

2007-08
(S.S)

BANGALORE



UNIVERSITY

REGULATIONS, SCHEME AND SYLLABUS

for the BCA course (I to VI Semesters)

(Syllabi of first two semesters and regulation approved earlier by BOS, Faculty of Science and Academic Council. Assent of the Chancellor for the same has also been obtained by the University)

(Syllabi of III to VI semesters approved in the BOS dt. 08.09.08)

BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Semester System- Y2K8 scheme)

Revised w. e. f. Academic Year 2008– 2009



PROCEEDINGS OF THE BOARD OF STUDIES MEETING IN MASTER OF COMPUTER APPLICATIONS (UG & PG) HELD IN THE MCA PROGRAMME ON 8.09.08.

The following members attended the meeting:

1. Prof. Pradeep G. Siddheshwar	Chairman	<i>Siddheshwar</i>
2. Mr. B.L. Muralidhara	Member	<i>B.L. Muralidhara</i>
3. Mr. M. Hanumanthappa	Member	<i>M. Hanumanthappa</i>
4. Mr. M.T. Somashekara	Member	<i>M.T. Somashekara</i>
5. Dr. Gopalakrishna D	Member	<i>Gopalakrishna D</i>
6. Dr. J.N. Singh	Member	<i>J.N. Singh</i>
7. Sri. Srinivasa A	Member	<i>Srinivasa A</i>
8. Dr. Rama	Member	<i>Rama</i>
9. Sri. Gundu Rao	Member	<i>Gundu Rao</i>
10. Sri. Manjunatha	Member	<i>Manjunatha</i>
11. Smt. Pratibha Kalburgi	Member	<i>Pratibha Kalburgi</i>

Dr. K. Narayanamurthy, Dr. Hemanth Kumar, Dr. B.V. Dhandra and Dr. Vishwakaryagadde could not attend the meeting

The committee discussed the following matters and made resolutions as indicated below:

1. The BCA Syllabi of III to VI semesters (Y2K8 Scheme) were discussed and finalized by the BOS.
2. The BOS recommended that remission be given on the Indian Constitution paper to students of third semester BCA (Y2K7 Scheme) as these students have studied the same in the first semester itself.
3. The BOS approved, with modification of format, the Ph.D. synopsis of the following students:

- a. M.T. Somashekara
- b. Hegde Chetana Laxminarayana
- c. Ashoka S.B.

The BOS authorized the Chairman to look into the modified synopsis to be submitted by the students and transmit the same to the University.

4. The BOS deferred the matter of revision of M.Sc. (Computer Science) and MCA Syllabi to the next BOS meeting.
5. The Panel of Examiners for UG (B.Sc. / BCA) and PG (M.Sc. / MCA) was prepared and approved by the BOS.
6. The BOS recommended that M.Phil in Computer Science may be introduced from 2010-2011 as the department would be better equipped to handle a new course at that time.

Siddheshwar
CHAIRMAN
 BOS IN CS(UG & PG)

Regulations, Scheme of Study and Examination for B.C.A. degree course under Semester System (Y2K8 scheme) (Revised w.e.f. 2008– 2009)

- R 1. a)** Title of the course: Bachelor of Computer Applications
b) Duration of the Course: The course shall be of three years duration spread over six semesters.
c) Scheme of study:
i) There shall be five theory papers and two practicals from first semester to fourth semester. The practical paper corresponds to one or two theory papers. The papers having no practical component carry 100 marks (90+10) and the papers carrying practical component also carry 100 marks (60+30+10).
ii) There shall be four theory papers and one project work during fifth and sixth semesters.
iii) The project work shall be carried out either independently or jointly (maximum of three students).
iv) Medium of Instruction: The medium of instruction shall be English.
d) Scheme of Examination:
i) At the end of each semester there shall be University examination of three hours duration in each of the theory paper/practical.
ii) Continuous Evaluation (CE) carrying 10 marks in each of theory papers shall be based on the performance of the students in two written tests of one hour duration. No minimum marks for passing is required in IA.
iii) At the end of the fifth and sixth semesters each student shall have to submit the completed project report for the evaluation which shall be certified by internal and/external guide and duly signed by the Principal/Chairman/Head/Course Coordinator.

The project report shall be evaluated by two examiners for 100 marks and Viva-voce shall carry 100 marks.

- R 2.** Each semester shall be of 4 months duration
R 3. Attendance: As per Bangalore University regulations in force for science degree courses.
R 4. A Candidate is allowed to carry over all the previous unleared (failed) theory papers and/Practicals to subsequent semesters as per Bangalore University regulations in force for science degree courses.
R 5. The maximum period for completion of the course shall be six years from the date of admission.
R 6. Eligibility for admission:
a) Any student who has passed PUC – II Science, Arts or Commerce securing a minimum of 35% of marks

OR

- b)** Any student who has passed JODC or Diploma in Engg. (of three year duration of Govt. of Karnataka) with minimum of 35% of marks in aggregate in all the semesters/years.
R 7. Admission Procedure:
a) Through Counseling in respective colleges
b) 50% weightage for entrance test in respective colleges
c) 50% weightage for performance at qualifying examination.
d) Merit list shall be prepared based on item No. 7(b) and 7 (c)

- e) Reservation: As per the notifications/Govt. orders from the University/Govt. from time to time.
- f) Tuition and other fees: As fixed by the University from time to time

R 8. The total number of students to be admitted to the course shall be as decided by the University.

R 9. Results: Results of candidate shall be declared and the classes awarded as per the procedure followed by the University for B.Sc. courses.

R 10. POWER TO REMOVE DIFFICULTIES

- 1) If any difficulty arises in giving effect to the provisions of these regulations, the Vice – Chancellor may by order make such provisions not inconsistent with the Act, Statutes, Ordinances or other Regulations, as appears to be necessary or expedient to remove the difficulty.
- 2) Every order made under this rule shall be subject to ratification by the appropriate University Authorities.

**Title of Papers and Scheme of Study & Examination for BCA
(Bachelor of Computer Applications) Revised w.e.f. 2008–2009**

Sem.	Paper	Title of the paper	Hrs/ Wk	Theory	Practical	CE	Total Marks
				Max. Marks	Max. Marks		
I	BCA101	Indian Language	4	90	-	10	100
	BCA102	English	4	90	-	10	100
	BCA103	Computer Fundamentals	4	90	-	10	100
	BCA104	Electronics	4	60	30	10	100
	BCA105	Programming Concepts Using C	4	60	30	10	100
II	BCA201	Indian Language	4	90	-	10	100
	BCA202	English	4	90	-	10	100
	BCA203	Mathematics	4	90	-	10	100
	BCA204	OOPS Using C++	4	60	30	10	100
	BCA205	Data Base Management Systems	4	60	30	10	100
III	BCA301	Indian Language	4	90	-	10	100
	BCA302	English	4	90	-	10	100
	BCA303	Indian Constitution	4	100	-	-	100
	BCA304	Operating Systems	4	90	-	10	100
	BCA 305	Data Structures Using C	4	60	30	10	100
	BCA306	Numerical Analysis and Linear Programming	4	60	30	10	100
IV	BCA401	Indian Language	4	90	-	10	100
	BCA402	English	4	90	-	10	100
	BCA403	Environmental Studies	4	90	-	10	100
	BCA404	Data communications and Networks	4	90	-	10	100
	BCA405	Visual Programming	4	60	30	10	100
	BCA406	UNIX Programming	4	60	30	10	100
V	BCA501	Software Engineering	4	90	-	10	100
	BCA502	Computer Architecture	4	90	-	10	100
	BCA503	Banking and insurance	4	90	-	10	100
	BCA504	JAVA Programming	4	60	30	10	100
	BCA505	Project	4	-	90	10	100
	BCA 506	Soft Skills & Personality Development Lab	-	-	90	10	100
VI	BCA601	Design & Analysis of Algorithms	4	90	-	10	100
	BCA602	Systems Programming	4	90	-	10	100
	BCA603	Computer Graphics	4	90	-	10	100
	BCA604	Web Programming	4	60	30	10	100
	BCA 605	Project	8	-	180	20	200

- Note:**
- 1) The practical classes during the course of the semester shall be as in other science courses.
 - 2) Examination for Theory/Practicals shall be of three hours duration.
 - 3) In the evaluation of projects in fifth and sixth semesters, during the practical examination the demonstration of the project carries 50% of marks and viva-voce carries 40% of marks.
 - 4) The papers should be taught only by people who have specialization in the area.
 - 5) For theory papers the paper number may be suffixed with T and for practical papers with P, e.g., 604T and 604P.
 - 6) The question paper pattern and mode of evaluation to be as finalized earlier for I and II semester BCA. Any further requirement in the matter may be decided by the Chairman, BOS in consultation with BOS members.

FIRST SEMESTER
BCA101T - INDIAN LANGUAGE

Syllabus as per the one prescribed for science courses of Bangalore University

BCA102T - ENGLISH

Syllabus as per the one prescribed for science courses of Bangalore University

BCA103T – COMPUTER FUNDAMENTALS

Syllabus as per the one prescribed for science courses of Bangalore University

BCA104T –ELECTRONICS

Introduction to network theorems and AC fundamentals

8 HOURS

Ohm's law: Statement, explanation. **Kirchhoff's law:** Statement & explanation of KCL and KVL. **Mesh/loop** analysis (up to 2 loops) and **node voltage** method, numerical problems. **Delta/star & star/delta transformation:** No derivations for inter-conversion equations, Introduction of network, port of network (one port network, two port network), unilateral network, bilateral network, linear network. Need for application of network theorems. (DC Circuits only). **Superposition theorem:** Statement, (Only with TWO voltage sources) steps to apply the theorem, explanation by considering a simple resistive network and problems. **Thevenin's theorem:** Statement, (Only with ONE voltage source) steps to apply the theorem, explanation by considering a simple resistive network and problems. **Norton's theorem:** Statement, (Only with ONE voltage source) steps to apply the theorem, explanation by considering a simple resistive network and problems. **Maximum power transfer theorem:** Statement, explanation of theorem by considering a simple resistive network, expression for maximum power delivered ($P_{L(max)} = V_{th}^2/4R_{th}$) (no derivation), graph of R_L Vs P_L , numerical problems and applications. **Reciprocity theorem:** Statement, explanation using resistive network with dc source and numerical problems. **AC Fundamentals:** Representation of ac sine wave, instantaneous value, peak value, peak to peak value, average value, r.m.s value, cycle, time period, frequency. (No derivations, only mention the expressions) Representation of non sinusoidal waves.

