of insertion sort in worst, best and average case?
3. Give the prefix form of (A+B)*C?
4. Expand LIFO?
5. What is de-queue?
6. What are the disadvantages of array?
7. What you mean by recursion?
8. How many number of link fields are there in doubly linked list?
9. What is a Heap Tree? And what is its application?
10. What is a simple graph?

PART B: Answer *any eight* questions. Each question carries **2** marks.
11. An array X[1..15][1..10] is stored in the memory with each element requiring 4 bytes of storage. If the base address of array is 1500, calculate the location of X[12][9] when the array X is stored in row major order?
12. Explain any two applications of stack?
13. What you mean by time complexity and space complexity?
14. Distinguish between static and dynamic memory allocation?
15. Give an algorithm to traverse a linked list?
16. Give a recursive algorithm for calculating Binomial Coefficient?
17. Define binary search tree?
18. Explain Priority Queue?
19. Define Circular linked list.
20. Explain how divide and conquer strategy is used in Quick Sort

PART C: Answer *any five* questions. Each question carries **5** marks.
21. Explain the classification of data structures with example. Explain recursive and non-recursive algorithms for binary search
22. Write a program to insert a node in Singly linked list in the below three cases
    a. At beginning
    b. At end
    c. After a specific node.
23. Explain basic operations of a stack and a queue.
24. Convert X: A+ (B*C-(D/E^F)*G)*H   into postfix notation using stack.
25. Write a C program to sort N characters using insertion sort.
    Compare Breadth First Search and Depth First Search.

PART D: Answer *any two* questions. Each question carries **12** marks.

26.

    a. Explain inorder, preorder and postorder traversal on a binary tree. Also trace how these traversals work on the following tree.
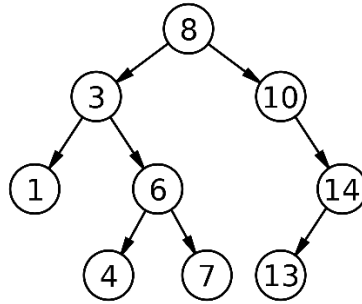
    b. Explain any three application of Graphs.

27.

    a. Give a recursive algorithm to traverse a Singly Linked List reversly.

    b. Explain three cases of deletion operation on Doubly Linked List

28.

    a. Explain different operations on DEQUE

    b. Explain how Circular Queue can be implemented? Also explain the basic operation on Circular Queue?

29.

    a. Write the algorithm for Merge Sort and trace Merge Sort algorithm on the list L= {78, 67, 90, 52, 82, 92, 33, 56, 18, 25}.

    b. Explain different dynamic memory allocation functions in C.

SEMESTER II
DISCRETE MATHEMATICS

**Time : 3 Hours**   **Total Marks: 75**

PART A: Answer *all* questions. Each question carries **1** mark.

1. Define equal and equivalent set?
2. What is invertible function? Find the inverse of $f(x) = \sqrt{x^2 + 1}$?
3. How many ways can one arrange the seven letters of the word SYSTEM?
4. What you mean by multinomial coefficient?
5. Give the truth table for $p \rightarrow (p \wedge q) \vee (q \wedge r)$
6. Give an example of weighted graph? How it can be represented using adjacency matrix?
7. Explain conjective normal form?
8. Briefly explain different operations on set?
9. Explain multiplication rule in Combinatorics?

10. What is a simple graph?

PART B: Answer *any eight* questions. Each question carries **2** marks.

