SACRED HEART COLLEGE (AUTONOMOUS), THEVARA

KOCHI, KERALA, 682013

CURRICULUM AND SYLLABUS

CHOICE BASED COURSE CREDIT AND SEMESTER SYSTEM

(CBCSS)

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

INTRODUCED FROM 2015 ADMISSION ONWARDS

BOARD OF STUDIES IN COMPUTER SCIENCE

Sacred Heart College, Thevara, Kochi, Kerala

BACHELOR OF COMPUTER APPLICATIONS
[SPECIALIZATION IN MOBILE APPLICATIONS]

1.1   PREAMBLE:

The Computer Science Department of Sacred Heart College is proposed to start a new programme as Specialization on Mobile Application. 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 Applications, Sacred Heart College, has initiated an industry collaboration to impart Bachelor of Computer Application, specialized in Mobile Applications. 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 program 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.

1.2 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.

1.3 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.
- Be able to understand, design, and analyze precise specifications of algorithms, procedures, and interaction behavior.
- Be able to apply mathematics, logic, and statistics to the design, development, and analysis of software systems.

- Be 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.

- Be able to gain experience of working in teams to build software systems.

- Students will be able to gain a strong ground in basic discipline of study

- Students will be able to learn the practical implementation , as the learning of the practical subjects will happen in laboratories or on the field ,

- The student will be able to have an insight to the situations in the existing field/market/industries because of the project work.

1.4 JOB OPPORTUNITIES:

1.4.1 for Mobile App Developers

Global Scenario

Mobile Applications have spawned a new industry aptly called the "Mobile Apps Economy' which continues to grow at a rapid pace. The boom is set to create about 3 million Mobile Application Development related jobs worldwide.

Indian Scenario

The sector's exponential growth bodes well for India. With huge investments provided for developing both consumer and enterprise apps, the sector in India will open up challenging opportunities – for both outsourced and indigenous app development.

The Indian app market was estimated to be Rs 150-200 crore during 2012, as per a study released by Avendus Partners. The total monthly revenues earned by Google Play and Apple app store from Indian customers was Rs 27.5 crore in October 2012 or an annualized run-rate of Rs 330 crore. Based on these estimates, the market size for 2012 has been pegged to be somewhere Rs 150-200 crore.

- As per the study, the Indian app market could reach Rs 2,000 crore by 2016.

- As per the estimates, Google Play and Apple App store are expected to cross Rs 800 crore each by 2016.

Job Opportunities

- 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

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

1.4.2 for Cloud Technology Professionals

Global Scenario

- There are currently about 50 million enterprise users of Cloud Office Systems which represent only 8 percent of overall office system users, excluding China and India.
- Predicts that a major shift toward cloud office systems will begin by the first half of 2015 and reach 33 % penetration by 2017.

Indian Scenario

Market Size - India

The public cloud services market in India is forecast to grow 36 percent in 2014 to total $443 million, up from $326 million in 2013, according to Gartner, Inc. Infrastructure as a service (IaaS), including cloud computing, storage and print services, continues as the fastest-growing segment of the market in India, growing 22.7 percent in 2013 to $43.1 million, and it is expected to grow 39.6 percent in 2014 to $60.2 million. Infrastructure as a service (IaaS), including cloud compute, storage and print services continued as the fastest-growing segment of the market,

growing 42.4 percent in 2012 to $6.1 billion and expected to grow 47.3 percent in 2013 to $9 billion.

Job Opportunities

- Cloud Computing to create 14 million new Jobs by 2015.
- By 2015, business revenues from IT innovation enabled by the cloud could reach US $1.1 trillion a year.

India will create over 2 million jobs in Cloud sector, predicts a study commissioned by Microsoft and conducted by International Data Corporation (IDC).

Career Progression Path - Cloud Technology

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

1.5 HIGHER STUDIES POSSIBLE:

1.5 DEFINITION:

1.5.1 **'Programme'** means a three year programme of study and examinations spread over six semesters, according to the regulations of the respective programme, the successful completion of which would lead to the award of a degree.

1.5.2 **'Semester'** means a term consisting of a minimum of 450 contact hours distributedover90 working days, inclusive of examination days, within 18 five-day academic weeks.

1.5.3 **'Academic Week'** is a unit of five working days in which distribution of work is organized from day-one today-five, with five contact hours of one hour duration on each day. A sequence of 18 such academic weeks constitutes a semester.

1.5.4 **'Common Course I'** means a course that comes under the category of courses for English a selection of this is compulsory for all students undergoing undergraduate programmes.

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

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

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

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

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

1.5.10 **'Credit'** is the numerical value assigned to a course according to the relative importance of the content of the syllabus of the programme.

1.5.11 **'Additional credit'** is the numerical value assigned to Club activities, Social service, Internship etc. which is not added with the total academic credits of the students.

1.5.12 **'Internship'** is job training for professional careers.

1.5.13 **'College Coordinator'** is a teacher nominated by the College Principal to co-ordinate the continuous evaluation undertaken by various departments within the college.

1.5.14 **'Department'** means any teaching department in a college.

1.5.15 **'Parent Department'** means the department which offers core courses within a degree programme.

1.5.16 **'Department Council'** means the body of all teachers of a department in a college.

1.5.17 **'Department Coordinator'** is a teacher nominated by a Department Council to co-ordinate the continuous evaluation undertaken in that department.

1.5.18 **'Faculty Advisor'** means a teacher from the parent department nominated by the Department Council, who will advise the student in the choice of his/her courses and other academic matters.

1.5.19 **'Grace Marks'** shall be awarded to candidates as per the University Orders issued from time to time.

1.5.20 **'Grade'** means a letter symbol (e.g., A, B, C, etc.), which indicates the broad level of performance of a student in a course/ semester/programme.

1.5.21 **'Grade Point' (GP)** is the numerical indicator of the percentage of marks awarded to a student in a course. Words and expressions used and not defined in this regulation shall have the same meaning assigned to them in the Act and Statutes.

1.6 DURATION:

- The duration of U.G. programme shall be 6 semesters.
- The duration of odd semesters shall be from June to October and that of even semesters from November to March.
- A student may be permitted to complete the Programme, on valid reasons, within a period of 6 continuous semesters from the date of commencement of the first semester of the programme.

1.7 REGISTRATION:

The strength of students for each course shall remain as per existing regulations, except in case of   open courses for which there shall be a minimum of 15 and maximum of 75 students per batch, subject to a marginal increase of 10. For non-core compulsory courses the student strength shall be decided by the Academic Council of the College from time to time.

Those students who possess the required minimum attendance and progress during a semester and could not register for the semester examination are permitted to apply for Notional Registration to the examinations concerned enabling them to get promoted to the next semester.

