B.C.A
(BACHELOR OF COMPUTER APPLICATION)

GAUHATI UNIVERSITY

REVISED PROGRAM STRUCTURE AND DETAILED CURRICULUM
IN THE L-T-P-C FORMAT

YEAR 2015

GAUHATI UNIVERSITY
BCA (Bachelor of Computer Application)
Year 2015

The course will be a 3 year - 6 semester course.

Eligibility: The candidate must have passed Higher Secondary or equivalent level examination from Science/Commerce/Arts Stream. Students who have passed the Higher Secondary examination with either Mathematics or Computer Science as one of the subjects obtaining minimum pass mark in the subject should be given preference at the time of admission. Students completing Diploma in CSE/IT from AICTE recognized institutes are also eligible for taking admission. The Colleges may have their own cut-off marks which they found to be reasonable for them and/or hold admission test for the final selection of candidates.

Examination: The mark obtained by a student in paper 2.6 Environmental Studies will not be counted in his/her semester grade point average (GPA), but he/she will have to obtain the minimum pass mark in this paper in order to clear the second semester. The **L-T-P-C** break- up for the courses has been mentioned below with each course. Each paper will carry a total of 6 credits except the courses 2.6 (Environmental Studies) and 6.3 (project work) which will carry 3 credits and 18 credits respectively. For the theory papers, 1 credit point corresponds to one lecture / tutorial per week and for practical papers 1 credit point corresponds to 1 practical session (of at least 2 hours) per week.
All matters related to examinations including internal evaluations will be as per the regulation of TDC for semester system of G.U. with choice based credit and grading system.

Course break-up

Total mark assigned for each theory/practical paper of credit 6 is 100 and that of credit 3 is 50. Total mark for minor project in semester IV is 100 and for major project in semester 6 is 300. For elective papers the L-T-P-C pattern is given individually.

Paper Number	Paper Title	Lecture/ Lab Hrs / Week	Tutorial	Credit
SEMESTER I				
BCA1.1	Computer Fundamental & ICT Hardware	5	1	6
BCA1.2	Communicative English	4	2	6
BCA 1.3	Introduction to C Programming	4	2	6
BCA1.4	Mathematics – I	5	1	6
BCA1.5	Laboratory - C Programming (BCA 1.3) and ICT Hardware (BCA 1.1) (60+40 = 100 marks)	12	0	6
SEMESTER II				
BCA 2.1	Data Structure and Algorithm	5	1	6
BCA 2.2	Computer Based Accounting and Financial Management	5	1	6
BCA 2.3	Digital Logic Fundamentals	5	1	6
BCA 2.4	Mathematics – II	5	1	6
BCA 2.5	Laboratory - Data Structure and Algorithm (BCA 2.1) and Accounting and Financial Management (BCA 2.2) (50+50 = 100 marks)	12	0	6
BCA 2.6	Environmental Studies	3	0	3
SEMESTER III				
BCA 3.1	Software Engineering	5	1	6
BCA 3.2	Computer Organization and Architecture	5	1	6
BCA 3.3	Database Management System.	5	1	6
BCA 3.4	Object Oriented Programming in C++	5	1	6
BCA 3.5	Laboratory - C++ programming (BCA 3.4) and DBMS (BCA 3.3) (50+50 = 100 marks)	12	0	6
SEMESTER IV				
BCA 4.1	Operating System	5	1	6
BCA 4.2	Web Technology	5	1	6
BCA 4.3	Java Programming	5	1	6
BCA 4.4	Minor Project			6
BCA 4.5	Laboratory - Operating System (BCA 4.1), Web Technology (BCA 4.2) and Java Programming (BCA 4.3) (20+40+40 = 100 marks)	12	0	6

SEMESTER V				
BCA 5.1	System Administration using Linux	5	1	6
BCA 5.2	Computer Networks	5	1	6
BCA 5.3	Open Source Software	5	1	6
BCA 5.4	Elective – 5.4			6
BCA 5.5	Laboratory - System Administration using Linux (BCA 5.1) and Open Source Software (BCA 5.3) (50+50 = 100 marks)	12	0	6
SEMESTER VI				
BCA 6.1	Elective 6.1			6
BCA 6.2	Elective 6.2			6
BCA 6.3	Project Work	0	0	18

Elective 5.4

i. Microprocessor and Assembly Language Programming (4-0-2-6)
ii. Automata theory and languages(5-1-0-6)
iii. Computer Oriented Numerical Methods and Statistical techniques (5-0-1-6)
iv. Animation (4-0-2-6)

Elective 6.1

1. Programming with C# (4-0-2-6)
2. Data Mining & Warehousing (5-1-0-6)
3. Optimization Techniques (5-1-0-6)
4. Object Oriented Analysis and Design (5-1-0-6)

Elective 6.2

1. Mobile Applications (4-0-2-6)
2. Cyber Law (5-1-0-6)
3. Distributed Systems (5-1-0-6)

DETAILED SYLLABUS

SEMESTER – I

BCA 1.1 COMPUTER FUNDAMENTAL & ICT HARDWARE

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I   **Marks: 20**

Evolution of Computer system, Classification of Computer, Modern Computer, Hardware and Software. Major components of a Digital Computer (A brief introduction of CPU, Main memory, Secondary memory devices and I/O devices) Keyboard, monitor, mouse, printers, Secondary storage devices (floppy disks, hard disks and optical disks), backup system and why it is needed? Bootstrapping a Computer.

Number System: Representation of numbers (only a brief introduction to be given) and characters in computer. Binary, Hexadecimal, Octal, BCD, ASCII. EDCDIC and Gray codes. Conversion of bases. Representation of signed integers, Sign and magnitude, 1's complement and 2's complement representation. Arithmetic operations using 2's complement representation and conditions for overflow/underflow and its detection.

Assembler, Compiler, Interpreter, Linker and Loader. Definition and concepts of algorithm and its different implementations-pseudo code, flowchart and Computer programs.

UNIT II   **Marks: 15**

Hard Disk Drive: logical structure and file system, FAT, NTFS. Hard disk tools: Disk cleanup, error checking, de fragmentation, scanning for virus, formatting, installing additional HDD. New trends in HDD. Floppy Disk Drive.

UNIT III   **Marks: 15**

Optical Media, CDROM, theory of operation, drive speed, buffer, cache, CD-r, CD-RW, DVD ROM, DVD technology, preventive maintenance for DVD and CD drives, New Technologies. Driver installation, Writing and cleaning CD and DVD.

UNIT IV   **Marks: 15**

Processor: Intel processor family. Latest trends in processor, Motherboard, Sockets and slots, power connectors. Peripheral connectors. Bus slots, USB, pin connectors. Different kinds of motherboards. RAM, different kinds of RAM. RAM up gradation. Cache and Virtual Memory concept.

UNIT V   **Marks: 15**

SMPS. BIOS. Network Interface Card, network cabling, I/O Box, Switches, RJ 45 connectors, Patch panel, Patch cord, racks, IP address.

SUGGESTED READINGS:

1. Anita Goel, *Computer Fundamentals*, Pearson, 2010.
2. *Comdex: Hardware and Networking Course Kit*:, DreamTech press.
3. V. Rajaraman, Neeharika Adabala, *Fundamentals of Computers*, PHI, EEE 6th Edition.
4. Ron Gilster, *PC hardware: A beginners Guide*, Tata McGraw Hill.
5. E. Balaguruswamy, *Computer Fundamentals and C Programming*, Tata McGraw Hill.

BCA 1.2 COMMUNICATIVE ENGLISH

Total Marks: 100 (Semester end examination - 60, Personal Interview - 20, Internal assessment (home assignment and group discussion)- 20)
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Communicative English plays a pivotal role in equipping the learners with all basic skills and enables them to use English language in all their real life contexts. The objective of this course is to prepare the students for the competitive world of ‗job market‖ with a reasonable fluency in spoken English and with flair knowledge of written communication. The course also aims to offer a broad outline of the different skills of Communicative English with practical know how, and is intended to impart the various skills on listening, speaking, reading and writing and on various types of written, oral and business communication .The course is intended to shed the communication barriers of the students/ people aspiring to get absorbed in the field of science and technology, computer science, business organizations, corporate sectors, civil and aviation sector, public administration and other government and private sectors, front-desk services and other relevant fields.

While classroom lectures will focus on the theoretical aspects of the contents of the different units, the practice sessions will give demonstrations of the skills involved.
The course is divided into two sections:

SECTION-I
Section-I will have 5 units carrying 60 marks. Students will be required to answer compulsory questions from Unit I, Unit II & Unit III. Unit IV and V are optional and students will be required to answer question from any one of them.

Unit-I: Concept and fundamentals of communication skills   **Marks: 15**
Scope and Meaning of communication; essentials of good communication- listening and reading skills, verbal and non verbal communications, gestures and body language, formal and informal communication; levels of communication -upward /downward /horizontal communication, barriers of communication

Unit-II: Oral Communication   **Marks: 15**
Mechanisms of effective oral communication- how to speak a language clearly, fluently and naturally; pronunciation – stress and intonation; everyday conversation and chat; group discussion and interviews; public speaking.

Unit-III: Written communication   **Marks: 15**
Mechanisms of effective written communication – punctuation, sequencing of ideas, building paragraph/body, a good introduction and conclusion; word buildings; writing letters for different occasions; report/ summary/ gist writing etc.

Unit-IV: Business communication in English   **Marks: 15**
Extensive oral and written examples of various kind of Business communication

Unit-V: English in the field of science & technology   **Marks: 15**

Extensive oral and written examples of various kinds of English used in the field of science and technology

N.B: *Unit IV and V are optional and students will be required to answer question from any one of them.*

Section II

Section -II will have 2 units carrying 20 marks.

Unit-I: Personal Interview   **Marks: 20**

An external expert appointed by the University, the head of the concerned department and the course in-charge of the institution will constitute an expert panel and students will be required to appear before them for viva voce to give evidence of their acquired communicative skills.

Unit-II: Home assignment and group discussion   **Marks: 20**

Home assignments and group discussion will have to be arranged by the teacher in charge of the course and from properly maintained records of such assignments and group discussion, one internal committee formed by the HOD of the CS/IT/CA department of the College concerned will finalize the marks.

SUGGESTED READINGS:

1. *Strengthen your Writing*: V. R. Narayanaswami (Orient Longman)
2. *Everyday Dialogues in English*: Robert J. Dixon (Prentice Hall of India)
3. *Spoken English*: V. Sasikumar & P. V. Dhamija (Tata McGraw-Hill Publishing Ltd.)
4. *C. S. Communication*: Rayudu (Himalaya Publishing House)
5. *Oxford Advanced Learner's Dictionary* Or *Cambridge Advanced Learner's Dictionary* Or *Longman's Contemporary English Dictionary*

BCA 1.3 INTRODUCTION TO C PROGRAMMING

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I   Marks: 15
Overview of C

Importance of C, sample C program, C program structure, executing C program. Variables, Data Types, Constants: integer constant, real constant, character constant, string constant; Character set, C tokens, keywords and identifiers, variables declaration, Assigning values to variables---Assignment statement, declaring a variable as constant, as volatile.

Operators and Expression

Categories of operator- Arithmetic, Relational, logical, assignment, increment, decrement, conditional, bitwise and special operators; arithmetic expressions, precedence and associativity of operators, type conversions, mathematical functions

Managing Input and Output Operators

Reading and writing a character, formatted input, formatted output.

UNIT II   Marks: 20
Decision Making and Branching Statement

if statement, *if…..else* statement, nested *if…. else* statement , *switch….case* statement, *goto* statement.

Decision Making and Looping

Definition of loop, categories of loops, *for* loop *while* loop, *do-while* loop, *break* statement, *continue* statement

UNIT III   Marks: 20
Arrays

Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays..

Functions

The form of C functions, Return values and types,return statement, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference , storage classes.

Unit IV   Marks: 15
Structures and Unions

Defining, giving values to members, initialization and comparison of structure variables, array of structure, array within structure, structure within structure, structures and functions, unions.

Preprocessors

Macro substitution, file inclusion.

Unit V   **Marks: 10**

Pointers

Definition of pointer, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.

File Management in C

Opening, closing and I/O operations on files, random access to files, command line arguments.

SUGGESTED READINGS:

1. Byron Gottfried, Schaum's *Outline Programming with C*, Second Edition, Tata McGraw-Hill
2. Yashavant Kanetkar, *Let Us C*, Eighth Edition, BPB Publications.

3.   Kernighan and Ritchie, *The C Programming Language*, Second Edition, Prentice Hall, 1998.

BCA1.4 MATHEMATICS–I

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I   **Marks: 30**
Determinants and Matrices

Definition and different types (such as identity matrix, diagonal matrix etc) of matrices, vectors and matrices. Addition, subtraction and multiplication of matrices. Properties of matrix operations. Existence of additive and multiplicative identity and additive inverse matrices. Transpose of a matrix and its properties. Symmetric and skew symmetric matrices. Elementary transformation of a matrix. Invertible matrices.

Determinant of a square matrix, minor, cofactor. Adjoint of a matrix and matrix inversion. Determination of rank of a matrix. Eigen values and Eigen vectors of a matrix (Stressing on symmetric matrices). Cayley-Hamilton theorem - Cramer's rule. Consistency of a system of linear non-homogenous equations and existence of solutions (statement only). Simple problems. Solutions of simultaneous linear equations by Gaussian elimination method.

UNIT II   **Marks: 20**
Complex Numbers

Definition and Algebra of complex numbers. Modulus and conjugate of a complex number. Representation of complex numbers - Argrand diagram and polar representation.

Roots of linear and quadratic equations in one variable, real roots, irrational roots, complex roots, Relation between the roots and the coefficients.

UNIT III   **Marks: 20**
Limits and Derivatives
Intuitive idea of limits and derivatives. Limits of polynomials and rational functions. Derivatives, Algebra of derivative of a function. Derivative of polynomials and trigonometric functions.

UNIT IV   **Marks: 10**
Calculus
Roll's theorem, Lagrange's Mean Value theorem and Taylor's theorem. Meaning of the sign of derivative. Indeterminate forms, maxima and minima (single variable).

SUGGESTED READINGS:

1. Narayanan S. and Manickavachagam , *Allied Mathematics Vol.1& Vol.2*.
2. M.K. Venkataraman, NPC, *Engineering Mathematics Vol.1 & Vol.2,*

BCA 1.5 LABORATORY

At least 6 practical assignments covering paper BCA 1.1 (40 marks) and at least 20 practical assignments covering paper BCA 1.3 (60 marks) should be done by the students from the list prepared by the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the whole course is covered. The details of the Laboratory works is listed in **Appendix-A**

DETAILED SYLLABUS

SEMESTER – II

BCA2.1 DATA STRUCTURE AND ALGORITHM
Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I   **Marks: 10**

Definition:

Concept of Data Types, elementary structure, words and their interpretations, packed words

Arrays:

Types, memory representation, address translation functions for one & two dimensional arrays, different examples.