11. Explain Hamming Code and its application?
12. Compare Equivalence relation and Partial ordering?
13. Explain different connectives in propositional calculus?
14. Explain multiplication rule in Combinatorics?
15. Define binary search tree with example?
16. Find the number of distinguishable permutations of the letters in the word MISSISSIPPI
17. Apply preorder traversal on the given tree?
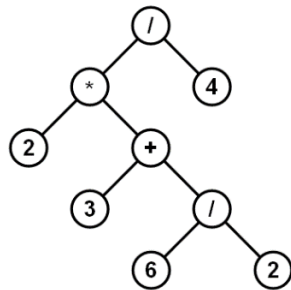
18. Explain any one MST algorithm?
19. Explain briefly the following.
    a. Tautology
    b. Contradiction
20. Which rule of inference is used in each argument below?
    a. Alice is a Math major. Therefore, Alice is either a Math major or a CSI major.
    b. Jerry is a Math major and a CSI major. Therefore, Jerry is a Math major.
    c. If it is rainy, then the pool will be closed. It is rainy. Therefore, the pool is closed.
    d. If it snows today, the university will close. The university is not closed today. Therefore, it did not snow today.
    e. If I go swimming, then I will stay in the sun too long. If I stay in the sun too long, then I will sunburn. Therefore, if I go swimming, then I will sunburn.
    f.

PART C: Answer *any five* questions. Each question carries **5** marks.
21. Explain Modus Ponens? Explain its use with an example?
22. Find the domain and range of $f(x) = \frac{x-1}{x+1}$.

23. What is 'Konigsberg Bridge Problem'? How can we transform this problem as a graph theoretical problem and solve?
24. Prove that $8 \mid 3^{2n} - 1$, for any integer $n \geq 0$.
25. State and prove De Morgan's Law in Boolean Algebra.
26. Using the digits 1, 3, 5, 7, and 9, with no repetitions of the digits, how many

     (a) one-digit numbers can be made?

(b) two-digit numbers can be made?

(c) three-digit numbers can be made?

(d) four-digit numbers can be made?

PART D: Answer *any two* questions. Each question carries **12** marks.

27.

    a. Explain Dijikstra's Algorithm to find the Single source shortest path. Also apply it on the following graph by taking 'c' as source
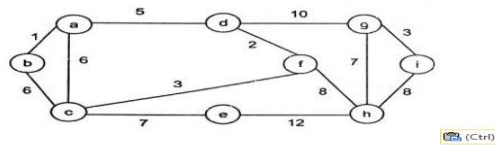
    b. State and Prove Euler's theorem.

28.

    a. In how many different ways can eight identical balls be distributed among three children if each receives at least two balls and no more than four balls?

    b. Prove C (n, r) = C (n-1, r) + C (n-1, r-1)

    c. How many different arrangements are there for the letters in the word 'Tennessee'?

29.

    a. Prove that D_{24} is a partial ordering and also draw the hasse diagram.

    b. Prove that $1^2 + 2^2 + 3^2 + \ldots\ldots + n^2 = n(n+1)(2n+1)/6$ using mathematical induction.

30.

    a. For each of the following compound propositions determine if it is a tautology, satisfiable or unsatisfiable:

        i. $(p \lor q) \land \neg p \land \neg q$

        ii. $p \lor q \lor r \lor (\neg p \land \neg q \land \neg r)$

        iii. $(p \rightarrow q) \leftrightarrow (\neg p \lor q)$

    b. Prove R by resolution:

        • $(P \rightarrow Q) \rightarrow Q$

        • $(P \rightarrow P) \rightarrow R$

        • $(R \rightarrow S) \rightarrow \neg(S \rightarrow Q)$

SEMESTER II
OOPS with C++

Time : 3 Hours   **Total Marks:75**

PART A: (Answer all the questions. Each question carries 1 mark.)

    1. which library is responsible for I/O function in C++.

2. What is the name of ": :" ?
3. What do you call when one class is adopting the other class's operations?
4. What does a pointer variable hold?
5. What is a file pointer?
6. What is an instance of class?
7. Define Polymorphism?
8. What to do you mean by abstract class?
9. Differentiate between an object and a class?
10. Define union?

PART B: (Answer any 8 of the following questions. Each question carries 2 marks.)