1.8 SCHEME AND COURSES:
This programme includes (a) Common courses I & II, (b) Core courses, (c) Complementary Courses, (d) Open Course (e) Additional core course. (f) Study tour (g) Internship

1.8.1 Additional Credit Components

- Talent & career club activity (desirable)

- Social service (mandatory)
- Internship for Commerce, Communication and Computer Application (mandatory).
- Internship (desirable for other programmes)

1.9 PROGRAMME STRUCTURE:

	PROGRAMME DURATION	6 SEMESTERS
A	Credits required for Common Course	08
B	Credits required for Complementary Course	08
C	Credits required for Vocational Course	22
D	Credits required for Open Course	03
E	Credits required for Core Course	79
F	Credits required for Additional Core Course	04
	Total Credits required for successful completion of the programme	**124**
G	Club activity (desirable)	01
H	Social service (mandatory)	01
I	Internship (mandatory)	02
J	Minimum attendance required	75%

The student shall select any Choice based core course offered by the department which offers the core courses, depending on the availability of teachers and infrastructure facilities, in the institution. Open course shall be offered in any subject and the student shall have the option to do courses offered by other departments.

2.0 SCHEME OF PROGRAMME:

SEM	COURSE CODE	TITLE OF THE COURSE	NO. HRS./ WEEK	CREDITS	TOTAL HRS./SEM	EXAM DURATION	TOTAL MARKS	
							INTERNAL	EXTERNAL
1	U1CCENG1	Communication Skills in English	5	4	90	3	25	75
1	U1CPCMT1	Foundation of mathematics	4	4	72	3	25	75
1	U1CRBCA1	Computer fundamentals & organization	4	4	72	3	25	75
1	U1CRBCA2	Programming in 'C'	4	3	72	3	25	75
1	U1CRBCA3	Introduction to Linux	4	3	72	3	25	75
1	U1PRBCA1	Programming in 'C' - Lab	2	1	36	3	25	75
1	U1PRBCA2	Introduction to Linux -Lab	2	1	36	3	25	75
			25	**20**	**450**		**175**	**525**
2	U2CCENG2	Critical Thinking, Academic Writing & Presentation	5	4	90	3	25	75
2	U2CPCMT2	Discrete Mathematics	4	4	72	3	25	75
2	U2CRBCA4	Operating system	4	3	72	3	25	75
2	U2CRBCA5	OOPS with C++	4	3	72	3	25	75
2	U2CRBCA6	Data structures using 'C'	4	3	72	3	25	75
2	U2ARESC1	Environmental Studies	5	4	75	3	25	75
2	U2PRBCA3	OOPS with C++ - Lab	2	1	36	3	25	75
2	U2PRBCA4	Data structures using 'C' - lab	2	1	36	3	25	75
			30	**23**	**525**		**200**	**600**

3	U3CRBCA7	Basic Statistics	4	4	72	3	25	75
3	U3CRBCA8	Software engineering	4	3	72	3	25	75
3	U3CRBCA9	RDBMS	4	3	72	3	25	75
3	U3CRBCA10	Computer networks	5	3	90	3	25	75
3	U3CRBCA11	Programming in JAVA	4	3	72	3	25	75
3	U3PRBCA5	RDBMS - Lab	2	1	36	3	25	75
3	U3PRBCA6	Programming in JAVA -Lab	2	1	36	3	25	75
			25	**18**	**450**		**175**	**525**
4	U4CRBCA12	Mobile Web and Application Development	5	4	90	3	25	75
4	U4VCBCA1	Introduction to Cloud Technology	4	4	72	3	25	75
4	U4VCBCA2	Fundamentals of Data Centre	4	4	72	3	25	75
4	U4CRBCA13	Basic Android	4	4	72	3	25	75
4	U4CRBCA14	Mobile Device and Network Architecture	4	4	72	3	25	75
4	U4PRBCA7	Basic Android - Lab	2	1	36	3	25	75
4	U4PVBCA1	Introduction to Cloud Technology - Lab	2	1	36	3	25	75
			25	**22**	**450**		**175**	**525**
5	U5VCBCA3	Principles of Virtualization	4	4	72	3	25	75
5	U5VCBCA4	Server Operating System	4	4	72	3	25	75
5	U5VCBCA5	Fundamentals of Storage	4	4	72	3	25	75
5	U5OCBCA1	Security Threats and Trends (Open)	4	3	72	3	25	75
5	U5CRBCA15	Advanced	5	4	90	3	25	75

		Android						
5	U5PVBCA2	Server Operating System – Lab	2	1	36	3	25	75
5	U5PRBCA8	Advanced Android – Lab	2	1	36	3	25	75
			25	**21**	**450**		**175**	**525**

6	U6CRBCA16	Introduction to Mobile UI and UX	3	2	54	3	25	75
6	U6CRBCA17	Mobile Ecosystem and Business Models	4	4	72	3	25	75
6	U6CRBCA18	Web Technology and Value added services in Mobile	4	4	72	3	25	75
6	U6CRBCA19	Mobile Testing	4	4	72	3	25	75
6	U6PJBCA1	Project and Viva-Voce	10	6	150	3	40	60
			25	**20**	**420**		**140**	**360**

TOTAL CREDITS	=	**124**
TOTAL MARKS	=	**4100**

2.0.1 Components of Internal Evaluation:

COMPONENTS	MARKS
Attendance	5
Assignment (Written assignments, preparation of models, charts, posters etc., field survey, field work)	5
Seminar/Viva	5
Test papers-2	10
Total	25

2.0.2 Attendance Evaluation:

For all courses without practical

% OF ATTENDANCE	MARKS
90 and above	5
85 – 89	4
80-84	3
76-79	2
75	1

(Decimals are to be rounded to the next higher whole number)

2.0.3   Test Paper

Average mark of two internal examinations shall be taken.

2.0.4 Final Examination

The Final examination of all semesters shall be conducted by the institution on the close of each semester. For re-appearance/improvement, students may appear along with the next batch.

2.0.5 Pattern of Questions:

Questions shall be set to assess knowledge acquired, application of knowledge in life situations, critical evaluation of knowledge and the ability to synthesize knowledge. The question setter shall ensure that questions covering all skills are set. He/She shall also submit a detailed scheme of evaluation along with the question paper.

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

Courses such as common courses, open course and complementary course do not contain practical courses. The pattern of questions for these courses without practical are listed below:

a. Each question paper has four parts A, B, C and D.

b. Part A contains 10 questions of 1 mark each all of which the candidate has to answer.

c. Part B contains 10 short answer type questions spanning the entire syllabus and the candidate has to answer 8 questions. Each question carries 2 marks.

d. Part C contains 7 problem type questions/short essays spanning the entire syllabus and the candidate has to answer 5 questions. Each question carries 5 marks. But for Open Courses, Part C contains short essay type questions only.

e. Part D contains 4 essay type questions spanning the entire syllabus ad the candidate has to answer 2 questions. Each question carries 12 marks.

f. The total mark for courses is 75.

2.0.6 Practical Examinations

The practical examinations for the core and complementary courses are to be conducted at the end of every semester by the institution. The external examiner shall be selected by the institution. The score sheet should be sent to the Controller of Examinations soon after the evaluation.