UNIT II   **Marks: 15**

Linked Structure:

Singly and doubly linked list, circular and non circular, list manipulation with pointers, example involving insertion and deletion of elements and their comparative studies with implementations using array structure

Stacks and Queues

Definitions, representation using array and linked list structure, application of stack and queues in simulation, postfix conversion and evolution of arithmetic expressions

UNIT III   **Marks: 15**

Binary Trees:

Definition, quantitative properties, memory representation, Trees traversal algorithms (recursive and non-recursive), threaded trees, BFS, DFS

UNIT IV   **Marks: 10**

Searching

Linear and binary search algorithms, performance and complexity, binary search trees (construction, insertion, deletion and search), Concept of optimal binary search trees.

UNIT V   **Marks: 20**

Sorting:

Terminology, performance evaluation, sorting algorithms (non recursive, recursive description, Complexity, advantages and disadvantage, implementation)

Bubble sort, insertion sort, selection sort, Tree sort, heap sort, quick sort, merge sort & radix sort. External Sorting.

UNIT VI   **Marks: 10**

Analysis of Algorithm

Time and Space complexity of algorithms, average case and worst case analysis, asymptotic notation as a measure of algorithm complexity, O and notations. Analysis of sorting algorithms- Selection sort, Bubble sort, Insertion sort, Heap sort, Quick sort and analysis of searching algorithms – linear search and binary search.

SUGGESTED READINGS:

1. *Data Structure* , Horowitz and Sahani, Narosa
2*. Introduction to Data Structures in C*, A.N.Kamthane, Pearson, 2007.
3. *Data Structure using C and C++,* Langsam**,** Augentein & Tanenbaum, PHI
4. *Data Structures in C*, A.S.Nair, T. Mahalekshmi, PHI, EEE.
5. *Data Structures using C*, S.K.Bandyopadhyay, K.N.Dey, Pearson.

BCA 2.2 COMPUTER BASED ACCOUNTING AND FINANCIAL MANAGEMENT
Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Part: I Accounting   **Marks: 30**

- Introduction - Definition, function, objective, need, advantage, events and transaction, double entry system of book keeping.
- Books of accounts - classification of books of accounts, meaning of journal, journalizing of transactions, ledger and ledger posting, closing of books of accounts and preparation of trial balance.
- Cash book - single column, double column and triple column; depreciation.
- Financial statements - Trading, Profit and Loss Account and Balance Sheet.

Part: II Tally   **Marks: 25**

1. Introduction – Versions of Tally, Features of Tally, ERP Features, Data Directory, and Tally switching between screen areas.
2. Company creation:-Create/ Alter/Select/Close/Delete.
   Introduction on F11 features & F12 configuration.
3. Basic Accounting: - Accounting Info Ledger/Group (Single & Multiple) Create/Display/Alter/Delete.
4. Accounting Voucher:- Types of Voucher, Configuring Voucher, Voucher Creation, Entering/Altering & Deleting.
5. Basic of Tally Inventory:-"Integrated A/c with Inventory" Create/Display/Alter/(Single & Multiple) : Group, Category, Godown, Units (Simple/Compound)
6. Invoicing :-Purchase & Sales in Invoice format, Debit Credit notes/Discount/Description
7. Inventory Voucher

Part: III   **Marks: 25**

Advanced Accounting

1. Bill wise Details – Transaction wise Bill By Bill for trading & non trading organization
2. Interest Calculation – Simple & Advance parameters Interest calculation on outstanding Balances, use of vouchers class ,Adjustment entries
3. BRS- Simple & Advanced
4. Multiple Currencies – Create of different currencies, voucher entries ,Adjustment entries on forex gain / loss
5. Cost Center & Cost Categories – (By using purchase, Sales, Receipt, Payment voucher) Create / Alter / Display.
6. Advance Inventory- Actual/Different Billed Qty, O' Value, Batch wise, Alternate Units, BOM, Price List
7. Budget & Control – Create / Alter, Budget for group / ledger / cost Center.
8. Scenario Mgt – Create / Alter / Delete. Transactions

Printing, Housekeeping & Administration

9. Administration – Security control, Tally Audit.
10. Housekeeping – Group company, Split company Export Data, ODBC.
11. Printing – Company printing option, Setting to a Bill.

SUGGESTED READINGS:

1. K.R.Das, K.M. Sinha, K.S.Paul Choudhury, G.G.banik; *Accountancy (for H.S. first year)*; LBS Publication.
2. B.B. Dam; *Accountancy (for H.S. first year).*
3. A.K.Nadhani, K.K.Nadhani; *Implementing Tally - 9*; BPB Publication, Delhi.
4. N. Agarwal and S. Agarwal; Comdex *Tally - 9 Course Kit (with CD).*
5. A.K. Nandhani; *Tally - 9, Training Guide*, BPB Publication.

BCA 2.3 DIGITAL LOGIC FUNDAMENTALS

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT – I   **Mark: 16**
Boolean Algebra and Logic Gates
Axiomatic definition of Boolean algebra, Rules (postulates and basic theorems) of Boolean algebra, dual and complement of Boolean expression, Canonical form and Standard form, Sum of product and product of sum form, Conversion between Boolean expression and truth table, Karnaugh map method (upto four variable kmap), Don't care condition, and Quine Mc Cluskey method, Different types of gates, Implementation of logic expression with logic gates.

UNIT – II   **Mark: 16**
Combinational Circuit
Adder: half adder, full adder, Subtracters: half subtracter and full subtracter, Magnitude comparator, Decoder, Encoder, Application examples of decoder and encoder, Multiplexer, Demultiplexer, Application examples of multiplexer and Demultiplexer.

UNIT – III   **MARK: 16**
Sequential Circuit
Simple RS flip-flop or latch, Clocked RS flip-flop, D flip-flop, JK flip-flop, T flip-flop, Analysis of Clocked Sequential circuits, State Reduction and Assignment, Flip –Flop Excitation tables, Design Procedure for sequential circuits.

UNIT – IV   **Mark: 16**
Counters
Ripple counters: Binary Ripple Counter, BCD Ripple Counter, and Synchronous Counters: Binary Counter, Binary Up and down Counter, BCD Counter, Counter design using state diagram, state table and state equation.

Unit – V   **Mark: 16**
Registers
Registers: Shift registers (serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out), Registers with parallel Load, Bidirectional shift register with parallel load.

SUGGESTED READINGS:

1. M. M. Mano, *Digital Logic and Computer Design*, PHI, 1994
2. C. Bartee*, Computer Architecture and Logic Design*, McGraw Hill, 1991

BCA 2.4 MATHEMATICS–II

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I   **Marks 25**
Sets, relations and functions
Definition and representation of sets, cardinality of sets, elementary set operations - union, intersection, difference, cartesian product, concept of universal set and complementation, Venn diagram, De Morgan's Law. Simple properties of the set operations. Computer representation of sets.
Relations, properties of binary relations - reflexive, transitive symmetric and anti- symmetric, closures of relations, equivalence relations, equivalence classes and partitions. Partial ordering relations and lattices.
Functions, one-to-one and onto, composition of functions, invertible functions. Principle of mathematical induction.

UNIT II   **Mark: 15**
Combinatorics and recurrence relations
Permutations, Combinations, partitions, permutations with repetitions, combinations with repetitions, permutations of sets with indistinguishable objects.
recurrence relations and their solutions.

UNIT III   **Mark: 20**
Graphs
Basic concepts, directed and undirected graphs, paths, reachability and connectedness, cycles and trees. Bipartite, Eulerian and Hamilton graphs, computer representation of graphs - matrix and linked representation of graphs. Algorithms on graphs, Breadth first search, Depth first search.

UNIT IV   **Marks: 10**
Mathematical Logic

Logical variables and constants, connectives, truth tables, Normal forms- CNF, DNF. Converting expressions to CNF and DNF. Theory of inference, Propositional calculus.

UNIT V   **Marks: 10**
Sequence and Series
Sequence, Arithmetic Progression and Geometric Progression, general term, A.M.(Arithmetic Mean) and G.M.(Geometric Mean). Relation between A.M. and G.M. Sum of AP and GP series. Sum to n terms of special series. Sequence of real numbers, bounded, convergent and non-convergent sequences. Uniqueness of the limit and bounds of a convergent sequence. Infinite series, exponential and logarithmic series.

SUGGESTED READINGS:

1. Tremblay, J.P, Manohar, R. *Discrete Mathematical Structures with Applications to Computer Science*, 2nd print 1988, McGraw Hill.
2. Kolman, Bernard, Robert C. Busby and Sharon Ross, *Discrete Mathematical Structures*, 3rd Edition, PHI.
3. *Discrete Mathematics*, N. Ch.SN Iyengar, K.A. Venkatesh, V. M. Chandrasekaran, P. S. Arunachalam, Vikash Publishing House Pvt Ltd.

BCA 2.5 LABORATORY

At least 15 practical assignments covering paper BCA 2.1 (50 marks), 10 assignments covering paper BCA 2.2 (50 marks) should be done by the students from the list prepared by the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the whole course is covered. The details of the Laboratory works is listed in **Appendix-B**

BCA 2.6 ENVIRONMENTAL STUDIES
Total marks: 100 (Semester end examination - 75, Field Study - 25)

Unit I: The Multidisciplinary nature of environmental studies 2 lectures

      Definition, scope and importance

      Need for public awareness

Unit II: Natural Resources 8 lectures

Renewable and non-renewable resources

- Natural resources and associated problems
  a. *Forest resources:* Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
  b. *Water resources:* Use and over utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
  c. *Mineral resources:* Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
  d. *Food resources:* World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problem, water logging, salinity, case studies.
  e. *Energy resources:* Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources, case studies.
  f. *Land resources:* Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit III: Ecosystems *6 lectures*

- Concept of an ecosystem
- Structure and function of and ecosystem.
- Producers, consumers and decomposers
- Energy flow in the system
- 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 IV: Biodiversity and its Conservation 8 lectures

- Introduction- definition, genetics, species and ecosystem diversities
- Biogeographical 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 a mega-diversity nation.
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wild life, man-wild-life conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity

Unit V: Environmental Pollution 8 lectures
- Definition
- Causes, effects and control measure 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 waste.
- Role of individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.

Unit VI: Social Issues and the Environment: 7 lectures
- From unsustainable to sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people, its problem and concern, case studies.
- Environmental ethics: issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.
- Waste land reclamation
- Consumerism and waste product
- Environment protection acts
- Air(prevention and control of pollution) acts
- Wild life protection act
- Forest conservation act
- Issues involved in enforcement of environmental legislation, public awareness.

Unit VII: Human Population and the Environment 6 lectures
- Population growth, variation among nations

- Population explosion- 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

Unit 8: Field work 5 lectures
- Visit to a local area to document environmental assets- river/forest/grassland/hill/mountain
- Visit to a local polluted site- urban/rural/ industrial/ agricultural
- Study of common plants, insects, birds
- Study of simple ecosystem, ponds, river, hill slopes etc.

RECOMMENDED READINGS:

(i)   Environmental Studies, Anindita Basak; Pearson Education, 2009

DETAIL SYLLABUS

SEMESTER – III

BCA 3.1 SOFTWARE ENGINEERING

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I   **Marks: 20**
Introduction:
Software Processes & Characteristics, Software life cycle, Models - Waterfall, Prototype, Evolutionary and Spiral Models.
Software Requirements analysis & specifications: Requirement engineering, requirement, elicitation techniques like FAST, QFD, requirements analysis using DFD, Data dictionaries, Requirements documentation, Nature of SRS, Characteristics & organization of SRS.

UNIT II   **Marks: 20**

Software Project Planning:
Size Estimation like lines of Code & Function Count, Cost Estimation Models, COCOMO, Risk Management.

UNIT III   **Marks: 20**
Software Design:
Data design**,** Architectural design**,** Interface design, Function Oriented Design, Object Oriented Design, Cohesion & Coupling, Classification of Cohesiveness & Coupling,
Software Metrics: different types of project matrics.

UNIT IV   **Marks: 20**
Software Testing and Maintenance:
Testing Process, Design of Test Cases, Types of Testing, Functional Testing, Structural Testing, Test Activities, Unit Testing, Integration Testing and System Testing. Debugging Activities
Software Maintenance: Management of Maintenance, Maintenance Process, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation. Software quality Assurance.
CASE tools--- Analysis tools, design tools, SQA tools, software testing tools.

SUGGESTED READINGS:

1. Rajeev Mall ─*Software Engineering*, PHI
2. Pressman Roger ─ *Software Engineering A Practitioners Approach*; Tata McGraw Hill
3. James F. Peters, Witold Pedrycz ─*Software Engineering An Engineering Approach*.

BCA 3.2 COMPUTER ORGANIZATION AND ARCHITECTURE

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Unit – I   **Marks: 10**
Introduction
Functional units of a computer, basic instructions (zero, one, two, three address), bus structure, memory locations, memory addresses, memory operations, instruction and instruction sequencing (straight line sequencing and branching). Addressing modes, stack, subroutine, I/O instructions.

Unit – II   **Marks: 10**
Register Transfer Logic
Introduction, inter register transfer, arithmetic micro-operation, logic micro-operation, shift micro-operation, Conditional control statements, fixed point binary data, instruction code, design of a simple computer.

Unit – III   **Marks: 15**
Processor Logic Design
Processor organization, design of arithmetic and logic circuit, status register, design of accumulator.

Unit – IV   **Marks 15**
Control Logic Design
Hardware control, micro-programmed control block diagram.

Unit – V   **Marks: 15**
I/O Subsystem
Program controlled I/O, Interrupts: enabling and disabling interrupts, handling interrupts from multiple sources (priority control), DMA.

Unit – VI   **Marks: 15**
Memory Subsystem
Semiconductor memory, SRAM, DRAM, ROM types, Cache memory, Flash memory, mapping functions.

SUGGESTED READINGS:

1. M. Morris Mano, *Digital Logic and Computer Design*, PHI publication
2. Hamachar, Vranesic and Zaky, *Computer Architecture*
3. William Stallings, Pearson, *Computer Organization and Architecture*

BCA 3.3 DATABASE MANAGEMENT SYSTEM

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I   **Marks: 10**

Introduction

Data, Database, Database management system, Characteristics of the database approach, Role of Database administrators, Role of Database Designers, End Users, Advantages of Using a DBMS and When not to use a DBMS.

DBMS Architecture: Data Models – Categories of data models, Schemas, Instances, and Database states. DBMS Architecture and Data Independence – The Three schema architecture, Data independence. DBMS Languages and Interfaces. Classifications of Database Management Systems.

UNIT II   **Marks: 20**

Data Modeling Using Entity-Relationship Model

Using High Level Conceptual Data Models for Database Design, Example Database applications. Entity types, Entity Sets, Attributes and Keys. Relationships, Relationship types, Roles and Structural constraints. Weak Entity Types and Drawing E- R Diagrams.

Index Structures for Files: Single Level Ordered Indexes – Primary indexes, Clustering indexes and Secondary indexes. Multi-level indexes, Hashing concepts.

UNIT III   **Marks: 20**

Relational Data Model

Relation, Integrity constraints - domain, entity and Referential integrity constraints, Basic Relational Algebra operations, select, project and join operations.