11. Define data types in C++.
12. Name any two differences between union and structure.
13. Define private access specifier.
14. Explain constructor.
15. Explain the need for an array?
16. Define operator overloading.
17. What is a pointer array?
18. What do you mean by a function?
19. Define class templates.
20. Define formatted I/O.

PART C: (Answer any 5 of the following questions. Each question carries 5 marks.)

21. What are the different looping constructs in C++. Give examples.
22. Explain about default and parameterized constructor with example.
22. Define copy constructor and explain constructor overloading.
23. Explain the different types of data conversions.
24. Explain in detail about different levels of inheritance.
25. Write a short note on virtual function.
26. Explain friend function with an example.
27. Write a short note on exception handling in C++.

PART D: (Answer any 2 of the following questions. Each question carries 12 marks.)

28. Write a note on the following:
    a. Built-in function
    b. User-defined function
    c. Different methods of calling a function
29. Discuss the following with example:
    a. Unary operator overloading
    b. Binary operator overloading
30. Explain the following with example:
    a. Call by pointer array
    b. Array of pointer

31. Write a C++ program to demonstrate file I/O operations.

****

SEMESTER II
Subject: OPERATING SYSTEM

Time: 3 Hours   **Max. Marks: 75**

PART A: (Answer all the questions. Each question carries 1 mark.)

1. What are the two system services of an operating system.
2. Define processes and threads.
3. Define turnaround time and waiting time.
4. What is swapping?
5. Define Thrashing?
6. What do you mean by Protection?
7. Give examples for security measures used in operating System?
8. Define Deadlock?
9. What do you understand by virtual memory?
10. What are program threats?

PART B: (Answer any 8 of the following questions. Each question carries 2 marks.)

11. What are system calls? Give two examples.
12. List out four system components.
13. What are short term schedulers?
14. What are semaphores?
15. Give the name of four necessary conditions for deadlocks.
16. Explain logical and physical address space?
17. Define paging.
18. Explain how to recover from deadlock?
19. Write down four attributes of a file.
20. Define contiguous allocation.

PART C: (Answer any 5 of the following questions. Each question carries 5 marks.)

21. Discuss the operating system structure.
22. What are virtual machines? Explain with example.
23. With the help of an example, explain Round Robin algorithm for CPU scheduling.
24. Explain Banker's algorithm with suitable example.
25. Describe Demand Paging with a neat diagram.
26. Compare Scan scheduling and C-Scan scheduling algorithm for disk scheduling.
27. Discuss the principles of Protection.
28. Explain Domain Structure with the help of suitable examples.

PART D: (Answer any 2 of the following questions. Each question carries 12 marks.)

29. Discuss evolution of operating system.

30. Explain Page Replacement algorithm with example.
31. What is a deadlock? Explain the methods that can be used for deadlock detection and recovery.
32. Discuss the strengths and weakness of implementing the access matrix using capabilities that are associated with domains.

SEMESTER III
Software Engineering

Time: 3 Hours   **Total. Marks: 75**

PART A : Answer *all* questions. Each question carries **1** mark.

1. Define Software Engineering.
2. What are the Advantages of incremental model?
3. What is meant by feasibility study?
4. What is meant by software prototyping?
5. What are the common characteristics of design methods?
6. What are the different levels of abstraction?
7. What is a Real-time system?
8. Define Smoke Testing?
9. Define debugging.
10. Define measure.

PART B: Answer *any eight* questions. Each question carries **2** marks.
11. Differentiate System and Computer based System.?

12. Distinguish between verification & validation?

13. Mention any two non-functional requirements on software to be developed?

14. What is known as SRS review? How is it conducted?

15. What are the different types of Cohesion?

16. List the guidelines for data design?

17. Write short note on black box testing?

18. What are the approaches of integration testing?

19. How the CASE tools are classified?

20. What are the types of static testing tools?

PART C: Answer *any five* questions. Each question carries **5** marks.

