



# Kristu Jayanti College

**AUTONOMOUS**

**Bangalore**

Accredited 'A' Grade by NAAC | An Institution Managed by CMI Fathers

## **DEPARTMENT OF COMPUTER SCIENCE**

**Bachelor of Computer Application  
Curriculum 2014 -17 Batch**

<http://www.kristujayanti.edu.in>

## CURRICULUM OVERVIEW

### 1. Aim

The programme aims to make the student equip with the knowledge background required to be a successful IT professional.

### 2. Eligibility

A Student should have passed 10 + 2 or equivalent academic stream.

### 3. Credits

Part	Category	Category Description	Hours Per Week	Credits	Total Credits	Semester
I	Language	Theory	4	3	6	I, II
	English	Theory	4	3	12	I, II, III, IV
	Major (Core)	Theory	4	3	48	I, II, III, IV, V, VI
		Practical	4	3	36	I, II, III, IV, V, VI
		Project	7	5	5	VI
II	Major (Allied)	Theory	4	3	9	I, II, III
		Practical	4	3	3	I
III	Allied	Theory	4	3	6	IV
IV	Non – Core ( Compulsory)	-	2	1	3	I, II
V	Life Skill Education (LSE)	-	3	2	2	I
VI	NSS/NCC/ Certificate Program/ Extra-Curricular/ Co-Curricular and Social Outreach Program	-	-	3	3	I, II, III, IV

**Note:** In case of Part VI – One credit is equal to 20 hours.

### 4. Attendance

- A student should have 85 percentage of attendance in each course.
- Any student who is not complying with this requirement will not be allowed to appear for End Semester Examination.

### 5. Passing Criteria

- No minimum pass mark for CIA
- ESE (End Semester Examination) alone 35% - (35 marks out of 100 / 21 marks out of 60)
- (ESE + CIA) aggregate 40% or 40 marks out of 100
- Student has to get pass mark in non-core course of the respective semester to get Overall “Pass” status.  
ESE alone 35% - (32 marks out of 90 / 16 marks out of 45) and (ESE + CIA) aggregate 40% or 20 marks out of 50.

- A student has to earn a total of 135 credits for the successful completion of the programme.

## **6. Specialization / Electives**

Electives are not offered for this programme.

## **7. Orientation & Bridge Programmes**

### **Orientation Programme**

Orientation is offered at the beginning of the programme. It basically includes sessions as mentioned below:

- Campus Culture
- Introduction to the Programme and Syllabus
- Soft skills
- Basic computing
- English communication
- Basic electronics
- Introduction to programming

### **Bridge Programme**

Bridge courses are offered on different subjects in order to cop up with the syllabus of the programme.

#### **I Semester**

- Basic Problem Solving Techniques

#### **II Semester**

- Basic Mathematics
- Project Designing Tools

## **8. Value Added Courses / Certificate Courses**

### **Value Added Courses**

#### **II Semester**

- OOPs Using C++

#### **III Semester**

- PL/SQL with Database Connectivity

#### **IV Semester**

- ASP.NET

### **Certificate Courses**

#### **V Semester**

- Quantitative Aptitude

#### **VI Semester**

- Advanced Java

### **9. Internship / Project**

The student has to undergo one Internship application project during the programme.

- **Application Project** : During the III semester which carries 2 credits

### **10. Skill Development Activities**

The Computer Academy offers provisions for students to be a part of the different technical communities which aims at the skill development in the respective domain. The various communities include:

- Coding and Debugging
- Lecture
- IT Quiz
- IT Manager
- Electronics
- Mathematics
- Statistics
- Web Designing
- Event Management

### **11. Co-curricular Activities**

The department has an auspicious club namely “Computer Academy” which organizes the various activities like:

- Synchronize: Intra collegiate IT Fest
- Xactitude: Inter collegiate IT Fest
- Galaxia: Science Exhibition
- Industrial Visit
- Guest Lecture
- Workshop/Seminars

### **12. Any Other Activities**

- Computer Literacy Programme
- Social Outreach Program

### **13. Programme Matrix**

#### **Abbreviations**

**ESE** – End Semester Examination

**CIA** – Continuous Internal Assessment

**MC** - Major Core

**MC Practical** - Major Core Practical

**MA** - Major Allied

**MA Practical** - Major Allied Practical

**A**-Allied,

**NC** - Non Core

**Lang** - Language

\* A Pass mark in the non core course is mandatory but marks secured for the same is not considered for grand total/grade/class

\*\* Non-core subjects.

\*\*\*Vernacular languages syllabus is available in the college library.

## **SEMESTER I**

Course Code	Course Title	Course Type	Hours / Week	Credits	CIA	ESE	Max Marks
13ENG1201	English - I	Lang	4	3	40	60	100
13AEN1201	II Language : Additional English***	Lang	4	3	40	60	100
14HIN1201	II Language : Hindi***						
13KAN1201	II Language : Kannada***						
13BCA1201	Basic Electronics	MA	4	3	40	60	100
14BCA1202	Programming in C	MC	4	3	40	60	100
13BCA12L1	Electronics Practical	MA Practical	4	3	20	30	50
14BCA12L2	Programming in C Practical	MC Practical	4	3	20	30	50
13NCS0101	Computer Fundamentals **	NC	2	1	5*	45*	50*
<b>Total</b>			<b>26</b>	<b>19</b>	<b>200</b>	<b>300</b>	<b>500</b>

## **SEMESTER II**

Course Code	Course Title	Course Type	Hours / Week	Credits	CIA	ESE	Max Marks
13ENG2201	English - II	Lang	4	3	40	60	100
13AEN2201	II Language : Additional English***	Lang	4	3	40	60	100
13HIN2201	II Language : Hindi***						
13KAN2201	II Language : Kannada***						
14BCA2201	Data Structures	MC	4	3	40	60	100
13BCA2202	Internet Technology	MC	4	3	40	60	100
13BCA2203	Mathematical Foundation in Computer Applications	MA	4	3	40	60	100
14BCA22L1	Data Structures Practical	MC Practical	4	3	20	30	50
13BCA22L2	Internet Technology Practical	MC Practical	4	3	20	30	50
13NHU0102	Indian Constitution **	NC	2	1	5*	45*	50*
<b>Total</b>			<b>30</b>	<b>22</b>	<b>240</b>	<b>360</b>	<b>600</b>

### **SEMESTER III**

Course Code	Course Title	Course Type	Hours / Week	Credits	CIA	ESE	Max Marks
13ENG3201	English III	Lang	4	3	40	60	100
13BCA3201	Programming in Java	MC	4	3	40	60	100
13BCA3202	Database Management System	MC	4	3	40	60	100
13BCA3203	Operating System	MC	4	3	40	60	100
13BCA3204	Probability and Statistics	MA	4	3	40	60	100
13BCA32L1	Programming in Java Practical	MC Practical	4	3	20	30	50
13BCA32L2	Database Management System Practical	MC Practical	4	3	20	30	50
13NHU0101	Environment Studies & Civic Sense **	NC	2	1	5*	45*	50*
<b>Total</b>			<b>30</b>	<b>22</b>	<b>240</b>	<b>360</b>	<b>600</b>

### **SEMESTER IV**

Course Code	Course Title	Course Type	Hours / Week	Credits	CIA	ESE	Max Marks
13ENG4201	English IV	Lang	4	3	40	60	100
13BCA4201	Software Engineering	MC	4	3	40	60	100
13BCA4202	Accounting and Financial Management	A	4	3	40	60	100
13BCA4203	Data Communication and Networks	MC	4	3	40	60	100
13BCA42L1	UNIX / LINUX Practical	MC Practical	4	3	20	30	50
13BCA42L2	Soft Skills Practices	A	4	3	20	30	50
13BCA42P1	Software Engineering Project	MC Practical	4	3	40	60	100
<b>Total</b>			<b>28</b>	<b>21</b>	<b>240</b>	<b>360</b>	<b>600</b>

## **SEMESTER V**

Course Code	Course Title	Course Type	Hours / Week	Credits	CIA	ESE	Max Marks
13BCA5201	Data Mining and Data Warehousing	MC	4	3	40	60	100
13BCA5202	Computer Graphics	MC	4	3	40	60	100
13BCA5203	Design and Analysis of Algorithms	MC	4	3	40	60	100
13BCA5204	Computer Architecture	MC	4	3	40	60	100
13BCA52L1	Computer Graphics Practical	MC Practical	4	3	20	30	50
13BCA52L2	Algorithms Practical	MC Practical	4	3	20	30	50
13BCA52P1	Enterprise Computing Project using ASP.NET	MC Practical	4	3	40	60	100
<b>Total</b>			<b>28</b>	<b>21</b>	<b>240</b>	<b>360</b>	<b>600</b>

## **SEMESTER VI**

Course Code	Course Title	Course Type	Hours / Week	Credits	CIA	ESE	Max Marks
13BCA6201	Multimedia Tools and Applications	MC	4	3	40	60	100
13BCA6202	E-Commerce	MC	4	3	40	60	100
13BCA6203	Mobile Application	MC	4	3	40	60	100
13BCA6204	System Programming	MC	4	3	40	60	100
13BCA62L1	Multimedia Tools and Applications Practical	MC Practical	4	3	20	30	50
13BCA62L2	Mobile Application Practical	MC Practical	4	3	20	30	50
13BCA62P1	Project	MC Practical	7	5	50	100	150
<b>Total</b>			<b>31</b>	<b>23</b>	<b>250</b>	<b>400</b>	<b>650</b>

### **Credit Structure**

Semester	1	2	3	4	5	6	Total
<b>Credits</b>	19	22	22	21	21	23	<b>128</b>
Application Project ( During III Semester)							<b>2</b>
Life Skill Education - Part V							<b>2</b>
NCC/NSS/Certificate Program/Extracurricular/ Co-curricular - Part-VI							<b>3</b>
<b>Total Credits</b>							<b>135</b>

# **I SEMESTER**



## 13ENG1201 ENGLISH I

**Credits: 3**

**Total: 60 Hours**

### **Objectives:**

- To attune young minds to concerns and issues which have a broad and wide scope of use and application to life.
- To cut across the history of creative expression in focusing primarily on the core values that governs human lives.

### **UNIT 1: Prose**

**15 hrs**

On Saying Please- A G Gardiner; Are the Rich Happy- Stephen Leacock; The Lost Child- Mulk Raj Anand; Mrs. Packletide's Tiger- Saki; Lamb to the Slaughter -Roald Dahl.

### **UNIT 2: Poetry**

**15 hrs**

On His Blindness- John Milton; The Village Schoolmaster - Oliver Goldsmith; The Solitary Reaper -William Wordsworth; Ozymandias- P.B.Shelley; La Belle Dame Sans Merci- John Keats.

### **UNIT 3: Remedial Grammar**

**15 hrs**

Subject-Verb Agreement-Tenses-Do-Forms-Active and Passive Voices-Use of Negatives-Prepositions-Vocabulary.

### **UNIT 4: Communication Skills**

**15 hrs**

Understanding Communication-Greeting and Introducing-Making Requests-Asking for and Giving Permission-Offering Help-Giving Instructions and Directions.

### **References:**

Glendinning, Eric H. and Beverly Holmstrom (2008), *Study Reading: A Course in Reading Skills for Academic Purposes*, New Delhi: CUP.

Joan Van Emden and Lucinda Becker Palgrave. *Effective Communication for Arts and Humanities Students*. Macmillan.

Langan, John (1996). *College Writing Skills*. McGraw Hills.

Murphy, Raymond. (1998), *Intermediate English Grammar*. New Delhi: CUP.

Wren & Martin (2001), *English Grammar & Composition*. S.Chand & Company Ltd.

## 13BCA1201 BASIC ELECTRONICS

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

The students will be familiarized with the fundamental concepts of electronics and its application.

### **UNIT 1: Introduction to Network Theorems & AC Fundamentals 12 hrs**

**Network theorems-** Ohm's law, Kirchhoff's law: Statement and explanation. Mesh/loop analysis and node voltage method, Numerical problems. Delta/star and star/delta transformation. Superposition theorem, Thevenini's theorem, Norton's theorem: statement, Steps to apply the theorem and problems for one voltage source. Maximum power transfer theorem: statement, expression for maximum power delivered.

**AC fundamentals-** Representation of AC sine wave, frequency, time-period, rms value, average value (No derivation, only mention)

### **UNIT 2: Semiconductor Devices 12 hrs**

**Introduction-**Atomic structure, energy level, energy bands diagram in solids.

**Semiconductor-**Properties, crystal structure, Effect of temperature on intrinsic semiconductor, Doping, donor, acceptor impurities, n-type and p-type semiconductor.

**Semiconductor devices-** PN junction diode, formation of PN junction, biasing of PN junction under forward and reverse biasing, breakdown in PN junction: avalanche and zener breakdown. V-I characteristics.

**Rectifier-** Half wave: Circuit, working, wave forms and expression for ripple factor and efficiency (no derivation), advantages and disadvantages. Full wave: Circuit, working, wave forms and expression for ripple factor and efficiency (no derivation), advantages and disadvantages. Bridge wave rectifier: Circuit, working, wave forms and expression for ripple factor and efficiency (no derivation), advantages and disadvantages.

**Digital ICs-** Classifications, features.

### **UNIT 3: Introduction to Digital Electronics 12 hrs**

**Introduction-**Comparison with analog systems, Need and advantages of digital systems, Noise and error corrections. Logic gates: AND, OR, NOT, NAND, XOR, NOR: Assembly with discrete components, Definition, pin diagram, truth table and timing diagram.

**Demorgan's theorem-**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-**Definitions, for 2, 3, and 4 variables, grouping of cells, redundant groups and don't care conditions; Simplification of 3 and 4 variable Boolean expression using K-maps (SOP only).

### **UNIT 4: Combinational Circuits 12 hrs**

**Half Adder-** Symbol, truth table, working; using logic circuit using basic gates and universal gates.

**Full Adder**-Symbol, truth table, working; using logic circuit using basic gates and universal gates.

**Half Subtractor**-Symbol, truth table, working; using logic circuit using basic gates and universal gates.

**Full Subtractor**-Symbol, truth table, working; using logic circuit using basic gates and universal gates.

**Adder-Subtractor**- Logic circuit, pin diagram IC 7483, IC 7486: Parallel adder: 4 bit parallel binary adder, BCD adder, IC 7483.