Database Design

Functional dependencies and Normalization for Relational Databases - Normalization concepts, first, second, third normal forms, Boyce-Codd normal form. Functional dependency diagram and design of relational database from it

UNIT IV   **Marks: 20**

SQL

SQL data definition and data types, specifying constraints in SQL, schema change statements, SQL constructs (Select ... From… Where… Group by ….. Having… Order by…. Exists…. Not Exists), Insert, Delete, Update, View, Definition and use, nested quires, Constraints considers(NOT NULL , UNIQUE, Check , Primary key. Foreign key, Default)
Introduction to PL/SQL(basic concept).

UNIT V   **Marks: 10**

Transaction Processing Concepts and Concurrency Control Techniques

Transaction and System concepts – Desirable properties of Transactions – Schedules and Recoverability. Lock-Based Protocols – Locks, Granting of Locks, and Two phase locking protocol and implementation of locking

Data Base Administration

Introduction to Database security issues, Discretionary Access Control Based on Granting/Revoking of Privileges and Multi-level security, Database recovery concepts.

SUGGESTED READING:

1. *Introduction to database management system*, C.J. Date, Pearson Education
2. *Fundamentals of data base management system*, Elmasri & Navathe, Pearson Education
3. *An introduction to Database systems*; Bipin C. Desai; Galgotia publications.
4. *Database Systems - Concept, Design and Applications*; S.K.Singh; Pearson Education.

BCA 3.4 OBJECT ORIENTED PROGRAMMING USING C++

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I   **Marks: 15**

Introduction to object oriented programming.

Origins of C++- Basic Concepts of Object Oriented Programming-Benefits of OOP-Applications of OOP.

Introduction to c++

Structure of a Simple C++ program-Output operator-Input operator-Cascading of I/O operators. Tokens- keyword, identifiers, constants, strings and operators. Basic data types-User defined data types-Dynamic initialization of variables-Reference variables-Operators in C++-Scope resolution operator-applications-Member dereferencing operators-Memory Management operators-new and delete.

Control Structures-simple if, if else, nested if, switch, while do, break and continue statements. Introduction to Functions-Function Prototyping-Call by reference-Return by reference-Inline functions-Default arguments-Const arguments.

UNIT II   **Marks: 15**

Classes and objects

Introduction - Defining a class-Class Vs structures-Creating objects-Accessing class members-Defining member functions-Outside the class definition-Inside the class definition-Outside functions as inline-Nesting of member functions-Private member functions-Memory allocation for objects-Array-Declaring an array-accessing elements of an array-Array of objects. Friendly functions.

Constructors and destructors

Basic Concepts of constructors-Default constructor-Parameterized constructor-Multiple constructors in a class-Constructor with default arguments-Dynamic initialization of objects-Copy constructor-Dynamic constructors-Destructors.

UNIT III   **Marks: 15**

Function and operator overloading

Overloading Concepts Function Overloading: Functions with different sets of parameters, default and constant parameters. Rules for overloading operators-Defining operator overloading-Overloading Unary operators-Prefix and Postfix operators overloading-Overloading Binary operators-Overloading relational operators-Overloading using friend functions-Overloading subscript operator. Pitfalls of operator overloading, Type conversion-Basic to Class-Class to Basic

UNIT IV   **Marks: 15**

Inheritance

Introduction-Defining derived classes-Types of inheritances-Single-Making a private member inheritable-Multilevel inheritance-Multiple inheritance-Hierarchical inheritance-Hybrid inheritance-Virtual base classes-Abstract classes-Constructors in derived classes-Nesting of classes.

Virtual functions and run time polymorphism-Introduction-Compile time and Runtime polymorphism-Pointers to objects-this pointer-Pointer to derived classes-Virtual functions-Rules for virtual functions-Pure virtual functions.

UNIT V   Marks: 10
Streams

C++ stream classes-put() and get() functions-getline() and write() functions-Overloading << and >> operators-Formatted Console I/O operations-ios class functions-width(),precision(),fill(),setf() and unsetf()-Formatting flags-Manipulators-User defined manipulators.

UNIT VI   Marks: 10
Files

Introduction-Stream classes for files-Opening files using constructor-Opening files using open()-File modes-Detecting end of file-eof()-Sequential input and output-put() and get()-Reading and writing objects-read() and write()-Random Access files-Manipulating file.

SUGGESTED READINGS:

1.   Schildt Herbert, *The Complete Reference C++*, Tata McGraw Hill, 4th Edition, 2003.
2.   Deitel & Deitel, *C++ How to program*, Pearson Education Asia, 6th Edition, 2008.
3.   Bjarne Stroustrup, *The C++ Programming Language,* Special Edition, Pearson Education, 2004.
4.   M. T. Somashekara, D. S. Guru, *Object-Oriented Programming with C++,* 2nd Edition, PHI, 2012.

BCA 3.5 LABORATORY

At least 6 practical assignments covering paper BCA 3.3(50 marks) and 12 assignments covering paper BCA 3.4 (50 marks) should be done by the students from the list prepared the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the course is covered. The details of the Laboratory works is listed in **Appendix-C**

DETAIL SYLLABUS

SEMESTER – IV

BCA 4.1 OPERATING SYSTEM
Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Introduction   **Marks:10**

Basics of Operating Systems: Definition – Generations of Operating systems, Types of Operating Systems (definition only): Mainframe, Batch, Multiprocessor, Distributed, Multitasking, Real time, Parallel and Time sharing.

Processes   **Marks:10**

Process: Concept of a Process, Process States, Process creation, Process termination, Context switching, Thread: Concept of thread, Design issues of thread, Types of threads, Benefits of threads Basic Concept of multithreading.

Process Synchronization   **Marks 10**

Basic concept of Inter-Process communication, Race condition, Critical-Section, Mutual exclusion, semaphore, mutex. Different ways to achieve mutual exclusion- Disabling interrupt, Test-and-Set-Lock, Peterson's solution using semaphore. Brief discussion on classical IPC problem (example-Dinning philosopher problem).

Scheduling   **Marks:10**

Basic Concepts of scheduling, Scheduling objectives, preemptive and non preemptive scheduling, Scheduling criteria – CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time , Basic concepts on batch, interactive and real-time scheduling algorithm, Scheduling algorithms- FCFS, SJF, RR, priority scheduling, Goals of scheduling algorithms

Deadlocks   **Marks:10**

Definition, Deadlock characteristics , Methods for Handling Deadlocks, Deadlock Prevention , Deadlock detection and Recovery, Deadlock Avoidance using Banker's Algorithm.

Memory management   **Marks:10**

Memory allocation in Multiprogramming, Relocation and Protection, Swapping, Virtual memory: - Basics of Virtual Memory, Logical versus Physical address space, Paging and Concept of Segmentation, Page fault, Page table and its entries, Demand paging, TLB, Page replacement algorithms: - LRU, Optimal, NRU, FIFO, Second chance, Clock, NFU, Working set.

File system   **Marks:10**

File concepts, File naming, File types(directory, regular, device), File attributes, Operations on file, Access Methods – Sequential, Random access, Directory in UNIX, Hierarchical directory structure, Relative path and Absolute path, Operation on directories, Disk layout, Disk partition, File system layout, Disk block allocation- Contiguous allocation, Linked list allocation, FAT, i-nodes, File system security

I/O management   **Marks: 10**

Basic principles and overall structure of I/O management subsystem, Device controllers, Layers of the I/O subsystem-interrupt handler's device driver, device independent I/O software and user space I/O software.

SUGGESTED READING:

1. Tannenbaum, *Operating Systems*, PHI, 4th Edition, 2000
2. Silbersachatz and Galvin, *Operating System Concepts*, Person, 5th Ed. 2001
3. William Stallings, *Operating System*, Prentice Hall of India, 4th Edition, 2003

BCA 4.2 WEB TECHNOLOGY
Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I   **Marks: 8**
Overview of the World Wide Web and the internet
A brief history of TCP/IP and the Internet, Internet services-email, telnet, ftp , Internet components, the birth of web, web page, home page, web site, types of Internet connection- dial up, DSL, Broadband, VSAT, WiFi

UNIT II   **Marks: 7**
Web Servers and Browsers
Web browsers-Netscape navigator and IE, Web browser helper applications, Web servers, Web server architecture

UNIT III   **Marks: 7**
Internet Architecture
IP addresses and its working, domain name system, URL

UNIT IV   **Marks: 8**
Inside the firewall
Firewall, proxy server, overview of intranet security, web server security, username/password authentication. COM, DCOM, CORBA

UNIT V   **Marks: 12**
Linking database to the Web
JDBC, ODBC- CGI, ASP andPHP, Dynamic page creation and advantages

UNIT VI   **Marks: 13**
HTML editors and tools
Basic HTML, HTML tags, creating list in HTML, hyperlinks, multimedia, HTML forms, tables in HTML, frames in HTML, image maps, style sheets in HTML. DHTML, XML-Introduction, Need for XML, Advantages, simple XML programs, DTD

UNIT VII   **Marks: 15**
Java Script
Client side Scripting languages, history of JavaScript, Java vs. Java Script, Creating interactive documents using JavaScript

UNIT VIII   **Marks: 10**
Using Visual Basic Script
The benefits of VBScript, Interacting VBScript with HTML forms, VBScript variables and operators, VBScript flow of control statements, Server Side scripting languages Introduction

SUGGESTED READINGS:

1. I. Bayross, *Web Enable Commercial Application Development Using HTML, DHTML, JavaScript, Perl, CGI*, BPB publications, 2000.
2. J. Jawoskri, *Mastering JavaScript*, BPB publications, 1999.
3. Margaret Levine Young – *Internet - The Complete Reference* - Millennium Edition – TMT Edition -1999.
4. Harley Hahn - *The Internet – Complete Reference* – Second Edition - TMH Edition.

BCA 4.3 JAVA PROGRAMMING
Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Unit I   **Marks: 15**
JAVA language basics
Basic features, Java virtual machine concepts Creation of JAVA, executing a java program using command line arguments

The primitive data types and Variables, Java Key words, integer and floating point data type, character and Boolean types, declaring and initialization variables, Type conversion and casting

Unit II   **Marks: 15**
Operators and Control Statements
Java operators - Arithmetic operators, Bitwise operators, Relational operators, Boolean logical operators, Assignment operator, Conditional operator,
if and switch statements, iteration statements, jump statements.

Unit III   **Marks: 20**
Classes and Methods
Class fundamentals, Objects, Constructors, this keyword, finalize () method
Overloading methods, garbage collection, Returning objects, introducing access control, understanding static, introducing final, introducing nested and inner classes

Strings
String operations, Character Extraction, Comparing, Searching & Modifying the strings, Data conversion using valueOf(), String Buffer

Unit IV   **Marks: 15**
Inheritance
Inheritance basics, using super,creating a multilevel hierarchy, method overriding, dynamic method dispatch, using abstract classes, using final with inheritance

Packages and interfaces
Packages, access protection,importing packages, interfaces

Multithread programming
The JAVA thread model, creating a thread, creating a multiple thread, Using isAlive() and join (), Interthread communication, suspending, resuming and stopping threads, using multithreading.

Unit V   **Marks: 15**
Exception handling
Exception handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, Java's built-in exceptions,

Input/output

Java I/O classes and interfaces, file, the stream classes, byte streams, character streams, console class.

Applet class

Applet basics, applet architecture, simple applet skeleton, applet displaying methods,

Event handling

Two event handling mechanisms, delegation event model, event classes, source of events, event listener interface

SUGGESTED READINGS:

1. Herbert Schildt, *The Complete Reference*,Seventh Edition, Tata McGraw Hill, 2007.
2. Bruce, Eckel, *Thinking in Java*, Third edition, Pearson Education, 2005

BCA 4.4 MINOR PROJECT
(100 Marks)

Students will have to develop a mini project. Students may be divided into groups, each group containing not more than two students. The project topics will have to be approved by a committee constituted by the HOD of the concerned department. The committee will perform continuous monitoring of the projects by holding presentations on monthly basis. Final evaluation of 100 marks will be done in the department in the presence of an external examiner to be appointed by the Controller of Examinations, G.U.

BCA 4.5 LABORATORY

At least 12 practical assignments covering paper BCA 4.1(20 marks), 35 practical assignments covering paper BCA 4.2 (40 marks) and 10 assignments covering paper BCA 4.3 (40 marks) should be done by the students from the list prepared the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the course is covered. The details of the laboratory works is listed in **APPENDIX-D**

BCA 5.1 SYSTEM ADMINISTRATION USING LINUX

Total Marks: 100 (Semester end examination - 80, Internal Assessment - 20)

UNIT 1 : Introduction   Marks: 10
Introduction to System Administration, Role and power of System Administrator. Basic Features of the Linux operating system. A brief Overview of the most popular Linux Distributions - Red Hat Enterprise Linux (RHEL), Ubuntu, Debian, Fedora, SUSE), Installation Requirements, Partitioning the Hard drive in Linux, Installing the Linux system, Installing and Configuring software in linux, Linux kernel and device drivers, System Startup and Shutdown. Standard I/O, Standard error, Redirection and Piping.

UNIT 2 : Linux file system   Marks: 15
Basics of Linux file system - File system types (ext3, ext4, xfs, jfs, ReiserFS, iso9660 etc.), three basic types of files (ordinary or regular, special or device and directory).
I-nodes and file attributes, Absolute and Relative path names. File system Mounting and Unmounting. Organization of the file tree, Standard directories and their contents.

UNIT 3 : Basic Linux Commands   Marks: 15
Files and Directory handling Commands - ls, cd, cp, mv, rm, mkdir, rmdir.
Commands for Creating and Viewing ordinary files – cat, more, pg.
Filter Commands – wc, head, tail, cut, tr, grep (with regular expressions).
Setting user and group ownership of files and Access permissions – chmod, chown, chgrp commands.
Study of different Linux Shells (sh, bash, csh, zsh). Environment variables.
Shell script basics (examples of some simple shell programming).

UNIT 4 : Process Creation   Marks: 12
Basic commands for starting and stopping processes, Basic process attributes and their role in Access control. Examining the list of running processes on the system and understand the data presented there. Background process. Job control. Crontab file format, Backup and Restore procedure.
Submit a print job, check the status of a print job, cancel a print job. Configuring the Print Queue, Selecting the Print Driver, Editing the Printer configuration.

UNIT 5 : General User Administration   Marks: 13
Understanding the 'root' account, Becoming a Superuser (su), A limited su (sudo) Managing user accounts - Adding a new user, Modifying and Removing User accounts, Changing Password, System monitoring and logging, Monotoring memory usage, disk space usage and I/O activity.

UNIT 6 : Networking in Linux   Marks: 15
The rules governing IP address classes and netmasks, Network Address, Netmask and Gateway. configuring Interface with ifconfig, ping, netstat, traceroute, telnet. Understanding the significance of the /etc/services file and well known port numbers.

Basics of configuring NFS, NIS, DNS, FTP, Squid Proxy, DHCP server, iptables and firewall. Basic Network Security Issues.