SEMICONDUCTOR DEVICES

12 HOURS

Introduction, atomic structure, energy level, energy band diagram in solids, classification of conductors, insulators and semiconductors. **Semiconductor,** properties, crystal structure of semiconductor, types-intrinsic and extrinsic semiconductor. **Intrinsic Semiconductor:** Crystal structure (Ge & Si), thermally generated charges (electron & holes) carriers, the effect of temp on their motion. **Extrinsic Semiconductor:** Doping, donor, acceptor impurities, n-type, p-type semiconductor, majority & minority carriers, their currents, concept of immobile ions. **Semiconductor devices:** PN junction diode, formation of pn junction, depletion layer, potential barrier, energy level diagram of pn junction, Biasing of pn junction, behavior of pn junction under forward and reverse biasing, break down in pn junction, avalanche and zener break down. **Diode characteristics:** V-I characteristics, forward and reverse bias, diode parameters, bulk resistance, knee voltage, static and dynamic resistance, PIV. **Application of diode:** As a rectifier, as logic gate, as a switch, etc. **Rectifier:** Types, Half wave, Full wave. **Half wave rectifier:** Circuit, working, wave forms and expression for ripple factor and efficiency (no

derivation), advantages & disadvantages. **Full wave rectifier:** Center tapped rectifier, Circuit, working, wave forms and expressions for ripple factor and efficiency (no derivation), advantages & disadvantages. **Bridge wave rectifier:** Circuit, working, wave forms and expressions for ripple factor and efficiency (no derivation), advantages & disadvantages. **Logic families:** Scale of integration, Digital IC's, classifications, DTL, TTL, ECL, MOS, CMOS, **Mention of features:** speed of operation, power dissipation, propagation delay, fan-in, fan-out.

NUMBER SYSTEMS

12 HOURS

Introduction to number systems – positional and non-positional, Base/ Radix. Decimal number system – Definition, digits, radix/base. Binary number system – Bit, Byte, **Conversions:** Binary to Decimal and Decimal to Binary. Octal number system – Conversion from Octal to Decimal, Decimal to Octal, Octal to Binary and binary to Octal. Hexadecimal number system-Conversions: Decimal to Hex, Hex to decimal, Hex to Binary, Binary to Hex, Octal to Hex, Hex to Octal. Binary arithmetic- binary addition, subtraction, multiplication and division (only Integer part). 1's and 2's complement – 2's complement subtraction. **Binary codes:** BCD numbers, 8421 code, 2421 code- examples and applications. **Gray code-** Conversions- Gray to binary and Binary to Gray, application of gray code (Mention only). **Excess – 3 code** - Self complementing property and applications. Definition and nature of **ASCII** code. Introduction to **error detection and correction** code, parity check. **Boolean algebra:** - Laws and Theorems.

AND, OR, NOT Laws, Commutative law, associative law, distributive law, Duality theorem. **Demorgan's theorems** – Statements, proof using truth tables; Simplification of Boolean expressions using Boolean laws. Definition of product term, sum term, minterm, maxterms, SOP, standard SOP, POS and Standard POS. Conversion of Boolean expression to Standard SOP and Standard POS forms. Karnaugh maps- Definition of Karnaugh map, K- map for 2, 3 and 4 variables. Conversion of truth tables into k-map, grouping of cells, redundant groups and don't care conditions. Karnaugh map technique to solve 3 variable and 4 variable expressions. Simplification of 3 and 4 variable Boolean expression using K-maps (SOP only).

LOGIC GATES

12 HOURS

AND Gate: Definition, symbol, truth table, timing diagram, Pin diagram of IC 7408. OR Gate: Definition, symbol, truth table, timing diagram, Pin diagram of IC 7432. NOT Gate: Definition, symbol, truth table, timing diagram, Pin diagram of IC 7404. NAND Gate: Definition, symbol, truth table, Pin diagram of IC 7400. NOR Gate: Definition, symbol, truth table, timing diagram, Pin diagram of IC 7402. Exclusive OR Gate: Definition, symbol, truth table, timing diagram, applications, Pin diagram of IC 7486. Exclusive NOR Gate: Definition, symbol, truth table, timing diagram. Combinational logic circuits: Definition, applications. Half Adder: Symbol, Logic circuits using XOR and basic gates, Truth table. Full Adder: Symbol, Logic circuits using XOR and basic gates, Truth table. Half Subtractor: Symbol, Logic circuits using XOR and basic gates, Truth table. Full Subtractor: Symbol, Logic circuits using XOR and basic gates, Truth table. Adder - Subtractor: Logic circuit, pin diagram IC 7483, IC 7486. Parallel Adder: 4 - bit parallel binary adder, BCD adder, IC 7483. NAND - NOR implementation of Adders.

SEQUENTIAL CIRCUITS

10 HOURS

Importance of clock in digital circuit and introduction to flip flop. Flip-flop-difference between latch and flip-flop. Qualitative study of level and edge triggering. RS latch/unlocked, symbol and truth table. RS flip-flop using NAND gate, symbol, truth table and timing diagram. D flip-flop-Logic symbol, RS flip-flop as a D flip flop, truth table and timing diagram. J-K flip-flop- Symbol, truth table, Realization of JK flip-flop using NAND gates, working, and timing diagram. Race around condition, preset and clear inputs, pin diagram of IC 74112. T flip flop - Logic symbol, JK flip flop as a T flip-flop, truth table and timing diagram. Master slave flip flop: Logic circuit, truth table and timing diagram, advantage of M/S flip flop, pin diagram of IC 7473, IC 7476. Registers: Definition, types of registers - Serial in serial out, Serial in parallel out, Parallel in serial out, Parallel in parallel out shift register (Block diagram representation for each), truth table, timing diagram and speed comparison.

BCA104P - PRACTICALS IN ELECTRONICS

List of experiments - (At least 10 experiments to be conducted)

- 1) Study of Logic Gates- AND, OR, NOT, NAND, NOR, XOR.
(using respective ICs)
- 2) Realization of AND, OR and NOT gates using Universal Gates.
- 3) Design and Realization of Half Adder/Subtractor using NAND Gates.
- 4) Design and Realization of Full Adder using Logic Gates.
- 5) Design and Realization of 4 bit Adder/Subtractor using IC 7483.
- 6) Design and Realization of BCD Adder using IC 7483.
- 7) Realization of R-S flip flop using NAND gates.
- 8) Realization of J-K flip flop using IC 7400 and 7410.
- 9) Realization of T and D flip flop using IC 7476.
- 10) Implementation of SISO Shift Registers using flip flops (IC 7476).
- 11) Implementation of SIPO Shift Registers using flip flops (IC 7476).
- 12) Implementation of PISO Shift Registers using flip flops. (IC 7476).
- 13) Implementation of PIPO Shift Registers using flip flops. (IC 7476).
- 14) Implementation of Half wave and Full wave rectifier using Semiconductor diode.
(Ripple factor)
- 15) Design and implementation of odd and even parity checker Generator using IC 74180.

BCA105T – PROGRAMMING CONCEPTS Using C

Total: 52 Hrs

- 1.0 **Computer Programming** : Basic Programming concepts - Algorithm, Flowcharts, Modular Programming and structured programming. (3 Hrs)
- 2.0 **'C' PROGRAMMING**
 - 2.1 Problem solving using Computers, Concept of flowcharts and algorithms (5 Hrs)
 - 2.2 **Overview of C** : Introduction, Importance of 'C', Sample 'C' Programs, Basic structure of 'C' programs, Programming style, Executing a 'C' Program. (3 Hrs)

- 2.3 **Constants, Variables and Data types** : 'C' Tokens, keywords, and identifiers, constants, variables, datatypes, declaration of variables, assigning values to variables, defining symbolic constants. (3 Hrs)
- 3.0 **Operators and expression** : Arithmetic operators, Relational operators. Logical operators, Assignment operators, increment and decrement operators, conditional operators, bitwise operators, special operators, some computational problems, type conversion in expressions, operator precedence and associativity. Mathematical functions. (5 Hrs)
- 3.1 **Managing input and output operators** : Input and Output statements, reading a character, writing characters, formatted input, formatted output statements. (3 Hrs)
- 3.2 **Decision making, Branching and looping** : Decision making with IF statement, simple IF statement, The IF-ELSE statement, nesting of IF .. ELSE statements, The ELSE -IF ladder, The switch statement, The?: operator, The GOTO statement, The WHILE statement, The DO statement, The FOR statement, jumps in loops. (6 Hrs)
- 4.0 **Arrays** : One dimensional arrays, Two-dimensional arrays, initializing two-dimensional array, Multidimensional arrays. (5 Hrs)
- 4.1 **Handling of character strings** : Declaring and initializing string variables, reading string from terminal, writing string to screen, arithmetic operations on characters, putting strings together. Comparison of two strings, string handling functions-strlen, strcat, strcmp, strcpy (5 hrs)
- 5.0 **User defined functions** :Need for user-defined functions, a multi-functional program, the form of 'C' function, Return values and their types, calling a function, category of functions- No arguments and no return values, arguments but no return values, arguments with return values, handling of non-integer functions, nesting of functions, recursion, functions with arrays. (4 Hrs)
- 6.0 **Structure and union** :Structure definition, giving values to members, structure initialization, comparison of structure variables, array as structure, array within structure, union. (5 Hrs)
- 7.0 **Pointers** : Understanding pointers, accessing the address of variables, declaring and initializing pointers, accessing a variable through its pointer. (3 Hrs)

Text books :

1. E.Balaguruswamy. : *Programming in ANSI C* " Tata Mc Graw-Hill (1998)
2. Kamthane, *Programming with ANSI and Turbo C*. Pearson Education 2003

References :

1. V.Rajaraman.: "Fundamentals of Computers", PHI (EEE) (1999)
2. V.Rajaraman.: "Programming in C", PHI (EEE) (2000)
3. S.ByronGottfried. : "Programming with C", Tata McGraw-Hill(2000)
4. Yashawant Kanetkar : "Let us C"
5. Rajesh Hongal : "Computer Concepts & C language"
6. Brian verminghan & Dennis M. Ritchie "ANSI C Programming " (PHI)
7. Ramkumar & Rakesh Aggarwal "ANSI C Programming" Tata McGraw Hill
8. Kernighan, C- Programming Language ANSI C Version. Pearson Education.
9. Venkateshmurthy, *Programming Techniques through C*. Pearson Education.
10. E. Balaguruswamy – *Computer Fundamentals and C Programming*. TMH 2008
11. Bronson : *ANSI C Programming* , 1st Edition, 2008 Cengage Learning India
12. Forouzan : *Computer Science A Structured Programming Approach Using C* 3rd Edition, Cengage Learning India

BCA105P - PRACTICALS IN C PROGRAMMING

List of programs

PART A

- 1) Write a Program to find the root of the given quadratic equation using switch case.
- 2) Write a C Program to generate and print first N FIBONACCI numbers.
- 3) Write a Program to find the GCD and LCM of two integer numbers
- 4) Write a C Program that reverse a given integer number and check whether the number is palindrome or not.
- 5) Write a Program to find whether a given number is prime number or not
- 6) Write a C Program to input numbers and to find mean variance and standard deviation.
- 7) Write a C Program to read two matrices and perform addition and subtractions of two matrices.
- 8) Write a C Program to read a string and check whether it is palindrome or not.
- 9) Write a Program to find the factorial of a number using function

PART B

- 10) Write a C Program to find if a character is alphabetic or numeric or special character.
- 11) Write a C Program to compute the sum of even numbers and the sum of odd numbers using a function.
- 12) Write a C Program to find trace and normal of a square matrix using functions.
- 13) Write a C Program to accept a sentence and convert all lowercase characters to uppercase and vice-versa.
- 14) Write a Program to accept different goods with the number, price and date of purchase and display them.
- 15) Write a C Program to find the length of a string without using the built-in function.
- 16) Copying the contents of one file into another.
- 17) Write a C program to accept the reverse of a string using pointers.