**Two Bit Comparator**-Symbol, logic circuit using XOR and basic gates, truth table.

**Encoder**-Decimal to BCD priority encoder.

**Decoder**-2:4 using AND gates, 3:8 using NAND gates, BCD to Decimal decoder and BCD to 7 segment decoder.

**Multiplexer**- 4:1 Symbol, logic circuit using basic gates, truth table.

**Demultiplexer**- 1:4 Symbol, logic circuit using basic gates, truth table.

## **UNIT 5: Sequential Circuits**

**12 hrs**

**Flip-flop**-Introduction, definition, 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, 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. Pin diagrams of IC 7473, IC 7476.

**Registers**-Definition, types of registers: SISO, SIPO, PISO and PIPO (block diagram representation for each), truth table, timing diagram and speed comparison.

### **Text Books:**

B. Basavaraj. (2002). *Fundamentals of Electronics* (revised ed). Subhash Stores.

Jain R P. (2002). *Modern Digital Electronics* (2<sup>nd</sup> ed.). TMH Publishing Company Limited.

Kharate, G K (2002). *Digital Electronics Fundamentals* . Subhash Stores.

R.S. Sedha. (2005). *Text book of Applied Electronics*. (1<sup>st</sup> ed.). S. Chand and Co, Ltd.

### **References:**

Chattopadhyay, Rakshit, Saha, Par. (2000). *Fundamentals of Electronics* (2<sup>nd</sup> ed.). New Age International.

Grob, Bernord. (2002). *Basic Electronics I* (8<sup>th</sup> ed.). TMH.

Malvino, Albert Paul and Brown, Jerald A. (2009). *Digital Computer Electronics* (3<sup>rd</sup> ed.). Tata Mcgraw Hill Publishing co Ltd.

Rangnekar, Saroj. (2001). *Digital Electronics* (1<sup>st</sup> ed.). ISTE.

## 14BCA1202 PROGRAMMING IN C

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

On successful completion of the course the student should be able to develop programs using C language

### **UNIT 1: Introduction**

**18 hrs**

**Computer Programming** - Basic programming concepts: Algorithm; Flowchart; Modular and structured programming.

**Introduction to C Programming** - Problem solving using computers; Concept of flowcharts and algorithms.

**Overview of C** - Introduction; Importance of C; Sample C programs; Basic structure of C program; Programming style; Executing a C program.

**Constants, Variables and Data types** - C tokens; Keywords and identifiers; Constants; variables; Data types; Declaration of variables; Assigning values to variables; Defining symbolic constants.

**Input and Output:** Input and output statement; Reading a character; Writing characters; Formatted input and output statement.

### **UNIT 2: C Operators & Control Structures**

**12 hrs**

**Operators and Expression** –Arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise, special operators and some computational problems; Type conversion in expression; Operator precedence and associativity; Mathematical functions.

**Decision making, Branching and Looping** - IF statement; Simple IF statement; The IF-ELSE statement; Nesting of IF-ELSE statements; The ELSE-IF ladder; The switch statement; Ternary operator; The GOTO statement; The WHILE statement; The DO statement; The FOR statement; Jump in loops.

### **UNIT 3: Arrays and Functions**

**12 hrs**

**Arrays** - One dimensional array, two dimensional arrays and multi-dimensional arrays; Initializing arrays.

**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.

**Functions** - Need for user defined functions; Multifunctional program; Form of C function; Return values and their types; Calling a function; Category of functions; Handling of non-integer functions; Nesting of functions; Recursion; Functions with arrays.

### **UNIT 4: Structures and Unions**

**10 hrs**

**Structures**– Structure definition; Giving values to members; Structure initialization; Comparison of structure variables; Array as structure; Array within structure; Union.

### **UNIT 5: Pointers and Files**

**08 hrs**

**Pointers** - Understanding pointers; Accessing the address of variables; Declaring and initializing pointers; Accessing a variable through its pointer.

**Files** -Types of file access; Types of files; File operations; Input and output operations on files.

**Text Books:**

Balagurusamy.E.*Programming in ANSI* .(5<sup>th</sup> ed.). Tata McGraw Hill.

Kamthane Ashok.(2003).*Programming with ANSI and Turbo C*.Pearson Education.

**References:**

ByronGottfried.S (2000).*Programming with C*. Tata McGraw Hill.

Deitel & Deitel.(2001).*C How to Program*.Addisson Wesley.

Kanetkar Yashavant. *Let Us C*. New Delhi :BPB Publication.

Kernighan Brian, Ritchie Dennis(1988).*The C Programming Language*. Prentice Hall.

Rajaraman.V. (2000). *Programming in C*.PHI (EEE).

Steve Oualline(2010).*Practical C Programming*.O'reilly.

Stephen G. Kochan(2005).*Programming in C*.Pearson

## 13BCA12L1 ELECTRONICS PRACTICAL

**Credits: 3**

**Total: 60 Hours**

1. Study of Logic gates- AND,OR,NOT,NAND,NOR XOR(using respective IC's)
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 flips flop using NAND gates.
8. Realization of J-K flips flop using IC 7400 and 7410.
9. Realization of T and D flip flop using IC 7400.
10. Realization of 2:4 Decoder.
11. Implementation of SISO shift registers using flip flops (IC 7474).
12. Implementation of SIPO shift registers using flip flops (IC 7474).
13. Implementation of PISO shift registers using flip flops (IC 7474).
14. Implementation of PIPO shift registers using flip flops (IC 7474).

**Note: List of Practical experiments (at least 10 experiments to be conducted)**

### Evaluation Criteria

Criteria	Marks
Writing 2 experiments ( Procedure, truth table)	10
Conducting 1 experiment (Construction)	10
Output and Result	05
Viva Voce	05
Total Marks	30

## 14BCA12L2 PROGRAMMING IN C PRACTICAL

**Credits: 3**

**Total: 60 Hours**

### Part A

1. Write a C program to generate and print first N Fibonacci numbers.
2. Write a C program to find the GCD and LCM of two integer numbers.
3. Write a C program that reverses given integer number and checks whether the number is palindrome or not.
4. Write a C program to find whether a given number is prime number or not.
5. Write a C program to read a string and check whether it is palindrome or not without using built-in function.
6. Write a C program to find the factorial of a number using function.
7. Write a C program to find if a character is alphabetic or numeric or special character.
8. Write a C program to compute the sum of even numbers and the sum of odd numbers using function.
9. Write a C program to accept a sentence and convert all lowercase characters to uppercase and vice-versa.
10. Write a C program to find the largest and second largest of N numbers.

### Part B

11. Write a C program to find the roots of the given quadratic equation using switch case.
12. Write a C program to input numbers and to find mean variance and standard deviation.
13. Write a C program to accept different goods with the number, price and date of purchase and display them using structure.
14. Write a C program to find the length of a string without using built-in function.
15. Write a C program to read two matrices and perform addition and subtraction of two matrices.
16. Write a C program to find the trace and normal of a square matrix using function.
17. Write a C program to copy one string to another using pointer.
18. Write a C program to count the number of vowels, consonants, digits, special characters, whitespace in a given string.
19. Write a C program to create file for storing details of N students. Student record should contain Roll No, Name and marks secured in two subjects. Copy the contents of the above created file to another file.
20. Write a C program to sort an array of strings.

### Evaluation Criteria.

Criteria	Marks
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total	30

# **SEMESTER II**



## 13ENG2201 ENGLISH II

**Credits: 3**

**Total: 60 Hours**

### **Objectives:**

- To develop the ability to get student's ideas across clearly to an audience, both in speech and in writing
- To help students develop important practical skills.

### **UNIT 1: Prose & Poetry**

**30 hrs**

Food -J B S Haldane; A Devoted Son -Anita Desai; Love is a Fallacy -Max Schulman; Night Train at Deoli-Ruskin Bond; Incident of the French Camp - Robert Browning; A Passerby - Robert Bridges; Snake – D H Lawrence; Matilda - Hilaire Belloc; Stopping by Woods on a Snowy Evening -Robert Frost; The Speaking Tree (The Times of India) 2 extracts; Human Rights (Extensive Reading).

### **UNIT 2: Functional Communication**

**16 hrs**

Essential English Grammar-Presentation Skills & Paper presentation-Note Taking-Report Writing-Letter Writing-Filling Challan, Bank forms & Application forms.

### **UNIT 3: Media Awareness**

**14 hrs**

Kinds of News-Who and Which News gets Prominence?-Who Controls the News?-Types of Radio Programmes-Types of Television Programmes-Elements of Advertising-Use of blog.

### **References:**

Glendinning, Eric H. and Beverly Holmstrom (2008), *Study Reading: A Course in Reading Skills for Academic Purposes*, New Delhi: CUP.  
Joan Van Emden and Lucinda Becker Palgrave. *Effective Communication for Arts and Humanities Students*. Macmillan.  
Murphy, Raymond. (1998), *Intermediate English Grammar*. New Delhi: CUP.  
Langan, John (1996). *College Writing Skills*. McGraw Hills.  
Wren & Martin (2001), *English Grammar & Composition*. S.Chand & Company Ltd.

## 14BCA2201 DATA STRUCTURES

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

To inculcate knowledge on implementing Data Structure concepts using C programming language.

### **UNIT 1: Introduction to Data Structures**

**14 hrs**

**Introduction** - Definition; Classification of data structures, primitive and non-primitive; Operations on data structures.

**Pointers** - Definition; Accessing the address of a variable; Declaring and initializing pointers; Accessing a variable through its pointer.

**Dynamic Memory Allocation** – Define static and dynamic memory allocation; Memory allocation functions, malloc, calloc, free and realloc.

**Recursion** - Definition; Types; Recursion in C; Writing recursive programs, Binomial coefficient, Fibonacci series, GCD, Towers of Hanoi.

### **UNIT 2: Searching and Sorting**

**12 hrs**

**Searching** - Basic searching techniques: Sequential search, Binary search – Iterative and recursive methods; Comparison between sequential and binary search.

**Sorting** - Definition; Different types, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort, Heap sort.

### **UNIT 3: Stack and Queue**

**10 hrs**

**Stack** - Definition; Array representation of stack; Operations on stack; Polish notation; Reverse Polish notation; Applications of stack, Conversion of an infix arithmetic expression to postfix, Evaluation of postfix expression.

**Queue** - Definition; Array representation of queue; Types of queue, Simple queue, Circular queue, Double ended queue, Priority queue, Operations on all types of queues.

### **UNIT 4: Linked List**

**12 hrs**

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, Circular doubly linked list; Operations on singly linked list: creation, insertion, deletion, search and display.

### **UNIT 5: Tree**

**12 hrs**

**Tree** – Definition, Tree, Binary tree, Complete binary tree, Binary search tree, Heap; Tree terminology, Root, Node, Degree of a node, Degree of a tree, Terminal nodes, Non terminal nodes, Siblings, Level, Edge, Path, Depth, Parent node, Ancestors of a node. Binary tree: Array and linked representation of binary tree; Creation of binary tree; Traversal of binary tree: Preorder, Inorder, Postorder; Variations of binary tree: Binary search tree(BST); Heap: Insertion and deletion of a node.

**Text Books:**

Kamthane Ashok.(2009).*Introduction to Data Structures in C*. (1<sup>st</sup> ed.). Pearson.  
Langsam Yedidyah, Augenstein J Moshe,Tenenbaum M Aaron.(2010).*Data Structures Using C and C++*(2<sup>nd</sup> ed.). New Delhi : PHI Learning Private Ltd.  
Lipschutz Seymour.(2010). *Data Structures with C*(1<sup>st</sup> ed.).New Delhi :Tata McGraw-Hill Education.

**References:**

Balagurusamy .E.(2013). *Data Structures Using C*(1<sup>st</sup> ed.). New Delhi:McGraw Hill Education.  
Horowitz Ellis, Sahni Sartaj, Freed Anderson Susan.(2008).*Data Structures Using C*(2<sup>nd</sup> ed.). Universities Press.  
Gilberg F Richard ,Forouzan A Behrouz. (2007). *Data Structures : A Pseudocode Approach with C*(2<sup>nd</sup> ed.). Cengage Learning.  
Kanetkar Yashavant.(2010). *Data Structures Through C*(2<sup>nd</sup> ed.). New Delhi :BPB Publication.  
Kanetkar P Yeshwant.(2009).*Understanding Pointers in C* (4<sup>th</sup> ed.). New Delhi: BPB Publications.  
Tremblay Paul Jean,Sorenson Paul.(2001). *An Introduction to Data Structures with Application*(2<sup>nd</sup> ed.).New Delhi:Tata McGraw - Hill Education.

## 13BCA2202 INTERNET TECHNOLOGY

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

On successful completion of the course, the student should be able to master the concepts of Internet technology and services.

### **UNIT 1: Fundamentals of Internet**

**10 hrs**

History; Internet addressing; Protocols: TCP/IP, HTTP; Domain name system; Intranet; URL; E-Mail; Directory services; News groups; Search engines.

### **UNIT 2: HTML**

**15 hrs**

Introduction to Hypertext markup language; Structure of HTML document; Head elements; Basic text formatting; Presentational elements; Phrase elements; Lists; Nested Lists; Tables; Hyperlinks; Images; Image maps; Forms; Frames.

### **UNIT 3: Cascading Style Sheets (CSS)**

**15 hrs**

Introduction; Internal style sheet; External style sheet; Controlling text; Text formatting; Selectors; Box Model; Backgrounds; Tables; Lists.

### **UNIT 4: Java Script**

**15 hrs**

Browser and document object; Scripts and HTML document.

Programming Fundamentals: Variables, Expressions and evaluation, Operators, Data type conversion; Conditional statements; Loops; Functions.

Built-in Objects: String, Date, Math, Array, Window; Events; Window and Document objects; Image object: Precaching images, Image rollovers; Forms and form elements; Form validation; Form enhancements.

### **UNIT 5: Introduction to XML**

**05 hrs**

Introduction to XML; XML Syntax; Working with document type definitions; Introducing XML schemas.