SUGGESTED READINGS :
1. Sumitabh Das, *UNIX : Concepts and Applications*, Tata McGraw Hill, 4th Edn.
2. Satish Jain, *Basics of OS, Unix and Shell Programming*, BPB Publications, (A8-R4 Revised Syllabus).
3. Mark G Sobell, *A Practical Guide to Linux*, Prentice Hall, 2nd Edition

BCA 5.2 COMPUTER NETWORKS
Total Marks: 100 (Semester end examination - 80, Internal Assessment - 20)

UNIT-I   **Marks: 15**

Physical Layer : Data communications : components – Network criteria – physical structures – network models – categories of networks –interconnection of networks – inter network Protocols and standards : protocols-standards-standards organizations- internet standards Network models: Layered tasks – OSI model – layers in the OSI model – TCP/IP protocol suite.

UNIT – II   **Marks: 15**

Digital Transmission: Digital to digital conversion: Line coding – line coding schemes – block coding - analog to digital conversion – PCM - transmission modes: serial transmission – parallel transmission

Analog Transmission: Digital to analog conversion: FSK-ASK-PSK Analog to Analog conversion: Amplitude modulation – Frequency modulation – phase modulation

Multiplexing: Frequency division multiplexing – Time division multiplexing –

Transmission Media Guided media: Twisted pair cable – coaxial cable – fiber optic cable Unguided media: radio waves - micro waves – infrared.

UNIT–III   **Marks: 15**

Data Link Layer: Error correction and detection: Introduction- block coding-linear block cods-cyclic codes-checksum. **Data link Control:** protocols-simplest protocol- stop and wait protocol- stop and wait automatic repeat request-go back n automatic repeat request-selective repeat-automatic repeat request-piggybacking.   **MultipleAccess:**   Random   access-Aloha-CSMA-CSMA/CD-CSMA/CA Controlled access: reservation, polling, token passing. Channelization: FDMA,TDMA, CDMA.

UNIT–IV   **Marks: 15**

Wired LANs: Ethernet: IEEE standards, standard Ethernet- fast Ethernet. **Wireless LANS:** IEEE 802.11-arhitecture-MAC sublayer addressing mechanism, physical layer-Bluetooth: architecture-Bluetooth layers-radio layer-baseband layer-L2CAP-other upper layers.

Network Layer:
AddressingIPV4 addresses - IPV6 Addresses
Internet Protocol: IPv4 –IPv6 **Address mapping protocols:** ARP – RARP.

UNIT-V   **Mark: 10**

Routing protocols: Unicast routing protocols: distance vector routing, Link State routing **Multicast Routing protocols (Any two) Transport Layer:** Process to process delivery – UDP – TCP **Congestion control and QOS:**Data traffic – congestion – congestion control – quality of service – techniques to improve quality of service.

UNIT – VI **Marks: 10**

Application layer: & Network Security :

DNS: Name space – domain name space – distribution of name space

Electronic mail Architecture –

FILE transfer: FTP **WWW and HTTP:** Architecture – web documents – HTTP

Network Security: Introduction - definitions – two categories - symmetric key cryptography – traditional ciphers – asymmetric key cryptography

SUGGESTED READINGS :

1. Behrouz A Forouzan, *Data communication and networking*, McGraw-Hill, 5th edition, 2011.
2. Data and Computer Communication, Stalling W, 5ed, PHI (EEE).

REFERENCE BOOK:

1. Andrew S Tanenbaum ,*Computer Networks*, PHI publications, 5th edition, 2011.

BCA 5.3 OPEN SOURCE SOFTWARE

Total Marks: 100 (Semester end examination - 80, Internal Assessment - 20)

UNIT I (LaTeX)   Marks: 40

Installation of LaTeX, Understanding Latex compilation, Basic Syntax, Writing equations, Matrix, Tables , Page Layout – Titles, Abstract Chapters, Sections, References, Equation references, citation, List making environments , Table of contents, Generating new commands, Figure handling , table & figure numbering, List of figures, List of tables, Generating index.
Packages: Geometry, Hyperref, amsmath, amssymb, algorithms, algorithmic graphic, color, tilez listing. Classes: article, book, report, beamer, slides. Applications : Writing Resume , Writing question paper , Writing articles/ research papers , Presentation using beamer

UNIT II B (Scilab)   Marks: 30

Introduction to scilab, Installation of Scilab(windows & Linux), Basic syntax, Mathematical Operators, Predefined constants, Built in functions. Complex numbers, Polynomials, Vectors, Matrix operations (functions like inv(), spec(), zeros(), ones(), eye(), rand(), . Handling these data structures using built in functions. Programming : Functions , Loops(for & while) ,Conditional statements , Handling .sci files , Installation of additional packages e.g. 'optimization' Graphics handling: 2D, 3D , Generating .jpg files , Function plotting, Data plotting , Applications : Numerical Linear Algebra (Solving linear equations, eigen values atc.) solving Ordinary Differential Equations, Numerical Analysis – iterative methods , GUI in scillab, Plotting 2D graphs, Comparison with C / C++/ Matlab.

UNIT III (Python)   Marks: 10

Introduction to Python, The procedure to install Python, How to open Python console, Basic Python commands.

SUGGESTED READINGS

1. http://fossee.in or http://scilab.in
2. http://spoken-tutorial.org/NMEICT-Intro
3. Reliable web resources as recommended by class teacher.

BCA 5.4.1 MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING

Total marks: Theory 60 (Semester end examination - 50 (exam duration 2 hours), Internal assessment - 10), Practical 40 (Semester end examination - 30, Internal assessment - 10)

Unit – I   **Marks: 10**
Internal Organization of 8085A microprocessor
User Programmable registers, PC, SP, accumulator, flags, data bus, address bus, control bus, instruction word size, opcode format, data format, memory addressing, I/O addressing, address decoding for memory and I/O.

Unit – II   **Marks: 10**
8085A microprocessor architecture
Pinout of 8085A microprocessor, multiplexed address/data bus, control and status signal, demultiplexing of control signals, other signals, bus timings, fetch decode and execute cycle, timing diagram for opcode fetch memory read and memory write, interfacing memory and I/O.

Unit –III   **Marks: 10**
Assembly Language Programming in 8085A Microprocessor
Complete instruction set in detail, programming examples, logic operation, counters and time delays, stack and subroutine, processing arrays, bit manipulation.

Unit – IV   **Marks: 10**
Interfacing
In and OUT instruction, decoding addresses, Interfacing LED, relay, seven segment display, switch, keyboard,.

Unit – V   **Marks: 10**
Interrupts
Vectored interrupts, interrupt priorities, general purpose programmable peripheral devices, 8255A control and status registers, programming 8255A, introduction to 8279, 8254 and 8237 (block diagrams and basic functions).

PRACTICALS:
The Laboratory details of this course is listed in Appendix E

SUGGESTED READING:
1. *Microprocessor Architecture, Programming and Application with the 8085* by Ramesh S.Gaonkar
2. *Microprocessor and Microcomputer* by B.Ram.

BCA 5.4.2 AUTOMATA THEORY AND LANGUAGES

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Unit I   **Marks: 15**
Finite Automata
DFA, NFA, NFA with ε-moves. Equivalence of DFA and NFA. Reduction of the number of states in a finite automata.

Unit II   **Marks: 20**
Regular Languages and Regular Grammar
Concept of languages and grammar. Regular expressions. Connection between regular expressions and regular languages. Regular grammars, Right and Left-Linear Grammars. Equivalence between Regular languages and Regular grammars.

Unit III   **Marks: 15**
Properties of Regular Languages
Closure under simple set operations- union, intersection, concatenation, complementation and star-closure. Decision algorithms for emptiness, finiteness and infiniteness, equality. Proof of non-regularity using Pigeonhole principle and using pumping lemma for regular languages.

Unit IV   **Marks: 15**
Context Free languages
Context-free grammars, leftmost and rightmost derivations, derivation trees. Parsing and Ambiguity in grammars and languages. Simplification of Context free Grammars- removing useless productions, empty-productions and unit-productions. Normal forms- Chomsky and Greibach normal forms. Pumping Lemma for CFL. Using Pumping Lemma to show that certain languages are not Context free.

Unit V   **Marks: 15**
Pushdown Automata
Definition and language accepted (acceptance by empty stack and final state and their equivalence). Pushdown Automata and Context free languages. Deterministic PDA and Deterministic Context free Languages.

SUGGESTED READING:

1. Peter Linz, *An introduction to Formal Languages and Automata*, 5th Edition, Narosa.
2. J. E. Hopcroft and J. D Ullman: *Introduction to Automata Theory, Languages and Computation,* Addison Wesley Publ., New York.

BCA 5.4.3 COMPUTER ORIENTED NUMERICAL METHODS AND STATISTICAL TECHNIQUES
Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

(Evaluation for the practical component of this paper will be done by the Colleges internally and will be part of the internal assessment of 20 marks)

UNIT – I   **MARKS: 10**
Representation of numbers:
Floating point representation, single and double precision, round off errors and truncation errors.

UNIT – II   **MARKS: 10**
Solution of non-linear equation
Bisection method, Newtons method, Regula Falsi method.

UNIT – III   **MARKS: 12**
Solution of simultaneous linear equation:

Basic elimination method, Gaussian elimination method, Gauss Jordan method, method of successive approximation.

UNIT – IV   **Marks: 10**
Ordinary differential equation:
Euler's method, Runge Kutta method.

UNIT – V   **Marks: 13**
Interpolation:
Newton's interpolation, Lagrange's interpolation, Newton's divided difference method.

UNIT – VI   **Marks: 10**
Numerical integration:
Trapezoidal rule, Simpson's $1/3^{rd}$ and Simpson's $3/8^{th}$ rule.

UNIT – VII   **Marks: 15**
Statistical methods:
Measure of central tendency: Mean, Median and Mode.
Probability, probability distribution, Binomial, Poison and normal distribution.
Mathematical expectations, moments, correlation, regression.

SUGGESTED READING:

1.M.K.Jain, S.R.K.Iyenger, R.K.Jain, ― *Numerical methods for Scientific and Engineering Computation*, Wiley Easterns.
2. K.E. Atkinson, ― *An introduction to numerical analysis*, J.Willey and Sons.

BCA5.4.4 ANIMATION

Total marks: Theory 60 (Semester end examination - 50 (exam duration 2 hours), Internal assessment - 10)
Practical 40 (Semester end examination - 30, Internal assessment - 10)

UNIT I : MULTIMEDIA AND FLASH PRELIMINARIES   Marks 10
Multimedia - understanding multimedia; experiencing and interacting with the message.
The Multimedia Computer and its components - multimedia hardware standards, the sound card, video card, the CD-Rom/DVD drive.
Multimedia Software - types and examples of multimedia software, animation, interactive programming, audio and video software, the place of Adobe Premiere and Macromedia Flash; other commonly used post production software like Adobe After Effects, Combustion, etc.
Introduction to Flash – the different aspects and uses of Flash; the Flash interface – the different windows, panels, the toolbox; Flash help system and how to use it.
Working with Flash Tools – Flash tools and how to use them : navigation and viewing tools, selection tools, drawing tools; strokes and fills in Flash and how to create and edit them; tools and panels for working with colours in Flash; text in Flash, different types of text blocks and how to work with them.

UNIT II : DRAWING IN FLASH   Marks 10
- **Working with graphic objects in Flash** – selecting, moving, transforming, grouping, stacking, and aligning objects; breaking apart objects and groups
- **Drawing in Flash** : panels used for drawing in Flash, techniques for creating different types of basic and advanced shapes, masks; editing and modifying the shapes; importing artwork and bitmaps into Flash; type effects such as masked text, drop shadowed text and embossed text.

UNIT III : ANIMATION   Marks 10
- **Animating in Flash** – animation tools: the timeline and how to work with it, the library panel, symbols and instances, the movie explorer panel and its uses; Different methods of animation in Flash: frame by frame animation, tweening – shape tweening and techniques for refining shape tweens; motion tweening, motion tweening effects; motion along a path; animating using masks, editing animations
- **Movie clips** - their uses, how to create them and edit them, nested movie clips; Flash buttons and how to create and animate them
- **Animation using timeline effects** – how to add a timeline effect and edit its settings.

UNIT IV : VIDEO, AUDIO AND EXPORTING   Marks 10
- **Working with Video and Sound**: Video - overview of working with video in Flash and supported formats; sound – overview of working with audio in Flash, supported formats, adding sounds to a document and to buttons, sound editing controls.
- **Publishing and Exporting Flash movies and images** – Publishing Flash movies and images into formats such as SWF, HTML, GIF, JPEG, PNG and QuickTime; exporting Flash movies as image sequences and clips.

UNIT V : ACTIONSCRIPT   **Marks 10**

- **ActionScript** : introduction to ActionScript, basics syntax and data types, elements of writing and debugging scripts; Using ActionScript for interaction in a Flash movie – events and event handlers; simple Flash movies using basic event handling and navigation – creating product kiosks, interactive web pages and elementary animation using ActionScript
- **Flash Learning Interactions**: creating e-learning content using Flash learning interactions – different Flash learning interactions, using them and configuring them in a Flash movie.

PRACTICALS

The student would be expected to create movies involving basic animation and/or interaction using ActionScript or Learning Interactions.

N.B: *The Laboratory details of this course will be prepared by the teacher handling this course.*

SUGGESTED READING:
1. *Macromedia Flash User Manual*
2. *Macromedia Flash online help system*

BCA 5.5 LABORATORY

At least 15 practical assignments covering paper BCA 5.1(50 marks), 6 practical assignments covering paper BCA 5.3 (50 marks) should be done by the students from the list prepared the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the course is covered. The details of the Laboratory works is listed in **Appendix-E**

BCA 6.1.1 PROGRAMMING WITH C#

Total marks: Theory 60 (Semester end examination - 50 (exam duration 2 hours), Internal assessment - 10), Practical 40 (Semester end examination - 30, Internal assessment - 10)

Unit I   **Marks: 10**
Creation of C#: C# family tree,, Relationship in .NET Framework, CLR, Managed vs. unmanaged code, CLS ;
Overview of C#: Object oriented programming, executing the program in IDE & command line compiler;
Data types, Literals and variables: Important data type, integers, floating- point, the decimal type, characters, the bool type; Literals; Variables, type conversion & casting, type conversion in Expressions.

Unit II   **Marks: 10**
Operators: Arithmetic operators, Relational & Logical operators, Assignment operators, Bitwise operators,
Control Statements: IF statements, Switch Statement, For loop, While loop, Do- while l loop, foreach loop, Break, Continue, goto.
Classes, Objects and Methods: Class fundamentals, creation of objects, Methods, Constructors and Destructors, new operator, this keyword.

Unit III   **Marks: 10**
Arrays & strings: One-dimensional array, Multi-dimensional array, Jagged arrays, Strings.
Closer look at methods & classes: Method overloading, overloading constructors, the Main () method, Recursion.
Operator overloading: Operator overloading fundamentals, Operator overload on built-in types, overloading relational operators, logical operators, Enabling short-circuit operators.