A minimum of 16 experiments should be done in a practical course and a candidate submitting a certified record with a minimum of 16 experiments is eligible for appearing for the practical examinations.

2.0.7 Evaluation:

2.0.7.1 Practical Examinations

The scheme of evaluation of the practical examination shall be decided by the Board of Examiners.

Student Strength for Practical Examination:

There shall be at least one teacher to supervise a batch of not more than 15 students in each laboratory session.

Pattern of Questions

The Practical examination consists of 2 Compulsory Questions. The student has to design algorithm and develop a software program to solve the given problem.

	Question 1	Question 2
Algorithm	10	-
Program	10	15
Output	10	15
Viva	10 marks	
Record	5 marks	
Total	**75 Marks**	

2.0.7.2 Project Evaluation

All Students have to begin working on the project in the FIFTH semester and must submit it in the 6th semester.

The ratio of Internal to External Component of the project is 2:3. The mark distribution for assessment of the various components is shown below:

Internal Evaluation of Project

COMPONENTS	MARKS
Attendance	05
Review I	05
Review II	05
Record	10
Viva	05
Presentation	10
TOTAL	**40 Marks**

External Evaluation of Project

COMPONENTS	MARKS
Analysis	05
Design	05
Security	05
Testing	05
Record	10
Presentation	20

Viva	10
TOTAL	**60 Marks**

2.0.8 Computation of SGPA

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses and the sum of the number of credits of all the courses undergone by a student in a semester.

$$\text{SGPA (Si)} = \sum(Ci \times Gi) / \sum Ci$$

Where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

2.0.9 Computation of CGPA

The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\text{CGPA} = \sum(Ci \times Si) / \sum Ci$$

Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

Note: The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade
Course 1	3	B	8	3 x 8 = 24

16

Course 2	4	C	7	4 x 7 = 28
Course 3	3	D	6	3 x 6 = 18
Course 4	3	A+	10	3 x 10 = 30
Course 5	3	E	5	3 x 5 = 15
Course 6	4	D	6	4 x 6 = 24
	20			139

Thus, SGPA =139/20 =6.95

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4
Credit : 20 SGPA:6.9	Credit : 22 SGPA:7.8	Credit : 25 SGPA: 5.6	Credit : 26 SGPA:6.0
Semester 5	Semester 6		
Credit : 26 SGPA:6.3	Credit : 25 SGPA: 8.0		

Thus, CGPA = 20 x 6.9 + 22 x 7.8 + 25 x 5.6 + 26 x 6.0 + 26 x 6.3 + 25 x 8.0

$$\overline{\hspace{6cm}}$$

144

= 6.73

Grades for the different semesters and overall programme are given based

On the corresponding SGPA/ CGPA as shown below:

SGPA/CGPA	Grade
Above 9	A+ - Outstanding

17

Above 8, but below or equal to 9	A - Excellent
Above 7, but below or equal to 8	B -Very Good
Above 6, but below or equal to 7	C – Good
Above 5, but below or equal to 6	D – Satisfactory
Above 4, but below or equal to 5	E – Adequate
4 or below	F – Failure

Note: A separate minimum of 30% marks each for internal and external (for both theory and practical) and aggregate minimum of 40% are required for a pass for a course.For a pass in a programme, a separate minimum of Grade E is required for all the individual courses. If a candidate secures F Grade for any one of the courses offered in a Semester/Programme only F grade will be awarded for that Semester/Programme until he/she improves this to E grade or above within the permitted period. Candidate secure E grade and above will be eligible for higher studies.

2.1. CONDONATION OF SHORTAGE OF ATTENDANCE:

Candidate can seek condonation of shortage of attendance only once in a 2 year course and twice in other courses of longer duration. Following are the rules regarding attendance requirement:-

Every candidate is to secure 75% attendance of the total duration of the course.

A candidate having a shortage of 10% can apply for condonation of shortage in prescribed form on genuine grounds. Condonation of shortage of attendance if any should be obtained at least 7 days before the commencement of the concerned semester examination.

It shall be the discretion of the Principal to consider such applications and condone the shortage on the merit of each case in consultation with the concerned course teacher and HoD. Unless the shortage of attendance is condoned, a candidate is not eligible to appear for the examination.

2.2 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 concerned Faculty, HOD of concerned department and one member of the Academic council nominated by the principal every year as members.

COMMUNICATION SKILLS IN ENGLISH

Total Hours: 90   **Total Credits: 4**

Aim:

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

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:

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

FOUNDATION OF MATHEMATICS

Total Hours: 72   **Total Credits: 4**

Aims

      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:

- Lipschutz: Set Theory and related topics (Second Edition), Schaum Outline Series, Tata McGraw-Hill Publishing Company, New Delhi. (Reprint 2009).
- P.R. Halmos : Naive Set Theory, Springer. .
- George E. Andrews : Number Theory, HPC.
- Ian Chiswell & Wifrid Hodges: Mathematical Logic, Oxford university press
- Graham Everest, Thomas Ward: An Introduction to Number Theory, , Springer
- Fernando Rodriguez Villegas: Experimental Number Theory, Oxford University Press
- Richard Johnsonbaugh – Discrete Mathematics (Pearsons)
- C.Y Hsiung Elementary Theory of Numbers, Allied Publishers

COMPUTER FUNDAMENTALS & ORGANIZATION

Total Hours: 72   **Total Credits: 4**

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)

Computer hardware and software. Machine language and high level language. Application software, computer program, operating system. Computer virus, antivirus and computer security. Elements of MS DOS and Windows OS. Computer arithmetic, Binary, octal and hexadecimal number systems. Algorithm and flowcharts, illustrations, elements of a database and its applications

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

Module 4: MS Office   (15 Hrs)

Word processing and electronic spread sheet. An overview of MS WORD, MS EXCEL and MS POWERPOINT

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.

Books for Reference:

- Alexis Leon and Mathews Leon (1999) : Fundamentals of information Technology, Leon Techworld Pub.
- Jain, S K (1999) : Information Technology "O" level made simple, BPB Pub
- Jain V K (2000) "O" Level Personal Computer software, BPB Pub.
- Rajaraman, V (1999): Fundamentals of Computers, Prentice Hall India
- Hamacher, Computer Organization McGrawhill
- Alexis Leon: Computers for everyone. Vikas, UBS
- Anil Madaan : Illustrated Computer Encyclopedia. Dreamland Pub
- Sinha. Computer Fundamentals BPB Pub.

PROGRAMMING IN C

Total Hours: 72   **Total Credits: 3**

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

Module 3: Advanced programming techniques: **(15 Hrs)**

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

Module 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

- Let us C by Yashwant Kanetka, 6th Edition, PBP Publication
- The C programming Language by Richie and Kenninghan, 2004, BPB Publication
- Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw Hill

INTRODUCTION TO LINUX

Total Hours: 72   **Total Credits: 3**

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.