Note : The list of programs has been divided into two parts for the sake of practical examination in which two programs are to be given one from each part.

SECOND SEMESTER

BCA201T – INDIAN LANGUAGE

Syllabus as per the one prescribed for science courses of Bangalore University.

BCA202 T– ENGLISH

Syllabus as per the one prescribed for science courses of Bangalore University

BCA203T – MATHEMATICS

Total: 52 hrs

- 1. **Matrices:** Review of fundamentals: Defn. matrix, order, Types of matrices: zero, row, column, square, diagonal, scalar, unit, symmetric, skew-symmetric
Determinant: Value of determinant of order 2×2 , 3×3 , minors, cofactors, adjoint, inverse of a matrix.
Solutions of linear equations: Cramers rule and matrix method involving two and three variables.

eigen values and eigenvectors: Defn., characteristic equation, characteristic roots, characteristic vectors(without any theorems) only 2x2 order.

Cayley Hamilton theorem.(only statement), verification of Cayley Hamilton theorem.(only 2x2 matrices), using the same finding the powers of A (A^4, A^3, A^{-1}, A^{-2}), inverse of a matrix using Cayley Hamilton theorem.

2. Integral Calculus

Defn., Problems of the type: i). $\int \frac{1}{a^2 \pm x^2} dx$, ii). $\int \frac{1}{x^2 - a^2} dx$,

iii). $\int \frac{1}{\sqrt{x^2 - a^2}} dx$ iv). $\int \frac{1}{\sqrt{x^2 + a^2}} dx$, v). $\int \frac{1}{ax^2 + bx + c} dx$,

vi). $\int \frac{1}{\sqrt{ax^2 + bx + c}} dx$ vii). $\int \frac{lx + m}{ax^2 + bx + c} dx$, viii). $\int \frac{lx + m}{\sqrt{ax^2 + bx + c}} dx$

ix). $\int \frac{1}{a + b \cos x} dx$ x). $\int \frac{1}{a + b \sin x} dx$, xi). $\int \frac{1}{a + b \cos x + c \sin x} dx$,

xii). $\int \frac{a \sin x + b \cos x}{A \sin x + B \cos x} dx$

Integration by partial fractions, Integration by parts,

Problems of the type $\int (f(x) + f'(x))e^x dx$, Definite integrals, properties(no proofs), problems.

3. Algebraic Structure

Binary operation, Defn. of group, properties(only statement), problems(both finite and infinite groups), subgroup, theorems(no proof), problems.

Vectors: Defns. of vector and scalar, vector addition, dot and cross product, projection of a vector on the other(no geometrical meaning), area of parallelogram, area of a triangle, scalar triple product, volume of parallelepiped, coplanarity of three vectors, vector triple product.

4. Differential Calculus

Differentiation of n^{th} derivatives: derivations of x^m , $(ax + b)^m$, $1/ax + b$, $\log(ax + b)$, $\sin(ax + b)$, $\cos(ax + b)$, $e^{ax} \sin(bx + c)$, $e^{ax} \cos(bx + c)$ and problems. Leibnitz rule (statement only), problems.

5. Differential Equations: Defn., solution(no formation), order and degree.

First order and first degree equations:

- Variable separable
- homogeneous
- Exact equation $Mdx + N dy = 0$ (reducible to exact / Integrating Factor not included)
- Linear equation.

6. Analytical Geometry

Defn. of vector $\vec{r}$, magnitude, problems, distance between two points, finding $\overline{AB}$ and $|\overline{AB}|$, direction cosine, ratio, $l^2 + m^2 + n^2 = 1$, problems i). Finding the direction cosines of A and B, ii) $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 2$ iii). $\sum \cos 2\alpha = -1$

Angle between two lines: $\cos\theta$ and $\sin\theta$, problems: angle between two vectors; angles of a triangle, angle between diagonals of a cube, angle between diagonals of a rectangle.

Equation of a line: $\vec{r} = \vec{a} + \lambda\vec{\alpha}$ (one point), $\vec{r} - \vec{a} = \lambda(\vec{b} - \vec{a})$ (two point form),

Direct problems: i) condition for lines to be parallel and perpendicular ii) point of intersection of lines

Equation of a Plane: i). $(\vec{r} - \vec{a}) \cdot \vec{\alpha} = 0$, ii) normal form $lx + my + nz = p$

Problems: i) $\vec{a}$, $\vec{\alpha}$ ii) image or reflection

1. **Introduction** : Procedural Languages, definition of OOP, Basic concept of OOP, Object, Class, Data Abstraction, Data Encapsulation, Data Hiding member functions, Reusability, Inheritance, Creating new Data Types, Polymorphism, Overloading, Dynamic binding, and Message passing. (2 Hrs)
2. **C++ Features**: The iostream class, C++ Comments, C++ Keywords, Variable declaration, The Const Qualifier. The Endl, Set W, set precision, Manipulators, The scope resolution operator, The new & delete Operators. (2 Hrs)
3. **Functions**: Simple Functions: Function declaration, calling the function, function definition; Passing argument to, returning value from function; passing constants, Variables, pass by value, passing structure variables, pass by reference, Default arguments, return statements, return by reference, overloaded functions; Different number of arguments, Different Kinds of arguments, inline function. (8 Hrs)
4. **Objects & Classes** : Classes & Objects, Class Declaration, Class members; Data Constructors, Destructors, Member functions, Class member visibility; private, public, protected. The scope of the class object constructors; Default Constructor, Constructor with argument, constructor with default arguments, Dynamic constructor, copy constructor, Overloaded constructor, Objects as function arguments; member functions defined outside the class, Objects as arguments, returning objects from functions, class conversion, manipulating private Data members, Destructors, classes, objects & memory, array as class member data, Array of objects, string as class member (12 Hrs)
5. **Operator Overloading** : Overloading unary operator: Operator Keyword, Operator Arguments, Operator return value, Nameless temporary objects, limitations of increment operator, overloading binary operator, arithmetic operators, comparison operator, arithmetic assignment operator, Data conversion; conversion between Basic types, Conversion between objects & Basic types, conversion between objects of different classes. (6 Hrs.)
6. **Inheritance** : Derived Class & Base Class : Specifying the Derived class accessing Base class members, the protected access specifier, Derived class constructor, Overriding member functions, public and private inheritance; Access Combinations, Classes & Structures, Access Specifiers, Level of inheritance; Multilevel inheritance, Hybrid inheritance, Multiple inheritance; member functions in multiple inheritance, constructors in multiple inheritance, Containership; Classes within classes, Inheritance & Program Development. (8 Hrs)
7. **Virtual Functions**: Normal member function accessed with pointers, Virtual member functions accessed with pointers, Dynamic binding, pure virtual functions, Friend function; Friends for functional notation, friend classes, the this pointer; Accessing Member Data with this, using this for returning values. (5 Hrs)
8. **Templates & Exception Handling**: Introduction, Templates, Class Templates, function templates, Member function templates, Template arguments, Exception Handling. (4 Hrs)
9. **Streams** : The Stream class Hierarchy, Stream classes Header file, string J/O : Writing strings, reading strings, character J/O, Detecting End – of – file. Object J/O; writing an object to disk, reading an object from disk, J/O with multiple objects; the f stream class, The open function, File Pointers; Specifying the position, Specifying the offset. The tellg Function, Disk J/O with Memory Functions; Closing Files, Error Handling, Command Line Arguments. (5 Hrs)

Text books:

1. Prata: C++ Primer Plus, 4/e Pearson Education
1. Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications

References:

1. Lippman: C++ Primer, 3/e Pearson Education
2. E. Balagurusamy: Object Oriented Programming with C++, Tata McGraw Hill Publications.
3. Stroustrup: The C++ Programming Language, Pearson Edition, 3rd Edition
4. Kamthane: Object Oriented Programming with ANSI and Turbo C++, Pearson Education
5. Bhav: Object Oriented Programming Using C++, Pearson Education
6. E. Balagurusamy - Object Oriented Programming with C++ 4/e TMH 2008
7. Farrell: Object Oriented Programming Using C++, 1st Edition 2008, Cengage Learning India

BCA204P - PRACTICALS IN C++ PROGRAMMING**List of programs**

- 1) Write a program to implement digital clock
- 2) Write a program to swap two numbers using friend function
- 3) Write a program to calculate area and circumference of circle using inline function
- 4) Write a program to create electricity bill
- 5) Write a program to prepare a shopping lists
- 6) Write a program to perform bank transaction
- 7) Write a program to perform addition of two matrices using operator overloading.
- 8) Write a program for multiplication of two matrices using operator overloading.
- 9) Write a program to find sum of complex number using friend function.
- 10) Write a program to implement operation on stack.
- 11) Write a program to add two distance variable.
- 12) Write a program to implement operation on queue.
- 13) Write a program to sort elements using templates.
- 14) Write a program to find the maximum of two numbers using template.
- 15) Write a program to compare two string using equal to operator.
- 16) Write a program to concatenate two strings.
- 17) Write a program to find maximum of 2 Nos. using friend function.
- 18) Write a program to create a student report using inheritance technique.
- 19) Write a program to add two time variable
- 20) Write a program to implement area of geometrical figures