Unit IV   **Marks: 10**
Inheritance: Basics, Member access & inheritance, Virtual Methods and overriding, Abstract Classes.
Interfaces, Structures & Enumerations: interfaces, interface references, interfaces can be inherited; Structures.

Unit V: **Marks: 10**
Exception Handling: Exception handling fundamentals, using multiple catch statements, catching all exception, nesting try blocks, throwing an exception, using finally.
I/O: The Stream classes, console I/O.

PRACTICALS: *The Laboratory details of this course is listed in Appendix E*

SUGGESTED READING:
1. Herbert Schildt, *TheComplete Reference*. C# 2.0, Tata McGraw-Hill Edition 2006.
2. Jesse Liberty. *Learning C#,* O'reilly publications,2002.

BCA 6.1.2 DATA MINING & WAREHOUSING

Total Marks: 100 (Semester end examination - 80, Internal Assessment - 20)

Data Warehousing   **Marks: 20**

Overview and Concepts: Need for Data Warehousing, Basic elements of Data Warehousing, differences between Database Systems and Data Warehouse. Data Warehouse Architecture and its components, Infrastructure and metadata. Data Design and Data Representation - Principles of dimensional modeling, advanced topics- data extraction, transformation and loading, data quality. OLAP in Data Warehouse, Data warehousing and the web. Implementation and Maintenance: Physical design process, Data Warehouse deployment, growth and maintenance.

Data Mining Introduction   **Marks: 10**

Basics of data mining, Different definitions of Data Mining and related concepts, Data mining process- Data preparation, data cleaning and data visualization. KDD process. Data miming techniques: Clustering, Association rules and Decision trees.

Clustering   **Marks: 20**

Concept of Similarity and distance, Euclidean distance, Manhattan distance, Cosine similarity, Jaccard coefficient. Partitional versus Hierarchical Clustering, different types of data in clustering. Partitional clustering methods – k-means, k-medoids, PAM, CLARA, CLARANS. Hierarchical clustering methods – BIRCH, CURE. Density based clustering methods- DBSCAN.

Rule Mining   **Marks: 20**

What is an association rule? Mining association rules, frequent sets and border sets, algorithms for mining association rules – Apriori algorithm, Pincer-Search algorithm, Border algorithm..

Classification   **Marks: 10**

Introduction, Clustering versus Classification, decision tree construction principle, decision tree generation algorithms – CART, ID3.

SUGGESTED READING:

1. A.K. Puzari, *Data Mining Techniques*, University Press.
2. J. Han and M. Kamber. *Data Mining: Concepts and Techniques*. Morgan Kaufman. 2001.
3. P. Tan, M. Steinbach and V. Kumar, *Introduction to Data Mining*, Pearson Education (LPE); 2009.

BCA 6.1.3 OPTIMIZATION TECHNIQUES
Total Marks: 100 (Semester end examination - 80, Internal Assessment - 20)

UNIT – I   **Marks: 10**
Introduction to Operation Research:
Origin and Development of OR, Nature and Features of OR, Applications of OR, Opportunities and Shortcomings of OR.

UNIT –II   **Marks: 15**
Linear Programming Techniques:
Mathematical Formulation of the Problem, Graphical Solution Method, The simplex algorithm, the two phase algorithm, Duality theorem, revised simplex algorithm, revised simplex method versus simplex method.

UNIT – III   **Marks: 15**
Transportation Problem:
General transportation problem, Transportation table, Duality and Loop in Transportation Problem, Formulation of Transportation Problem, Solution of Transportation Problem(North West Corner's method and Vogal's Approximation method).

UNIT – IV   **Marks: 10**
Assignment Problem
Mathematical Formulation of the problem, Assignment method, Special cases in assignment problem,The travelling salesman problem.

UNIT-V   **Marks : 10**
Network Scheduling by PERT/CPM
Introduction, Rules of Network Construction, Critical Path Analysis, Distinction between PERT/CPM.

UNIT –VI   **Marks : 10**
Simulation:
Simulation models, Even type of simulation, Generation of random numbers, Monte Carlo techniques, simulation techniques applied to queues.

UNIT-VII   **Marks : 10**
Information Theory
A measure of Information, Entropy-the expected information, Entropy as a measure of Uncertainity, Properties of Entropy function

SUGGESTED READING:
1. K. Swarup, P.K.Gupta, M.Mohan, *Operations Research*, S.Chand &Sons, NewDelhi
2. K.V.Mittal & G Mohan, ― *Optimization Methods*, Wileys

BCA 6.1.4 OBJECT ORIENTED ANALYSIS AND DESIGN

Total Marks: 100 (Semester end examination - 80, Internal Assessment - 20)

UNIT – I   **Marks: 15**
Complexity – The inherent complexity of software, The Structure of complex systems, Bringing order to chaos, on designing complex systems, Categories of analysis and Design methods.
The Object Model – The evolution of object model, Elements of object model.

UNIT – II   **Marks: 10**
Classes and Objects
The Nature of an Object, Relationship among objects, nature of a class, Relationship among classes.

UNIT – III   **Marks: 15**
Introduction to Modeling and UML
Importance of modeling, principles of modeling, object oriented modeling, overview of UML conceptual model of the UML, Architecture.

UNIT–IV   **Marks: 15**
Basic Structural Modeling
Common Mechanism: Terms and Concepts, Common modeling techniques. Diagrams, Class Diagrams.
Advanced Structural Modeling
Interfaces, Types and Roles, Packages, Object Diagrams.

UNIT–V   **Marks: 10**
Basic Behavioral Modeling
Interaction, Interaction diagram, Use case, Use case diagram.
Advanced Behavioral Modeling
State Machines, State Diagrams.

UNIT –VI   **Marks: 15**
Architectural Modeling
Deployment, Deployment Diagram, Collaboration

Case Study
Any application can be discussed with help of an open tool.

SUGGESTED READING:

1. Grady Booch, Robert A.Makimchul,MichaelW.EagelJimConallen,Kelli A. Houston, *Object Oriented Analysis and Design with Applications,* 3rd Edition, Pearson Education Inc,2013.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, *The Unified Modeling Language User Guide*, 2nd Edition, Pearson Education Inc,2013.
3. Michael Blaha, James Rumbaugh, *Object Oriented Modeling and Design with UML,* 2nd Edition, Pearson, 2010.

BCA6.2.1 MOBILE APPLICATIONS

Total marks: Theory 60 (Semester end examination - 50 (exam duration 2 hours), Internal assessment - 10), Practical 40 (Semester end examination - 30, Internal assessment - 10)

UNIT – I   Marks: 15
Overview
A little background about mobile technologies, Introduction to mobile devices and Administration - Mobile devices vs. desktop devices, Power Management, Screen resolution, Touch interfaces, Application deployment, App Store, Google Play, Windows Store, Development environments

Different mobile technologies – Android, Windows, IOS, Black Berry, series 40, Bada, Benefits and drawbacks of Smartphone programming, Overview of Android, How it all got started, Why Android different and important, Android Stack overview, Linux kernel, native libraries, App framework, Apps, SDK overview, platforms, tools, versions. Creating and setting up custom Android emulator.

UNIT–II   Marks: 10
Get Started with Android
Install the android SDK, Install base tools, install SDKs and Add-ons, Install apache Ant, Emulator, and Device. Get know Eclipse, Build, install and Run the Application in your Emulator or Device, Project Structure.
Creating Applications and Activities: Introducing the Application Manifest, Using the Manifest Editor, The Android Application Life Cycle, Application Priority and Process States. Creating an Activity: The Activity Life Cycle.

Designing User interface
Designing by declaration, creating the opening screen, using alternate resources, implementing an about box, applying a theme, adding a menu, adding settings, debugging with log messages, debugging with debugger.
The Android Widget Toolbox, Layouts, Creating and Modifying Views, Creating and Using Menus, Android Menu System

UNIT – III   Marks: 10
Intents, Broadcast Receivers, Adapters, and Connecting to an Internet Resource, Using Activities as Dialogs
Exploring 2D graphics and Multimedia
Learning the basics, adding Graphics to existing apps, handling input, learn to change the final improvements, Playing audio, Playing Video, Adding sound to existing app.
Storing local Data
Reading/writing local data, Accessing the Internal File system, Accessing SD card.

UNIT – IV   **Marks: 10**

Location and Sensing

SMS Messaging , Displaying MAPS Location Data, Monitoring and Tracking a Location,

Putting SQL to work

Introducing SQLite, In and Out of SQLite, Hello Database, Data Binding, using content provider, implementing content provider.

Preparing and Publishing

Preparing app for publishing, Deploying APK files, uploading in Market.

UNIT –V   **Marks: 5**

Accessing Android Hardware:

Using the Media APIs, Playing Media Resources, Recording Multimedia, Using the Camera,
Controlling Camera Settings, Using the Camera Preview, Taking a Picture, Introducing the
Sensor, Android Telephony, Making Phone Calls, Monitoring Phone State and Phone Activity,
Monitoring Data Connectivity and Activity, Accessing Phone Properties and Status,
Controlling the Phone, Controlling Device Vibration

Web Apps and Android compatibility:

Using Web view, Introducing HTML5

PRACTICALS:

*The Laboratory details of this course is listed in **APPENDIX-E***

SUGGESTED READING:

        1   Grant Allen, *Beginning Android 4*, A press, 2012.

        2   Wei-Meng Lee, *Beginning android 4 application Development*, John Wiley & sons, Inc, 2012.

        3   Charles Petzol, *Programming Windows,* Microsoft Press, 6th Edition, 2012.

REFERENCE BOOKS:

        1   Ed Burnette, *Hello, Android: Introducing Google's Mobile Development Platform,* Pragmatic. Bookshelf (2009), ISBN-13: 978-1934356173.

        2   Jerome (J.F) DiMarzio , *Android - A programmer's Guide*, Tata McGrew Hill ,2010, ISBN: 9780071070591.

        3   Charles Petzold, *Programming Windows Phone*, Microsoft Press,2010

BCA6.2.2 CYBER LAW
Total Marks: 100 (Semester end examination - 80, Internal Assessment - 20)

Unit 1 Cyber Laws   Marks: 10
Meaning of Cyber world and cyber law, The internet and online resources, Security of information , Computer security and Security threats, The language of cyber space, Legal enactments of cyber laws.

Unit 2 Cyber Crimes   Marks: 30
Introduction , Classification , Offences under the Information Technology Act 2000 - Computer related crimes , Digital forgery , Cyber defamation , Cyber pornography , Cyber stalking or harassment , Hacking and Cracking , Tampering with computer source documents , Publishing of obscene information in electronic form , Breach of confidentiality and privacy, Online theft , Internet fraud , Spoofing , Sniffing, e-mail spamming and bombing , Financial crimes, Data alteration /Destruction , ATM fraud , Identity Theft , Malicious programs, Cyber terrorism.

Unit 3 Information Technology Act–2000 and its various Terms and Provision   Marks: 20
History, object, Essence, and specifics of the Act, Salient features, e – Governance, Digital Signature , Cryptography , Digital Signature Certificate, Legal recognition of Digital Signature , Legal recognition of Electronic documents, Offences and Contraventions, Penalties and Adjudications, Digital evidence and Cyber forensics, Legal software and Legal Process outsourcing (LPO).

Unit 4 Regulation of Cyber Space   Marks: 20
Freedom of Expression in cyber space, The cyber Regulation Appellate Tribunal, Need for regulations in cyber space, Scope of cyber Laws in e- Commerce, e – Taxation and online Contracts , Global Efforts on electronic Communication and Protection.

Prescribed Legislations
1. Information Technology Act '2000

SUGGESTED READINGS:

1. *Cyber law and Crimes* - Barkha and U. Rama Mohan
2. *Cyber Laws* – Justice Yatindra Singh
3. *Cyber Law in India* : Law on Internet (Pioneer book Publication , Delhi) –Dr . Farooq Ahmed
4. *Internet Law* - Chris Reed
5. *Law relating to computers , Internet and e – commerce* (Universal Law Publication co. , Delhi) – Nandan Kamath
6. *Information Technology : Law and Practice* (Universal Publication Co. Delhi) – Vakul Sharma .
7. *Leagal diamention of cyberspace* (Indian Law Institute Publication , Delhi) - S . K. Verma and Raman Mittal .
8. *Cyber Crime Law Enforcement , Security and Surveillance in the Information age (Rout Leadge)* , 2000 – Brian Loader and Douglas Thomas .

BCA6.2.3 DISTRIBUTED SYSTEMS

Total Marks: 100 (Semester end examination - 80, Internal Assessment - 20)

UNIT – I   Introduction   **Marks: 15**

Introduction, definition of a distributed system, goals, Making Resources Accessible, Distribution, Transparency, Openness, Scalability. Types of distributed systems, Distributed Computing Systems, Distributed Information Systems, Distributed Pervasive Systems.

UNIT – II   Communication   **Marks: 13**

Remote procedure call, basic rpc operation, parameter passing, asynchronous rpc. Message-oriented communication, message-oriented transient communication, message-oriented persistent communication.

UNIT – III   Synchronization   **Marks: 12**

Clock synchronization, physical clocks, global positioning system, clock synchronization algorithms. Logical clocks, lamport's logical clocks. Mutual exclusion, a centralized algorithm, a centralized algorithm, a distributed algorithm, a token ring algorithm.

UNIT – IV   Election Algorithms   **Marks: 15**

Global positioning of nodes, election algorithms, Traditional Election Algorithms, Elections in Wireless Environments, Elections in Large-Scale Systems.

UNIT – V   Consistency and replication   **Marks: 15**

Introduction, Reasons for Replication, Replication as Scaling Technique, data-centric consistency models, Continuous Consistency, Continuous Consistency, client-centric consistency models, Eventual Consistency, Monotonic Reads. Consistency protocols, Primary-Based Protocols.

UNIT – VI   Fault tolerance   **Marks: 10**

Introduction to fault tolerance, Basic Concepts, Failure Models, Failure Masking by Redundancy, process resilience, Agreement in Faulty Systems.

SUGGESTED READINGS

1   Andrew S. Tanenbaum, Maarten Van Steen, *Distributed Systems: Principles and Paradigms*, 2nd Edition, Printice-Hall of India, 2008.
2   Coulouris, G, Dollimore J, Kindberg T, Blair G, *Distributed System: Concept and Design,* 5th Edition, Pearson Education

Reference Books:

1   Tanenbaum S Andrew, *Distributed Operating Systems,*5th Edition*,* Pearson Education Asia, 2010.
2   SinghalMukesh, ShivaratriG Niranjan, *Advanced Concepts In Operating Systems Distributed Data Base And Multiprocessor Operating Systems*, McGraw-Hill, Inc., 2009.

APPENDIX-A

BCA1.5 LABORATORY

Practical Assignments covering paper BCA1.3 (Introduction to C programming) - 60 marks (At least 20 programming assignments have to be done by each student from the following list. The assignments should be selected in such a way that all the features of C language are included.)