### **Text Books:**

Danny Goodman, Brendan Eich. (2007), *JavaScript Bible*(6<sup>th</sup>ed.),Wiley Publications.

DuckettJon.(2011).*HTML,XHTML,CSS and JavaScript*.NewDelhi:Wiley India,

Steven M.Schafer. (2010).*HTML, XHTML, and CSS Bible*(5<sup>th</sup> ed.).Wiley-Eastern Publishing Inc.

### **References:**

Alexis Leon and Matews Leon, *Internet for Everyone*.NewDelhi:Vikas Publishing house Pvt.Ltd.

Krayank ,Habracken.*Internet 6 in 1*.NewDelhi :Prentice Hall of India Pvt.Ltd.

Pfaffenberger, Bryan.(2000).*HTML 4/4.01 Bible - with DHTML/XHTML and JavaScript*, India IDG .

## 13BCA2203 MATHEMATICAL FOUNDATION IN COMPUTER APPLICATIONS

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

To acquire basic knowledge of various mathematical concepts related to computer programming

### **UNIT 1: Matrices**

**10 hrs**

Review of fundamentals: Definition of matrix, order of a matrix, types of matrices, algebra of matrices; Determinant: Value of determinant of order 2x2 and 3x3, Minors, cofactors, adjoint and inverse of a matrix; Solutions of systems of linear equations in two and three variables: Cramer's rule and matrix method; Eigen values and Eigen vectors: definition and problems (no theorems) for matrices of order 2x2; Cayley-Hamilton theorem (only statement); Verification of Cayley Hamilton theorem (only 2x2 matrices); Inverse of a matrix using Cayley-Hamilton theorem.

### **UNIT 2: Algebraic Structures & Vectors**

**15 hrs**

Binary operations: definition of group, properties (only statements), problems, finite and infinite groups, subgroups, theorems (no proofs), problems.

**Vectors:** Definition of vectors and scalars; vector addition; dot and cross product; projection of a vector on another (no geometric meaning); area of a parallelogram; area of a triangle; scalar triple product; volume of parallelepiped; Coplanarity of three vectors; vector triple product.

### **UNIT 3: Analytical Geometry**

**12 hrs**

Definition of vector  $r$ ; magnitude; problems; distance between two points; direction cosines; direction ratios; angle between two lines; angle between two vectors; angles of a triangle; angle between diagonals of a cube.

Equation of a line, condition for lines to be parallel and perpendicular, point of intersection of lines; equation of a plane, reflection of a point on a line and on a plane.

### **UNIT 4: Differential Calculus**

**08 hrs**

Derivatives: Standard derivatives, product rule, quotient rule, chain rule, second order derivatives,  $n^{\text{th}}$  derivative of some standard functions.

### **UNIT 5: Integral Calculus**

**15 hrs**

Standard Integrals; Integration by substitution; Integration by partial fractions; Integrals of the type  $\int \frac{dx}{ax^2+bx+c}$ ,  $\int \frac{(px+q)dx}{ax^2+bx+c}$ , Integration by parts; Definite integrals (without properties).

### **Text Books:**

Gururajachar G.B.(2013). *A Text Book of Mathematics for B.C.A, Second Semester*. Bangalore :Excellent Series Publications.

Ranganath, G.K.(2013). *A Text for BCA Mathematics*. Delhi: S.Chand .

**References:**

Herstein, I.N. *Topics in Algebra*(2<sup>nd</sup> ed.). Wiley Eastern Limited.

Sharma, J K (2011).*Discrete Mathematics*(3<sup>rd</sup> ed). New Delhi : Macmillan Publishers India ltd.

Shantinaraayan, S. *Differential Calculus* Delhi: S.Chand.

Shantinaraayan, S. *Integral Calculus*, Delhi: S.Chand.

Shantinaraayan, S. *Elements of Analytical Solid Geometry*.Delhi: S.Chand.

## 14BCA22L1 DATA STRUCTURES PRACTICAL

**Credits: 3**

**Total: 60 Hours**

### **Part-A**

1. Write a C program to find the Binomial Coefficient using recursion.
2. Write a C program to simulate the working of Towers of Hanoi problem for N disks, print the moves taken by the problem using recursion.
3. Write a C program to find the greatest common divisor of two numbers using recursion.
4. Write a C program to search for the greatest and smallest element in an array of integers using sequential search.
5. Write a C program to search for an element in an array using Binary Search.
6. Write a C program to sort a list of N elements using Bubble sort technique.
7. Write a C program to sort a list of N elements of integer type using Selection sort technique.

### **Part- B**

8. Write a C program to sort a list of N elements using Merge sort technique.
9. Write a C program to sort a list of N elements of integer type using Quick Sort technique.
10. Write a C program to demonstrate the working of a stack using an array. The elements of the stack may be integers. Operations to be supported are 1.PUSH, 2.POP 3.DISPLAY. The program should print appropriate messages for STACK overflow, Underflow. Use separate functions to detect these cases.
11. Write a C program to convert and print a given valid fully parenthesized infix arithmetic expression to postfix expression.
12. Write a C program to simulate the working of linear Queue using an array. Provide the operations QINSERT, QDELETE and QDISPLAY. Check the queue status for empty and full.
13. Write a C program to simulate the working of a Circular queue using an array. Provide the operations CQINSERT, CQDELETE and CQDISPLAY. Check the Circular Queue status for empty and full.
14. 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:
  - a. LINSERT - Inserting a node in the front of the list and after a node.
  - b. LDELETE - Deleting the node based on Roll no.
  - c. LSEARCH - Searching a node based on Roll no.
  - d. LDISPLAY - Displaying all the nodes in the list.
15. Using dynamic variables and pointers, Write a C program to construct a doubly linked list consisting of the following information in each node. Roll No (Integer), Name (Character String) .The Operations to be supported are:
  - a. DLINSERT - Inserting a node in the front of the list and after a node.
  - b. DLDELETE - Deleting the node based on Roll no.
  - c. DLSEARCH - Searching a node based on Roll no.
  - d. DLDISPLAY - Displaying all the nodes in the list.
16. Write a C program to implement the operations of a Queue using linked list.
17. Write a C program to create file for storing details of N students. Student record should contain Roll No, Name and marks secured in two subjects. Using the

above created file, create an output file which contains Roll No, Name, and Marks in two subjects, Total and Average.

18. The preorder and inorder traversals of a binary search tree is given below:

Inorder: 5, 10, 15, 20, 30, 40

Preorder: 20, 10, 5, 15, 40, 30

Write a program that can generate the postorder traversal of the binary search tree.

19. Using dynamic memory allocation ,construct a Binary Search Tree of integers. Write C functions to do the following:

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.

While constructing the Binary search tree do not add any duplicate.

Display the tree using all the traversal methods.

20. Write a C program to sort a list of N elements of integer type using Heap Sort technique.

#### **Evaluation Criteria.**

<b>Criteria</b>	<b>Marks</b>
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total	30



## **13BCA22L2 INTERNET TECHNOLOGY PRACTICAL**

**Credits: 3**

**Total: 60 Hours**

### **Part A**

1. Create a Web page to display the details of your college
  - a) Use appropriate text formatting options.
  - b) Make the name of the College to scroll from left to write at the bottom.
  - c) Use appropriate foreground and background color representation.
2. Create a Web page to display Specifications of a System using Ordered & Unordered list.
3. Create a Web page to display the contents of a Book using Nested list.
4. Create a Web page to display the Telephone Bill using table tag.
5. Create web page that plays video and audio files.
6. Display a digital clock at the status bar using JavaScript.
7. Create a Web page to input a number and calculate the factorial using Java Script.
8. Create a Web page to sort the elements of an array using Java Script.
9. Create a Web page that accepts a string and capitalizes each word of the string using Java Script.
10. Write a Java script program to open a new document after a particular interval.

### **Part B**

11. Create a Web page to display 5 courses in a college and their details using Hyperlinks.
12. Create a Web page to display 3 tourist place images and their details using Image links.
13. Create a Web page to display your class Timetable. Use your choice of background color, table color etc. Use appropriate cell spacing, cell padding and cell width.
14. Create a Web page to display the details of the store in the first frame, list the 3 products in the second frame and link each one to display the product details in the third frame.
15. Create a web page to input the student register number and Semester from the user using prompt( ) and validate the student register number of the format DDAADADDD(for eg:13CS1H101) and semester of the format (1-6) using regular expression. Use appropriate alert messages.
16. Create a registration form and validate the following.
  - Any field of the form is empty?
  - Email address is valid or not?
  - Password should not be more than 7 characters long.
17. Create a web page to display 5 objective questions, evaluate and display the score using Java script.
18. Design a web page of your home town with an attractive background color, text color, an image, font face etc. (Use Internal CSS for formatting)
19. Create a catalog for an online shopping company that sells music records (Use External style sheets for formatting).

20. Design an XML document to store the student details. The information must include Register number, Student name, Name of the college, Course, Year of joining and email id. Create the sample data for 3 students and a CSS style sheet to display the document.

**Evaluation Criteria.**

Criteria	Marks
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total	30

# **SEMESTER III**

## 13ENG3201 ENGLISH III

**Credits: 3**

**Total: 60 Hours**

### **Objectives:**

- To develop student's proficiency in the language and develop their communication skills.
- To equip learners with skills for self-learning.

### **UNIT 1: Prose & Poetry**

**24 hrs**

Life Doesn't Frighten Me -Maya Angelou; Letters: Letter from a Concentration Camp, Letter to Scottie-F Scott Fitzgerald; Kabuliwala-Rabindranath Tagore; The Shroud -Munshi Premchand; Forum-William Shakespeare; Writing a Curriculum Vitae-Wislawa Szymborska.

### **UNIT 2: Play**

**15 hrs**

Lady Windermere's Fan- Oscar Wilde.

### **UNIT 3: Writing Skills**

**21 hrs**

Applying for Passport-Comprehension-Letters to the Editor-Dialogue Writing-Story Writing.

### **References:**

Bevington, David (2002). *Shakespeare*. Oxford: Blackwell, ISBN 0-631-22719-9.  
Connecticut : Greenwood Press. ISBN 978-0-313-30325-8.  
Lupton, Mary Jane (1998). *Maya Angelou: A Critical Companion*. Westport, Macmillan Publishing (published January 1952). ISBN 978-0-02-615920-3.  
Murphy, Raymond. (1998), *Intermediate English Grammar*. New Delhi: CUP.  
Tagore Rabindranath (1952). *Collected Poems and Plays of Rabindranath Tagore*.  
Wren & Martin (2001), *English Grammar & Composition*. S.Chand & Company Ltd.

## 13BCA3201 PROGRAMMING IN JAVA

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

To inculcate knowledge on the architecture-neutral nature of java which enables us to write applications once and run anywhere anytime forever.

### **UNIT 1: Introduction to Java and Features of Java**

**10 hrs**

History; Evolution of Java; How Java changed internet; Fundamentals of object-Oriented programming; Basic concepts of object-oriented programming; Benefits of object-oriented programming; Features of Java; How Java differs from C And C++; Overview of Java; Simple Java program; Structure; Java development kit (JDK); Java interpreter; Java virtual machine. Data types; Variable; Type conversion and casting; Operators and expressions; Programming structure; Operators and expressions; Decision-making and branching: If; If.. Else; Nested If; Switch; ?: Operator; Looping: While; Do; For – Jumps In Loops - Labeled loops; Array – Types of arrays; String handling.

### **UNIT 2: Classes Inheritance Packages & Interfaces**

**16 hrs**

**Classes** - Class fundamentals; Methods; Naming conventions; Declaring objects; Access specifiers; Final; Static; Abstract. Native. Volatile; Synchronized. Constructors; Command line arguments; this keyword; Garbage collection; finalize method; Overloading methods.

**Inheritance** - Single; Multilevel inheritance; Method overriding-Dynamic method Dispatch; Abstract classes ,Usage of Super; Abstract; Final keywords.

**Interfaces** - Defining a Package; CLASSPATH; Defining an interface; Implementing interfaces; Variables in interfaces; Extending interfaces; Implementing interface.

**Package** - Define package; CLASS PATH; Access protection; Importing packages. Lang-Package - Wrapper classes; Util package:-Date; Calendar; Random; IO packages:- File input stream and Output stream.

### **UNIT 3: Exception Handling Multithreading**

**10 hrs**

**Exception Handling** - Fundamental of exception; Exception types; Using try & catch; Multiple catch; Nested try; Throw; Finally; Built-in exception; User-defined exception.

**Multithreading**-Thread fundamentals; Priorities; Creating thread using thread class and runnable interface.

### **UNIT 4: Applets & Event Handling**

**10 hrs**

**Applet** - Basics; Applet architecture; Applet life cycle; Applet display methods; Repaint; Status window; Passing parameters to applets; Getdocumentbase(); Getcodebase(); Applet context and showdocument().

**Event Handling** – Event handling mechanisms; Delegation event model; Event classes; Sources of events; Event listener interfaces; Handling mouse and keyboard events; Adapter classes; Inner classes.

### **UNIT 5: AWT & AWT Controls**

**14 hrs**

**AWT**-AWT classes; Window fundamentals; Working with frame windows; Creating a frame window in an applet; Creating a windowed program; Displaying information within a window.

**AWT Controls**-Layout managers and menus – Control fundamentals; Labels; Buttons; Check boxes; Check box group; Choice control; Lists; Scroll bar; Text field; Text area; Layout managers; Menu bars and Menus; Dialog boxes; File dialog; Handling events by extending AWT components.

**Introducing Swing** – Origins; Features; MVC connection; Components & containers; Simple swing application; Swing applet.

**Java I/O Classes** – File; Stream classes; Byte streams; Character streams.

**Text Books:**

Balagurusamy.E. *Programming with JAVA a Primer*. NewDelhi : Tata McGraw- Hill Publishing Company Limited.

Herbert Schildt. *The Complete Reference- Java* (7<sup>th</sup> ed.). New Delhi : Tata McGraw-Hill Publishing Company Limited.

**References:**

Daniel Liang Y.(2007). *Introduction to JAVA Programming* (6<sup>th</sup> ed.).Pearson Education.

Deitel and Deitel. *Java Programming*. Prentice Hall.