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

- The Design of Unix Operating System, Maurice J. Bach, Pearson Education, 2010
- Advance UNIX, a Programmer's Guide, S. Prata, BPB Publications, and New Delhi, 2011
- Unix Concepts and Applications, Sumitabh Das, 2010
- The UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice Hall of India. 2009
- Guide to UNIX Using LINUX, Jack Dent Tony Gaddis, Vikas/ Thomson Pub. House Pvt. Ltd. 2010

PROGRAMMING IN C-LAB

Total Hours: 36   **Total Credits: 1**

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.

11 Converting a hexadecimal number into its binary equivalent.

12 Check whether the given string is a palindrome or not.

13 Demonstration of bitwise operations.

14 Applying binary search to a set of N numbers by using a function.

INTRODUCTION TO LINUX- LAB

Total Hours: 36   **Total Credits: 1**

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.

SEMESTER II

Total Hours: 90   **Total Credits: 4**

CRITICAL THINKING, ACADEMIC WRITING AND PRESENTATION

Aim:

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

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.

DISCRETE MATHEMATICS

Total Hours: 72   **Total Credits: 4**

MODULE I: Preliminaries   **(15 hrs)**

Basic set Theory, terminology and notation, Venn diagrams, truth table and proof. Functions and relations, partial orderings and equivalence relations, mathematical induction. An application of Hamming codes.

MODULE II: Combinatorics   **(20 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 III: Propositional Calculus   **(20 hrs)**

Proposition, compound proposition, truth table for basic operators, connectives, theorems from Boolean algebra, De-Morgan's law, normal forms, rules of inference, chain rule and modusponens, chains of inference, tautology, proof by adopting a premise. Reductio- ad-absurdum, proof by resolution.

MODULE IV: Graphs and Algorithms   **(17 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.

Text Books :
1. Petergray – Logic, Algebra and databases (chapter 3), Affiliated East West press pvt Ltd.
2. Robert J mcEliece, Robert B Ash and Carol Ash – Introduction to discrete mathematics (chapter 1,2 and 4) , Mc.Graw Hill.

Reference Books:

1. S. Lipschutz : Set Theory and related topics (Second Edition), Schaum Outline Series, Tata McGraw-Hill Publishing Company, New Delhi.
2. R.G..Stoll -   Set Theory and Logic
3. P.R. Halmos   - Naive Set Theory, Springer
4. John Clark & Derek Allen Holton - A first book at graph theory (Allied Publishers)
5. Douglas B west – Introduction to Graph Theory , Pearson Education

OPERATING SYSTEM

Total Hours: 72   **Total Credits: 3**

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

- Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
- Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
- Silberschatz / Galvin / Gagne, Operating System,6th Edition,WSE (WILEY Publication)
- William Stallings,   Operating System, 4th Edition, Pearson Education.
- H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education
- Abraham Silberschatz and peter Baer Galvin, Operating System Concepts, 8th Edition, Pearson Education 1989 (Chapter   1,3.1,3.2,3.3,3.4,3.6,4,5,6 (Except 6.8,6.9), 7, 8,9,10,11,13, (Except 13.6) 19 (Except 19.6),20(Except 20.8, 20.9), 22,23)
- Nutt: Operating Systems, 3/e Pearson Education 2004

OOPS with C++

Total Hours: 72   **Total Credits: 3**

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, Pearson Edition, 3rd Edition
- Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications
- Lippman: C++ Primer, 3/e Pearson Education
- C++ completer reference by Herbert Schildt, Tata McGraw Hill Publications.
- Let us C++ by Yeshwanth Kanetkar

DATA STRUCTURES USING C

Total Hours: 72   **Total Credits: 3**

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:

- Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
- Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
- Robert Kruse Data Structures and program designing using 'C'
- Trembley and Sorenson Data Structures
- E. Balaguruswamy Programming in ANSI C.
- Bandyopadhyay, Data Structures Using C Pearson Education, 1999
- Tenenbaum, Data Structures Using C. Pearson Education, 200
- Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
- Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
- Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron   Data Structures using C and C++ Pearson Education

ENVIRONMENTAL STUDIES

Total Hours: 75   **Total Credits: 4**

Unit 1: The multidisciplinary nature of environmental studies   (15 hours)
Definition, scope and importance
Need for public awareness

Unit 2: Natural resources: (10 Hours)
Renewable and non-renewable resources:

   a. Forest resources: Use of over exploitation, deforestation, case studies. Timber, mining, dams and their effects on forests 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 of exploitation and environmental effects of extracting and using mineral resources, case studies.

   d. Food resources: World food problems, changes caused by agriculture and overgrazing, effect of modern agricultural fertilizers- pesticides, 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 resources, land degradation, man induced landslides, soil erosion and desertification.

   • Role of an individual in conservation of natural resources
   • Equitable use of resources for sustainable lifestyles

Unit 3: Ecosystems   (10 Hours)

   • 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 following ecosystem:-

      a. Forest ecosystem
      b. Grassland ecosystem

c. Desert ecosystem
d. Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4: Biodiversity and its conservation   (10 hours)
- Introduction- definition: genetic, species and ecosystem diversity
- Biographical classification of India
- Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, national and local level
- India as mega-diversity nation
- Hot-spots of biodiversity
- Threats of biodiversity: : habitat lose, poaching of wildlife, man- wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 5: Environmental Pollution   (10 hours)
Definition
- Causes, effects and control measures of:
    a. Air Pollution
    b. Water pollution
    c. Soil pollution
    d. Marine pollution
    e. Noise pollution
    f. Thermal pollution
    g. Nuclear pollution
- 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

Unit 6: Social Issues and the Environment   (10 hours)
- From unsustainable to sustainable development
- Urban problem relate to energy
- Water conservation, rain water harvesting, water shed management
- Resettlement and rehabilitation of people, its problem 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
- Wasteland reclamation
- Consumerism and waste products
- Environment Protection Act
- Air (Prevention and Control Pollution) Act
- Water (prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

Unit 7: Human Population and the Environment   (5 Hours)
- Population growth, variation among nations
- Population exploitation- Family welfare programme
- Environment and Human health
- Human rights
- Value education
- HIV/AIDS
- Women and child welfare
- Role of information technology in environment and human health
- Case studies

                                                                    (5 Hours)

Unit 8: Field work
- Visit to a local area to document environmental assets- river/forest/grassland/hill/ mountains.
- Visit to a local polluted site urban/rural/industrial/agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystem, pond, river, hill slopes etc.
- Each student has to submit a field report on any one of the above topics which forms the basis for evaluation of field work for 25 marks.