List of Experiments:
1. Write a program to convert a given temperature value from Fahrenheit scale to Centigrade scale and vice versa.
2. Write a program to display ASCII value of a character.
3. Write a program to check whether a number is perfect or not.
4. Write a program to find out the biggest of three numbers using nested if.
5. A company insures its drivers if either of the following conditions are satisfied
   - Driver is married.
   - Driver is an unmarried, male and above 30 years of age.
   - Driver is unmarried, female and above 25 years of age.

   Write a program to decide if a driver is to be insured using logical operators.
6. Write a program to read a list of positive integers terminated by -1 and display the odd and even numbers separately and also their respective counts.
7. Write a program to read values of n and x and print the value of y using switch case where
   a. $y=n+x$ when n=1
   b. $y=1+x/n$ when n=2
   c. $y= n+3x$ when n=3
   d. $y=1+nx$ when n>3 or n<1.
8. Write a program to n values of sales and then calculate the commission on sales amount where the commission is calculated as follows:
   a. If sales $<=$ Rs.500, commission is 5%.
   b. If sales > 500 but $<= 2000$, commission is Rs 35 plus 10% above Rs 500.
   c. If sales > 2000 but $<= 5000$,commission is Rs 185 plus 12% above Rs.2000.
   d. If sales > 5000 ,commission is 12.5%.
9. Write a program to find out minimum, maximum, sum and average of n numbers without using array.
10. Program to find mean and standard deviation (SD) for a set of n numbers without using array.
11. Write a program to find out the roots of a quadratic equation. Use proper testing to find checks for real and complex roots.
12. Write a program to print the digits of a number in words. (eg. if a number 841 is entered through the keyboard your program should print "Eight Four One".)

13. Write a program to print the PASCAL Triangle up to the n-th row where n is an input to the program.
14. Write a function to return the HCF of two positive integers. Write a main function to read two positive integers and print their HCF and LCM by using the above function.
15. Write a program to convert a decimal number into binary number using function.
16. Write a program to display the result of sine series using function.
17. Write a program to find the sum of the following series
    $1+x-x^3/3!+x^5/5!-x^7/7!+\ldots$ corrected up to the 3 decimal place.
18. Write a program to read n numbers in a sorted array and insert a given element in a particular position
19. Write functions to compute the factorial of a number using both recursive and non-recursive procedure.
20. Write a program to print the values of ^nc_r and ^np_r for given positive integers $n \geq r > 0$. Use a function fact(n) to return the factorial of a non-negative integer.n.
    $$^nc_r = n!/r!*(n-r)! \quad ^np_r = n!/(n-r)!$$
21. Write a program to display the first n Fibonacci numbers using function.
22. Write a program to display the prime numbers within a given range. Write a function to check whether a given integer is prime or not and use it.
23. Write a program to Multiply two matrices using function
24. Write a program to display the upper Triangle and lower Triangle of a given square matrix using function.
25. Write a function to check if a given square matrix is symmetric or not. Write a main function to implement it.
26. Write a program to read a m X n matrix and calculate the Row sum and Column Sum of the matrix
27. Write a function to read in an integer and print the representation of the number using the sign and magnitude representation scheme using 8 bits. The program should check for overflow/under flow conditions. The left most bit is to be used as the sign bit.
28. Write a program to merge two sorted arrays.
29. Write a program to implement selection sort using function.
30. Write a program to count the number of vowels in a string.
31. Write a program to concatenate two strings using function (without using library function).
32. Write a program to convert a string from upper case to lower case and vice versa.
33. Write a program to swap two numbers using function (pass the pointers).
34. Write a program to sort n number of strings in ascending order using pointer.
35. Write a program using pointers to copy a string to another string variable (without using library function).
36. Declare a structure of a student with details like roll number, student name and total marks. Using this, declare an array with 50 elements. Write a program to read details of n students and print the list of students who have scored 75 marks and above.
37. Create a structure to store the following information of employees.
    a. Employee's number, name, pay and date of joining.

It has been decided to increase the pay as per the following rules:

Pay <= Rs.3000   : 20% increase

Pay <= Rs.6000 but > Rs.3000   :15%   increase

Pay > Rs.6000   : no increase

Write a program to implement the above structure.

38. Write a program to read a text file and count the number of vowels in the text file.

39. Write a program to copy a text file to another file.

Practical Assignments covering paper BCA 1.1 (Computer Fundamentals & ICT Hardware) - 40 marks (At least 6 assignments have to be done by each student from the following list.)

Objectives:

The Practical introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like Windows OS, LINUX OS, and device drivers. Basic system administration in Linux which includes: Basic Linux commands in bash, Create hard and symbolic links, Text processing, Using wildcards In addition hardware and software level troubleshooting process, tips and tricks would be covered.

Different ways of hooking the PC on to the network and internet from home and workplace and effectively usage of the internet. Configuring the TCP/IP setting. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

List of Experiments/Tasks:

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Basic commands in Linux

Task 6: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

Task 7: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Task 8: The test consists of various systems with Hardware / Software related troubles, formatted disks without operating systems. Installation of antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

BCA 2.5 LABORATORY

Practical assignments covering paper BCA 2.1 (Data Structure and Algorithm) - 50 marks (Each student should do at least 15 assignments from the following list.)

List of Experiments: (Write programs in C language)
1. Implement binary search and linear search algorithms on arrays.
2. Implement following sorting algorithms :
   - i) Bubble sorting
   - ii) Insertion sort
   - iii) Heap sort
   - iv) Quick sort
   - v) Merge sort

3. Write a program to create a singly linked list and insert an element at the beginning, end, and at a given position of the linked list.

4. Write a program to create a singly linked list and delete an element from any position of the linked list.

5. Write a program to create a singly linked list. Write functions for
   - i. counting the number of elements in a list
   - ii. to search for a given element in a list. If the item has been found then it should return the position at which the item was found; otherwise it should return -1 to indicate not found.

6. Write a function to concatenate two linked lists.

7. Write a function to merge two sorted linked lists.

8. Write a program to create a doubly linked list and insert an element at any position.

9. Write a program to create a doubly linked list and delete an element from a given position.

10. Write a program to create a circular linked list and insert / delete an element at any position.

11. Write a program to implement a stack using
   - i) array structure

ii) linked list structure

12. Write a program to implement two stacks using a single array.

13. Write a program to evaluate a postfix expression using stack.

14. Write a program to convert an infix expression into a postfix expression.

15. Write a program to implement a queue using array.

16. Write a program to implement a queue using linked list.

17. Write a program to implement a circular queue using array.

18. Write a program to implement a circular queue using linked list.

19. Write a program to create a binary search tree using link representation and display the elements in preorder, in order and post order using recursive function.

20. Write a program to create a binary search tree using link representation and
        i) search
        ii) delete an item from the binary search tree.

Covering paper 2.2 (Computer Bases Accounting and Financial Management) - 50 Marks (Each student should do at least 10 assignments from the following list.)

List of Experiments:
1. Create Multiple Ledger of the following Account Heads :

Bank Charges ; Basic Pay ; Bonus ; Bonus Paid ; Business Promotion Expenses ; Commission Paid ; Conveyance ; Depreciation on Air Conditioner ; Depreciation on Building ; Depreciation on Computers ; Depreciation on Furniture & Fixtures ; Depreciation on Motor Car ; Depreciation on Plant & Machinery ; Discount ; Donation ; Electricity Charges ; Employers Contribution to Provident Fund ; Freight Outward ; Insurance Premium ; Interest Due ; Interest & Finance Charge ; Interest on Bank Overdraft ; Interest on Partner's Capital A/c ; Interest on Unsecured Loans ; Legal Fees ; Miscellaneous Expenses ; Office Rent ; Office Repairs & Maintenance ; Printing & Stationery ; Rent ; Rent Due ; Travelling Expenses.

2. Make necessary entries in Tally in the books of Galaxy Enterprise :
(a)   Introduced Cash Rs 10,00,000 , Furniture worth Rs1,00,000 , Computer worth Rs 86,000 , Machinery Rs 1,20,000 into the business on 1st Jan,2010
(b)   Opened a Current A/c with Bank of Baroda with Rs 1,00,000 on 2nd Jan,2011

(c)   Purchased goods on 6th Jan,2010 from Sridhar Stores on credit Rs 2,25,000

(d)   Sold goods for Cash Rs 1,20,000 to Maitree Stores on 7th Jan,2010

(e)   Sold goods to Sankar on credit for Rs 34,000 on 9th Jan,2010

(f)   Paid Rent advance Rs 25,000 by Cheque No 345671 on 10th Jan,2010

        Withdrew from bank Rs 5,000 for office expenses on 18th Jan,2010

        Purchased stationery items on 22nd Jan , 2010 for office use from Radhika Stationeries for Rs 1,500

        Received Advance from Jagat for supply of goods worth Rs 12,000

        Paid salary to office staff Rs10,000 by Cheque 345672 on 31st Jan, 2010

3. Make Data Entries for the following transactions :
   - (a) Withdrew Rs 1,00,000 cash from SBI on 6th Jan ,2011
   - (b) Deposited Rs 40,000 in HDFC Bank on 9th jan ,2011
   - (c) Transferred Rs 20,000 from HDFC Bank to SBI on 12th jan , 2011
   - (d) Paid Rs 4,300 as Insurance charges through HDFC Bank on 18th Jan , 2011
   - (e) Received Rs 3,25,000 from ABC Co. Ltd. On 23rd Jan , 2011 against our sales through Cheque and it has been deposited in SBI
   - (f) Sales worth Rs 5,50,000 made on credit to Vikas Group on 29th jan,2011
   - (g) Provision towards Employers PF Contribution Rs 78,000 made on 31st jan,2011
   - (h) Purchased Machinery Rs 1,00,000 from Sunder Enterprise (INPUT VAT 12.5%)

4. Enter the following transactions in Tally in the books of Computer Solutions :
   - (a) Purchased on 8th April , 2009 HCL Celeron 15 Nos @ Rs 14,000 ; HCL PIV 15 Nos @ Rs 21,000 from Next Generation Systems (Input VAT @ 4%)
   - (b) Sold on 10th April , 2009 to Fortune Computer Services 10 Nos HP Laserjet Series 1010 @ Rs 12,000 (Output VAT @ 12.5%)
   - (c) Received from Fortune Computer Services Rs 80,000 on 25th April , 2009
   - (d) Paid to Next Generation System Rs 2,00,000 vide Cheque No 357602 of HDFC Bank

5. Record the following transactions in Tally in the books of Hind Computers :
   - (a) Returned one Wireless Keyboard Rs 250 to Super Buzz (Input VAT 4%) on 13th August , 2010
   - (b) Returned from Computer Junction BM PIV Rs 500 on 16th August , 2010 (CST 4%)
   - (c) Transferred 10Nos CD ROM Disks (1 Box @ Rs 265/Box) from Stores to Defective Goods Stores on 31st August , 2010

6. Prepare a Cash Book from the books of ABC Enterprise :
   - (a)   Cash Balance on 1st April 2010 Rs 4,00,000
   - (b) Opened a Current Account with UCO Bank on 5th April , 2010 with Rs16,000
   - (c) Purchased goods for Cash Rs 2,50,000 on 6th April , 2010
   - (d) Sold goods for Cash Rs 1,25,000 on 8th April , 2010

(e) Paid for Travelling Expenses Rs 2,300 on 10th April , 2010

(f) Paid for Staff Welfare Rs 1,200 on 16th April , 2010

(g) Introduced Additional Capital Rs 50,000 on 20th April , 2010

(h) Withdrew from Bank for Office Cash Rs 2,000 on 27th April , 2010

(i) Sold goods for Rs 65,000 on 28th April , 2010 and payment received by Cheque 15,000 and balance in Cash

7. Prepare a Double Column Cash Book from the following transactions of XY Ltd :

   (a) On 1st Jan, 2010 Cash in Hand Rs 5,00,000 and Cash at SBI Rs 2,30,000

   (b) On 4th Jan, 2010 Goods purchased for cash Rs 1,24,000

   (c) On 8th Jan, 2010 Goods sold for cash Rs 2,25,000

   (d) Deposited into SBI an amount of Rs 1,10,500

   (e) Paid rent to landlord Rs 24,000 by Cheque no 234675

   (f) Withdrew from SBI Rs 30,000 for purchase of Furniture

   (g) Received payment of Rs 30,000 from Amit Kothari, a customer by Cheque

   (h) Withdrew from SBI Rs 23,000 for office cash

8. Make relevant Voucher Entries from the following transactions :

   (a)   On 1st April, 2010 India Infotech received a Bill (vide No. 001) from Pheonix Agencies for Rs. 5,00,000 towards the Advertisement services rendered.

   (b) On April 8, 2010, payment of Rs. 4,95,000 is made towards bill no. Bill-001 to Pheonix Agencies for the purchase of Advertisement services, vide cheque no. 254781

   (c) On May 6, 2010, Universal Infotech, paid TDS of Rs. 5,000 towards Advertisement Expenses, vide cheque no. 056330 for the month of April, 2010.

9. Show how would you deal with the following Bills in Tally :

   (a) On 7th May, 2010, India Infotech received a bill (vide no. 911) from Gautam Bishnu & Associates for Rs. 1,12,360 inclusive of other charges of Rs. 12,360 towards the auditing services provided(TDS Rs10,000)

   (b) On 8th May, 2010 India Infotech received a bill (vide No. 696) from Digitech Computers for Rs. 25,000 towards commission charges.

   (c) On 12th May, 2010 India Infotech received a bill (vide No. 874) from Digitech Computers for Rs. 40,000 towards commission charges.

   (d) On 14th May, 2010 India Infotech deducted tax Rs 2,500 towards Commission Expenses for the transaction dated 8th May and Rs 4,000 towards transaction dated 12th May.