Debasish Jana .(2005).*Java and Object-Oriented Programming Paradigm*, PHI.

John Hubbard R. *Programming With Java* ( 2<sup>nd</sup> ed.). TMH.

Kathy Sierra. *Head First Java*. (2<sup>nd</sup> ed.).O'Reilly Media.

NageswaraRao.R .(2008).*CORE JAVA An Integrated Approach*. Dreamtech Press.

## 12BCA3202 DATABASE MANAGEMENT SYSTEM

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

On successful completion of the course the students should have gained knowledge on data base designing and concepts of data base management system.

### **UNIT 1: Introduction to Database Management System 09 hrs**

**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 DBMS.

**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 DBMS.

### **UNIT 2: Data Modeling and Record Storage 10 hrs**

**Data Modeling Using the ER Model** - High level conceptual data models for DB design with an example; Entity types; Entity sets; Attributes; Keys; ER model concepts; Notation for ER diagrams; Proper naming of schema constructs; Relationship types of degree higher than two.

**Record Storage and Primary File Organization** - Hardware description of disk devices-Track, Sector, Disk block or pages; 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 .

### **UNIT 3: Normalization and Relational Data Model 15 hrs**

**Functional Dependencies and Normalization for Relational Databases** - Informal design guidelines for relational DB schema; Functional dependencies; Normal forms based on primary keys; General definitions - First normal form, Second normal form and Third normal forms, Boyce-Codd normal form.

**Relational Data Model** - Relational model concepts; Relational constraints and relational database schemas; Defining relations; Update operations and dealing with constraint violations.

**Relational Algebra** - Basic relational algebra operations; Additional relational operations; Examples of queries in the relational algebra; Relational database design using ER-to- relational mapping; ER-to-relational mapping algorithm.

### **UNIT 4: Relational Database Language 15 hrs**

**SQL** - Data definition in SQL; Queries in SQL-Insert, Delete and Update statements in SQL; Views in SQL; Specifying general constraints as assertions; Specifying domain and indexes; Additional features of SQL.

### **UNIT 5: Transaction Processing Concepts 11 hrs**

**Transaction Processing** - Introduction; Transaction and system concepts; Desirable properties of transaction; Schedules and recoverability; Serializability of schedules; Transaction support in SQL.

**Concurrency Control Techniques** - Locking techniques for concurrency control; Concurrency control based on time stamp ordering; Optimistic concurrency control techniques.

**Text Books:**

Elmasri & Navathe.(2003).*Fundamentals of Database Systems*.Pearson Education.  
Scott Ulman. *Oracle9i PL/SQL programming*.Tata McGraw-Hill.

**References:**

C.J.Date.*Introduction to Database Systems*. (6<sup>th</sup> ed.)AddisionWesley.  
Das Gupta,Pranab Kumar(2009).*Database Management System, Oracle SQL and PL/SQL*.PHI Learning.  
Hector Garcia-Molina,Jeffrey D. Ullman,Jennifer Widom (2006).*Database Systems: The Complete Book* . Pearson.  
Ivan Bayross(2008).*The Programming Languages of Oracle*.(3<sup>rd</sup> ed.).BPB Publications.  
Patrick O'Neil (2002).*Data Base Principles; Programming & Performance*.(2<sup>nd</sup> ed.). Academic Press.  
Raghu Ramakrishnan, Johannes Gehrke. *Database Management Systems*.(3<sup>rd</sup> ed.). Kindle Edition.  
Silberschataz, Korth,Sudarshan. *Database System Concepts*. McGrawHill.  
Sundarraman.*Oracle 9i Programming A Primer*.(1<sup>st</sup> ed.) Pearson Education.



## 13BCA3203 OPERATING SYSTEM

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

Learning the functions of Operating System in detail.

### **UNIT 1: Introduction to Operating Systems 07 hrs**

Batch systems; Concepts of multiprogramming and time sharing; Parallel; Distributed & real-time systems; Operating system structures; Components & services; System calls; System programs and virtual machines.

### **UNIT 2: Process Management, Synchronization and Deadlocks 21 hrs**

Process concept; Process scheduling; Cooperating processes; Threads; Inter process communication; Scheduling criteria; Scheduling algorithms; CPU scheduling; Multiple processor scheduling; Real time scheduling; Algorithm evaluation; The critical section problem; Synchronization hardware; Semaphores; Classical problems; Critical regions; Monitors; Deadlock: System model; Characterization; Dead lock prevention; Avoidance and detection; Recovery from dead lock; Combined approach to deadlock handling.

### **UNIT 3: Memory Management 11 hrs**

Logical and Physical Address Space; Swapping; Contiguous Allocation Space; Paging; Segmentation; Segmentation with Paging in Multics and Intel 386; Virtual Memory: Demand Paging and its Performance; Page Replacement Algorithm; Allocation of Frames; Thrashing; Page Size and Other Consideration; Demand Segmentation.

### **UNIT 4: File and Disk Management 15 hrs**

File concepts; Access methods; Directory structure; File sharing; Protection; File system structures; File system implementation; Directory implementation; Allocation methods; Free space management; Efficiency and performance; Recovery; Disk structure & scheduling methods; Disk management; Swap-space management.

### **UNIT 5: Protection and Security 06 hrs**

Goals of protection; Domain of protection; Access matrix; Security problem; User authentication; Program threats and system threats.

### **Text Books:**

Silberschartz Abraham, Galvin Baer Peter. (2000). *Operating System Concepts*. (5<sup>th</sup> and 6<sup>th</sup> ed.). John Wiley & Sons.

Stallings Williams. (2005). *Operating Systems*. (2<sup>nd</sup> ed.). Prentice Hall.

Tanenbaum Andrew, S. and Woodhull Albert, S. (2009). *Operating Systems: Design and Implementation*. (3<sup>rd</sup> ed.). PHI Learning Pvt. Ltd.

### **References:**

Bach Maurice, J. (2012). *The Design of the UNIX Operating System*. Prentice Hall India.

Bhatt Chandra Pramod, P. (2008). *Introduction to Operating System: Concepts and Practices*. (2<sup>nd</sup> ed.). PHI Learning Pvt. Ltd.

Deitel Harvey M., Choffnes David R. and Deitel Paul J. (2007). *Operating System*. (3<sup>rd</sup> ed.). Pearson.

Deitel, H. M. *Operating Systems including Case Studies in UNIX, OS/2, MS-DOS, Macintosh, VM, MVS, Open Systems*. (2<sup>nd</sup> ed.). Pearson Education.

Dhamdhere, D. M. (1996). *Systems Programming and Operating Systems* .Tata McGraw-Hill Education.

Godbole Achyut, S . *Operating Systems with case studies in UNIX, Netware and Windows NT*.Printice Hall Publications.

Madnick Stuart , E. and Donovan John, J. *Operating Systems*.Tata McGrawHill Edition.

Nutt Gary. (2004). *Operating Systems*. Pearson Education.

## 13BCA3204 PROBABILITY AND STATISTICS

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

On successful completion of the course the students should be able to do data analysis, draw inferences using hypothesis testing and estimation.

### **UNIT 1: Univariate Data Analysis**

**18 hrs**

Need for quantifying data; Quantitative and qualitative data; Frequency distributions- discrete and continuous; Histogram, Frequency curve, Cumulative frequency curve; Measures of central tendency -Mean, median and mode; Measures of dispersion - quartile deviation, standard deviation, coefficient of variation; Skewness -Karl Pearson and Bowley's formula; Kurtosis(definition).

### **UNIT 2: Bivariate Data Analysis**

**12 hrs**

Correlation and regression -Definition, Explanation of concepts, Karl Pearson and Spearman's rank correlation; Curve Fitting - Linear and quadratic.

### **UNIT 3: Probability**

**10 hrs**

Basic concepts- Trail, Sample space, Event, Types of events; Definitions of probability; Addition and multiplication rules of probability; Conditional probability; Baye's theorem; Random variables; Expectation.

### **UNIT 4: Probability Distribution**

**08 hrs**

Discrete: Binomial, Poisons, - mean and variance (without proof) and problems. Continuous: Exponential, Normal -Mean and variance (without proof) and problems.

### **UNIT 5: Inferential Statistics**

**12 hrs**

Definition of null, Alternate, Simple and composite hypothesis; Level of significance; Type I and type II errors; Testing equality of single and two means (large samples), Single and two proportions; Independence of attributes.

### **Text Books:**

Seema Sambargi-itagi. (2001). *A Text Book of Probability and Statistics*.(1<sup>st</sup> ed.).Himalaya Publishing House.

Srimani, P. K. (2000). *A Text Book of Probability and Statistics*. (1<sup>st</sup> ed.). Subhash Stores.

### **References:**

Gupta, S.C. (2005). *Fundamentals of Statistics*. (6<sup>th</sup> ed.).Himalaya Publishing House.

Gupta, S.P. (2006). *Statistical Methods*. (4<sup>th</sup> ed.). S. Chand.

Mann, et. al. (2012). *An Introduction to Probability and Statistics*. (2<sup>nd</sup> ed.). Wiley India.

Ravi Kumar, Hema .(1998). *A Text Book of Statistics*. (2<sup>nd</sup> ed). United Pub.

Sharma, K.V.S. (2002). *Statistics made Simple Do it yourself on PC*. Prentice Hall of India Pvt. Ltd.

Sooryanarayana, B. *Probability and Statistics*.(2008). S. Chand.

Spieger, M.R. (1980). *Theory and Problems of Probability and Statistics*. London: Schaum's Outline Series, McGraw Hill,

Srimani, P. K. and Vinayaka, M.M. *Probability and Statistics*.Subhas Sotres.

## 13BCA32L1 PROGRAMMING IN JAVA PRACTICAL

Credits: 3

Total: 60 Hours

### Part A

1. Write a program to display all prime numbers between a given range.
2. Write a program to implement at least six String methods.
3. Write a program to display a multiplication table.
4. Write a program to insert element in existing array.
5. Write a program to demonstrate the usage of *super* and *this* keyword.
6. Write a program to find area of geometrical figures using method overloading.
7. Write a program to execute any Windows95 application (Like notepad calculator etc.).
8. Write a program to find out total memory, free memory and free memory after executing garbage collector (*gc* ( )).
9. Write a program to copy a file to another file using java.io package classes. Get the file names at run time and if the target file exists then ask confirmation for overwriting and take necessary actions.
10. Write a program to list files in the current working directory depending upon a given pattern.

### Part B

11. Write a program to create object for *TreeSet* and *Stack* and implement all its methods.
12. Write a java program to implement Exception Handling.
13. Write a java program to create an Interface and implement it in a class.
14. Write a java program to create a class by extending the Thread class and use the methods of Thread class to change name, priority of the current Thread and display the same.
15. Create a text field that allows only numeric value and in specified length.
16. Write a program to implement mouse events in an applet.
17. Create a Frame and checkbox group with five checkboxes, with label as Red, Green, Blue, Yellow and White. At runtime change the background color of the frame with appropriate selection of the checkbox.
18. Create a Frame with three Scrolls and change the background color of the frame using RGB function with values of scrolls.
19. Write a program to display a frame with a button. The caption of the button should be "Change Color". For every click of the button, the background color of the frame should change randomly.
20. Write an applet that displays the current time. This applet should also change its color after every 2 seconds.

### Evaluation Criteria

Criteria	Marks
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voice	5
Total	30

## 13BCA32L2 DATABASE MANAGEMENT SYSTEM PRACTICAL

**Credits: 3**

**Total: 60 Hours**

### Part A

#### 1. STUDENT DETAILS DATABASE

The student details database has a table with the following attributes.

STUDENT (RegNo : number; Name : text; DOB : date ; Marks : number)

- Remove the existing attribute marks from the table.
- Change the data type of regno from integer to string.
- Add a new attribute PhoneNo to the existing table.
- Enter 5 tuples into the table.
- Display all the tuples in student table.
- Display all the students who were born in 1980s.
- Display all the students in alphabetical order of their names.

#### 2. LIBRARY DATABASE

A library database has a table with the following attributes:

LIBRARY (BookId: number; Title : text; Author : text; Publisher : text; Year\_Pub : number; Price :number ( 6,2) )

- Enter 5 tuples into the table.
- Display the different publishers from the list.
- Arrange the tuples in the alphabetical order of book titles.
- List details of all the books whose price ranges between Rs. 100.00 and Rs.300.00.
- Display all the authors under a specific publisher.

#### 3. EMPLOYEE SALARY DATABASE

The salary database of an organization has a table with the following attributes :

EMPSALARY (EmpCode : number; EmpName : text; DOB : date; Dept : text; Salary number(10,2) )

- Enter 5 tuples into the table.
- Display the number of employees working in each department.
- Find the sum of the salaries of all employees.
- Find the sum and average of the salaries of employees of a particular department.
- Find the highest salary that an employee draws.
- Find the least salary that an employee draws.
- Find the total salary for each department.
- Increase the salary of those employees working for the computer department by Rs. 1000.
- Display all employees increasing order of their age for a specific department.

#### 4. INVENTORY DATABASE

An inventory database has the following tables

ITEM (ItemCode : number; ItemName : text; Price : number(10,2) )

PURCHASE (ItemCode : number; Quantity : number)

- Create the tables with the above attributes.
- Enter 5 – 7 tuples into the tables.

- c) List the items purchased.
- d) Display the total items purchased ( listing must have the columns : ItemCode, ItemName,TotalQuantity).
- e) List the items which are not purchased by anyone.

## 5. BANK CUSTOMER DATABASE

A bank customer database has two tables CUSTOMER and ACCOUNT.

CUSTOMER (CustNo: number; CustName : text; City : text; AccNo : number ; Balance : number( 10,2))

ACCOUNT (AccNo: number; AccType: text; Branch : text; AccStatus : text; ChequeFacility : text)

- a) Create the above tables and specify the primary and foreign keys.
- b) Enter 5 – 8 tuples for each relation.
- c) List the customers from “Bangalore” who have cheque facility.
- d) List all the customers whose balance is greater than 30000.00 and have an active account.
- e) Find the current outstanding balance amount of branch “Malleswaram”.

## 6. INSURANCE DATABASE

Consider the Insurance database given below. The primary keys are underlined and the data types are specified.