21. Explain About RAD Model?

22. Draw a DFD of Ticket Booking System

23. How the Architecture Design can be represented?

24. What is the need for cyclomatic complexity?

25. Distinguish between alpha and beta testing?

26. Compare horizontal and vertical partitioning?

27. Why is it so difficult to gain a clear understanding of what the customer wants?

PART D: Answer *any two* questions. Each question carries **12** marks.

28.
  a. What are the necessities of Life cycle model? Elaborate on the various Software life cycle models and its issues?
  b. Differentiate product engineering and business engineering overview?

29.
  a. Why customer iteration is difficult process? Explain one formal procedure used for customer interaction.
  b. Draw an ER and DFD diagram for university information System.

30.
  a. Discuss in detail about the design process in software development process.
  b. Justify "Design is not coding and coding is not design".

31.
  a. What are the upper and lower CASE tools? What is the purpose of upper-CASE tools
  b. Explain in detail the COCOMO model.

SEMESTER III

RELATIONAL DATABASE MANAGEMENT SYSTEM

TIME: 3 HOURS   **MAX MARKS:75**

PART A: ANSWER ALL QUESTIONS

1. Define RDBMS?
2. What is the difference between database instance and database schema?
3. Define relation?
4. What are the different data types in Advanced SQL?
5. Define transaction?
6. What is a metadata?
7. What do you mean by functional dependency?
8. Differentiate between NOT NULL and UNIQUE constraint?
9. Explain the following commands
   i) Cardinality
   ii) Domain
10. What is the primary key in a table?

PART B : Answer Any Eight Questions. Each Question Carries 2 Marks
11) What are views? How are they useful?
12) Explain Cartesian product?
13) Write short notes on transaction states?
14) Differentiate between Tuple relational and Domain relational calculus?
15) What is the difference between Embedded SQL and Dynamic SQL?

16) Explain First normal form?
17) Explain about weak entity set and Strong Weak set?
18) Explain tuples and relations?
19) What is the difference between procedural and nonprocedural DML?
20) What is database redundancy? How can we control it?

PART C : Answer Any Five Questions. Each Question Carries 5 Marks
21) What are the various data models available for database systems?
22) Explain following
    i) Data Independence
    ii) Nested Queries in SQL
23) Define Normalization? Explain about the different types of normal forms?
24) Differentiate between Data Definition Language and Data Manipulation Language?
25) What are the fundamental operations in SQL?
26) Explain the desirable properties of a Transaction?
27) Briefly explain the symbols used in ER diagrams?

PART D: Answer Any Two Questions.Each Question Carries 12 Marks
28) Explain the Database Architecture and its various components in detail?
29) Explain in detail about the different Integrity Constraints in SQL?
30) Explain the advantages of using DBMS?
31) Explain about ER diagrams with a real time example?

SEMESTER III
Programming in Java

Time: 3 Hours   **Max. Marks: 75**

PART A: Answer *all* questions. Each question carries **1** mark.

1. Define polymorphism?
2. What you mean by scope of a variable?
3. Define a class?
4. What is the purpose of this keyword?
5. What is the super class of all exceptions?
6. Name any two classes in util package?
7. What is the use of isAlive() function in thread class?
8. Which method is first invoked when applet start running?
9. What is JDBC?
10. What is the use of ResultSet Class?

PART B: Answer *any eight* questions. Each question carries **2** marks.

11. How is JAVA bytecode different from other low-level computer languages coding?

12. How abstraction is realized in Java?

13. Differentiate between class and interface?

14. What are the basic datatypes in Java?

15. List any four Event Listeners in Java?

16. What is the use of final keyword?

17. Briefly explain about thread priorities?

18. What is the difference between throw and throws keywords?

19. What is the use of super keyword?

20. What is the use of executeQuery() and executeUpdate() function in Statement class?

PART C: Answer *any five* questions. Each question carries **5** marks.