10. Prepare a Bank Reconciliation Statement of Digitech Solutions on 31st December, 2010

    (a) Balance as per Bank Book on 31st Dec,2010 Rs 32,000

(b) Cheque deposited into UBI Rs 13,000 on 27th Dec , 2010 cleared by bank on 31st Dec ,2010 omitted to be recorded in Cash Book

(c) Withdrew from UBI Rs 2,000 for office cash on 28th Dec,2010 but omitted to be recorded in Cash Book

(d) Service Charge debited by UBI Rs 200 not credited in Cash Book

(e) Bank Interest Rs 568 credited by UBI not recorded in Cash Book

(f) Dividend from UTI Rs 12,450 credited by UBI not recorded in Bank Book

(g) Direct deposit by Ravi, a customer Rs 3,400 into our UBI A/c not recorded in Cash Book

11. Choose the Correct Answer :

(i) What kind of procedure is used while operating the key F1 ?
   (a) ALT and F1
   (b) CTRL and F1
   (c) SHIFT and F1
   (d) F1

(ii) By default how many Groups and Ledgers does Tally have ?
 (a) 22 Groups and 2 Ledgers
 (b) 28 Groups and 3 Ledgers
 (c) 28 Groups and 2 Ledgers
 (d)) 26 Groups and 3 Ledgers

(iii) To toggle back to the 'Main Area' , the short cut key is
(a) CTRL and M (b) CTRL and A (c) CTRL and I (d) CTRL and N

(iv) Ledger Menu comes under
    (a) Accounts Info
    (b) Inventory Info
    (c) Accounting Vouchers
    (d) Inventory Vouchers

(v) To change the current period press
    (a) F1
    (b) ALT and F1
    (c) F2
    (d) ALT and F2

12. Fill in the Blanks:
    (a) To display the 'Change Voucher Type' press ----------------
    (b) The shortcut key to view detailed 'Profit & Loss A/c' is ------------------
    (c) To record the Voucher in 'Sales' press --------------

(d) To shut an Activated Company press --------------
(e) The shortcut key used to get the 'Stock Journal Voucher' screen is -------------

13. Show relevant Voucher Entry in Tally:
(a) You have purchased an item at a rate of Rs.100 on 8th April , 2010 however by mistake your supplier had billed you at a rate of Rs.95. Now your supplier issues a debit note for balance of Rs. 5 plus vat and other applicable duty Rs 6.
(b) You have agreed to pay a purchase invoice of Rs 1,00,000 within 1 month time to your supplier Geeta Stores. However, you couldn't manage to pay and your supplier agreed for a delayed payment at an interest rate of @2. p.m. for the same

14. The total gross salary payable by X Ltd for the month of January 2010 is Rs. 3,00,000. Out of above, basic salary which is eligible for Provident Fund contribution @ 12% is Rs. 2,00,000. X Ltd is also required to pay a sum @12% from the basic salary before the same is disbursed to employee. Apart of this, it is also required to pay @1.61% (of basic pay additional amount as per below :
@1.10% towards PF administration fees ; @0.50% towards Employees Deposit linked insurance scheme and @0.1% towards EDLI administration charges.
Show how you would record the above transactions in Tally.

15.   BX Ltd purchased a machinery for Rs 5,00,000. To use this machine company requires a platform, pipe connections, electrical connections, fabrication works etc. at the cost of Rs. 1,00,000. On the expense of Rs. 1,00,000 tax to be deducted at source. The Company made a contract with Arun Contractors for electrical and fabrication work. On 10-8-2010 BX Ltd received bill for Rs. 60,000 from Arun contractors towards electrical and fabrication work. Record the above transaction in Tally.

BCA3.5 LABORATORY

Covering Paper 3.3 (Database Management System) - 50 Marks

Each student should do at least 6 assignments from the following list.

List of Experiments:

1. Create a table *Employee* with the following columns:
    Emp_no (numeric) primary key
    Emp_name (string)
    Join_date (Date)
    Basic_pay_fixed_at (numeric)
    Date_of_birth (Date)

Insert the following data into the table.

Emp_no.	Emp_name	Join_date	Basic_pay	Date_of_birth
1001	Charles Babbage	01-Jun-2000	8000.00	03-10-1973
1002	George Boole	01-Jul-2001	5000.00	04-12-1972
1003	E.F. Codd	01-Jun-2001	8000.00	06-03-1969
1004	Bill Gates	01-Jul-2003	5000.00	09-10-1995
1005	Tony Greig	01-Aug-2004	8000.00	04-05-1985

2. Create the following two tables and insert data into the tables.
 Player (Roll no.→Primary Key)

Roll no.	Name
10	Vijay Amrithraj
20	Leander Paes
30	Mahesh Bhupathi
40	Sania Mirza

Match (Match_no→Primary key,Roll no→Foreign key)

Match_no	Roll_no.	Match_Date	Opponent
1	20	10-Jul-2008	Washington
2	30	12-Jan-2008	Sampras

| 3 | 20 | 12-Aug-2008 | Borg |
| 4 | 30 | 20-Mar-2008 | Vijay |

Perform the following two operations:

     (i) Perform EQUIJOIN operation to retrieve data from both the files.

     (ii) Perform OUTERJOIN operation to retrieve the unmatched records.

3. Design an ER diagram for a **BANK** database schema. To consider that each Bank can have multiple branches and each branch can have multiple Accounts and Loans for customer. Also to specify the non weak & weak entity types, key attributes & key types, relationship types, instances, constraints and participations.

4. Create a table **Student** taking the attributes given bellow

       Roll_no, Student_name, Address, Date_of_addmission, Class

       Section and Contact_no.

Write appropriate queries to perform the following operations:

    a) To insert values in the Student table.

    b) To delete values from Student table

    c) To list the names of all students which roll_no > 20.

    d) To search for students who got admitted before 01-01-2006.

    e) To change the name of the student whose roll number is 10 to Amar.

5. Create tables **Department** and **Employee** with the attributes given bellow.

     Employee (EmpNo , Empname, Address, Dno)

     Department (Dno, Dname, Location)

   Dno in Employee is a foreign key.

Write appropriate queries to perform the following operations:

    a) To insert values in the tables.

    b) To retrieve the names and addresses of all Employees working in the Finance department.

    c) To print the location where Administration department is located.

    d) to delete all information regarding a particular employee.

6. Create table **Student** and **Course** taking the attributes given bellow.

       Student (Roll_no, Name, Semester, Course_no(Foreign key))

       Course (Course_no, Course_name)

Write appropriate queries for the following operations:

    a) To retrieve names of all students who are admitted to the course 'BCA'.

b) To retrieve the names of all students whose course name is 'BCA' and who are in the 3rd semester.

c) To display details of all courses in which more than 100 students got admitted.

d) For course being offered, display the course name and number of students admitted to the course.

7. Create tables *Employee*, *Department*, *Location*, *Works_on*, and *Project* taking the attributes given bellow.

   Employee (Fname, Lname, Empno, Bdate, Address, Salary, Dnumber)
   Department (Dname,Dnumber,Mgrno)
   Locations(Dnumber, DLocation)
   Works_on(Empno, Pnumber, Hours_per_day)
   Project(Pname, Pnumber, Location,Dnumber (Foreign))
   Dependent(Empno, Dependent_name, Sex, DOB, Relationship)

Write appropriate queries for the following operations:

a) Retrieve the names and addresses of all employees who work in the Finance department.

b) To retrieve the names of all employees who works on all the projects controlled by department number 6

c) For each department, print the name of the department and the name of the manager of the department.

d) Retrieve the location where the Administration department is located.

e) For every project located in Mumbai list the project number, the controlling department and department manger's name and address.

f) Find out how many employees are there in each department.

g) Find the total salary of all employees of the "Research" department, as well as the maximum, minimum and average salary in this department

h) Retrieve the name of all employees who have no dependent.

i) Alter the "Employee" table by deleting the coloumn Bdate.

j) Retrieve the Fname, Lname of all employees whose salary is higher than average salary.

k) For each department retrieve the department number, the number of employee in the department and their average salary.

l) Retrieve the name of all employees who have two or more dependent

m) Retrieve the details of all employees who works on project number 1,2,3

8. Create Table

   Client_master (Client_no, name, address, Bdue)
   Product_master(P_number,Description,saleprice,costprice)
   Sales_master(Salesmno,Sname,Addres,Salamnt,Remarks)
   Sales_order(O_no,Client_no,Odate,Delyaddr,Salesmno)

Sales_order_detail(<u>Order_no,Product_no</u>, Qtyorder, product_rate,Qty_dispatched)

Write appropriate queries to perform the following operations:

    i) List name of all clients having 'a' as the second letter in their names.
    ii) Retrieve the description and total Qty sold for each product.
    iii) Find product no. and description of non moving products (i.e product not being sold).
    iv)For each product being sold, list the product number and the total amount (in Rs.) sold.
    v) List all client who stay in 'Bangalore' or 'Mumbai'
    vi) List the clients who stay in a city whose First letter is 'M'
    vii) Find the names of clients who had purchased the item 'Trouser'.
    viii)   Find out if T-Shirt' has been ordered by any client and if so print the details of the client.
    ix) List details of all products whose unit price is more than Rs. 5000.00.
    x) Calculate the total amount (in Rs.) purchased by each client that has purchased items amounting more than Rs. 20000.

9. Create table
    Author(Author_id, Name, City, Country)
    Catalog (Book_id, Title, Author1_id, Author2_id, Publisher_id, Category_id, Year, Price)
    Publisher(Publisher_id, Name, City, Country)
    Order_details(Order_no, Book_id, Quantity)
    Category(Category_id, Description)
    Order_summary(Order_no,Member_id,Odate,Amount,Ostatus)
    Member(Member_id, Name, Address, Contact)
    Assume that all books have at most two authors.
  Write appropriate queries to perform the following operations:

a) Retrieve the title, author, and publisher names of all books published in 1999 and 2006.
b) Retrieve the title of all books whose one author is 'A Tanenbum'.
c) Get the details of all books whose price is greater than the average price of the books.
d) Get the names of all the books for which an order has been placed.
e) Get the names of all authors who have more than ten books in the catalog.
f) Get the details of the authors whose books are being sold from the book club.

g) Get the title and price of all books whose price is greater than the maximum of the category average.

Practical Assignments covering paper 3.4 (OOP in C++)- 50 marks
Each student should do at least 12 practical assignments from the following -

List of Experiments:
1. Define a class named ***triangle*** to represent a triangle using the lengths of the three sides. Write a constructor to initialize objects of this class, given the lengths of the sides. Also write member functions to check
   (a) if a triangle is isosceles
   (b) if a triangle is equilateral
   Write a main function to test your functions.
2. Define a structure ***employee*** with the following specifications.
   empno : integer
   ename : 20 characters
   basic, hra, da : float
   calculate() : a function to compute net pay as basic+hra+da with float return type.
   getdata() : a function to read values for empno, ename, basic, hra, da.
   dispdata() : a function to display all the data on the screen
   Write a main program to test the program.
3. Define a class ***circle*** to represent circles. Add a data member ***radius*** to store the radius of a circle. Write member functions area() and perimeter() to compute the area and perimeter of a circle.
4. Define a class ***complex*** with two data members ***real*** and ***imag*** to represent real and imaginary parts of a complex number.
   Write member functions
   rpart() : to return the real part of a complex number
   ipart() : to return the imaginary part of a complex number
   add() : to add two complex numbers.
   mul() : to multiply two complex numbers.
   Write constructors with zero, one and two arguments to initialize objects.
   (*This is an example of polymorphism.*)
5. Define a class ***point*** with two data members ***xordinate*** and ***yordinate*** to represent all points in the two dimensional plane by storing their x co-ordinate and y co-ordinate values.
   Write member functions
   dist() : to return the distance of the point from the origin.

slope(): to return the slope of the line obtained by joining this point with the origin.

Write constructors with zero, one and two arguments to initialize objects. Also write a friend function to compute the distance between two points.

6. Define a class *string* with the following data members

        char *p;

        int size;

and write member functions to do the following (without using library function) and using dynamic memory allocation.

- Length of the string
- Compare two strings
- Copy one string to another
- Reverse the string

Write suitable constructors and destructors. Also write a copy constructor for the class.

7. For the class *complex* defined in 4 above, overload the <<, >>, + and * operators in the usual sense. Also overload the unary – operator.

8. For the class *string* defined in 6 above, overload the <<, >> and + operators where + is to be used for concatenating two strings.

9. Define a class *time* to store time as hour, minute and second, all being integer values. Write member functions to display time in standard formats. Also overload the ++ and -- operators to increase and decrease a given time by one second where the minute and hour values will have to be updated whenever necessary.

10. Define a class to store matrices. Write suitable friend functions to add and multiply two matrices.

11. Write a class based program implementing static members.

12. Define a class *student* with the following specification:

        rollno   : integer

        sname : 20 characters

Derive two classes *artst* and *scst*. The class *artst* will represent students belonging to arts stream and the class scst will represent students belonging to science stream. The artsst class will have additional data members *ph, hs, en* and **as** to store marks obtained by a student in three subjects Philosophy, History, English and Assamese. The class *scst* will have additional data members *ph, ch, ma and en* to store marks obtained in Physics, Chemistry, Mathematics and English.

Write the following member functions in the classes artst and scst

        ctotal()   : a function to calculate the total marks obtained by a student

        takedata() : function to accept values of the data members

        showdata() : function to display the marks sheet of a student .

13. Define an abstract base class *printer*. Derive three classes *laser-printer, line-printer* and *ink-jet-printer*. The derived classes will have data members to store the features of that particular printer. Write pure virtual function display() in the base class and redefine it in the derived classes.

14. Define a abstract base class *figure* and add to it pure virtual functions

    display()   : to display a figure
    get()   : to input parameters of the figure
    area() : to compute the area of a figure
    perimeter()   : to compute the perimeter of a figure.

    Derive three classes *circle, rectangle* and t*riangle* from it. A circle is to be represented by its radius, rectangle by its length and breadth and triangle by the lengths of its sides. Write a main function and write necessary statements to achieve run time polymorphism.

15. Write an interactive program to compute square root of a number. The input value must be tested for validity. If it is negative, the user defined function *my_sqrt()* should raise an exception.

16. Define a class *rational* to store rational numbers as a pair of integers, representing the numerator and denominator. Write a member function for setting the values of the numerator and denominator. This function should raise an exception if attempt is made to set a zero value as the denominator and in such cases it should be set to 1.

17. Write a class template for storing an array of elements. Overload the << and >> operators. Write a member function to sort the array in descending order.

18. Write a class template for representing a singly linked list. Write functions for inserting, deleting, searching and for displaying a linked list. Write a main function to test it on a linked list of integers and characters.

BCA 4.5 LABORATORY

Practical Assignments Covering paper 4.1 (Operating System) - 20 marks

Each student should do at least 12 assignments from the following list.

List of Experiments:
1. Write a program to create a child process that starts looping and then terminates.

2. Write a program to show that the child can be set up to ignore a signal from its parent.

3. Write a program to show that a process can ignore a signal.

4. Write a program to create a thread in which prints "We are proud to be Indians" and terminates.

5. Write a program to demonstrate how to "wait" for thread completions by using the Pthread join routine. Threads are explicitly created in a joinable state.

6. Write a program to create a thread in which print "We are proud to be Indians" and pass multiple arguments using structure during its creation.

7. Write a program to compute the dot product of two vectors and also show the use of mutex variable.

8. Write a program to create threads, the main thread creates three threads. Two of these threads increment a counter variable while third thread watches the value of the counter variable. When the counter variable reaches a predefined limit, the waiting thread is signaled by one of the incrementing threads. The waiting thread "awakens" and then modifies the counter. The program continues until the incrementing threads reach a final value and also print the final value.

9. Write a program to show attaching and detaching shared memory.

10. Write a program to show the communication between two processes through shared memory.

11. Write a program to show how two processes can talk to each other using wait() and signal() operations applied on semaphore.

12. Write a program in which a parent process accepts a list of integers to be sorted. Parent process uses the fork system call to create a new process called a child process. Both the processes use shared memory for the list of integers. Now use the parent process to sort the integers using bubble sort and the child process to sort the integers using selection sort.
Use semaphore variable for process synchronization.