1. **Introduction:** Database and Database Users, Characteristics of the Database Approach, Different people behind DBMS, Implications of Database Approach., Advantages of using DBMS, When not to use a DBMS. (5 Hrs)
2. **Database System Concepts and Architecture:** Data Models, Schemas, and Instances., DBMS Architecture and Data Independence., Database languages and interfaces., The Database system Environment, Classification of Database Management Systems. (4 Hrs)
3. **Data Modeling Using the Entity-Relationship Model:** High level Conceptual Data Models for Database Design with an example., Entity types, Entity sets, Attributes, and Keys, ER Model Concepts, Notation for ER Diagrams, Proper naming of Schema Constructs, Relationship types of degree higher than two. (5 Hrs)
4. **Record Storage and Primary File Organization:** Secondary Storage Devices. Buffering of Blocks. Placing file Records on Disk. Operations on Files, File of unordered Records (Heap files), Files of Ordered Records (Sorted files), Hashing Techniques, and Other Primary file Organization. (6 Hrs)
5. **Functional Dependencies and Normalization for Relational Databases :** Informal Design Guidelines for Relational Schemas, Functional Dependencies, Normal Forms Based on Primary Keys., General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form. (6 Hrs)
6. **Relational Data Model and Relational Algebra:** Relational Model Concepts., Relational Model Constraints and Relational Database Schema, Defining Relations, Update Operations on Relations., Basic Relational Algebra Operations, Additional Relational Operations., Examples of Queries in the Relational Algebra., Relational Database design Using ER – to – Relational Mapping. (6 Hrs)
7. **Relational Database Language:** Data definition in SQL, Queries in SQL, Insert, Delete and Update Statements in SQL, Views in SQL, Specifying General Constraints as Assertions, Specifying indexes, Embedded SQL. (5 Hrs)
8. **PL / SQL:** Introduction, Exceptions & Cursor Management, Database Triggers, Functions, Procedures and packages. (8 Hrs)
9. **Transaction Processing Concepts:** Introduction, Transaction and System Concepts, Desirable properties of transaction, Schedules and Recoverability, Serializability of Schedules, Transaction Support in SQL, Locking Techniques for Concurrency Control, Concurrency Control based on time stamp ordering, Optimistic Concurrency control techniques, Using locks for Concurrency Control in Indexes. (7 Hrs)

Text book :

1. Patrick O'Neil, *Data Base Principles, Programming & Performance 2nd Edn.* Academic Press, 2002.
2. Elmasri & Navathe, *Fundamentals of Database Systems (Fourth Edition)*, Pearson Education, 2003.
3. Sundarraman, *Oracle 9i programming A Primer, 1/e* Pearson Education.
4. ROBCORONEL, *DBMS, Implementation and Management, 5th Edn.*, Thomson Pub., 2005.

References :

1. Kahate, *Introduction to Database Management System*, Pearson Education 2004.
2. Abrahamsi. Silberschatag, Henry. F. Korth, S. Sudarshan, *Database System Concepts*, Mc.graw hill.
3. Jefry. D. Ullman , *Principles of database system*.
4. Oracle Press : ORACLE - Computer reference
5. C.J. Date, *Introduction to database systems*, Sixth Edition, Addison Wesley, 1995.
6. Raghu Ram Krishnan, *Database Management Systems*, Second Edition., Mc.Graw Hill, 2000
7. Leon – *Fundamental of Database Management System*
8. Rob : *Database Management Systems: Design, Implementation and Management*, 7th Edition, 2008 , Cengage Learning India
9. Pratt: *Concepts of Database Management* , 5th Edition, 2008 , Cengage Learning India

BCA205P - PRACTICALS IN DBMS

Programs must be developed in the practical classes in such a way that integration of the programs leads to an application program. This should be a pre-cursor to the mini projects to be taken up by the students in the fifth and sixth semesters.

THEORY AND PRACTICAL EXAMINATIONS

The pattern of question paper and the scheme of evaluation are as per the prescribed ones for science degree courses.

Text Book for BCA Mathematics paper :

1. Grewal, B.S, *Higher engineering Mathematings*, Latest Edition

Reference Books for BCA Mathematics paper:

1. Sastry S.S. *Engineering Mathematics*, 2000
2. Peter V. O'Neil, *Advanced Engineering Mathematics*, 5th Edition.
3. Liu – *Elements of Discrete Mathematics (SIE)* 3/e

Text Book for BCA Electronics paper :

1. Bignell & Donovan, *Digital Electronics*, 4th Edn. Thompson Pub.
2. V. K. Mehta, *Basic Electrical and Electronics Engineering*.
3. Thomas L. Floyd, " *Digital Fundamentals*", Pearson Education Inc, New Delhi, 2003

Reference Books for BCA Electronics paper:

1. Thomas C. Bartee, *Digital fundamentals*
2. Morris Mano, *Digital Design*, 3rd ed, Prentice Hall of India Pvt.Ltd, New Delhi.
3. R. P Jain, *Modern Digital Electronics*, 3rd ed, Tata Mc Graw Hill, 2003.
4. Malvino and Leach, *Digital Electronics*.
5. Salivahanan – *Electronic Devices and Circuits* 2/e TMH

THIRD SEMESTER
BCA301T – INDIAN LANGUAGE

Syllabus as per the one prescribed for science courses of Bangalore University.

BCA302T – ENGLISH

Syllabus as per the one prescribed for science courses of Bangalore University.

BCA303T - INDIAN CONSTITUTION

Unit – 1

- a. Framing of the Indian Constitution: Role of the Constituent Assembly.
- b. Philosophy of the Constitution: Objectives, resolution, preamble, fundamental Rights and Duties. Human rights and Environmental protection. 10 hrs

Unit -2

- a. Special Rights created in the Constitution of Dalits, Backward Classes, Women and Children, and religious and linguistic minorities.
- b. Directive Principles of State policy: The need to balance fundamental rights with directive principles. 10 hrs

Unit – 3

- a. Union Execution : President, Prime Minister and Council of Ministers: powers and functions, coalition Government, problems in their working.
- b. Union Legislature : Lok Sabha and Rajya Sabha, powers and functions. Recent trends in their functioning. 08 hrs

Unit – 4

- a. State Government : Governor, Chief Minister and Council of ministers, Legislature.
- b. Centre – State relation: Political, financial, administrative : Recent Trends. 12 hrs

Unit-5

- a. Judiciary : Supreme Court, Judicial Review, Writs Public interest litigations. Enforcing rights through writs.
- b. Emergency provision (Article 356) 10 hrs

Books for Reference:

1. D.D Basu – *Introduction to the Indian Constitution.*
2. A.S Narang – *Indian Constitution, Government and Politics.*
3. Nani Palkhivala – *we the People, UBS Publishers, New Delhi, 1999.*
4. A.G Noorani – *Indian Government and Politics.*
5. J.C Johari – *Indian Government and Politics Vol-I and II, Vishal, New Delhi.*
6. Granville Austin – *The Indian Constitution – Corner Stone of a Nation, Oxford, New Delhi, 2000.*
7. M.U. Pylee, *Constitutional Government in India.*
8. K.K. Ghai, *Indian Constitution.*
9. J.N Pandey, *Constitution of India.*

1. **Introduction:** Batch Systems, Concepts of Multiprogramming and Time Sharing, Parallel, Distributed and real time Systems, Operating System Structures, Components & Services, System calls, System programs, Virtual machines **(6 Hrs)**
2. **Process Management:** Process Concept, Process Scheduling, Co – Operating process, Threads, Inter process communication, CPU Scheduling Criteria, Scheduling algorithm, Multiple Processor Scheduling, Real time Scheduling, Algorithm evolution. **(8 Hrs)**
3. **Process Synchronization and deadlocks:** The Critical Section Problem, Synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, monitors, Dead locks – System model, Characterization, Dead lock prevention, avoidance and detection, Recovery from dead lock, Combined approach to deadlock handling. **(10 Hrs)**
4. **Memory Management:** Logical and Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Segmentation with paging in Mastics and Intel 386, Virtual memory – Demand paging and it's performance, Page replacement algorithms, Allocation of frames, thrashing, page size and other considerations. Demand Segmentation **(10 Hrs)**
5. **File management (Systems, Secondary Storage Structure):** File Concepts, Access methods, Directory Structure, Protection and consistency semantics, File system structure, Allocation methods, Free space management, Directory Implementation, Efficiency and Performance, Recovery. **(8 Hrs)**
6. **Disk Management (Structure, Disk Scheduling Methods):** Disk Structure & Scheduling methods, Disk management, Swap – Space management, **(5 Hrs)**
7. **Protection and Security:** Goals of protection, Domain Protection, Access matrix, Security Problem, Authentication, One time password, program threats, System threads. **(5 Hrs)**

Text books:

1. *Abraham Silberschatz and peter Baer Galvin, Operating System Concepts, Fifth Edition, Pearson Education 1989 (Chapter 1,3.1,3.2,3.3,3.4,3.6,4,5,6 (Except 6.8,6.9), 7, 8,9,10,11,13, (Except 13.6) 19 (Except 19.6),20(Except 20.8, 20.9), 22,23)*
2. *Nutt: Operating Systems, 3/e Pearson Education 2004*
3. *Stuart : Operating systems : Principles , Design and Implementation, 1st Edition 2008, Cengage Learning India*

References:

1. *Milan Milonkovic, Operating System Concepts and design, II nd Edition, McGraw Hill 1992.*
2. *Richard Peterson , Linux- The complete reference.*
3. *Tanenbaum, Operation System Concepts. Pearson Education.*
4. *Nutt, Operating Systems. Pearson Education.*
5. *Stallings, Operating Systems, Pearson Education.*
6. *Dhamdhare – Operating Systems 2/e TMH 2007*
7. *Flynn : Operating Systems , 1st Edition, 2008, Cengage Learning India*

BCA305T – DATA STRUCTURES Using C

Total: 52 Hrs

Introduction to Data structures: Definition, Classification of data structures : primitive and non primitive. Operations on data structures. (2 Hrs)

Dynamic memory allocation and pointers: Definition Accessing the address of a variable, Declaring and initializing pointers. Accessing a variable through its pointer. Meaning of static and dynamic memory allocation. Memory allocation functions : malloc, calloc, free and realloc. (4 Hrs)

Recursion: Definition, Recursion in C, Writing Recursive programs – Binomial coefficient, Fibonacci, GCD. (4 Hrs)

Searching and Sorting Search:- Basic Search Techniques : Search algorithm searching techniques : sequential search, Binary search – Iterative and Recursive methods. Comparison between sequential and binary search. (4 Hrs)

Sort- General Background: Definition, different types: Bubble sort ,Selection sort, Merge sort, Insertion sort, Quick sort (10 Hrs)

Stack – Definition, Array representation of stack, Operations on stack : Infix, prefix and postfix notations Conversion of an arithmetic expression from Infix to postfix. Applications of stacks. (7 Hrs)

Queue- Defn, Array representation of queue, Types of queue: Simple queue, circular queue, double ended queue(deque)priority queue, operations on all types of Queues(7 Hrs)

Linked list – Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list : Singly linked list, Doubly linked list, Circular linked list and circular doubly linked list. Operations on singly linked list : creation, insertion, deletion, search and display. (7 Hrs)

Tree - Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology : Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree : Array representation of tree, Creation of binary tree. Traversal of Binary Tree : Preorder, Inorder and postorder. (7 Hrs)

Text books :

1. Kamthane: *Introduction to Data Structures in C*. Pearson Education 2005.
2. Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron *Data Structures using C and C++* Pearson Education

References :

1. Weiss, *Data Structures and Algorithm Analysis in C*, II Edition, Pearson Education, 2001
2. Lipschutz: *Schaum's outline series Data structures* Tata McGraw-Hill
3. Robert Kruse *Data Structures and program designing using 'C'*
4. Trembley and Sorenson *Data Structures*
5. E. Balaguruswamy *Programming in ANSI C*.
6. Bandyopadhyay, *Data Structures Using C* Pearson Education, 1999
7. Tenenbaum; *Data Structures Using C*. Pearson Education, 2000
8. Krishnamoorthy – *Data Structures using C* TMH 2008
9. Forouzan : *Computer Science A Structured Programming Approach using C*, 2nd Edition, 2008 Cengage Learning India
10. Gilberg : *Data Structure a Pseudocode Approach using C*, 2nd Edition, 2008, Cengage Learning India.