Reference Books:

1. Agarwal, K.C.2001 Environmental Biology. Nidhi Publ.Ltd.Bikaner.
2. Bharucha Erach, The Biodiversity of India. Mapin Publication Pvt.Ltd, Ahamadabad-380013, India , Email: mapin@iccnel.net (R)
3. Brunner R.C, 1989, Hazardous Waste Incineration, McGraw Hill Inc.480p
4. Clark R.S, Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P.Cooper, T.H.Gorhani,E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ House, Mumbai, 1196p
6. De A.K, Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Erath, Centre for Science and Environment (R)

8. Gleick, H.P.1993. Water in crisis, Pacific Institute for studies in Dev, environment & Security. Stockolm env. Institute. Oxford Univ. Press.473p
9. Hawkins R.E, Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V.H & Watson , R.T. 1995, Global Biodiversity Assessment, Cambridge Univ.Press1140p
11. Jadhav, H & Bhosale, V.M,1995, Environmental Protection and Laws.Himalaya Pub House, Delhi284p
12. Mck inney, M.L & schoch R.M. 1996. Environmental Science system & Solutions, Web enhanced edition , 639p
13. Mhaskar A.K, Matter Hazardous, Tecno-Science publication(TB)
14. Miller T.G. Jr., Enviromental Science, Wadsworth Publicating Co. (TB)
15. Odum, E.P. 1971. Fundamentals of ecology. W.B. Saunders Co. USA, 574p
16. Rao M.N & Datta, A.K.1987, Waste Water treaement, Ofxord & IBH Publ, Co. Pvt.Ltd.345p
17. Sharma B.K.2001. Environmental Chemistry. Goel Publ. House, Meerut
18. Survey of the Environment. The Hindu (M)
19. Townsend C, Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
20. Trivedi R.K, Handbook of Environemental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
21. Trivedi R.K and P.K Goel , Introduction to air pollution, Techno-Science Publication (TB)
22. Wagner K.D, 1998. Environmental Management. W.B Saunders Co. Phi;Adelphia, USA 499p

OOPS WITH C++ LAB

Total Hours: 36   **Total Credits: 1**

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.

DATA STRUCTURES USING C LAB

Total Hours: 36   **Total Credits: 1**

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

Total Hours: 72   **Total Credits: 4**

Module I   **(15 Hours)**

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 II   **(20 Hours)**

Measures of Central Tendency – Mean; Median; Mode; Geometric Mean; Harmonic Mean and Properties, Absolute and Relative measures of Dispersion – Range, Quartile Deviation, Percentiles, Deciles, Box Plot, Mean Deviation, Standard Deviation, Coefficient of Variation.

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.

Core Reference

1. S.P. Gupta: Statistical Methods (Sultan Chand & Sons Delhi).
2. S.C. Gupta and V.K. Kapoor: 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: Basic Statistics

SOFTWARE ENGINEERING

Total Hours: 72   **Total Credits: 3**

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, "Software engineering", Seventh Edition, Pearson Education Asia, 2007

2. Roger S. Pressman, "Software Engineering – A practitioner's Approach", Sixth Edition, McGraw-Hill International Edition, 2005

RDBMS

Total Hours: 72   **Total Credits: 3**

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, "Database System Concepts", Fifth Edition, Tata McGraw Hill, 2006

2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Pearson/Addision Wesley, 2007.

3. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2003.

COMPUTER NETWORKS

Total Hours: 90   **Total Credits: 3**

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:
- CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011
- CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013
- Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
- CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

PROGRAMMING IN JAVA

Total Hours: 72   **Total Credits: 3**

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.   The complete reference Java –2: V Edition By Herbert Schildt Pub. TMH.

2.   SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

RDBMS LAB

Total Hours: 36   **Total Credits: 1**

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-LAB

Total Hours: 36   **Total Credits: 1**

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

MOBILE WEB AND APPLICATION DEVELOPMENT

Total Hours: 90   **Total Credits: 4**

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. Professional Mobile Application Development by Jeff McWherter, Scott Gowell, 2012

2. Mobile Computing Principles: Designing and Developing Mobile Applications by Reza B'Far, Cambridge University, 2005

3. Mobile Applications: Architecture, Design, and Development by Valentino Lee, Heather Schneider and Robbie Schell, Pearson Education, 2004

INTRODUCTION TO CLOUD TECHNOLOGY

Total Hours: 72   **Total Credits: 4**

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 Computing Companies and Migrating to Cloud   (10 hours)

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

Module 3: Cloud Cost Management and Selection of Cloud Provider   (15 Hours)

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

Module 4: Governance in the Cloud   **(15 hours)**

Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal

Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations

Module -5 ten cloud do an do nots: (17 Hours)

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

Books for Reference:

- Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011
- Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010
- Handbook on Cloud Computing, Borivoje Furht, Armando Escalante, Springer, 2010
- Cloud Computing Theory and Practice, Dan C Marinescu, Elsevier, 2013
- Cloud Computing for Dummies, Judith Hurwitz, Robin Bloor, Marcia Kaufman & Fern Halper, Wiley Publishing, 2010

FUNDAMENTALS OF DATA CENTER

Total Hours: 72   **Total Credits: 4**

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: Data Center Requirements   **(10 Hours)**

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

Module 3: Data Center Design   **(15 hours)**

Characteristics of an Outstanding Design, Guidelines for Planning a Data Center, Data Center Structures, No-Raised or Raised Floor, Aisles, Ramp, Compulsory Local Building Codes, Raised Floor Design and Deployment, Plenum, Floor Tiles, Equipment Weight and Tile Strength, Electrical Wireways, Cable Trays, Design and Plan against Vandalism,

Module 4: Introduction to Server Farms   **(15 Hours)**

Types of server farms and data centre, internet server farm, intranet server farm, extranet server farm , internet data center, corporate data center, software defined data center, data center topologies, Aggregation Layer, Access Layer, Front-End Segment, Application Segment, Back-End Segment, Storage Layer, Data Center Transport Layer, Data Center Services, IP Infrastructure Services, Application Services, Security Services, Storage Services.

Module 5: Business Continuity and Disaster Recovery fundamentals   (17 Hours)

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

Books for Reference:

- IP Storage Networking by : Gary Oreinstein, Addison Wesley Professional, 2006
- Information Storage and Management, G. Somasundaram – Alok Srivastava, Wiley; 1 edition (April 6, 2009)
- Administering Data-Centers, Kailash Jayswal, Wiley; 1 edition (November 28, 2005)

BASIC ANDROID

Total Hours: 72   **Total Credits: 4**

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:
- Professional Android 4 Development by Reto Meier, John Wiley and Sons, 2012
- Android in Action, Third Edition, by W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, 2012
- Android Application Development Cookbook, by Wei-Meng Lee, John Wiley and Sons, 2013
- Beginning Android 4, by Grant Allen, Apress, 2011

MOBILE DEVICE AND NETWORK ARCHITECTURE

Total Hours: 72   **Total Credits: 4**

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:

- Wireless and Mobile Network Architectures by Yi-Bang Lin and Imrich Chlamtac, Wiley-India, 2008

- Mobile Networks Architecture by Andre Perez, Wiley, March 2012

- Mobile Computing – Technology, Application & Service Creation by Asoke. K Talukder, Roopa R. Yavagal, Asoke K. Talukder, Tata McGraw-Hill, 2005

- GSM - Architecture, Protocols and Services by Jörg Eberspächer, Hans-JoergV ögel, Christian Bettstetter, Christian Hartmann John Wiley & Sons, Dec-2008

BASIC ANDROID-LAB

Total Hours: 36   **Total Credits: 1**

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 player which plays an mp3 song.
13. Create a media recorder which will record the sound.
14. Testing applications

INTRODUCTION TO CLOUD TECHNOLOGY – LAB

Total Hours: 36   **Total Credits: 1**

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.