13. Write a program to implement Banker's Algorithm for multiple resource type each.

14. Write a program to simulate Dining Philosophers Algorithm.

Covering Paper 4.2 (Web Technology) - 40 Marks

List of Experiments:

HTML *(At least 17 assignments has to be done from this group)*

1. Create a HTML document consisting of HTML heading, paragraphs and images.

2. Create a HTML document and insert comments in the HTML source code and insert horizontal lines.

3. Construct HTML document to set the font of a text, size of the font, style of the font.

4. Create a HTML document to show how to create hyperlinks.

5. Create a HTML document to use an image as a link.

6. Create a HTML document to open link in a new browser window.

7. Create a HTML document to jump to another part of a document (on the same page).

8. Create a HTML document to insert images from another folder or another server.

9. Create an image-map, with clickable regions.

10. Create a HTML document with all table elements (Table, Caption, Table Row, Table Data element, Table Heading Element, THEAD, TFOOT, TBODY)

11. Create HTML document to make an unordered list, an ordered list, different types of ordered lists, different types of unordered lists, Nested list, Definition list.

12. Create HTML form with the all FORM elements (text fields, password field, Checkboxes, Radio buttons, Select elements, Drop-down list with a pre-selected value, Textarea (a multi-line text input field) and buttons.

13. Create HTML document with all Frame elements (FRAMESET, FRAME, NOFRAMES, and INLINE FRAME).

14. Create a HTML document to add AUDIO and VIDEO.

15. Create a HTML document to aligning images (Let the image float to the left/right of a paragraph)

16. Create a HTML document to jump to a specified section within a frame

17. Construct a HTML document with CSS to Set the background colour of a page.

18. Construct a HTML document with CSS to set an image as the background of a page.

19. Construct HTML document with CSS to Set the text color of different elements and align the text.

20. Construct HTML document to set different colours to visited/unvisited links, Specify a background colour for links

XML

21. Construct an XML document that contain information about products of an organization and check the validation of the XML document using DTD.

22. Construct an XML document that contain information of 5 students (such as roll no., name , address, class) and check the validation of the XML document using DTD.

23. Construct an XML document that contain details of 10 books and check the validation of the XML document using DTD.

JavaScript
(At least 10 assignments has to be done from this group)
24. Write a program in javasrcript to accept a name from the user and display the same name in an alert box.

25. Write a program in javasrcript to display a message in a confirm box.

26. Write a program in javasrcript to display the message "time is running out" in the status bar.

27. Write a program in JavaScript to enter marks of a student and find his/her grade according to the following:

if marks>=90 then grade A

if marks>=80 then grade B

if marks>=70 then grade C

if marks>=60 then grade D

otherwise, fail.

28. Write a program in JavaScript to create a button and when the button is clicked the message "Hello World" is displayed on an alert box.

29. Write a program in JavaScript to accept 2 nos. from the user and show the working of all arithmetic operators.

30. Write a program in JavaScript to accept 2 strings and concatenate them.

31. Write a program in JavaScript to display the current date and time.

32. Write a program in JavaScript to find the length of an array.

33. Write a program in JavaScript to check whether a string is palindrome or not.

34. Write a program in JavaScript that responds to a mouse click anywhere on the page (using mouse click).

35. Write a program in JavaScript to display the contents of a check box in a alert box.

36. Write a program to validate a form in the user id and password forms.

37. Write a program in JavaScript to create a welcome cookie, Button animation, Image map with added JavaScript Simple timing, Timing event in an infinite loop.

VBScript

(At least 8 assignments has to be done from this group)

38. Write a program in VBScript to create a variable.

39. Write a program in VBScript to uppercase to lowercase.

40. Write a program in VBScript to create an array.

41. Write a program in VBScript using conditional statements loop.

42. Write a program in VBScript using loop.

43. Write a program in VBScript to display Date and Time

44. Write a program in VBScript to display the current month and day.

ASP

45. Write a program in ASP to interact with a user in a form that uses the "get" method.

46. Write a program in ASP to interact with a user in a form that uses the "post" method.

47. Write a program in ASP to interact with a user in a form with radio buttons.

48. Write a program in ASP to create a welcome cookie.

Assignments Covering Paper 4.3 (Java Programming) - 40 Marks

Each student should do at least 10 assignments from the following list.

List of Experiments:
1. Design a class to represent a bank account and include the following data members –

Data Members: name of the depositor, account number, type of a/c, balance amount in the a/c

Methods: to assign initial values, to deposit an amount, to withdraw an amount after checking the minimum balance (Rs.1000), to display the name of the depositor and balance.

2. Write an applet programming to print the first name, last name, sex, address, mobile no. and pin code of an end user passing parameters.

3. Write an applet programming to create three buttons and draw a rectangle on clicking the first button, a solid rounded rectangle on clicking the second button and a solid circle and an arc on clicking the third button.

4. Write an applet programing to draw the following shapes –

     a) A straight line   b) A polygon   d) A solid oval

     e) A solid rounded rectangle   f) A polyline

5. Write a program to create 3 – threads for execution with different priorities.

6. Write a program to create three threads for execution of the natural nos. less than 5 using synchronization concept.

7. Write a program to –

a) Print the name of the thread, and its priority

b) Change the name of the current thread to "JAVA"

c) Display the detail of the current thread

8. Write a java program for a class teacher that contains two fields name and qualification. Extend the class to department that contains data members deptno and deptname. An interface name as college contains one field name of the college. Using the above classes and interface get the appropriate information and display them.

9. Design three classes person, employee and student using the concept of inheritance. Each class should have a constructor of its own properties as name, age, gender and common method showdata().

10. Write a program to create a class shape with properties length and breadth. Extend the class to rectangle and square, and find the area of the rectangle and the square. Use input() method to take input using keyboard.

11. Write a program to create an array of employee name and salary related to the employee. If the salary is greater than Rs.10,000 raise an exception "Salary is greater than Rs.10,000", otherwise display the required information.

12. Write a program to find the square root of a number. If the input value is negative, raise a user defined exception "The number is a negative number".

13. Write a program to create three StringBuffers. The first one takes no parameters, second one takes an integer value and the third one sets an initial value "Java". Find the content, length and capacity for the StringBuffers.

14. Write a java program to input a string and converts the string to lower case and upper case. Also find the substring from 5 to end, from 0 to 5, from 3 to 7, and from 5 to 5.

15. Write a java program to create a class, library that contains the field, bookno, Extend the class, library to book having fields author and title, and then extend the class, book to issue. Create an interface, language that contains a field, lang. Implement the interface for the class, book. Use appropriate methods for the classes and interface.

BCA5.5 LABORATORY

Practical Assignments covering paper BCA5.1 (System Administration using Linux)- 50 marks
Each student should do at least 15 assignments from the following list.

List of Experiments:
1. Installation of Linux Operating System and partitioning the disk.
2. Installing software packages in linux OS using GUI as well as command line.
3. Changing the default run level of a system
4. Mounting and un mounting a removable media.
5. Finding the list of all running processes and redirect the output in a file.
6. Use of different kill signals to kill a running process.
7. Bringing a process from back ground to fore ground and vice-versa.
8. Adding and managing user accounts.
9. Monitoring disk space quota and memory usage and redirect the output in a file.
10. Backup and restoring a file.
11. Compression and extracting a file. Use command line.
12. Configuring a network interface and assigning a default route.
13. Scheduling job using crontab.
14. Changing the ownership and access permission of file or directory. Use command line.
15. Copy, move and rename a file.
16. Configuring a ftp server
17. Assigning address of DNS.
18. Use of ssh, telnet, netstat, ping, route commands.
19. Use grep, awk, sed commands.
20. Use of redirection and piping.
21. Monitoring and managing system log infomation.
22. Basics of firewall using iptables.
23. Basics of configuring http server.
24. Managing different services in linux.
25. Monitoring the traffic going through a network interface.
26. Write shell script to
     a. Find factorial of a given number
     b. Convert a decimal number to hexadecimal number

Practical Assignments covering paper BCA5.3 (Open Source Software)- 50 marks
Each student should do at least 6 assignments from the following list.

List of Experiments:

1) Calculate the value of x using the following formula in scilab
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$ where a, b and c are constants.

2) Write a code to check if a number is less than 10, if yes, then display `< 10', if it is greater than 10, then display `> 10', else display the square of the number.
3) Write code to check if a given number n is less than or equal to 10, if yes, display its square.
4) Write a for loop to display all the even numbers between 1 to 50.
5) Write a program to find the sum of a list of numbers.
6) Write a program using while loop to display odd numbers in the range 1 to 25.
7) if $A = \begin{bmatrix} 1 & 4 & 0 \\ -1 & 5 & 8 \\ 4 & 5 & 6 \end{bmatrix}$
   a. Find A(:,:)
   b. Extract the 2nd column of A
8) Determine the determinant and eigen values of the matrix, A2 + 2* A where A is define in Q. No 7.
9) Define a 3x3 matrix A with all elements equal to 1. Multiply 1st and 2nd row with scalars, 3 and 4 respectively, and determine the determinant of the resultant matrix.
10) A = [2 3 1; 4 6 5; 1 3 6] Use a suitable sequence of row operations on A to bring A to upper triangular form.
11) Solve the following differential equations using Scilab and plot the dependent variable vs independent variable.

   a. $dy/dx + y/x = -x^3 ; (x > 0)$

   b. $\cos(x) \, dy/dx + \sin(x) \, y = x^2 : y(0) = 4$

12) plot sin(x) versus x.(Put a title: "Sine", and labels, `x axis' and `y axis')
13) Plot sin(x) and cos(x) on the same window.

BCA5.4.1 LABORATORY

Practical Assignments covering paper BCA 5.4.1 (Microprocessor using Assembly Language Programming):- 30 marks

Each student should do at least 8 assignments from the following list.

List of Experiments:

1. Write a program to add two 8 bit numbers & store it in a memory location 8820h.
2. Write a program to copy a block of memory from one location 8820h to another location 8840h.
3. Write a program to perform the addition of two 16 bit numbers.
4. Write a program to add two numbers & store it in a register **e**.
5. Write a program to load two unsigned numbers in register b & c. Subtract b from c. If the result is in 2's complement, convert the result in absolute magnitude & display it.
6. Write a program to find the difference of two numbers & store the result in a memory location 8830h.
7. Write a program to find the larger / smaller of two given numbers.
8. Write a program to subtract two numbers and add it to a given memory location.
9. Write a program to perform x+y−5,where x and y are 16−bit numbers.
10. Write a program to find 2's complement of a number.

BCA5.4.4 LABORATORY

Practical Assignments covering paper BCA 5.4.4 (Animation): 30 Marks
The list of the experiments will be prepared by the respected teacher of the course.

BCA 6.1.1 LABORATORY

Practical Assignments covering paper BCA 6.1.1 (Programming with C#): 30 marks
Each student should do at least 20 assignments from the following list

List of Experiments:

1. Write a program to Check whether the Entered Number is Even or Odd
2. Write a program to Swap 2 Numbers
3. Write a program to Get a Number and Display the Sum of the Digits
4. Write a program to Display the Date in Various Formats
5. Write a program to Illustrate the Use of Access Specifiers
6. Write a program to Illustrate LeftShift Operations
7. Write a program to Compare Two Dates
8. Write a program to demonstrate Polymorphism
9. Write a program to Demonstrate Multilevel Inheritance
10. Write a program Program to Illustrate Single Inheritance
11. Write a program to Illustrate Multilevel Inheritance with Virtual Methods
12. Write a program to get the Length of the Array
13. Write a program to Reverse an Array
14. Write a program to Perform a Selection Sort
15. Write a program to Perform Bubble Sort
16. Write a program to Perform Matrix Addition
17. Write a program to Perform Matrix Subtraction
18. Write a program to Demonstrate Properties of the Class
19. Write a program to Create Obsolete Class
20. Write a program to Demonstrate Pass by Value Parameter
21. Write a program to Combine Two Delegates
22. Write a program to Illustrate Array of Delegates
23. Write a program to Display Results using Delegates
24. Write a program to Create Generic Delegate
25. Write a program to Illustrate Predicate
26. Write a program to Illustrate Actions
27. Write a program to Create a Progress Bar Control
28. Write a program to Create Input Box and Display the Text

29. Write a program to Create Radio Button and Demonstrate its Use

30. Write a program to Illustrate Elapsed Event

31. Write a program to Demonstrate Use of Clone

32. Write a program to Demonstrate Trigger Concept

33. Write a program to Create Stop Watch

34. Write a program to Demonstrate IndexOutOfRange Exception

35. Write a program to Demonstrate DivideByZero Exception

36. Write a program to Create a File

37. Write a program to Read the Contents of the File

38. Write a program to Create a Directory

39. Write a program to Illustrate Handling an Event Declared in an Interface

40. Write a program to Demonstrate IDumpable Interface

41. Write a program to Demonstrate iList Interface

42. C# Program to Demonstrate iDictionary Interface

43. Write a program to Create a Simple Thread

44. Write a program to Kill a Thread

45. WAP in C# which takes your information (name, age , address, marks etc) as input and print your information.

46. Design an interface for GUI calculator and implement logic for calculator.

**Practical Assignments covering paper BCA 6.2.1 (Mobile Applications): 30 marks
Each student should do at least 10 assignments from the following list**

List of Experiments:

1. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the red color with white background.

2. To understand Activity, Intent
   i. Create sample application with login module.(Check username and password)
   ii. On successful login, go to next screen. And on failing login, alert user using Toast.
   iii. Also pass username to next screen.
3. Create login application where you will have to validate EmailID (UserName). Till the username and password is not validated , login button should remain disabled.

4. Create and Login application as above. On successful login, open browser with any URL.

5. Create an application that will pass some number to the next screen, and on the next screen that number of items should be display in the list.

6. Understand resource folders :
   i. Create spinner with strings taken from resource folder.
   ii. On changing spinner value, change image.

7. Understand Menu option.
   i. Create an application that will change color of the screen, based on selected options from the menu.

8. Create an application that will display toast (Message) on specific interval of time.

9. Create a background application that will open activity on specific time.

10. Create an application that will have spinner with list of animation names. On Selecting animation name, that animation should affect on the images displayed below.

11. Understanding of UI :
    i. Create an UI such that , one screen have list of all the types of cars.
    ii. On selecting of any car name, next screen should show Car details like: name , launched date ,company name, images(using gallery) if available, show different colors in which it is available.

12. Understanding content providers and permissions:
    i. Read phonebook contacts using content providers and display in list.

13. Read messages from the mobile and display it on the screen.

14. Create an application to call specific entered number by user in the EditText

15. Create an application that will create database with table of User credential.

16. Create an application to read file from asset folder and copy it in memory card.

17. Create an application that will play a media file from the memory card.

18. Create an application to make Insert , update , Delete and retrieve operation on the database.

19. Create an application to read file from the sdcard and display that file content to the screen.

20. Create an application to draw line on the screen as user drag his finger.

21. Create an application to send message between two emulators.

22. Create an application to take picture using native application.

23. Create an application to pick up any image from the native application gallery and display it on the screen.

24. Create an application to open any URL inside the application and clicking on any link from that URl should not open Native browser but that URL should open the same screen.