PERSON (DriverId: text; Name : text; Address : text)

CAR (RegNo: text; Model: text; Year: number)

OWNS (DriverId : text; RegNo: text)

ACCIDENT (ReportNo: number; AccDate: Date; Location: text)

PARTICIPATED (DriverId: text; RegNo: text; ReportNo: number; Dmg\_Amt: number(10,2))

- a) Create the above tables by specifying the primary and foreign keys.
- b) Enter atleast five tuples for each relation.
- c) Update the damage amount for each car accident.
- d) Add a new accident to the database.
- e) Find the total number of people who owned cars that were involved in accidents in the year 2002.
- f) Find the number of accidents in which cars belonging to a specific model were involved.
- g) Display the owners and their car details.

## 7. ORDER PROCESSING DATABASE

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

CUSTOMER(CustId: number; CustName: text; City: text)

CUSTORDER(OrderNo: number; OrderDate: date; CustId: number; OrderAmount: number)

ITEM (ItemNo : number; ItemName: text; UnitPrice number(10,2));

ORDER\_ITEM(OrderNo: number; ItemNo: number; OrdItemQty : number)

WAREHOUSE(WarehouseNo: number; City: text)

SHIPMENT(OrderNo: number; WarehouseNo: number; ShipDate: date)

- a) Create the above tables by properly specifying the primary keys and the foreign keys.
- b) Enter atleast five tuples for each relation.
- c) Produce a listing: CustName; no\_of\_orders;avg\_order\_amt; where the middle

- attribute is the total average order amount for that customer.
- List the order\_no for orders that were shipped from all the warehouses that the company has in a specific way.
  - Demonstrate the delete of itemno 10 from the ITEM table and make that field null in the ORDER\_ITEM table.
  - List all the items ordered by a particular customer.

## Part B

### 8. STUDENT ENROLLMENT DATABASE

Consider the following database of students enrollment in courses and books adopted for each course.

STUDENT(RegNo : number; Name : text; Major : text; BDate :date)

COURSE(CourseNo : number; CourseName: text; Departmentt: text)

ENROLL(RegNo: number; CourseNo: number; Semester: number; TotalMarks: number)

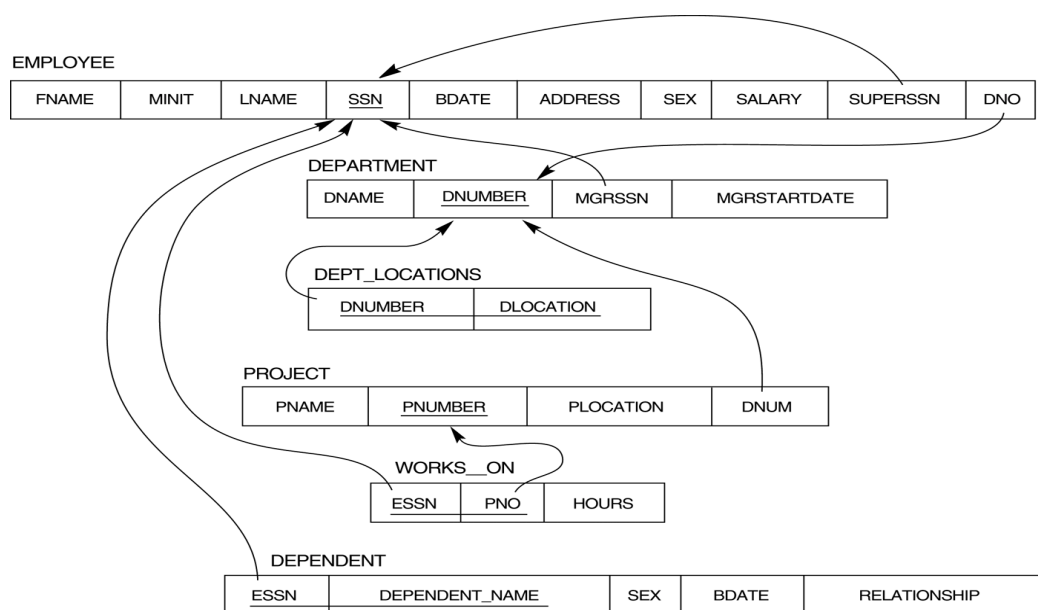
TEXTBOOK (Bk ISBN: number; BookTitle: text; Publisher:text; Author: text)

BOOK\_ADOPTION (CourseNo: number; Bk ISBN: number ;Semester: number;)

- Create the above tables by specifying the primary keys and the foreign keys.
- Enter atleast five tuples for each relation.
- Insert a new text book to the database and make this book be adopted by some department.
- List the students who have been enrolled.
- List the students who have registered but not enrolled.
- List the books which have been adopted.
- List any department that has all its adopted books published by a specific publisher.
- Illustrate inner join ; outer join by joining student and enroll table.

### 9. COMPANY DATABASE1

The database schema of a company is given in the following picture. Primary key fields are underlined and referencing is shown with arrow marks.



- Create the above tables by specifying the primary and foreign keys.
- Enter atleast five tuples for each relation.
- Retrieve the names of employees in department 5 who work more than 10 hours per week on the 'Product X' project.
- For each project, list the project name and the total hours per week (by all employees) spent on that project.
- Retrieve the names of employees who work on every project.
- Retrieve the names of employees who do not work on any project.

## 10. MOVIE DATABASE

A movie database has a table with the following attributes:

MOVIE (title : text, year : number, length : number, incolour : text, studioname : text, producer : text)

STARSIN (movietitle : text, movieyear : number, starname : text)

MOVIESTAR(name : text, address : text, gender : char, birthdate : date)

MOVIEEXECUTIVE(name : text, address : text, networth : number)

STUDIO(name : text, address : text)

- Create the above tables by specifying the primary and foreign keys.
- Enter atleast five tuples for each relation.
- Find the address of MGM Studios.
- Find Julia Roberts birth date.
- Find all the stars that appear in a movie made in 1980 or a movie with “life” in the title.
- Find all the executives worth \$100000.
- Find all the stars who are either a male or live in “Miami”.(Miami as part of their address).

## 11. TABLE CONSTRAINTS

Create a table called CLIENTS with the following fields:

A text field of 20 characters called CNAME with the client’s name.

An integer field called EMPNO which is the employee ID of the associated sales rep

The table should be configured such that:

- Blank fields cannot be inserted into the CNAME column.
- If the EMPNO field is not filled it is automatically given a value of 7777.
- The EMPNO field cannot be given a value outside the range 7000 to 8000.

## 12. AIRLINES FLIGHT INFORMATION

The following relations keep track of airline flight information:

FLIGHTS (flno: integer, from: text, to: text, distance: integer, Departs: time, arrives: time, price: real).

AIRCRAFT (aid: integer, aname: text, cruisingrange: integer) .

CERTIFIED (eid: integer, aid: integer).

EMPLOYEES (eid: integer, ename: text, salary: integer).

Note that the Employees relation describes pilots and other kinds of employees as well; every pilot is certified for some aircraft, and only pilots are certified to fly.

- Create the above tables by specifying the primary and foreign keys.
- Enter atleast five tuples for each relation.
- Find the names of aircraft such that all pilots certified to operate them have salaries more than Rs 80,000.
- For each pilot who is certified for more than three aircrafts, find the eid and the



- maximum cruisingrange of the aircraft for which she or he is certified.
- Find the names of pilots whose salary is less than the price of the cheapest route from Bengaluru to Frankfurt.
  - For all aircraft with cruisingrange over 1000 Kms., Find the name of the aircraft and the average salary of all pilots certified for this aircraft.
  - Find the names of pilots certified for some Boeing aircraft.
  - Find the aids of all aircraft that can be used on routes from Bengaluru to New Delhi.

### 13. STUDENT-FACULTY ALLOTMENT DATABASE

Consider the following relations:

Student (snum: integer, sname: text, major: text, level: text, age: integer)

Class (name: text, meets\_at: text, room: text, fid: integer)

Enrolled (snum: integer, cname: text)

Faculty (fid: integer, fname: text, deptid: integer)

- Create the above tables by specifying the primary and foreign keys.
- Enter atleast five tuples for each relation.
- Find the names of all Juniors (level = JR) who are enrolled in a class taught by Prof. Ram.
- Find the names of all classes that either meet in room R128 or have five or more Students enrolled.
- Find the names of all students who are enrolled in two classes that meet at the same time.
- Find the names of faculty members who teach in every room in which some class is taught.
- Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than five.

#### Note:

- Any fully fledged DBMS (like Oracle and SQL server) package may be used.
- The students have to execute the programs in SQL.
- The primary key for the table is underlined.

#### Evaluation Criteria.

Criteria	Marks
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total	30

# **SEMESTER IV**

## 13ENG4201 ENGLISH IV

**Credits: 3**

**Total: 60 Hours**

### **Objectives:**

- To develop student's proficiency in the language and develop their communication skills
- To equip learners with skills for self-learning.

### **UNIT 1: Prose & Poetry**

**24 hrs**

I Have a Dream-Martin Luther King Jr.; Song of the Rain-Khalil Gibran; The Moustache - Guy de Maupassant; India's Heroes -Anonymous; Nightingale and the Rose-Oscar Wilde; Diary of Anne Frank-An Autobiographical Extract.

### **UNIT 2: Novel**

**16 hrs**

Bachelor of Arts - R K Narayan.

### **UNIT 3: Word Power & Writing Skills**

**10 hrs**

Exercise & Worksheets.

### **UNIT 4: Functional English**

**10 hrs**

Curriculum Vitae and Cover Letters-Precise writing-Facing an Interview-Kinds of Paragraph Writing.

### **References:**

- Bushrui, Suheil B.; Jenkins, Joe (1998). *Kahlil Gibran, Man and Poet: a New Biography*. Oneworld Publications. p.55. ISBN 978-1851682676.
- Mendelsohn, Daniel.(2008). "The two Oscar Wildes". *How Beautiful It Is and How Easily It Can Be Broken: Essays By Daniel Mendelsohn*. New York: HarperCollins. p. 218. ISBN 978-0-06-145644-2.
- Murphy, Raymond.(1998). *Intermediate English Grammar*. New Delhi: CUP.
- Sales-Pontes, A Hilda (1983). *R.K. Narayan*. Atlantic Highlands. ISBN 978-0-391-02962-0.OCLC 10625411.
- Wren &Martin (2001). *English Grammar & Composition*. S.Chand & Company Ltd.

## 13BCA4201 SOFTWARE ENGINEERING

**Credits: 3**

**Total: 60 Hours**

**Objective:**

Student should be able to explain the software engineering principles and techniques that are used in developing quality software products.

**UNIT 1: The Product**

**04 hrs**

Evolution of software; Characteristics of software; Software applications; Components of software; Software myths; Software problems; Software reuse; Overview of risk management; Process visibility; Professional responsibility.

**UNIT 2: The Process**

**05 hrs**

Definition of software engineering; Software engineering models :Waterfall model, Prototyping model, Spiral model.

**UNIT 3: Project Management and Planning**

**20 hrs**

Management spectrum : People, Product, Process ,Project; Metrics-Measures; Metrics and indicators; Types of metrics-Size oriented, Function-oriented metrics, Metrics for software quality; Resources-Human, hardware ,Software resources; Software project estimation-Decomposition technique, LOC based estimation, Empirical estimation; COCOMO model; Risk management: Risk identification, Risk analysis, Risk projection, Risk assessment, Risk prioritization, Risk resolution, Risk monitoring and control; Project scheduling-Work tasks, Time line charts and CPM; Software quality assurance; Quality; Formal technical review and software reliability.

**UNIT 4: Analysis Principles and Design Concepts**

**20 hrs**

**Analysis Principles** - Prototyping; Software requirement specification(SRS).

**Analysis Modeling**- Data modeling; Data flow diagram(DFD); Structured analysis.

**Design Concepts and Principles**-Design process; Design principles; Design concepts and effective modular design; Design steps; Data design; Object oriented design; Function oriented design; Interface design and procedural design.

**UNIT 5: Software Testing and Maintenance**

**11 hrs**

**Software Testing** - The testing process; Test planning & strategies; Types of testing: Unit testing; Integration testing; System testing; Acceptance testing; Black box and White box testing and static verification.

**Maintenance**- Types of maintenance; Enhancing maintainability during development.

**Text Books:**

Ian Sommerville. (2002). *Software Engineering*(6<sup>th</sup> ed.). Pearson Education, Asia.

Roger S Pressman. *Software Engineering – A practitioner's Approach*. (5<sup>th</sup> ed.).Mc Graw Hill International Edition.

**References:**

James F Peters and WitoldPedryez.(2000).*Software Engineering – An Engineering Approach*. New Delhi: John Wiley and Sons.

Jon Fairclough. (1996). *Software Engineering*. Prentice Hall Press.

Pankaj Jalote.(1995). *An Integrated Approach to Software Engineering*. Narosa Publications.

Richard Fairley. *Software Engineering Concepts*. Tata McGraw Hill Edition.

## 13BCA4202 ACCOUNTING & FINANCIAL MANAGEMENT

**3 Credits**

**Total: 60 Hours**

### **Objective:**

The understanding of financial concepts related to accounting and financial management helps the students in developing financial application software in a better way.

### **UNIT 1: Introduction**

**10 hrs**

Major types of accounting-financial accounting, Cost accounting, Management accounting; Management accounting-Need; Essentials of management Accounting-Importance, Objectives, Scope, Functions, Principal systems and techniques, Advantages, Limitations; Distinction between financial accounting and management accounting; Distinction between cost accounting and management accounting.

### **UNIT 2: Analysis and Interpretation of Financial Statement**

**15 hrs**

Methods of analysis-Comparative statements; Common size statement; Trend percentage or trend ratio (Horizontal analysis); Ratios; Fund flow statement; Ratio analysis - Meaning of ratio; Necessity and advantages of ratio analysis; Interpretation of ratios; Types of ratio- A) According to the nature of items-Balance sheet ratios, Revenue statements or profit and loss account ratios, Inter statement or composite ratios B)Functional classification - Liquidity ratios ,Leverage ratios, Activity ratios, Profitability ratios; Problems.