21. Write a java program to find biggest of three numbers (Follow OOP concepts)?

22. Explain the relation between abstract keyword and method overriding?

23. What is the difference between error and exceptions? Explain how exceptions are handled in Java?

24. What are constructors? Write a program to illustrate constructor overloading?

25. Explain the life cycle of a thread? What you mean by thread synchronization?

26. Explain two methods for creating threading in Java with example program?

27. Explain the steps for executing a select query in mysql database using JDBC?

PART D: Answer *any two* questions. Each question carries **12** marks.

28.
   a. Explain the concept of inheritance in connection with OOPs?
   b. How multiple inheritance is implemented in Java? Explain with example program.
   c. What is used defined exceptions? How it is achieved in Java?

29.
   a. Write a program to create a class NumberArray, provide constructor to initialize the array, functions to read, display, find the biggest, smallest element, and to sort the array.
   b. Explain different bitwise operators in Java?
   c. Explain different unconditional jump statements in Java?

30.
   a. Write a multithreaded java program to write all even numbers less than a given number into a file "EVEN.txt" in one thread, and to write all odd numbers less than a given number into a file "ODD.txt" in another thread?
   b. Write a Java program and the corresponding HTML code for printing "Hello World" in the center of an applet of size 600x400?

31.
   a. Explain about different JDBC Divers?
   b. Explain types of ResultSet? How data is fetched from ResultSet?
   c. Write a program to find the factorial of a numbers using recursion. The number should read form command line?

Subject: Basic Android

Time: 3 Hours   **Max. Marks: 75**

PART A: (Answer all the questions. Each question carries 1 mark.)
1. Android is a _____ OS
2. Expand SDK?
3. Window is nothing but _____ in Android
4. What element is used to manipulate data in Android.
5. Which API is used to manipulate audio & video
6. Expand GPS?
7. Which element Manager is used to find Location
8. Which Activity is used for Maps
9. Expand CRUD
10. Which View is used to display web pages

PART B: (Answer any 8 of the following questions. Each question carries 2 marks.)
11. What is Android?
12. List all android Features
13. What is Manifest File?
14. What is Activity?
15. Describe List View
16. Explain Table View
17. What is SQLite?
18. What are Content Providers?
19. What is Bluetooth?
20. What is Testing?

PART C: (Answer any 5 of the following questions. Each question carries 5 marks.)
21. Explain GPS and Location Manager
22. Describe how to test Activity
23. What is Media? List some of Media API
24. What is a Notification? Describe different type of notification
25. What is intent? List the difference between Intent & Activity
26. What is service? Explain Broadcast receivers
27. List all the steps to test Andriod App

PART D: (Answer any 2 of the following questions. Each question carries 12 marks.)
28. Write code to display List in the Table View using arrays
29. Write code to perform CRUD on Employee table (name, salary)
30. Write code to display Map in a App
31. Write code to display image viewer

INTRODUCTION TO CLOUD TECHNOLOGY

TIME: 3 HOURS   **MAX MARKS: 75**

PART A: ANSWER ALL QUESTIONS

1) Define Cloud Computing?
2) How does cloud computing provides On-demand Functionality?
3) What are the different delivery models of Cloud?
4) Name any two types of Cloud?
5) Define Service Catalog?
6) What do you mean by SLA?
7) List out any two major goals of cloud computing Platform?
8) List out the practical applications of cloud Computing?
9) Define Virtualization?
10) What do you mean by tenants?

PART B: Answer **any Eight** questions. Each question carries 2 marks

11) What are the essential characteristics of Cloud computing?
12) Define Cloudnomics?
13) What are the different types of cloud?
14) What are efficient steps that is needed for migrating into the cloud?
15) Explain the different Cloud Mitigation Strategies?
16) List the major Cloud components in Cloud Infrastruture?
17) What are the obstacles for Cloud Technology?
18) What are the three common approaches to migrate the on-premise applications to cloud?
19) What is the need for Cloud Governance?
20) Differentiate between provider side and client side encryption standards?