1. Write a C program to search for an element in an array using Binary search
2. Write a C program to sort a list of N elements using Bubble sort Technique
3. Write a C program to demonstrate the working of stack of size N using an array. The elements of the stack may assume to be of type integer or real, the operations to be supported are 1. PUSH 2. POP 3. DISPLAY. The program should print appropriate messages for STACK overflow, Under flow and empty, use separate functions to detect these cases
4. Write a C program to simulate the working of an ordinary Queue using an array. Provide the operations QINSERT, QDELETE and QDISPLAY. Check the Queue status for empty and full.
5. Write a C program to simulate the working of an Circular Queue using an array. Provide the operations CQINSERT, CQDELETE and CQDISPLAY. Check the Circular Queue status for empty and full.
6. Using dynamic variables and pointers Write a C program to construct a singly linked list consisting of the following information in each node;
Roll – No (Integer), Name (Character string)
The operations to be supported are ;
 1. LINSERT Inserting a node in the front of the list
 2. LDELETE Deleting the node based on Roll – No
 3. LSEARCH Searching a node based on Roll-No
 4. LDISPLAY Displaying all the nodes in the list
7. Write a C program to sort a list of N elements using Merge sort Algorithm
8. Using Dynamic variables and pointers construct Binary search tree of integers , Write C functions to do the following ;
 1. Given a KEY, Perform a search in Binary search tree . If it is found display Key found else insert the key in the Binary search tree.
 2. While constructing the Binary search tree do not add any duplicate
 3. Display the tree using any of the traversal method
9. Write a C program to sort a list of N elements of integer type using heap sort Algorithm
10. Write a C program to simulate the working of Towers of Hanoi problem for N disks , print the total number of Moves taken by the program.
11. Write a C program to sort a list of N elements of integer type using quick sort Algorithm
12. Write a C program to find ncr using recursion
13. Write a C program to convert and print a given valid fully parenthesized in fix arithmetic expression to post fix expression, the expression consists of single character (letter or digit) as operands and +, -, *, / as operators, assume that only binary operators are allowed in the expression
14. Write a C program to search for an element using sequential search
15. Write a C program to create file for N students, it should contain Roll-No, Name and Marks in two subjects. Using the above created file, create an out put file which contains Roll-No, Name, Marks in subjects, Total and Average.

BCA306T – NUMERICAL ANALYSIS and LINEAR PROGRAMMING

Total: 52 Hrs

- I. Floating-point representation and errors-Normalized floating-point forms, Errors in representing numbers, Floating point machine number and machine epsilon, Loss of significance and its avoidance(Chapter 2 in Cheney and Kincaid). **6 Hrs**
- II. Roots of equations-locating roots of $f(x)=0$ Bisection method and convergence analysis, Newton's method and convergence analysis, failure of Newton's method due to bad starting points, modification of Newton's method for multiple roots, Newton's method for System of Non-linear equations, Secant method and convergence analysis, Golden ratio (Chapter 3 in Cheney and Kincaid). **8 Hrs**
- III. Interpolation and numerical differentiation-polynomial interpolation and its existence Lagrange and Newton form of interpolating Polynomial, Divided difference and recursive property , Inverse interpolation ,Error in Polynomial interpolation, First and Second derivative formulae via interpolation Polynomials. (Chapter 4 in Cheney and Kincaid). **8 Hrs**
- IV. Numerical integration-Trapezoidal, Simpson's and adaptive Simpson rules and Error analysis, (Chapters 5 and 6 in Cheney and Kincaid). **6 Hrs**
- V. System of linear equations-Gaussian elimination and back substitution –partial and complete pivoting, Tridiagonal and pentadiagonal banded systems, Thomas algorithm, Doolittle, Cholesky and Crout LU decomposition methods, Jacobi and Gauss –Seidel iterative methods and convergence theorems. Power (and inverse power) method of obtaining largest (smallest) eigenvalue and corresponding eigenvector. (Chapters 7 and 8 in Cheney and Kincaid). **8 Hrs**
- VI. Ordinary differential equations- initial value problem, Picard's, Taylor series, Runge-Kutta first, second and fourth order methods, adaptive Runge-Kutta method of fifth order (derivation of only Runge-Kutta first and second order methods), boundary value problems-shooting methods for linear differential equations. (Chapters 10, 11 and 14 in Cheney and Kincaid). **8 Hrs**
- VII. Linear programming-first Primal form, Graphical solution method, Transforming problems into first primal form, dual problem, Theorem on primal and dual problems, Second Primal form. Simplex method , Approximate solution of inconsistent linear systems. (Chapter 17 in Cheney and Kincaid). **8 Hrs**

Text Book

1. Cheney E. W. and Kincaid D. R. "Numerical Method and Applications, Cengage learning (Book/cole)-Indian Edition(2008).

Reference Books

1. Jain M. K. ,Iyengar S. R. K. and Jain R. K. " Numerical methods for Scientific and Engineering Computation ".
2. Sastry S. S. " Introductory methods of Numerical Analysis ", PHI(2005).

BCA306P – NUMERICAL ANALYSIS and LINEAR PROGRAMMING Lab

- 1) Write a program to find the roots of an equation $f(x) = 0$ using Bisection method.
- 2) Write a program to find the simple/multiple roots of $f(x) = 0$ using Newton – Raphson method.
- 3) Write a program to find the roots of system of non-linear algebraic equations using Newton's method.
- 4) Write a program to find the roots of $f(x) = 0$ using Secant method.
- 5) Write a program to find the integral of a function using Trapezoidal rule.
- 6) Write a program to find the integral of a function using Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule using switch case.
- 7) Write a program to find the integral of a function using adaptive Simpson method
- 8) Write a program to solve the system of equations $Ax = b$ in tridiagonal form using Thomas Algorithm.
- 9) Write a program to solve the system of equations $Ax = b$ using Gauss elimination method.
- 10) Write a program to solve the system of equations $Ax = b$ using Jacobi Iteration method.
- 11) Write a program to solve the system of equations $Ax = b$ using Gauss-Seidel method
- 12) Write a program to find the largest (or smallest) Eigen value and corresponding eigen vector of a square matrix using power (or inverse power) method.
- 13) Write a program to solve first and second order ordinary differential equations (initial value problem) using Runge-Kutta fourth order method.
- 14) Write a program to solve first order ordinary differential equations (initial value problem) using adaptive Runge-Kutta method .
- 15) Write a program to solve second order ordinary differential equations (boundary value problem) using shooting method based on adaptive Runge-Kutta method and Newton-Raphson method.
- 16) Write a program to solve the optimization problem solvable by Simplex method.

FOURTH SEMESTER
BCA401T – INDIAN LANGUAGE

Syllabus as per the one prescribed for science courses of Bangalore University.

BCA402T – ENGLISH

Syllabus as per the one prescribed for science courses of Bangalore University.

BCA403T – ENVIRONMENTAL STUDIES
As approved by the Environmental Science Board

Total : 52 hrs

Unit 1: Nature of environmental studies: Definition, scope and importance, Multidisciplinary nature of environmental studies, need for public awareness.

Natural resources and associated problems: (a) **Forest resources:** Use and over-exploitation, deforestation timber extraction, mining, dams and their effects on forests and tribal people, (b) **Water resources:** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. (c) **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources. (d) **Food resources:** World food problems, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems. (e) **Energy resources:** Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. (f) **Land resources:** land as resources, and 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. **(10 Hrs)**

Unit 2: Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, Characteristic features, structure and function of the following ecosystem: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **(10 Hrs)**

Unit 3: Biodiversity and its conservation: Introduction-Definition: genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option value, Biodiversity at global, national and local levels, India as a mega-diversity nation, Western ghat as a biodiversity, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife Conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ, Conservation of biodiversity. **(10 Hrs)**

Unit 4: Environmental Pollution: Definition, causes, effects and control measures of: a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards., Solid waste management: causes, effects and control measures urban and industrial wastes, Role of an individual in prevention of pollution, Disaster management: folds, earthquake, cyclone and landslides, Tsunami. **(10 Hrs)**

Unit 5: Social Issues and Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust,

Wasteland reclamation, consumerism and waste products, Environment protection Act, Air (Prevention and control of pollution) Act., Water (Prevention and control of pollution) Act., Wildlife protection act, Forest conservation Act, Issues involved in enforcement of environmental legislation public awareness. (8 Hrs)

Unit 6: Human Population and the Environment: Population growth, variation among nations, Population explosion, Family welfare programme, Environment and human health, Value Education, Women and Child Welfare, Role of information technology in Environmental and human health. (4 Hrs)

References:

1. S. Sinha, M. Shukla & R. Shukla, *Text book of Environmental studies* AITBS Publishers, Delhi. (2005)
2. Agarwal, K.C., 2001 *Environmental Biology*, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, *The Biodiversity of India*, Mapin publishing Pvt. Ltd. Ahmedabad-380013, India.
4. Brunner R.C., 1989, *Hazardous Waste Incineration*, McGraw Hill Inc. 480p.
5. Clark R.S. *Marine pollution*, Clanderson Press Oxford.
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001 *Environmental Encyclopedia*, Jaico Publ. House. Mumbai, 1196p.
7. De. A.K. *Environmental Chemistry*, Wiley Eastern Ltd.,
8. *Down to Earth*, Centre for Science and Environment.
9. Gleick, H.P. 1993 *Water in crisis*, pacific institute for studies in Dev. Environmental & Security. Stockholm Env. Institute. Oxford University press 473p.
10. Hawkins R.E. *Encyclopedia of Indian Natural History*, Bombay Natural History Society, Bombay,
11. Jadhav H & Bhosle V.M. 1995 *Environmental Protection and laws*. Himalayas Pub. House Delhi, 284p
12. Mckinney M.L. & Schoel R.M. 1996 *Environmental Science systems & Solutions* Web. Enhanced edition 639p.
13. Heywood, Vh & Watson R.T. 1995 *Global biodiversity Assement* Cambridge Univ. press 1140p
14. Mhaskar A.K. *Matter Hazardous Techno-Science Publications*.
15. Miller T.G. Jr. *Environment Science* Wadsworth publishing co.
16. Odum E.P. 1971 *Fundamental of Ecology* W.B. Saunders Co. USA 574p
17. Rao M.N. & Data A.K. 1987 *Waste Water treatment*, Oxford and IBH Publ. Co pvt, ltd 345p
18. Sharma B.K. 2001 *Environmental chemistry* Goel Publ. House, Meerut.
19. Townsend C. Harper. J. and Michel Begon, *Essesetials of Ecology* Blackwell Science.
20. Trivedi R.K. *Handbook of Environmental Laws, rules, guidelines, ompliances and Standards*, Vol I and II Enviro Media.
21. Trivedi R.K. and P.K. Goel *introduction to air pollution*, Techno-Science Publications.
22. Wagner K.D. 1998 *Environmental Management*. W.B. Saunders Co. Philadelphia, U.S.A. 499p.
23. Benny Joseph – *Environmental Studies* 2/e TMH 2008
24. Miller : *Environmental Science* , 11th Edition 2008, Cengage Learning India

1. Communication Networks & Services

Approaches to Network design: Network Goals, Network Topologies, Switching Techniques: Message, Packet and Circuit switching, Evolution of Network Architecture and Services

- (i) Telegraph Networks and Message switching
- (ii) Telephone Networks and Circuit switching
- (iii) Internet, Computer Network and Packet switching

Essential elements of Network Architecture

Key factors in Communication Network Evolution

(6 hrs)

2. Layered Architecture & Applications

Examples of Layering: OSI Reference Model, TCP/IP Model

Application Layer Protocols and TCP/IP utilities : Telnet, FTP, HTTP and IP utilities like PING, TRACEROUTE, IPCONFIG, NETSTAT

(4 hrs)

3. Digital Transmission

Digital representation of information, Basic properties of digital transmission systems, Characterization of communication channels: Frequency domain and Time domain, Fundamental limits in digital transmission: Nyquist signaling rate, Shannon channel capacity, Line coding.

Modems and Digital modulation: Amplitude shift keying, Frequency shift keying, Phase shift keying.

Transmission media: Twisted Pair, Coaxial cable, Optical Fibre, Radio transmission, Infra red Light.

Error detection and correction: Error detection, two dimensional parity checks, internet checksum, polynomial codes and their error detection capability

Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Wavelength Division Multiplexing, SONET Multiplexing

Circuit Switches: Space division switches, time division switches

(12 hrs)

4. Peer-To-Peer Protocols

Connection oriented and connectionless service models, Features of Services offered by a given layer, Peer to peer protocols in end to end and single hop network

ARQ protocols: Stop and wait, go back N, Selective Repeat

Other peer to peer protocols: Sliding window flow control, Timing recovery for synchronous services, TCP Reliable stream service and flow control

Data Link Control – Framing, Point to Point Protocol (PPP), High level Data Link Control (HDLC).

(10 hrs)

5. Medium Access Control Protocols

Multiple access communications,

Random access MAC protocols: ALOHA, Slotted ALOHA, CSMA, CSMA/CD

Scheduling approaches to medium access control: Reservation systems, polling, Token passing rings, Comparison of Scheduling approaches in medium access control,

Comparison of random access and scheduling medium access controls

Channelization: FDMA, TDMA, CDMA

(7 hrs)

6. Local Area Networks

LAN structure, MAC sublayer, Logical Link Control layer (LLC), LAN Standards: Ethernet and IEEE 802.3 LAN standard, Token Ring and IEEE 802.5 LAN standard, FDDI, Wireless LANs and IEEE 802.11 standard, LAN bridges: Transparent bridges, Source Routing bridges, Mixed-media bridges. (7 hrs)

7. Packet Switching Networks

Network services and Internal Network operation, Packet network topology, Datagrams and Virtual circuits, Connectionless packet switching: Virtual circuit packet switching, Structure of a packet switch
Routing in packet networks : Routing algorithm classification, Routing tables, Flooding, Hierarchical Routing, Shortest path routing algorithms (Bellman Ford Algorithm, Dijkstra's Algorithm), Link State routing, Distance Vector Routing
Congestion control algorithms: Open Loop control and Closed Loop control (6 hrs)

Text books

- 1) Douglas E Comer. "Networks and Internet with Internet Applications". Prentice Hall, 2004.
- 2) Stallings, Data and Computer Communications, 7/e, Pearson Education, 2003
- 3) Alberto Leon-Garcia & Indra Widjaja, Communication Networks – Fundamental Concepts & Key architectures, Mc.Graw Hill – 2000.

References

- 1) Andrew S Tanenbaum Computer Networks, 4/e, Pearson Education
- 2) S. Keshav, An Engineering Approach to Computer Networks, Pearson Education.
- 3) Behrouz Ferouzan, Introduction to Data Communications & Networking TMH, 1999.
- 4) Larry & Peterson & Bruce S Davis; Computer Networks Second Edition, Morgan Kaufman, 2000.
- 5) Halsa, Data Communication, Computer Networks and Open Systems. Held, Understanding Data Communications.
- 6) Forouzan – Data Communications and Networking 4/e (SIE)
- 7) White : Data Communications and Networking 1st Edition, 2008, Cengage Learning India

BCA405T – VISUAL PROGRAMMING

Total: 52 hrs

Unit 1: Windows Programming: Traditional Programming Paradigms – Overview of Windows Programming – Data Types – Resources – Windows Messages – Device Contexts – Document Interfaces – Dynamic Linking Libraries – Software Development Kit (SDK) Tools – Context Help. **10 hrs**

Unit 2: Visual Basic Programming: Introduction – Forms – Variables, Types – Properties – Decision Making – Looping – Modules – Procedures – Functions-Tool Box Controls – Menus – Grid Controls – Dialog Boxes – Database Manager – Data Control – Record set Objects. **20 hrs**

Unit 3: Visual C++ Programming: Objects – Classes - VC++ Components – Resources – Event Handling – Menus – Dialog Boxes – Importing VBX Controls – Files – MFC File Handling – Document View Architecture – Serialization. **10 hrs**

Unit 4: Interfacing Other Applications – Multiple Document Interface (MDI) – Splitter Windows – Exception Handling – Debugging – Object Linking and Embedding (OLE) – Database Application – DLL – ODBC. **12 hrs**

Text Books :

1. *Visual Basic 6 by Gurumit singh (Aman) , Firewall media.*
2. *Deitel, Visual Basics 6- How to program. Pearson Education*

Reference Books:

1. *Windows Programming by Charles Petzold, Microsoft Press.*
2. *Visual Basic 6 from the ground up by Garry Cornell, TMH.*
3. *Visual C++ Programming by Steven Holzner, PHI.*
4. *Visual Programming by Yashwant Kanitkar.*

BCA405P – VISUAL PROGRAMMING LAB

Minimum of 15 related programs must be developed in the practical classes in such a way that integration of the programs leads to an application program. This should be a precursor to the mini projects to be taken up by the students in the fifth and sixth semesters.

BCA406T – UNIX PROGRAMMING

Total: 52 Hrs

1. **Introduction**
History, salient features, Unix system architecture, Unix command format, Unix internal and external commands, Directory commands, File related commands, Disk related commands, general utilities. **(6)**
2. **Unix File System**
Boot inode, super and data block, in-core structure, Directories, conversion of pathname to inode, inode to a new file, Disk block allocation. **(2)**
3. **Process Management**
Process state and data structures of a Process, User vs. kernel node, context of a Process, background processes, Process scheduling commands, Process terminating and examining commands. **(6)**
4. **Secondary Storage Management**
Formatting, making file system, checking disk space, mountable file system, disk partitioning, file compression. **(6)**
5. **Special Tools and Utilities**
Filters, Stream editor SED and AWK, Unix system calls and library functions, Processes, signals and Interrupts, storage and compression facilities. **(8)**
6. **Shell Programming**
Vi editor, shell types, shell command line processing, shell script features, executing a shell script, system and user-defined variables, expr command, shell screen interface, read and echo statement, command substitution, escape sequence characters, shell script arguments, positional parameters, test command, file test, string test, numeric test.
Conditional Control Structures – if statement, case statement
Looping Control Structure – while, until, for, statements.
Jumping Control Structures – break, continue, exit. **(16)**

7. **Unix System Communication**
Introduction, write, read, wall commands, sending and handling mails. (4)
8. **System Administration**
Roles of a System Administrator, File System Maintenance, System Startup and Shutdown, User Management, Backup and Restore, Daemons, Domain Name System DNS, Distributed File System. (4)

Text Books

- 1) Forouzan : *Unix and Shell Programming*, 1st Edition, 2008 Cengage Learning India
- 2) Raymond, *The Art of Unix Programming*, Pearson Education, Asia 2002.
- 3) Kernighan B W & Robert B, *The Unix programming environment*.
- 4) *UNIX and Shell Programming*, Archana Verma, Firewall Media.

References

- 1) Glass, *Unix for Programmers and Users*, 3/e Pearson Education
- 2) Kernighan, *The Unix Programming Environment*
- 3) Sobell G, *A practical Guide to Unix System*.
- 4) Kochan, *Unix Shell Programming*, Pearson
- 5) Sumithaba Das – *UNIX: Concepts and Applications 4.e*

BCA406P - UNIX PROGRAMMING LAB SECTION A

Write Shell programs for the following:

1. To count the number of characters in a given string
2. To find whether the given year is leap year or not
3. To check whether a given number is even or odd
4. To find the factorial of a given number.
5. To print a string in the reverse order.
6. To count the number of vowels in a given string.
7. To print all prime numbers between m and n ($m < n$).
8. To check whether a given string is a palindrome or not.
9. Write a shell script that displays all the files in the current directory.
10. To write a shell script that creates a file and compresses it using:
a) compress b) pack

SECTION B

11. Create a file containing the following fields: student No., student name, age, sex, height and weight. Print all the details in a neat format.