### **UNIT 3: Working Capital**

**08 hrs**

Meaning; Objective and importance; factors determining requirement of working capital; Sources of working capital; Computation of working capital.

### **UNIT 4: Marginal Costing**

**10 hrs**

Meaning and definition of marginal cost and marginal costing; Contribution; Profit volume ratio; Advantages of marginal costing; Limitation; Problems.

### **UNIT 5: Budget and Budget Types**

**17 hrs**

**Budget** - Meaning of budget and budgetary control; Definition; Nature of budget and budgetary control; Objective of budget and budgetary control; Limitations of budget and budgetary control; Steps in budgetary control.

**Types/Classification of Budgets** - According to time- Short term, Long term ;According to flexibility -Flexible ,Fixed .

### **References:**

B.S. Khanna. *Cost Accounting Principles and Practice*.

I. M. Pandey. *Management Accounting* , Vikas publishing house .

M. Y. Khan; K. P. Jain. *Management Accounting*. Tata Mc Graw Hill Publishing Company Ltd.

M.N. Arora .*Cost Accounting Principles and practice*, New Delhi:Vikas Publishing House Pvt. Ltd.

R. N. Anthony, G. A. Walsh . *Management Accounting*. Tata Mc Graw Hill Publishing Company Ltd.

S.N. Maheshwari . *Cost Accounting Theor y and Problems*, New Delhi: Mittal Shree Mahvir Book Dept.

V.K. Sexena, *Cost Accountant Textbook*, New Delhi: Sultan Chand and Sons.

## 13BCA4203 DATA COMMUNICATION AND NETWORKS

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

To inculcate knowledge on the data transfer techniques over the digital networks.

### **UNIT 1: Communication Networks & Services**

**06 hrs**

Network goals; Network types; Network topologies; Switching techniques-Message; Packet and circuit switching; OSI Reference model; TCP/IP model.

### **UNIT 2: Physical Layer & MAC Sub Layer**

**12 hrs**

Transmission Media-Twisted pair, Coaxial cable, Optical fiber, Satellite communication networks; Multiple access communications; Random access; MAC Protocols-ALOHA, Slotted ALOHA; CSMA; CSMA/CD; Channelization-FDMA; TDMA; CDMA; 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.

### **UNIT 3: Data Link Layer**

**12 hrs**

Error detection and correction - Error detection; Two dimensional parity checks; Internet checksum; Polynomial codes and their error detection capability; ARQ Protocols- Stop and wait, Go back N, Selective repeat.

### **Unit 4: Transport Layer & Network Layer**

**15 hrs**

Connection oriented VS Connectionless service; Structure of a packet switch routing in packet networks: Routing algorithm classification; Routing tables; Flooding; Hierarchical routing; Shortest path routing algorithms; Link state routing; Distance vector routing algorithm; User datagram protocol (UDP); transmission control protocol (TCP); Congestion control; quality of services (QOS).

### **UNIT 5: Session Layer, Presentation Layer & Application Layer**

**15 hrs**

Remote procedure call (RPC)-TELNET; Network virtual terminal. Introduction to cryptography- Data encryption standard; Public key cryptography and RSA; Viruses and related threats; Firewall design Principles;DNS; SMTP; FTP; HTTP; WWW.

### **Text Books:**

Andrew Tanenbaum. (2009). *Computer Networks* (4<sup>th</sup> ed.).Prentice Hall of India.

William Stallings.(2003).*Cryptography and Network Security Principles and Practices*.(3<sup>rd</sup> ed.). Prentice Hall of India.

### **References:**

B.A.Forouzan. *Data Communication and Networking*. (2<sup>nd</sup> ed.). Tata McGraw Hill.

D.Bertsekas, R. Gallager. *Data Networks*. ( 2<sup>nd</sup> ed.). Prentice Hall of India.

D.E. Comer. *Internetworking with TCP/IP- Vol. I*. Prentice Hall of India.

Peterson . (2008). *Computer Networks*. Tata McGraw Hill.

Robertazzi. (2000). *Computer Networks and Systems*, Springer.

W.Stalling. *Data & Computer Communication*.Maxwell Macmillan International Edition.

## 13BCA42L1 UNIX / LINUX PRACTICAL

Credits: 3

Total: 60 Hours

### Part A

1. Write a shell program to count the number of characters in a given string.
2. Write a shell program to count the number of vowels.
3. Write a shell program to find whether the given year is leap year or not.
4. Write a shell program to check whether given string is palindrome or not.
5. Write a shell program to display all the files in a current directory.
6. Write a shell program to find the factorial of a given number.
7. Write a shell program to print a string in a reverse order.
8. Write a Shell Script to print the multiplication table.
9. Write a menu based program to permit or remove read/write/execute permission of a file.
10. Write a shell program to compare two strings given by the user.

### Part B

11. Write a menu driven shell script to implement the following UNIX commands:  
a) **rm -r**    b) **uniq**    c) **tail**    d) **cmp**
12. Write a shell script to create a file and compress it using  
a) **compress**    b) **pack**
13. Write a shell script to find a given pattern in a list of files of the current directory using **grep** command.
14. Write a shell script to generate the prime numbers between a lower limit and upper limit.
15. Write a shell script for sending and handling mail using **write** command
16. Write a shell script to create two directories and store five files in one directory using the related commands and to transfer all the files to another directory.

### Evaluation Criteria.

Criteria	Marks
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total	30

## 13BCA42L2 SOFT SKILLS PRACTICES

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

To enhance the personality of the student and empower them with soft skills through a practical approach.

### **UNIT 1: The Self-Concept**

**10 hrs**

What is attitude; The process of attitude formation; You are the chief architecture of yourself; Self-management techniques.

### **UNIT 2: Believe in Yourself**

**12 hrs**

Self-image and self-esteem; Building self-confidence; Environment we mix with; How to build self-image; Meaning and definition of personality.

### **UNIT 3: Personal Planning and Success Attitude**

**12 hrs**

Prioritizing; Creating the master plan; Active positive visualization and positive attitude; How to build a successful attitude; Spot analysis.

### **UNIT 4: Self-Motivation and Communication**

**14 hrs**

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.

### **UNIT 5: Leadership as a Process**

**12 hrs**

Coordination while working in a team; Leadership styles; Leader and 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.

### **Guidelines**

All the topics to be worked out practically by

- Conducting Personal Interviews.
- Giving Presentation On A Technical Topic Based On The Curriculum.
- Conducting Group Discussions.

### **References:**

Dharam Prakash.(2010).17 Steps to Excellence. Better Yourself Books.  
Fr.Anthony D'Souza.(2011).Leadership,Better Yourself Books.  
Hurlock,Elizabeth B.(2003). *Personality Development*.TMH.  
Richard Denny.(2000) .*Succeed For Yourself* .Kogan Page India.



## 13BCA42P1 SOFTWARE ENGINEERING PROJECT

**Credits: 3**

**Total: 60 Hours**

### **Guidelines:**

- Students have to develop a project using JAVA
  - Project can be implemented live but need to be demonstrated at the time of examination.
  - The Internal Assessment (IA) marks can be awarded by the guide by evaluating the performance of the student during the course of the project work.
  - The students can do the project in a group (team) consisting of not more than 2.
  - Each team must submit a project report.
  - A report of each individual phase has to be submitted within the stipulated time to the concerned faculty.
  - The individual report for each phase has to be submitted as mentioned below with time lengths.
1. Initiation phase: The initiation phase is the beginning of the project. In this phase, the idea for the project is explored and elaborated. The goal of this phase is to examine the feasibility of the project. Questions to be answered in the initiation phase include the following:
    - Why this project?
    - Is it feasible?
    - What should the results be?
    - What are the boundaries of this project (what is outside the scope of the project)?

Time Length: 8 hours of project lab.

2. Definition phase: After the project plan (which was developed in the initiation phase) has been approved, the project enters the second phase: the definition phase. In this phase, the requirements that are associated with a project result are specified as clearly as possible.

It is important to identify the requirements as early in the process as possible. The several categories of project requirements are:

- Preconditions
- Functional requirements
- Operational requirements
- Design limitations

Time Length: 10 hours of project lab.

3. Design phase: The list of requirements that is developed in the definition phase can be used to make design choices. In the design phase, one or more designs are developed, with which the project result can apparently be achieved.

Time Length: 12 hours of project lab.

4. Development phase: During the development phase, everything that will be needed to implement the project is arranged. The development phase is complete when implementation is ready to start.  
Time Length: 20 hours of project lab.
  5. Implementation phase: The project takes shape during the implementation phase. This phase involves the construction of the actual project result.  
Time Length: 5 hours of project lab.
  6. Follow-up phase: Although it is extremely important, the follow-up phase is often neglected. During this phase, everything is arranged that is necessary to bring the project to a successful completion.  
Time Length: 5 hours of project lab.
- Marks allotment for project :  
Total (IA+EA) = 40+60  
Internal Assessment (Record + Attendance + Preparatory): 10+10+20  
External Assessment (Viva + Demonstration): 20+40

# **SEMESTER V**

## **13BCA5201 DATA MINING AND DATA WAREHOUSING**

**Credits: 3**

**Total: 60 Hours**

### **Objectives:**

- To introduce the concept of data mining with in detail coverage of basic tasks, metrics, issues, and implication. Core topics like classification, clustering and association rules are exhaustively dealt with.
- To introduce the concept of data warehousing with special emphasis on architecture and design.

### **UNIT 1: Introduction and Data Warehousing**

**12 hrs**

Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation, Further Development, Data Warehousing to Data Mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining.

### **UNIT 2: Data Preprocessing and Architecture Description**

**12 hrs**

Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures, Data Warehouse and OLAP Technology for Data Mining, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology.

### **UNIT 3: Association Rules**

**12 hrs**

Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

### **UNIT 4: Classification and Clustering**

**12 hrs**

Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods.

Cluster Analysis: Introduction - Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

### **UNIT 5: Recent Trends**

**12 hrs**

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, Text mining, Mining the World Wide Web, Applications and Trends in Data Mining, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multirelational Data Mining.

**Text Books:**

Arun K Pujari (2006). *Data Mining Techniques* (2<sup>nd</sup> ed.). Universities Press.

Jiawei Han & Micheline Kamber “*Data Mining – Concepts and Techniques*”, (2<sup>nd</sup> ed.). Morgan Kaufmann Publishers, Elsevier.

Paulraj Ponnaiah (2003) . *Data Warehousing Fundamentals* (2<sup>nd</sup> ed.). Wiley student Edition.

**References:**

Margaret H.Dunham (2004). *Data Mining: Introductory and Advanced Topics*, Pearson Education.

Sam Anahory, Dennis Murry (2003). *Data Warehousing in the real world*, Pearson Education.

David Hand, Heikki Manila, Padhraic Symth (2004). *Principles of Data Mining*, PHI W.H.Inmon (2003) .*Building the Data Warehouse* (3<sup>rd</sup> ed.). Wiley.

Alex Bezon, Stephen J.Smith (2001). *Data Warehousing, Data Mining & OLAP*, McGraw-Hill Edition.

## 13BCA5202 COMPUTER GRAPHICS

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

To provide students with an understanding of the algorithms and theories that forms the basis of computer graphics and modeling and its practical implementations.

### **UNIT 1: Graphics Systems**

**12 hrs**

Application of computer graphics; Graphic software; Video display devices– Raster scan and random scan displays; CRT functioning - Factors affecting CRT; Raster scan system; Color CRT monitors - Display processor with raster system; Raster co-ordinate system; Color mapping - Instruction set and raster system applications; OpenGL Implementation- Introduction to OpenGL; Basic OpenGL syntax; Display; Window management using GLUT.

### **UNIT 2: Output Primitives**

**14 hrs**

Line Drawing Methods- DDA and Bresenham; Line attributes; Circle drawing methods – Direct and midpoint circle drawing; Ellipse drawing - Bresenham's ellipse algorithm; Area filling - Scan line area filling and character attributes; OpenGL Implementation - OpenGL pixel; Array functions; OpenGL bitmap function; OpenGL Pixmap function; OpenGL character functions.

### **UNIT 3: 2D- Transformation**

**14 hrs**

Geometric transformation; Translation; Rotation; Scaling; Reflection and shear matrix representations; Homogeneous co-ordinates - Composite transformation - Raster methods for geometric transformations; Window and viewport; Clipping & classifications - Point clipping, Line clipping, Text clipping, Polygon clipping, Curve clipping; Line clipping techniques - Cohen Sutherland line clipping algorithm, Midpoint subdivision algorithm; Area clipping -Sutherland and Hodgman polygon clipping algorithm.

OpenGL Implementation- OpenGL two dimensional viewing functions; Implementing GLUT display windows; Viewing graphics objects in a GLUT display window; Basic OpenGL geometric transformation functions.

### **UNIT 4: 3D Graphics**

**14 hrs**

3D-Coordinate system; 3D-Display techniques; 3D-Transformations – Projection transformations, Orthogonal projections, Oblique parallel projections, Perspective projections; Polygon surfaces; Octrees; Bezier curves; Hidden surface removal; Depth buffer and scan line method introduction; Functions for segmenting; Display file; Segment attributes; Display file compilation.

OpenGL Implementation - OpenGL three dimensional viewing; OpenGL general perspective projection function; OpenGL display lists.

### **UNIT 5: Graphical Input Techniques**

**06 hrs**

Positioning techniques; Grid; Constraints; Dynamic manipulation; Gravity field; Rubber band; Selection technique; Menu; Pointing and selection by naming; Keyboard; Mouse; Joystick; Touch panels; Track ball; Tablet; Data glove; Digitizers; Voice systems.

OpenGL Implementation- OpenGL interactive input device functions.

**Text Books:**

- Donald Hearn & M. Pauline Baker. (2013). *Computer Graphics OpenGL* (3<sup>rd</sup> ed.). Pearson.
- Donald Hearn & M. Pauline Baker. (2012). *Computer Graphics C Version* (2<sup>nd</sup> ed.). Pearson.
- Sumit Chauhan. (2011). *Introduction to Computer Graphics* (1<sup>st</sup> ed.). Himalaya Publishing House.