PART C: Answer **any Five** questions. Each question carries 5 marks

21) What are the best practices used in selection of Cloud Provider?
22) Explain the different actors involved in the Cloud computing Reference Model?
23) Write short note on Cloud Security Challenges?
24) Explain different risk assessment methods in cloud computing?
25) Explain in detail about the seven step model used in cloud computing?
26) Explain in detail about the deployment models in cloud computing?
27) Explain and illustrate with different case studies of migrating into cloud?

PART D: Answer **any Two** questions. Each question carries 12 marks

28) Explain the Cloud Computing Reference Architecture Model in detail with a neat diagram?
29) Explain the Seven- step Model of Migration into a Cloud?
30) Explain the ten cloud do and do nots in Cloud Technology?
31) What are the different considerations for selecting the Cloud Solutions?

MOBILE DEVICE AND NETWORK ARCHITECTURE

Time: 3 Hours   **Max. Marks: 75**

PART A: (Answer all the questions. Each question carries 1 mark.)

1. _____ signal information encoded as a set of discrete Value
2. A computer network is the infrastructure that allows two or more computers to communicate with each other is called _____
3. _____ number of modes of CCS
4. Who created PSTN which is largely governed by technical standards?
5. Simple hexagon is used to represent a _____
6. Expand POTS?
7. Which part is responsible for relaying, storing and forwarding a short message between a SMS node in the network and a mobile station?
8. _____ year GSM was found
9. Expand ISP
10. _____ is the part of telecommunication System

PART B: (Answer any 8 of the following questions. Each question carries 2 marks.)

11. What is Nyquist?
12. What is Analog Signal?
13. What is Digital Signal?
14. What is Ultra High Frequency?
15. Describe SIM Application Toolkit
16. Explain CPU?
17. What is the need of RF system?
18. Describe Radio Frequency
19. What is Middleware?
20. What is SDK?

PART C: (Answer any 5 of the following questions. Each question carries 5 marks.)

21. Explain different types of memory
22. Describe Telephone Network Hierarchy
23. Explain Analog & Digital Communications
24. Describe Public Switched Telephone Network
25. Explain different Access Channels
26. Describe Power reduction techniques
27. Explain Function of the RF Subsystems

PART D: (Answer any 2 of the following questions. Each question carries 12 marks.)

28. Describe Layers of OSI Model
29. Explain SMS Network Architecture
30. Explain All Generations of Mobile Networks
31. Explain Handset Architecture

****

SEMESTER IV

MOBILE WEB APPLICATION DEVELOPMENT

Time: 3 hours   **Total Marks: 75**

PART A: (Answer all the questions. Each question carries 1 mark.)
1. _____ simply a computer program that dispenses web pages as they are requested
2. Which application that is accessed by users over a network such as the Internet or an intranet.
3. _____ specifically designed to run on a device's operating system and machine firmware, and typically needs to be adapted for different devices.
4. Centralization, Scalability, Flexibility, Interoperability are the Advantages of _____
5. Expand WWW
6. Each machine on the Internet is assigned a unique address called an _____
7. Web Services are based on the concept of _____
8. Expand WSDL?

9._____ allows the developer to create a set of rules to specify legal content and place restrictions on an XML file

10. Which is the most suitable design pattern for server side web application development.

PART B: (Answer any 8 of the following questions. Each question carries 2 marks.)
11. What is WWW?
12. What is HTML?
13. What is XML?
14. Describe the xml validation techniques
15. Explain Client-Server model
16. Describe internet and intranet
17. Explain static and dynamic web applications
18. What is emulator?
19. Explain mobile web applications
20. List differences between DTD and Schema

PART C: (Answer any 5 of the following questions. Each question carries 5 marks.)
21. Explain Mobile Application Development paradigm
22. Describe the process of writing and compiling Java Program
23. Describe OOPs concepts
24. What is a SIM and SIM based applications?
25. What is WAP and Describe standards of WAP
26. What is Server Side Scripting and Describe PHP
27. Explain principles of UI development