Write menu based shell programs with at least 3 options for the following:

12. Payroll system

FIFTH SEMESTER
BCA501T – SOFTWARE ENGINEERING

Total: 52 Hrs

1. **Introduction:** Definition of Software engineering, Software product and software process, Software attributes, Software Engineering challenges, Software development life cycle, Process model: Water fall model, Bohemia's Spiral model, Iterative enhancement model, Overview of risk management, Project management, Process visibility, Professional and ethical responsibility. **(4 Hrs)**
2. **System Engineering:** System and their environment, System Procurement, System Engineering Process, System Architecture modeling, Human Factors, System Reliability Engineering. **(3 Hrs)**
3. **Software Requirement Analysis and Specification:** Software Requirements - Functional and Non Functional, Requirement elicitation and Analysis, SRS document, Requirement specification, Requirement Engineering Process, Requirement Validation, Requirement Management. Social 7 organizational factors, System Models – Types of models, Metrics. **(8 Hrs)**
4. **Software Prototyping:** Prototyping in software process, Prototyping techniques, User interface prototyping. **(2 Hrs)**
5. **Software Design:** Design types, Design principles – Problem partitioning, Abstraction, Modularity, Top-Down and Bottom-up, Design process, Design Strategies, Design quality, Coupling and Cohesion, Design notation and specification, Design methodologies, Domain Specific architecture. **(5 Hrs)**
6. **Object oriented design and function oriented design:** Object oriented concepts-Classes and objects, inheritance, polymorphism, Object identification, Object oriented analysis and design example, Design models, object interface specification, Data flow design, Structural decomposition, Detailed design. **(5 Hrs)**
7. **User Interface Design:** Design Issues, User interaction, Information presentation, User interface design process, user analysis, user interface prototyping, Interface evaluation. **(3 Hrs)**
8. **Reliability and reusability:** Software reliability metrics, software reliability specifications, statistical testing, reliability growth modeling, fault avoidance, fault tolerance, exception handling and defensive programming, software development with reuse, reuse landscape, design patterns, Generator based reuse, Application system reuse – COTS product reuse, software product lines. **(8 Hrs)**
9. **Testing:** Testing fundamentals – error, fault and failure, Test cases and test criteria, process, test plan and strategies, Types of testing – Black box, White box, structural and interface testing, Program inspection, Levels of testing, Mathematically based verification, Static analysis tool, Metrics. **(8 Hrs)**
10. **Software Management:** Project management, quality management, cost estimation, cost estimation models, Risk management, software maintenance. **(6 Hrs)**

Text Books

1. Ian Sommerville - *Software Engineering*, 6th Edition, Pearson Education Ltd.

Reference Books

1. Roger S. Pressman - *Software Engineering, A Practitioner's approach*, 5th Edition, McGraw-hill book company
2. Richard Fairly - *Software Engineering Concepts*, First Edition, TATA Mcgraw Hill Publishing Co Ltd.
3. Pankaj Jalote - *An integrated approach to Software Engineering* - Narosa Publishing house.
4. Jawadekar- *Software Engineering: A Primer* TMH 2008

BCA502T – COMPUTER ARCHITECTURE

Total: 52 Hrs

DIGITAL LOGIC CIRCUITS: Logic gates Boolean algebra, map simplification, combinational circuits, flip-flop, sequential circuits. (05)

INTEGRATED CIRCUITS AND DIGITAL FUNCTIONS: Digital integrated circuits, IC flip-flops and registers, decoders and multiplexers, binary counters, shift registers, random - access memories (RAM) read-only memories (ROM) (10)

DATA REPRESENTATION : Data types, fixed-point representation, floating-point representation, other binary codes, error detection codes. (05)

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, computer instruction, timing and control, execution and instruction, input-output and interrupt, design of computer. (10)

CENTRAL PROCESSOR ORGANIZATION: Processor bus organization, arithmetic logic unit (ALU), instruction formats, addressing modes, data transfer and manipulation, program control, microprocessor organization. (10)

INPUT-OUTPUT ORGANIZATION: Peripheral devices, asynchronous data transfer, direct memory access (DMA), priority interrupt, input-output processor (IOP). (06)

MEMORY ORGANIZATION : Auxiliary memory, microcomputer, memory hierarchy, associative memory, virtual memory, cache memory. (06)

References:

1. M.Moris Mano, *Computer System Architecture*, 2nd Edition Prentice Hall of India (1991).
2. Heuring and Jordan, *Computer systems design and Architecture*, Pearson Education (2003)
3. William Stallings, *Computer Organization and Architecture*, Pearson Education (2003)
4. Floyd, *Digital Fundamentals*, 8th Edition, Pearson Education (2003)
5. Andrew S. Tenenbaum, *Structured Computer Organization*, 3rd Edition, Prentice Hall of India (1990)
6. David Patterson & Hennessy, *Computer Organization & Design*, Elsevier, 2005.
7. Carter - *Computer Architecture (SIE) (Schaum's Outline Series)*

BCA503T – BANKING AND INSURANCE

Total: 52 Hrs

UNIT I: Financial System: Institutions, Markets – Primary, Secondary, Money & Capital markets, instruments of money market, Functions and their economic significance. **(12)**

UNIT II: Commercial Banks-Functions, Structure of Commercial banks in India-Sources of funds, Investment norms-factors determining liquidity of banks-Asset Structure of Commercial banks-profitability of banks **(12)**

UNIT III: The concept of Risk & Insurance – classification of insurance-life insurance—types of General Insurance – insurance of property, pecuniary interest, liability and person – types of policies fire, marine, motor, engineering, aviation, agriculture, liability and person. **(08)**

UNIT IV: Essentials of a contract- Principles applicable to insurance business- utmost good faith- insurable interest-indemnity-subrogation and contribution – proximate cause-financial principles- premium funds- investments-reserves-surplus-valuation of funds. Introduction to risk- Risk Appraisal-risk selection-underwriting-Reinsurance-concepts and methods-facultative, treaty reinsurances and various methods. **(12)**

UNIT V: Growth and development of insurance – present day Regulatory environment- Insurance Act, 1938-IRDA Act, 1999-Present Market environment- intermediaries – Office organization-departments-files-correspondence-new technology, controls. **(08)**

References:

1. G. Kotreswar, *Risk Management, Insurance and Derivatives*- Himalaya Publishing House.
2. T.T. Seth, *Insurance Principles and Practice*- S Chand, New Delhi
3. Courses IC 01, IC 02, IC 11, IC 12, IC 25 of Insurance Institute of India, Mumbai
4. L.M. Shole – *Financial Institutions and Markets*, TMH.
5. K.C. Shekar & Lakshmy Shekar, *Banking Theory & Practice*, Vikas Publication (2001).

1. **Introduction:** Internet origin and development – internet architecture frame work-world Wide Web.
2. **Introduction to JAVA:** JAVA Evolution: Java History, Java Features, How Java Differs from C and C++, Java and Internet, Java and World Wide Web, Web Browsers, Hardware and Software requirements, Java Support Systems, Java Environment. Overview of JAVA Language: Introduction, Simple Java Program, More of Java, An Application with Two Classes Java Program structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. Constants, Variables, and Data Types: Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Operators and Expressions; Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type conversion and Associativity, Mathematical Functions. Decision Making and Branching: Introduction, Decision Making with if Statement, Simple if Statement, The if else Statement, Nesting of if else Statements, The else if Ladder, The Switch Statement, The ?: Operator. Decision Making and Looping: Introduction. The while Statement, The do Statement, The for Statement, Jumps in Loops Labeled Loops. (12 Hrs)
3. **Classes, Arrays, Strings and Vectors:** Classes, Objects and Methods: Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class Overriding Methods, Final Variables and Methods, Finalizer methods, Abstract Methods and Classes, Visibility Control. Arrays, Strings and Vectors: Arrays, One – dimensional Arrays, Creating an Array, Two – dimensional Arrays, Strings, Vectors, Wrapper Classes. (8 Hrs)
4. **Interfaces, Packages, and Multithreaded Programming:** **Interfaces:** Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. **Packages:** Putting Classes together: Introduction, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes. **Multithreaded Programming:** Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a thread, Life Cycle of a thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface. (10 Hrs)
5. **Managing Exceptions, Applet Programming: Managing Errors and Exception:** Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, Throwing Our Own Exceptions,

Using Exceptions for Debugging. Applet Programming: Introduction, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, running the Applet, More about Applet Tag, Passing Parameters to Applets, Aligning the Display, More About HTML Tags, Displaying Numerical Values, Getting Input from the User. (12 Hrs)

6. **Graphics Programming, Input / Output: Graphics Programming:** Introduction, The Graphics Class, Lines and rectangles, circles, and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts. **Managing Input / Output Files in JAVA:** Introduction, Concept of Streams, Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, Other Useful I/O Classes, Using the File Class, Input/Output Exceptions, Creation of Files, Reading/Writing Characters, Reading/Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Interactive Input and output, Other Stream Classes. (10 Hrs)

Text Books:

- 1) Shishir Gundavaram, *CGI Programming on the World Wide Web*, O'Reilly and Associates, (1996). (Chapter 1 – 7)
- 2) E. Balaguruswamy, *Programming with JAVA, A Primer*, 2nd Edition., TMH (1999), (Chapter 2 – 16)
- 3) Hathleen Halata, *Internet Programming with VB Script and Java Script*, Thomson Pub 2005.

References:

- 1) Thomas Boutel, *CGI programming in C and Perl*, Addison – Wesley, (1996).
- 2) Jeffrey Dwight et al, *Using CGI*, (Second Edition), Prentice Hall, India, (1997).
- 3) Darrel Ince & Adam Freeman, *Programming the Internet with Java*, Addison – Wesley, (1997).
- 4) Ken Arnold & James Gosling, *The Java Programming Language*, Addison – Wesley, (1998)
- 5) Patrick Naughton & Herbert Schildt, *JAVA 2: The Complete Reference*, 3rd Edition, TMH, (1999).
- 6) Schildt: *JAVA The Complete Reference* 7/e
- 7) Khalid Mughal : *JAVA Actually*, 1st Edition 2008, Cengage Learning India
- 8) Wigglesworth : *JAVA Programming Advanced Topics* 3rd Edition, 2008, Cengage Learning India.

BCA504P – JAVA PROGRAMMING Lab

1. Write a program to find factorial of list of number reading input as command line argument.
2. Write a program to display all prime numbers between two limits.
3. Write a program to sort list of elements in ascending and descending order and show the exception handling.
4. Write a program to implement Rhombus pattern reading the limit from user.
5. Write a program to implement all string operations.
6. Write a program to find area of geometrical figures using method.
7. Write a program to implement constructor overloading by passing different number of parameter of different types.
8. Write a program to create student report using applet, read the input using text boxes and display the o/p using buttons.
9. Write a program to calculate bonus for different departments using method overriding.
10. Write a program to implement thread priorities.
11. Write a program to implement thread, applets and graphics by implementing animation of ball moving.
12. Write a program to implement mouse events.
13. Write a program to implement keyboard events.