**References:**

- Edward Angel.(2013). *Interactive Computer Graphics A Top-Down Approach Using OpenGL* (5<sup>th</sup> ed.). Pearson.
- James D. Foley, Andries Van Dam, Steven K. Feiner & F Hughes John.(2013). *Computer Graphics Principles & Practice in C* (2<sup>nd</sup> ed.).Pearson.
- Roger T. Stevens. (1993). *Graphics Programming in C*. BPB Publications.
- Steven Harrington. (1987). *Computer Graphics A Programming Approach*. (2<sup>nd</sup> ed.). International Edition. McGraw-Hill Publications.
- Tom McReynolds, David Blythe. (2005.). *Advanced Graphics Programming Using OpenGL*. Elsevier Publications.
- William M. Newman & Robert F. Sproull. (1997). *Interactive Computer Graphics*. Tata McGraw Hill.
- Yeshwant Kanetkar. (1998). *Graphics Under C* (1<sup>st</sup> ed.).BPB Publications.

## 13BCA5203 DESIGN AND ANALYSIS OF ALGORITHMS

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

To develop the analytical skills in students, to enable them to design algorithms for various applications and to analyze the same.

### **UNIT 1: Introduction**

**12 hrs**

Definition of Algorithm; Characteristics; Different control structures; Writing structured programs; Analysis of algorithm; Asymptotic notations and basic efficiency classes.

### **UNIT 2: Divide-Conquer Method**

**12 hrs**

General method; Binary search; Finding maximum & minimum; Merge sort; Quick sort; Insertion sort.

### **UNIT 3: Greedy Method**

**12 hrs**

General method; Knapsack problem; 0/1 Knapsack problem; Job sequencing with deadline; Minimum cost spanning tree; Single source shortest paths.

### **UNIT 4: Dynamic Programming**

**12 hrs**

General method ;Introduction to graphs; Definition; Types; Terms related to graph; Multi stage graphs; All pairs shortest path; 0/1 knapsack; The traveling sales person problem; Flow shop scheduling; Hamiltonian problem

### **UNIT 5: Basic Traversal & Search Techniques**

**12 hrs**

Search & traversal techniques for trees; Search & traversal techniques for graphs; Introduction to np-hard and np-completeness.

Backtracking - General method; 4-queens problem; The 8- queens problem; Sum of subsets; Graph coloring.

### **Text Books:**

Aho Ullman & Hopkraft .*Design & Analysis Of Algorithms* .(1<sup>st</sup> ed.). Dorling kindersley  
Ellis Horowitz Sartaj Sahni & SanguthevarRajasekaran.(2007). *Fundamentals Of Computer Algorithms*. Silicon Press.

### **References:**

A.A. Patambekar.(2011). *Design & Analysis of Algorithm*. Technical Publishers.  
M.H.Alsuwaiyel.(1999).*Algorithms:Design Techniques and Analysis*.World Scientific Publications.  
Sara Base, Allen Van Gelder.(1999).*Computer Algorithms Introduction to Design and Analysis* (3<sup>rd</sup> ed.). Addison Wesley Publishing Company  
T.H.Cormen, C.E.Leiserson, R.L.Rivest, C.Stein.(2003). *Introduction to Algorithms* (2<sup>nd</sup> ed.).Prentice Hall of India Pvt. Ltd.  
V.V.Miniswamy. (2009).*Design and Analysis of Algorithms* .I. K. International Pvt Ltd.



## 13BCA5204 COMPUTER ARCHITECTURE

**3 Credits**

**Total: 60 Hours**

### **Objective:**

To have a thorough knowledge of the basic structure and operation of a digital computer.  
To study the different ways of communicating with I/O devices and standard I/O interfaces

### **UNIT 1: Computer Organization and Design** **12 hrs**

Instruction codes - Stored program organization; Computer registers; Computer instruction; Instruction cycle-Fetch and decode; Input output and interrupt; I-O instructions; Program interrupt; Basic design of computer.

### **UNIT 2: Central Processing Unit** **12 hrs**

Introduction; General register organization; Control stack organization; Register stack; Memory stack; Instruction format; Addressing modes; Data and manipulation- Data transfer instructions and data manipulation; Program control- Status bit conditions.

### **UNIT 3: Input/ Output Organization** **12 hrs**

Peripheral devices; I/O interface-I/O bus and I/O modules; I/O Vs. Memory bus; Asynchronous data transfer; Programmed I/O interrupt initiated I/O; Direct memory access.

### **UNIT 4: Parallel Processing** **12 hrs**

Parallelism in uniprocessor system; Parallel computer structures; Pipeline computers; Array computers; Multiprocessor systems.

### **UNIT 5: Architectural Classification** **12 hrs**

Multiplicity of instruction - Data streams; Serial versus Parallel processing; Parallelism versus Pipelining.

### **Text Books:**

Kai Hwang, Faye A. Briggs. *Computer Architecture & Parallel Processing*. McGraw-Hill.

Morris Mano. M. *Computer System Architecture*. (3<sup>rd</sup> ed.). PHI Publications.

### **References:**

Carl Hamacher, Zvonko Vranesic, Safwat Zaky(2002). *Computer Organization*. (5<sup>th</sup> ed.). Tata McGraw Hill.

Hayes. John. P. *Computer Architecture and Organization*. (3<sup>rd</sup> ed). Tata McGraw-Hill

Pal Chaudhary P. *Computer Organization and Design*. New Delhi:Prentice Hall.

Stalling, Williams. *Computer Organization And Architecture* .( 4<sup>th</sup> ed). Prentice Hall.

## 13BCA52L1 COMPUTER GRAPHICS PRACTICAL

**Credits: 3**

**Total: 60 Hours**

### **Part – A**

1. Write a C program to implement DDA line drawing algorithm.
2. Write a C program to implement Bresenham's line drawing algorithm.
3. Write a C program to implement DDA circle drawing algorithm.
4. Write a C program to implement Bresenham's circle drawing algorithm.
5. Write a C program for drawing a Pie chart depicting the election result of 4 parties.
6. Write a C program for drawing a vertical histogram depicting the production of cars in a manufacturing company for four different years.
7. Write a C program for clipping of a triangle.
8. Write a C program for implementing the 2-D transformations.
9. Write a C program to implement Cohen Sutherland line clipping algorithm.
10. Write a C program to implement midpoint sub division method of line clipping.

### **Part – B**

11. Write an OpenGL program for drawing a wireframe sphere.
12. Write an OpenGL program for implementing 2-D transformations.
13. Write an OpenGL program for drawing Sierpinski Gasket.
14. Write an OpenGL program for implementing animation.
15. Write an OpenGL program for implementing menu driven graphics package.

### **Evaluation Criteria.**

<b>Criteria</b>	<b>Marks</b>
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total	30

## 13BCA52L2 ALGORITHMS PRACTICAL

**Credits: 3**

**Total: 60 Hours**

### **Part - A**

1. Write a C program to find the GCD of two numbers using Euclid's Method.
2. Write a C program to find the binomial co-efficient using dynamic programming.
3. Write a C program to find the Maximum and Minimum element in a given array using Divide and Conquer technique.
4. Write a C program to compute the transitive closure of a given digraph using Warshall's algorithm.
5. Write a C program to obtain the topological ordering of vertices in a digraph.
6. Write a C program to check whether a graph is connected using Depth First Search technique.
7. Write a C program to print all the nodes reachable from a given starting node in a digraph using Breadth First Search method.

### **Part - B**

8. Write a C program to find the shortest path from a given vertex in a weighted connected graph to other vertices using Dijkstra's algorithm.
9. Write a C program that implements All pairs shortest path problem (Floyd's algorithm) using dynamic programming.
10. Write a C program that implements Kruskal's algorithm using greedy method.
11. Write a C program to find the minimum cost spanning tree of a given undirected graph using Prim's algorithm.
12. Write C a program that implements knapsack problem using greedy method.
13. Write C a program that implements 0/1 knapsack problem using greedy method.
14. Write a program that implements N-queens problem using Backtracking technique.

### **Evaluation Criteria.**

<b>Criteria</b>	<b>Marks</b>
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total	30

## **13BCA52P1 ENTERPRISE COMPUTING PROJECT (ASP.NET)**

**Credits: 3**

**Total: 60 Hours**

### **Guidelines:**

- Students have to develop a project using ASP.Net.
- Project can be implemented live but need to be demonstrated at the time of examination.
- The Internal Assessment (IA) marks can be awarded by the guide by evaluating the performance of the student during the course of the project work.
- The students can do the project in a group (team) consisting of not more than 2.
- Each team must submit a project report.
- A report of each individual phase has to be submitted within the stipulated time to the concerned faculty.
- The individual report for each phase has to be submitted as mentioned below with time lengths.

1. Initialization phase: The initialization phase is the beginning of the project. In this phase, the idea for the project is explored and elaborated. The goal of this phase is to examine the feasibility of the project. Questions to be answered in the initiation phase include the following:

- Why this project?
- Is it feasible?
- What should the results be?
- What are the boundaries of this project (what is outside the scope of the project)?

Time Length: 8 hours of project lab.

2. Definition phase: After the project plan (which was developed in the initialization phase) has been approved, the project enters the second phase: the definition phase. In this phase, the requirements that are associated with a project result are specified as clearly as possible.

It is important to identify the requirements as early in the process as possible. The several categories of project requirements are:

- Preconditions
- Functional requirements
- Operational requirements
- Design limitations

Time Length: 10 hours of project lab.

3. Design phase: The list of requirements that is developed in the definition phase can be used to make design choices. In the design phase, one or more designs are developed, with which the project result can apparently be achieved.

Time Length: 12 hours of project lab.

4. Development phase: During the development phase, everything that will be needed to implement the project is arranged. The development phase is complete when implementation is ready to start.

Time Length: 20 hours of project lab.

5. Implementation phase: The project takes shape during the implementation phase. This phase involves the construction of the actual project result.

Time Length: 5 hours of project lab.

6. Follow-up phase: Although it is extremely important, the follow-up phase is often neglected. During this phase, everything is arranged that is necessary to bring the project to a successful completion.

Time Length: 5 hours of project lab.

- Marks allotment for project :

Total (IA+EA) = 40+60

Internal Assessment (Record + Attendance + Preparatory): 10+10+20

External Assessment (Viva + Demonstration): 20+40

# **SEMESTER VI**

## 13BCA6201 MULTIMEDIA TOOLS AND APPLICATION

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

Students should be able to understand the relevance and underlying infrastructure of the multimedia systems, multimedia technologies and multimedia standards.

### **UNIT 1: Introduction to Multimedia & Texts** **12 hrs**

**Multimedia:** Development platforms for multimedia : DOS, Windows and Linux; Identifying multimedia elements: Text, Images, Sound, Animation and Video; Making simple multimedia with PowerPoint; Trends in multimedia; Needs and areas of use.

**Text:** Concepts of plain and formatted text, RTF and HTML text; Common text preparation tools; Conversion to and from the various text formats; Using standard software; Object linking and embedding concept; Basics of font design; Overview of font editing and designing tools; Understanding and using various text effects.

### **UNIT 2: Images & Animation** **12 hrs**

**Images:** Importance of graphics in multimedia; Vector and raster graphics; Image capturing methods: Scanner, Digital camera; Various attributes of images: Size, Color, Depth; Image file formats: BMP, DIB, EPS, CIF, PEX, PIC, JPG, TGA, PNG and TIF; Graphic file format conversions; Processing images with common software tools: Photoshop, Paint Shop pro, Corel draw.

**Animation:** Basics of animation; Principle and use of animation in multimedia; Effect of resolutions; Pixel depth; Image size on quality and storage; Overview of 2D and 3D animation techniques and software; Animation pro; 3D studio and Paint Shop pro animator ; Animation on the Web; Features and limitations; Creating simple animations for the web using GIF animator and Flash.

### **UNIT 3: Sound & Video** **12 hrs**

#### **Sound**

Sound and its attributes; Mono V/s Stereo sound; Sound channels; Sound and its effect in multimedia; Analog V/s Digital sound; Basics of digital sounds; Sampling; Frequency; Sound depth; Channels; Sound on PC; Sound standards on PC; Capturing and editing sound on PC; Overview and using some sound recording; Editing software. Overview of various sound file formats: WAV, MP3, MP4; Ogg Verbose.

**Video:** Basics of video: Analog and digital video; Using video on PC; Introduction to graphics accelerator cards; DirectX; Introduction to AV/DV and IEEE1394 cards; Digitization of analog video to digital video; Interlacing and non-interlacing; Brief note on various video standards: NTSC, PAL, SECAM, HDTV; Introduction to video capturing media and instrument: Videodisk, DVCAM, Camcorder; Introduction to digital video compression techniques and various file formats : AVI, MPEG, MOV Real Video; Brief introduction to video editing and movie making tools: Quick time, video for windows , Adobe premiere.

### **UNIT 4: Authoring Tools and Multimedia Project** **14 hrs**

**Multimedia authoring tools:** Types of tools : Card and page based authoring tools, Icon based authoring tools, Time based authoring tools; Planning and distribution of a multimedia project; Multimedia development team and required skills; Stages in

designing and producing multimedia products for CD; Testing of product; Distribution of multimedia product; Various formats of CD's and DVD's.

**Multimedia Project:** Multimedia project plan; Multimedia project team; Multimedia Project design and development; Difference phases of multimedia project; Examples of multimedia projects.

## **UNIT 5: Multimedia on the Web**

**10 hrs**

**Tools for the World Wide Web :** Web servers; Web browsers; Web page makers and site builders ; Plugins and delivery vehicles: Text, Images, Sound, Animation, Video and Presentation ; Beyond HTML ; 3D Worlds.

### **Text Books:**

Andreas Holzinger.*Multimedia Basics: Vol – 1 Technology, Firewall Media.* Laxmi Publications Pvt. Ltd .

Tay Vaughan. *Multimedia: Making It Work.* (4<sup>th</sup> ed.). Tata McGraw Hill.

### **References:**

David Hillman.*Multimedia–Technology and Applications.* Delhi : Galgotia Publications.

James E Shuman. *Multimedia In Action.* Vikas Publishing House.

Judith Jeffcoate. ( 1998).*Multimedia in Practice Technology and Applications.* PHI.

Parag Havaldar and Gerard Medioni. (2009).*Multimedia Systems: Algorithms, Standards, and Industry Practices.* PaperBack.