PART D: (Answer any 2 of the following questions. Each question carries 12 marks.)
28. Design a Web page to accept the information from the User for sign up.
29. Explain Programming rules and Challenges and Mobile Programming Tools
30. Explain Mobile Programming best practices
31. What is content adaption? Explain Adaption Strategies

ADVANCED ANDROID

TIME: 3 HOURS **MAX MARKS: 75**

PART A: ANSWER ALL QUESTIONS
1. What is an Intent Service?
2. Explain how to start and stop a service?
3. What is a web service?
4. How to change proxy settings in Android Studio.?
5. What is the role of SurfaceFlinger in Android graphics library?
6. What is 9-patch image?
7. What is ViewPager?
8. What are the basic security features provided in Android
9. What is an application sandbox?
10. What is communication protocol?

PART B: Answer Any Eight Questions. Each Question Carries 2 marks
11. Distinguish between AlarmManager and JobScheduler
12. Explain the callback methods in AsyncTask.
13. Distinguish between Canvas and Drawable?
14. Briefly describe all the process levels
15. What are the steps involved in creating a OpenGL App to draw a Circle?
16. What are the different types of Animations in Android?
17. What is backstack in Android? Explain.
18. What is the use of android:process attribute in AndroidManifest.xml file.
19. How to configure auto-backup to cloud for the applications
20. What is SOAP? Explain with an example

PART C: Answer Any Five Questions Each Question Carries 5 Marks
21. Differentiate bounded service and unbounded service.
22. How Remote Service communication works in Android
23. Explain how to create a Broadcast Receiver
24. Explain Socket Programming with example?
25. Differentiate between JSON and XML
26. Briefly explain the steps involved in integrating C2DM in app.
27. How can you create a simple HelloWorld app for Android watch ?

PART D: Answer Any Two Questions. Each Question carries 12 marks
28. Write an android application to display and cancel notification.
29. Write an android application to start music, stop music and pause music using Service with Binder.
30. Illustrate the use of threading in android development with an example
31. Explain about consuming JSON services in android with an example.

SEMESTER V
SERVER OPERATING SYSTEM

TIME: 3 HOURS   MAX MARKS: 75

PART A: Answer All Questions. Each Question carries 1 marks

1) How the remote administration is enabled in windows server core 2008?
2) Differentiate between forward and reverse zone in DNS.
3) What is WDS?
4) Describe the traffic class in IPv6.
5) What do you meant by zone transfer in DNS?
6) Describe zone replication.
7) What is a PowerShell?
8) Define group policy container.
9) Describe event logs at server manager.
10) Describe how group policy object is created?

PART B: Answer Any Eight Questions. Each Question carries 2 marks

11) Mention any four advantage of windows server 2008 over 2003.
12) Differentiate between windows server core and windows server standard.
13) Describe the functions of flow table?
14) What is network location awareness?
15) Explain the configuration of active directory database.
16) What you meant by replication of domain controller?
17) What is global catalog?
18) Mention the benefits of group policy management.
19) Explain how auditing is achieved by server manager.
20) Mention the advantages of windows server manager.

PART C: Answer Any Five Questions. Each Question carries 5 marks

21) Explain the post installation tasks associated with windows server core installation.
22) Describe the properties of WDS server.
23) Differentiate between IPv4 and IPv6.
24) Illustrate the management of various records in DNS.
25) Explain the configuration of read only domain controllers.
26) Describe the fine-grained password policies.
27) Explain the roles of server manager in windows server 2008.

PART D: Answer Any Two Questions. Each Question carries 12 marks

28) Explain the installation and configuration of various server roles and features.
29) a) Explain IPv6 header with neat diagram.   (7)
    b) Explain any two mechanisms to migrate from IPv4 to IPv6   (5)
30) How domain controllers are configured in windows server 2008?
31) Explain the installation and configuration of group policy management.

****