BCA505P – PROJECT

BCA 506P - SOFT SKILLS & PERSONALITY DEVELOPMENT

The self concept : What is attitude? The process of attitude formation. You are the chief architect of your self. Self management techniques.

Believe in your self : Self image and self esteem ,Building self confidence ,Environment we mix with, how to build self image ? ,Meaning and definition of personality.

Personal planning and success attitude : Prioritizing, creating the master plan , active positive visualization and positive attitude, How to build a success attitude, Spot analysis .

Self motivation & communication : Levels of motivation ,power of irresistible enthusiasm ,etiquettes and manners in a group, public speaking, oral and written communication , Body language, Importance of listening and responding, Tips for technical writing .

Leadership as a process : co-ordination while working in a team, Leadership styles, Leader & Team player , Management of conflict, Profiles of great and successful personalities, Role of career planning in personality development, How to face personal interviews and group discussions.

Reference books :

- 1) Wallace : *Personality Development* 1st Edition, 2008 Cengage Learning India
- 2) *Succeed for your self* -Richard Denny (3rd edition)- Kogan page India
www.vivagroupindia.com
- 3) *Unleashing Leadership* – John Hoover & Angelo Valenti – Jaico publishing House –
WWW.JAICOOKS.COM
- 4) Kundu, C.I.- *Personality development*, Sterling Bangalore.
- 5) *Listening and Responding* – Sandra D.Collins-Cengage Learning India
- 6) *1,001 ways to inspire your organization, your team and your self* – David E. Rye-
Jaico publishing house

Objectives of the course

1. To provide an understanding of what is personality and what are the processes of developing one's personality.
2. To make a student aware of his or her role in different settings such as son, daughter, sister, brother, neighbor, citizen and so on.
3. To create awareness about physical, intellectual, emotional, social, educational aspects of personality.
4. To provide skills of written and oral communication with focus on skill development.

Methodology of testing evaluation will be given in the beginning of the semester. Group discussions, case studies, presentations mock interviews are the general methods to be followed apart from conventional training and coaching.

SIXTH SEMESTER

BCA601T – DESIGN AND ANALYSIS OF ALGORITHMS

Introduction: Definition of algorithm, Characteristic of algorithm, Different Control Structures, Writing Structured Programs, Analysis of algorithm (7 hrs)

Divide and Conquer: General Method, Binary Search, Finding Maximum & Minimum., Merge Sort, Quick Sort. (10 hrs)

Greedy Method: General method, Knapsack Problem, Job Sequencing with deadline, Minimum – cost Spanning trees, Single – Source Shortest Paths (10 hrs)

Dynamic Programming: Introduction to Graphs, Definition types, Terms related to graph, General Method, Multistage Graphs, All pair Shortest Paths, 0/1 – knapsack, The traveling salesperson problem, Flow Shop Scheduling. (10 hrs)

Basic traversal & Search techniques: Search & traversal techniques for trees, Search & traversal techniques for graphs. (8 hrs)

Backtracking: General method, The 8- Queens Problem, Sum of subsets, Graph Coloring. (7 Hrs)

Text books:

1. Aho Ullman & Hopkraf *"Design & analysis of Algorithms"*.
2. Sara Baase, Allen Van Gelder, *Computer Algorithms , Introduction to design and Analysis, 3rd edn (9th reprint), Pearson, 2005.*
3. *Design & Analys of alogorithm- Horowitz & Sahni*
4. *Fundamentals of Computer algorithm – Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran.*

References:

1. Berman : Algorithms , 1st Edition 2008, Cengage Learning India

BCA602T – SYSTEMS PROGRAMMING

Background: Machine Structure, Evolution of the Components of a Programming System., Assembler, Loaders, Macros, Compilers, Formal Systems. (3 Hrs)

Machine Structure, Machine Language and assembly language.: General Machine Structure, Machine Language, Assembly Language (8 Hrs)

Assemblers: General Design Procedure, Design of assembler, Statement of Problem, Data structure, Format of databases, algorithm, look for modularity, Table Processing: Searching and Sorting., The problem, Searching a table, linear Search, binary Search, Sorting, interchange sort, Shell Sort, Bucket Sort, Radix Exchange Sort, address calculation sort, comparison of sorts, hash or random entry searching. (10 Hrs)

MACRO LANGUAGE AND THE MACRO PROCESSOR: Macroinstruction, Features of macro facility, Macro instruction arguments, conditional macro Expansion, macro calls within macros, macro instructions defining macros., Implementation, Statement of problem, implementation of a restricted facility, A two pass algorithm. A single pass algorithm, implementation of macro calls within macros. Implementation within an assembles. (10 Hrs)

LOADERS: Loader schemes, Compile & go, General loading Scheme, absolute loaders, Subroutine Languages, Relocating loaders, Direct linking loaders, other loading Schemes – Binders, linking loaders, Overlays, Dynamic binders. Design of absolute loader., Design of a Direct linking loader Specification of problem, Specification of data structure, format of data bases algorithm. (10 Hrs)

COMPILERS: Statement of problem, Problem1: Recognizing basic Elements, Problem2: Recognizing Syntactic cutis & interpreting meaning, Problem3: Storage allocation., Problem4: Code Generation. Optimization (machine independent) optimization(machine dependent), Assembly Phase, General model of compiler (6 Hrs)

PHASES OF COMPILERS: Simple Structure of Compiler, Brief introduction to 7 Phases of Compilers, (5 Hrs)

Text books:

1. John J. Donowon , *System Programming*, TATA McGraw-Hil.
2. Beck: *System Software*, 3/e Pearson Education

References:

1. Dhamdhare: *System programming and Operating System TMH*

BCA603T – COMPUTER GRAPHICS

Total: 52 Hrs

Graphics Systems : Application of CG, CG classification-Graphic softwares- CRT Functioning- Factors Affecting CRT- Raster scan System – Shadow mask method, Display Processor with raster system- Raster co-ordinate system- color mapping- Instruction set and Raster System applications. (6 hrs)

Output Primitives : Line drawing methods-Direct, DDA and Bresenham's, line attributes, - Circle drawing-Direct and midpoint circle drawing-Ellipse Drawing- Bresenham's Ellipse Algorithm-Area filling- scan- line area filling and character attributes. (8 hrs)

Two dimensional Transformation :Basic Transformation, Translation, Rotation, Scaling- Reflection and Sheer matrix representations- Homogeneous co-ordinates-composite transformation- Raster methods for transformation. (8 hrs)

Windowing and Clipping : Viewing Transformations, Clipping process, Point clipping, Line Clipping, Cohen Sutherland line clipping algorithm, Midpoint Subdivision algorithm, Area clipping, Sutherland and Hodgeman Polygon clipping Algorithm, Text clipping. (6 hrs)

Three Dimensional Graphics : 3D-coordinate system, 3D-Display techniques, 3D-transformations, Polygon surfaces, Octrees, Bezier curves, Hidden surface removal, Depth buffer and scan-line method. (6 hrs)

Segments : Introduction, functions for segmenting, display file, segment attributes, display file compilation. (6 hrs)

Graphical Input Techniques : Positioning techniques, Grid, Constraints, Dynamic manipulation, Gravity field, Rubber band, Selection technique, Menu, Pointing and selection by naming. (8 hrs)

Graphical Input Devices : Keyboards, Mouse, Joystick, Touch Panels, Track ball (4 hrs)

Text Books:

1. Donald Hearn & M. Pauline Baker, *Computer Graphics C version, PHI 1990*
2. Steven Harrington, *Computer Graphics, MCGH.*

References:

1. Newman & Sproull, *Principles of Interactive Computer Graphics, McGraw Hill.*
2. Yeshwant Kanetkar, *Graphics Under C, BPB publications.*
3. J.D. Foley, A.V. Dam, S.K. Feiner & J.F. Hughes, *Computer Graphics, Addison Wesley, 1997.*
4. Cooley, *The Essence of Computer Graphics, Pearson Education*
5. Sinha – *Computer Graphics*

BCA604T - WEB PROGRAMMING

Total Hours : 52

Fundamentals of Web

15 Hrs

Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. XHTML: Origins and evolution of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables, Forms, Frames, Syntactic differences between HTML and XHTML.

CSS

6 Hrs

Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The Box model, Background images, The and <div> tags, Conflict resolution.

JavaScript

10 Hrs

Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions; Errors in scripts; Examples.

JavaScript and HTML Documents, Dynamic Documents with JavaScript

15 Hrs

The JavaScript execution environment; The Document Object Model; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model; The navigator object; DOM tree traversal and modification.

Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Slow movement of elements; Dragging and dropping elements.

5. XML

6 Hrs

Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets; XML processors; Web services.

Text Books

1. Robert W. Sebesta: *Programming the World Wide Web*, 4th Edition, Pearson Education, 2008. (Chapters 1 to 9)

Reference Books

1. M. Deitel, P.J. Deitel, A. B. Goldberg: *Internet & World Wide Web How to program*, 3rd Edition, Pearson Education / PHI, 2004.
2. Chris Bates: *Web Programming Building Internet Applications*, 3rd Edition, Wiley India, 2006.
3. Xue Bai et al: *The Web Warrior Guide to Web Programming*, Thomson, 2003
4. Sklar : *Principles of web design* , 1st Edition, 2008 Cengage Learning India
5. Sklar : *The Web Warrior Guide to Web Design Technologies*, 1st Edition, Cengage Learning India

BCA604P - Web Programming Lab

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.
5. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function)
6. Write a JavaScript code to find factorial of N. (Use recursive function)
7. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
8. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
9. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
10. Create a form consists of a two Multiple choice lists and one single choice list,

- The first multiple choice list, displays the Major dishes available.
- The second multiple choice list, displays the Starters available.
- The single choice list, displays the Soft drinks available.

The selected items from all the lists should be captured and displayed in a Text Area along with their respective costs. On clicking the 'Total Cost' button, the total cost of all the selected items is calculated and displayed at the end in the Text Area. A 'Clear' button is provided to clear the Text Area.

11. Write a JavaScript code block, which checks the contents entered in a form's Text element. If the text entered is in the lower case, convert to upper case. Make use of function to Uppercase ().
12. Create a web page using two image files, which switch between one another as the mouse pointer moves over the images. Use the onMouseOver and onMouseOut event handlers.

BCA605P –PROJECT

5786-BUP- 300- June 2011