<p style="text-align:center">**SEMESTER V**</p>

<p style="text-align:center">**PRINCIPLES OF VIRTUALIZATION**</p>

Total Hours: 72   **Total Credits: 4**

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:

- Virtualization with Microsoft Virtual Server 2005 by Twan Grotenhuis, Rogier Dittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006
- Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source Incorporated, 2008
- Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter, EBook, 2005

SERVER OPERATING SYSTEM

Total Hours: 72   **Total Credits: 4**

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:

- Red hat Linux Administration By Michael Turner and Steve Shah-McGraw-Hill Companies, Inc Publisher, 2010

- Redhat Fedora linux for Dummies By Naba Barkakati-Wiley Publishing, Inc, 2011
- RHCSA/RHCE Red Hat Linux Certification Study Guide (Exams EX200 & EX300), 6th Edition (Certification Press) [Paperback], Michael Jang, McGraw-Hill Osborne Media; 6 edition (June 17, 2011)

FUNDAMENTALS OF STORAGE

Total Hours: 72   **Total Credits: 4**

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:

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

Reference Book:

Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley; 1 edition (April 6, 2009)

SECURITY THREATS AND TRENDS (OPEN COURSE)

Total Hours: 72   **Total Credits: 3**

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

ADVANCED ANDROID

Total Hours: 90   **Total Credits: 4**

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:

- Professional Android 4 Development by Reto Meier, John Wiley and Sons, 2012
- Android in Action, Third Edition, by W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, 2012
- Android Application Development Cookbook, by Wei-Meng Lee, John Wiley and Sons, 2013
- Beginning Android 4, by Grant Allen, Apress, 2011
- Beginning Tablet Programming, by Robbie Matthews, Apress, 2011

SERVER OPERATING SYSTEM – LAB

Total Hours: 36   **Total Credits: 1**

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.

ADVANCED ANDROID – LAB

Total Hours: 36   **Total Credits: 1**

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.

INTRODUCTION TO MOBILE UI AND UX

Total Hours: 54   **Total Credits: 2**

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. "Human Computer Interaction" by Alan Dix, Janet Finlay , ISBN :9788131717035, Pearson Education (2004)

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

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

Reference Books:

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

2. The Essentials of Interaction Design, by Cooper, et al. , Wiley Publishing(2007)

3. Usability Engineering, by Nielsen, J. Morgan Kaufmann, San Francisco, 1993. ISBN 0-12-518406-9

4. The Resonant Interface: HCI Foundations for Interaction Design , by Heim, S. , Addison-Wesley. (2007)

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

MOBILE ECOSYSTEM AND BUSINESS MODELS

Total Hours: 72   **Total Credits: 4**

Module 1: Value Generating Ecosystem   **(15 hours)**

Ecosystem Models. User Experience. Business Essentials. I-mode,

Module 2: Overview of Mobile Market   **(10 hours)**

Mobile Marketing, Market Players. Mobile Network Operators. Mobile agencies, Open Source Operating Systems Vs. Proprietary Operating Systems – Cost Effectiveness

Module 3: Business Models   **(15 hours)**

Business Ecosystem. Methodological Approach. Ecosystem Evolution,

Module 4: Case Studies - I   **(15 hours)**

Examples of ecosystem - Google Ecosystem, Apple Ecosystem, Mobile Advertising: Mobile advertising and search, mobile products and service offerings, incentives and loyalty programs, banner display ads, interstitial ads, in-content ads, ads to download other apps, making money with ads, app advertising, ad networks vs. media owners. affiliate marketing

Module 5: Case Studies - II   **(17 hours)**

Dell Ecosystem, Ecosystem of a Device Manufacturer, Ecosystem of a Mobile Application Development Company, Monetizing App: free and paid apps, app store search, advertising, e-mail marketing, types of apps, native or cross platform apps. M-commerce: future of mobile marketing, mobile sites, services, benefits, mobile banking, mobile purchase, m-commerce apps, challenges.

Books for References:

- Mobile Design and Development Practical concepts and techniques for creating mobile sites and web apps, By Brian Fling, O'Reilly Media, 2009

- Ad hoc networking - technology and trends: trend report 2002/2001 by Anne Buttermann, Center for Digital Technology and Management (München), BoD – Books on Demand, 2001

- M-Commerce, 2013 by Paul Skeldon

- Mobile Commerce, 2013 by Karabi Bandyopadhyay

- Mobile Advertising: Supercharge Your Brand in the Exploding Wireless Market – 2008 - by Chetan Sharma, Joe Herzog, Victor Melfi

- Mobile Marketing - How technology is revolutionizing marketing, communications and advertising - by Daniel Rowles, 2014

- Mobile App Marketing and Monetization by Alex Genadinik, 2014

WEB TECHNOLOGY AND VALUE ADDED SERVICES IN MOBILE

Total Hours: 72   **Total Credits: 4**

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:

- Mobile Messaging Technologies and Services: SMS, EMS, and MMS by Gwenaël Le Bodic, John Wiley and Sons, 2005

- Voice application development with Voice XML by Rick Beasley, John, O'Reilly

- Next generation wireless applications: creating mobile applications in a Web by Paul Golding

- Short Message Service (SMS): The Creation of Personal Global Text Messaging by Friedhelm Hillebrand, John Wiley & Sons, 2010

- JavaScript: The Complete Reference, 2013 by Thomas Powell, Fritz Schneider

MOBILE TESTING

Total Hours: 72   **Total Credits: 4**

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:

- Android Application Testing Guide, Diego Torres Milano, 2010
- Robotium Automated Testing for Android, Hrushikesh Zadgaonkar, 2011
- A Practical Guide to Testing Wireless Smartphone Applications by Julian Harty, Mahadev Satyanarayanan, 2011
- Testing Applications on the Web: Test Planning for Mobile and Internet-Based Systems Hung Q. Nguyen, Bob Johnson, Michael Hackett, 2012

PROJECT WORK

Total Hours: 180   **Total Credits: 6**

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.

BACHELOR OF COMPUTER APPLICATIONS [Specialization in Mobile Applications and Cloud Technology]

Subject: COMPUTER FUNDAMENTALS AND ORGANIZATION

Total Marks: 80

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

1. What is Scale of Integration?
2. ……………………. 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?

PART B: (Answer any 7 of the following questions. Each question carries 2 marks.)

1. What is a Computer?
2. List out the characteristics of a microcomputer.
3. Give a note on ALU?
4. What is virtual memory?
5. Define an algorithm with a simple example.
6. Convert the binary whole number 110010 to its corresponding decimal number.
7. List any four characteristics of 'Microsoft Office 2013'.
8. Explain how to apply a theme in 'Microsoft PowerPoint'?
9. Expand CAN and PAN and briefly explain them.
10. How will you configure the addresses in the Internet?

PART C: (Answer any 5 of the following questions. Each question carries 6 marks.)

1. Explain the overview of a computer system.
2. Explain in detail, the instruction steps to execute CPU cycle.
3. What is RAID? Explain the RAID Levels.
4. Write a short note on Machine language with an example.
5. Briefly explain about 'Interpreters' and 'Assemblers'.
6. Explain the 'Security' feature in MS-Office.
7. Write a short note on search engines.
8. Explain DNS with example.

PART D: (Answer any 2 of the following questions. Each question carries 15 marks.)

1. Discuss the generations of computer with suitable examples.
2. Explain the memory Hierarchy.
3. What are Basic Gates? Explain with truth tables.
4. Explain different types of Networks along with their advantages and disadvantages.

BACHELOR OF COMPUTER APPLICATIONS [Specialization in Mobile Applications and Cloud Technology]

Subject: DATA STRUCTURES USING C

Total Marks: 80

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

1. _____ is a non-primitive data type.
2. _____ is a dynamic memory allocation function.
3. Process of calling function again and again by itself is known as _____
4. Process of finding any one element in a list is called _____
5. Name any one sorting technique.
6. Write a prefix expression.

PART B: (Answer any 7 of the following questions. Each question carries 2 marks.)

1. Define primitive data types with example.
2. Define time and space complexity
3. What is the use of free () function?
4. Explain the use of realloc() function?
5. Define binomial coefficient.
6. Write a recursive function for Fibonacci series
7. Define iterative search.
8. Define recursive search.
9. What do you mean by the term sorting?
10. Define stack.

PART C: (Answer any 5 of the following questions. Each question carries 6 marks.)

1. Write a short note on dynamic memory allocation and its functions.
2. Explain the disadvantage of static memory allocation. Mention the steps for accessing a variable through its pointer.
3. Explain the advantages and disadvantages of recursion. Write an algorithm for finding the GCD of a number using recursion.
4. Explain binary search using an example.
5. Explain insertion sort using an example.
6. Write a short note on infix, prefix and postfix notations.
7. Explain queue and its operation with examples.
8. Give a note on tree data structure. Explain binary tree.

PART D: (Answer any 2 of the following questions. Each question carries 15 marks.)

7. What is a stack? Explain the different operations that can be done on a stack with example.
8. Explain the different operations on a queue. Write the algorithm for each operation.
9. Discuss linked list and types of linked list. Explain the advantage and disadvantages of them.
10. Explain binary search tree. Write the algorithm for searching for an element in the binary search tree.

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BACHELOR OF COMPUTER APPLICATIONS [Specialization in Mobile Applications]

Subject: INTRODUCTION TO LINUX

Total Marks: 80

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

7. _____ is the command to create a file in Linux.
8. List out four flavors of Linux.
9. What is Lseek?
10. Define a Process.
11. List out two modes of vi editor.
12. _____ is the syntax of a command to install a package using rpm.

PART B: (Answer any 7 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. Write the syntax of search and replace command in vi editor.
18. Write the syntax of "wall" and "who" command.
19. Define kernel.
20. List out four roles of system administration.

PART C: (Answer any 5 of the following questions. Each question carries 6 marks.)

9. Explain any five system calls in Linux.
10. Describe the concept of hard link and soft link.
11. Explain the structure of file system in Linux.
12. Explain mounting and unmounting process in detail.
13. Write short notes on daemon process and background process.
14. Explain about yanking.
15. Write down the parameters of uname.

16. Explain the rpm package and its management process.

PART D: (Answer any 2 of the following questions. Each question carries 15 marks.)

11. Discuss various distributions of Linux.
12. Explain the /(root) file system with a neat diagram.
13. Describe process states and transitions with the help of a diagram.
14. Discuss the concept of managing groups and modifying group attributes.

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BACHELOR OF COMPUTER APPLICATIONS [Specialization in Mobile Applications]

Subject: OOPS with C++

Total Marks: 80

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

1. _____ is the library which 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?

PART B: (Answer any 7 of the following questions. Each question carries 2 marks.)

1. Define data types in C++.
2. Name any two differences between union and structure.
3. Define private access specifier.
4. Explain constructor.
5. Define operator overloading.
6. What is a pointer array?
7. What do you mean by a function?
8. Define class templates.
9. Define formatted I/O.
10. Explain command line arguments.

PART C: (Answer any 5 of the following questions. Each question carries 6 marks.)

1. What are the different looping constructs in C++. Give examples.
2. Explain about default and parameterized constructor with example.
3. Define copy constructor and explain constructor overloading.
3. Explain the different types of data conversions.

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4. Explain in detail about different levels of inheritance.
5. Write a short note on virtual function.
6. Explain friend function with an example.
17. Write a short note on exception handling in C++.

PART D: (Answer any 2 of the following questions. Each question carries 15 marks.)

1. Write a note on the following:
   a. Built-in function
   b. User-defined function
   c. Different methods of calling a function
2. Discuss the following with example:
   d. Unary operator overloading
   e. Binary operator overloading
3. Explain the following with example:
   f. Call by pointer array
   g. Array of pointer
4. Write a C++ program to demonstrate file I/O operations.

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BACHELOR OF COMPUTER APPLICATIONS [Specialization in Mobile Applications]

Subject: OPERATING SYSTEM

Total Marks: 80

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

1. _____ and _____ are two system services of operating system.
2. Define processes and threads.
3. Define turnaround time and waiting time.
4. What is swapping?
5. What do you understand by virtual memory?
6. What are program threats?

PART B: (Answer any 7 of the following questions. Each question carries 2 marks.)

1. What are system calls? Give two examples.
2. List out four system components.
3. What are short term schedulers?
4. What are semaphores?
5. Give the name of four necessary conditions for deadlocks.

6. Explain logical and physical address space?
7. Define paging.
8. Write down four attributes of a file.
9. Define contiguous allocation.
10. What is language-based system?

PART C: (Answer any 5 of the following questions. Each question carries 6 marks.)

1. Discuss the operating system structure.
2. What are virtual machines? Explain with example.
3. With the help of an example, explain Round Robin algorithm for CPU scheduling.
4. Explain Banker's algorithm with suitable example.
5. Describe Demand Paging with a neat diagram.
6. Compare Scan scheduling and C-Scan scheduling algorithm for disk scheduling.
7. Discuss the principles of Protection.
8. Explain Domain Structure with the help of suitable examples.

PART D: (Answer any 2 of the following questions. Each question carries 15 marks.)

1. Discuss evolution of operating system.
2. Explain Page Replacement algorithm with example.
3. What is a deadlock? Explain the methods that can be used for deadlock detection and recovery.
4. Discuss the strengths and weakness of implementing the access matrix using capabilities that are associated with domains.

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BACHELOR OF COMPUTER APPLICATIONS [Specialization in Mobile Application]

Subject: PROGRAMMING IN C

Total Marks: 80

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

1. _____ and _____ are 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.

PART B: (Answer any 7 of the following questions. Each question carries 2 marks.)

1. What is an Algorithm?
2. Define 'Compiler' and 'Interpreter'.
3. What is character set in C?
4. Explain the different types of arrays.
5. Write a program to print 'Hello C Programming'.
6. What are local and global variables in 'C' programming?
7. Define structures in 'C' programming.
8. What do you mean by 'Call by value'?
9. What are the preprocessors?
10. Define File pointer.

PART C: (Answer any 5 of the following questions. Each question carries 6 marks.)

1. Write a flowchart and algorithm to simulate a calculator.
2. Explain the Machine language and High-level language.
3. What are operators in 'C' programming? Explain.
4. State the differences between 'while' and 'do while' loop with example?
5. Write a 'C' function to find the largest number among three numbers.
6. Write down a program to use structure within union, and display the contents of structure elements.
7. Mention instruction codes to print details of 50 students using structures in 'C' programming.
8. Write a 'C' program to read the content of file using 'fgets'.

PART D: (Answer any 2 of the following questions. Each question carries 15 marks.)

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

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BACHELOR OF COMPUTER APPLICATIONS [Specialization in Mobile Application]

Subject: Basic Android

Total Marks: 80

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

1. Android is a _____ OS
2. SDK stands for _____
3. Window is nothing but _____ in Android
4. _____ is used to manipulate data in Android.

5. _____ API is used to manipulate audio & video
6. GPS stands for _____
7. _____ Manager is used to find Location
8. _____ Activity is used for Maps
9. CRUD stands for _____
10. _____ View is used to display web pages

PART B: (Answer any 7 of the following questions. Each question carries 2 marks.)

1. What is Android?

2. List all android Features

3. What is Manifest File?

4. What is Activity?

5. Describe List View

6. Explain Table View

7. What is SQLite?

8. What are Content Providers?

9. What is Bluetooth?

10. What is Testing?

PART C: (Answer any 5 of the following questions. Each question carries 6 marks.)

1. Explain GPS and Location Manager

2. Describe how to test Activity

3. What is Media? List some of Media API

4. What is a Notification? Describe different type of notification

5. What is intent? List the difference between Intent & Activity

6. What is service? Explain Broadcast receivers

7. List all the steps to test Andriod App

(Answer any 2 of the following questions. Each question carries 15 marks.)

1. Write code to display List in the Table View using arrays

2. Write code to perform CRUD on Employee table (name, salary)

3. Write code to display Map in a App

4. Write code to display image viewer

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BACHELOR OF COMPUTER APPLICATIONS [Specialization in Mobile Application]

Subject: Mobile Device and Network Architecture

Total Marks: 80

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. PSTN is largely governed by technical standards created by the _____
5. Simple hexagon is used to represent a _____
6. POTS stands for _____
7. _____ 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. ISP stands for _____
10. _____ is the part of telecommunication System

PART B: (Answer any 7 of the following questions. Each question carries 2 marks.)

1. What is Nyquist?

2. What is Analog Signal?

3. What is Digital Signal?

100

4. What is Ultra High Frequency?

5. Describe SIM Application Toolkit

6. Explain CPU

7. Describe Radio Frequency

8. What is Middleware?

9. What is SDK?

10. What is SIM?

PART C: (Answer any 5 of the following questions. Each question carries 6 marks.)

1. Explain different types of memory

2. Describe Telephone Network Hierarchy

3. Explain Analog & Digital Communications

4. Describe Public Switched Telephone Network

5. Explain different Access Channels

6. Describe Power reduction techniques

7. Explain Function of the RF Subsystems

PART D: (Answer any 2 of the following questions. Each question carries 15 marks.)

1. Describe Layers of OSI Model

2. Explain SMS Network Architecture

3. Explain All Generations of Mobile Networks

4. Explain Handset Architecture

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BACHELOR OF COMPUTER APPLICATIONS [Specialization in Mobile Application]

Subject: Mobile Ecosystem and Business Models

Total Marks: 80

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

1. _____ Technology is the software that enables devices to communicate in a simple, flexible and direct manner.
2. _____ Protocol is the global standard for sending and receiving digital information
3. ACPI stands for _____
4. _____ is responsible for relaying, storing and forwarding a short message between a SMS node in the network and a mobile station
5. Reliance Communications Ltd is also called _____
6. SWAP stands for _____
7. Some organizations serve two or more interdependent Customer Segments are called _____
8. _____ Links a company establishes between itself and its different customer segments.
9. _____ Business models focus on minimizing costs wherever possible.
10. _____ Costs that vary proportionally with the volume of goods or services produced

PART B: (Answer any 7 of the following questions. Each question carries 2 marks.)

1. What is an ecosystem?

2. Explain i-mode

3. Explain the concept of mobile marketing.

4. What is a mobile agency?

5. Explain the business model template

6. Explain methodological approach

7. Explain Bluetooth and HomeRF

8. What are the different hardware and software technologies?

9. Give note on network operators

10. Explain mobile ecosystem

PART C: (Answer any 5 of the following questions. Each question carries 6 marks.)

1. Explain the different ecosystem models – apple, Microsoft, Google, Amazon

2. Describe all network technologies

3. Explain terminal equipments

4. Explain Mobile Advertising

5. Explain Highway Addressable Remote Transducer

6. Describe Plug and Play

7. Explain Common Business Models

PART D: (Answer any 2 of the following questions. Each question carries 15 marks.)

1. Describe Dell System Case Study

2. Explain Ecosystem of a Device Manufacturer

3. Explain M-commerce and its features

4. Explain Market Players

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BACHELOR OF COMPUTER APPLICATIONS [Specialization in Mobile Application]

Subject: Mobile Web Application Development

Total Marks: 80

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. _____ an 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. WWW stands for _____
6. Each machine on the Internet is assigned a unique address called an _____
7. Web Services are based on the concept of _____
8. WSDL stands for _____

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

12. _____ the most suitable design pattern for server side web application development.

PART B: (Answer any 7 of the following questions. Each question carries 2 marks.)

1. What is WWW?

2. What is HTML?

3. What is XML?

4. Describe the xml validation techniques

5. Explain Client-Server model

6. Describe internet and intranet

7. Explain static and dynamic web applications

8. What is emulator?

9. Explain mobile web applications

10. List differences between DTD and Schema

PART C: (Answer any 5 of the following questions. Each question carries 6 marks.)

1. Explain Mobile Application Development paradigm

2. Describe the process of writing and compiling Java Program

3. Describe OOPs concepts

4. What is a SIM and SIM based applications?

5. What is WAP and Describe standards of WAP

6. What is Server Side Scripting and Describe PHP

7. Explain principles of UI development

PART D: (Answer any 2 of the following questions. Each question carries 15 marks.)

1. Design a Web page to accept the information from the User for sign up.

2. Explain Programming rules and Challenges and Mobile Programming Tools

3. Explain Mobile Programming best practices

4. What is content adaption? Explain Adaption Strategies

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