Prabat K Andleigh and KiranThakrar .(2003).*Multimedia Systems and Design.* PHI.

Ray Villalobos. ( 2007).*Exploring Multimedia for Designers.* Design Exploration.

Stephen M. Alessi and Stanley R.Trollip. (2000).*Multimedia for Learning: Methods and Development.* Amazon publications (3<sup>rd</sup> ed.).

Timothy Paul Garrand.( 2006). *Writing for Multimedia and the Web.* (3<sup>rd</sup> ed.) A Practical Guide to Content Development for Interactive Media.



## 13BCA6202 E COMMERCE

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

Students should be able to understand the relevance and applications of E Commerce.

### **UNIT 1: Internet as a Network Infrastructure**

**08 hrs**

Internet terminology : Chronological history of the internet; Internet governance; Internet society; Overview of internet applications.

### **UNIT 2: Electronic Commerce**

**16 hrs**

Electronic commerce framework; Electronic commerce and media convergence; Anatomy of e-commerce applications; Electronic commerce consumer applications; Electronic commerce organization applications.

#### **Electronic Commerce and World Wide Web:**

Architectural framework for electronic commerce; World wide web as the architecture; Web background; Hypertext publishing; Technology behind the web; Security and the web.

### **UNIT 3: Electronic Payment Systems**

**12 hrs**

Types of electronic payment systems: Digital token-based electronic payment systems, Smart cards and electronic payment systems, Credit card-based electronic payment systems, Risk and electronic payment systems, Designing electronic payment systems.

### **UNIT 4: Inter-Organizational Commerce and EDI**

**10 hrs**

Electronic Data Interchange (EDI): Legal, Security and privacy Issues; EDI and electronic commerce.

### **UNIT 5: Advertising and Marketing on the Internet**

**14 hrs**

The new age of information based marketing; Advertising on the internet; Market research.

#### **Mobile and Wireless Computing Fundamentals**

Mobile computing framework; Mobile computing applications.

### **Text Books:**

H. M. Deitel, P. J. Deitel, A. B. Goldberg. *Internet & World Wide Web*. Pearson Education.

Kalakotia, Whinston. *Frontiers of Electronic Commerce*. Pearson Education.

### **References:**

Bhaskar Bharat. *Electronic Commerce - Technologies & Applications*. TMH.

Loshin Pete, Murphy P. A. *Electronic Commerce*. Jaico Publishing Housing.

Murthy. *E-Commerce*. Himalaya Publishing.

M.M. Oka. *E-Commerce*. EPH.

## 13BCA6203 MOBILE APPLICATION

**Credits: 3**

**Total: 60 Hours**

### **Objective:**

On successful completion of the course the student should be able to develop and deploy their own mobile applications.

### **UNIT 1: Overview**

**12 hrs**

Background about mobile technologies; Different mobile technologies: Android, Windows, IOS, Black Berry, Series 40, Bada; Benefits and drawbacks of smartphone programming; Android: Overview, Evolution, Features, Stack overview; Linux kernel; Native libraries; App framework; Apps; SDK: Overview, platforms; Tools.

### **UNIT 2: Get Started with Android**

**12 hrs**

Get to know Eclipse: Build, Install, Run the application in the emulator or device, Project structure.

**Designing User interface** - Designing by declaration; Creating the opening screen; Using alternate resources; Implementing an *About Box*; Applying a theme; Adding a menu; Adding settings; Debugging with log messages; Debugging with debugger.

### **UNIT 3: Exploring 2D graphics and Multimedia**

**12 hrs**

Learning the basics; Adding graphics to existing apps; Handling input, Learn to change the final improvements; Playing audio; Playing video; Adding sound to existing app; Storing local data; Reading/writing local data; Accessing the internal file system; Accessing SD card.

### **UNIT 4: Location and Sensing**

**12 hrs**

SMS Messaging; Displaying MAPS location Data; Monitoring and tracking a location.

**Putting SQL to work:** Introducing SQLite; In and Out of SQLite; Hello database; Data binding; Using content provider; Implementing content provider.

### **UNIT 5: Introduction to Windows Phone Programming**

**12 hrs**

Windows 8 GUI development; Windows 8 software development tools; .Net 4.5 features Windows Phone platform overview; Multitasking windows; Interacting from background; Local data, Working with sensors, tools and phone emulator; Debugging and performance; What's new in Windows phone 8; App-to-App communication; Lock screen background; Lock screen badges; Tiles; Tiles templates; Tiles update; Final touch before deploying and testing in emulators.

### **Text Books:**

Grant Allen. (2012) . *Beginning Android 4*. Apress.

Wei-Meng Lee. (2012). *Beginning Android 4 Applications Development*. John Wiley & sons, Inc.

### **References:**

Charles Petzold. (2010). *Programming Windows Phone*. Microsoft Press. India.

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

Jerome (J.F) DiMarzio. (2010). *Android - A programmer's Guide*. Tata Mcgraw Hill.

Wallace B. McClure, Nathan Blevins, John J. Croft IV, Jonathan Dick and Chris Hardy. (2012). *Professional Android Programming with Mono for Android and .NET / C#*. Wiley India Pvt, Ltd.

Zigurd Mednieks, Laird Dornin, G. Blake Meike, and Maumi Nakamura. (2012). *Programming Android*. O'Reilly. Shroff Publishers. India.

## 13BCA6204 SYSTEM PROGRAMMING

**Credits: 3**

**Total: 60 Hours**

### **Objectives:**

- The subject introduces the design and implementation of system software.
- To understand the relationship between the system software and machine architecture.

### **UNIT 1: Machine Structure, Machine Language and Assembly Language**

**12 hrs**

Machine structure; Evolution of the components of a programming system; General machine structure; Machine language; Assembly language.

### **UNIT 2: Assemblers**

**12 hrs**

General design procedure; Design of assembler; Statement of a problem; Data structure; Format of databases; Algorithm of two pass assembler and brief flowchart.

### **UNIT 3: Macro Language and Macro Processor**

**12 hrs**

Macro instruction; Features of macro facility; Macro instruction arguments; Conditional macro expansion; Macro calls within macros; Macro instructions defining macros; Implementation; A two pass algorithm and brief flowchart.

### **UNIT 4: Loaders**

**12 hrs**

Loader schemes; Compile & go; General loading scheme; Absolute loaders; Subordinate languages; Relocating loaders; Direct linking loaders other loading schemes; Binders; Linking loaders; Overlays; Dynamic binders; Design of absolute loader.

### **UNIT 5: Compilers**

**12 hrs**

Statement of Problem- Problem1: Recognizing basic elements; Problem 2: Recognizing syntactic & Interpreting meaning; Problem 3: Storage allocation Problem 4: Code generation; Optimization (Machine independent); Optimization( Machine dependent); Assembly phase; General model of compiler; Brief introduction to 7 phases of compilers; Passes of a compiler with flow chart.

### **Text Books:**

Dhamdhare. *System Programming and Operating System*. (2<sup>nd</sup> ed.). Tata McGraw- Hill Education.

John J. Donowon. *System Programming*. Tata McGraw-Hill Education.

### **References:**

A.A. Puntambekar, I.A. Dhotre. *System Software*. Technical Publication.

Aho, Sethi and Ullman. ( 2002). *Compilers Principles, Techniques and Tools* Pearson Education.

Asoke K. Talukder and Manish Chaitanya. *Architecting Secure Software Systems*. CRC Press.

Beck. *System Software*. ( 3<sup>rd</sup> ed.). Pearson Education.

Brian Berenbach, Daniel Paulish, JuergenKazmeier, and Arnold Rudorfer. *Software & Systems Requirements Engineering In Practice* .

D.M.Dhamdere. (1987). *Introduction to System Software*. McGraw-Hill Education.

David Salomon. *Assembler and Loader*. Ellis Horwood.

## 13BCA62L1 MULTIMEDIA TOOLS AND APPLICATION PRACTICAL

**Credits: 3**

**Total: 60 Hours**

### **Part – A**

1. Create Sun Flower using Photoshop.
2. Create Plastic Surgery for the Nose using Photoshop.
3. Create See-through text using Photoshop.
4. Create a Web Page of displaying event brochure using Photoshop.
5. Create a picture in the existing image background in Corel Draw.
6. Create a 3D text in Corel Draw
7. Design a business card for a company embed photo in it using Core Draw.
8. Design a banner for a marriage function using Corel Draw.

### **Part – B**

9. Create an advertisement for a Textile company in Corel Draw.
10. Animate Plane Flying in the Clouds using Photoshop/Flash.
11. Preproduction & Presentation Graphics: Create a 7-10 slide presentation in your favorite presentation graphics application. (Power point is suggested)
12. Desktop Publishing: Create a 2-page desktop-published "newsletter," possibly using your "What is Multimedia?" text. Include graphics.
13. Multimedia Sound: Create 2 soundtracks and 2 EFX sounds for a previous project.
14. Digital Video: Use video capture to digitize your video shoot to another video source to create short production (15-45 seconds)
15. Create three basic Web pages using Dreamweaver / flash or other authoring package or write bare HTML if you are able; pages must be linked and must include at least one graphic per page.
16. Production Planning and Design: Create a proposal of project. Include summary, flowchart, element and resource lists.

### **Evaluation Criteria.**

<b>Criteria</b>	<b>Marks</b>
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total	30

## 13BCA62L2 MOBILE APPLICATION PRACTICAL

**Credits: 3**

**Total: 60 Hours**

### **Part – A**

1. Creating “Hello world” Application.
2. Creating an Application that displays message based on the screen orientation.
3. Create an application that displays custom designed Opening Screen.
4. Create menu in Application.
5. Play an audio, based on the user event.
6. Read/ write the Local data.
7. Dynamically Listing and catching You tube video content.
8. Hello world – windows app.
9. Create a Tiles based app.
10. Using Bluetooth in Android applications.

### **Part - B**

11. Animating custom graphics.
12. Developing Search application.
13. Display Map based on the Current location.
14. Working with Remote SQL servers.
15. Create / Write data with database (SQLite).
16. Reading data from Remote database.
17. Design a Lock Screen in the existing app.
18. Creating network connectivity notifications.
19. Building our own Custom Library Modules.
20. Learn to deploy both android and windows Applications.

**Note : All the exercises is to be developed using ANDROID SDK tools .**

### **Evaluation Criteria.**

<b>Criteria</b>	<b>Marks</b>
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total	30

## 13BCA62P1 PROJECT

**5 Credits**

**Total: 105 Hours**

### **Guidelines:**

- Students have to develop a project using any advanced technology.
- Project can be implemented live but need to be demonstrated at the time of examination.
- The Internal Assessment (IA) marks can be awarded by the guide by evaluating the performance of the student during the course of the project work.
- The students can do the project in a group (team) consisting of not more than 2.
- Each team must submit a project report.
- A report of each individual phase has to be submitted within the stipulated time to the concerned faculty.
- The individual report for each phase has to be submitted as mentioned below with time lengths.

1. Initialization phase: The initialization phase is the beginning of the project. In this phase, the idea for the project is explored and elaborated. The goal of this phase is to examine the feasibility of the project. Questions to be answered in the initiation phase include the following:

- Why this project?
- Is it feasible?
- What should the results be?
- What are the boundaries of this project (what is outside the scope of the project)?

Time Length: 5 hours of project lab.

2. Definition phase: After the project plan (which was developed in the initialization phase) has been approved, the project enters the second phase: the definition phase. In this phase, the requirements that are associated with a project result are specified as clearly as possible.

It is important to identify the requirements as early in the process as possible. The several categories of project requirements are:

- Preconditions
- Functional requirements
- Operational requirements
- Design limitations

Time Length: 10 hours of project lab.

3. Design phase: The list of requirements that is developed in the definition phase can be used to make design choices. In the design phase, one or more designs are developed, with which the project result can apparently be achieved.

Time Length: 30 hours of project lab.

4. Development phase: During the development phase, everything that will be needed to implement the project is arranged. The development phase is complete when implementation is ready to start.

Time Length: 50 hours of project lab.

5. Implementation phase: The project takes shape during the implementation phase. This phase involves the construction of the actual project result.  
Time Length: 5 hours of project lab.
  6. Follow-up phase: Although it is extremely important, the follow-up phase is often neglected. During this phase, everything is arranged that is necessary to bring the project to a successful completion.  
Time Length: 5 hours of project lab.
- Marks allotment for project :  
Total (IA+EA) = 50+100  
Internal Assessment (Record + Attendance + Preparatory): 15+10+25  
External Assessment (Viva + Demonstration): 30+70



# **NON CORE COURSES**

## 13NHU0102 INDIAN CONSTITUTION

**1 Credit**

**Total: 30 Hours**

### **Objectives:**

- Enables the citizens to know their rights and duties
- Makes them an ideal citizen of India
- Helps them for their valuable contribution of nation building

### **UNIT 1: Introduction**

**06 hrs**

Constituent assembly, preamble, features of Indian constitution, fundamental duties, fundamental rights, methods of constitutional amendment, directive principles of state policy.

### **UNIT 2: Union Parliament**

**07 hrs**

Rajya Sabha- powers and functions, Loka Sabha- powers and functions, committees of the parliament, speaker. State legislature- Legislative council and legislative assembly – powers and functions.

### **UNIT 3: Union Executive**

**07 hrs**

President, Prime Minister Powers and functions. Governor, Chief Minister- powers and functions. Union and state council of ministers. Coalition government.

### **UNIT 4: Judiciary**

**05 hrs**

Features of Indian judiciary. Supreme court- powers and functions. High court- powers and functions. Public interest litigation

### **UNIT 5: Issues**

**05 hrs**

Indian federation- Centre and state powers, Indian secularism. Reservations in India, Social justice, Environmental protection, Human rights

### **References:**

- Austin, Granville (1999), *Indian constitution: cornerstone of a nation* New Delhi  
Bakshi, P.M (2002), *The Constitution of India – Universal Law publishers.*  
Basu, Durga Das (1995), *Introduction to the constitution of India* New Delhi: Prentice – hall of India Pvt.  
Basu, Durga Das (2002), *Introduction to the Constitution of India* New Delhi: Wadhwa and Company Law Publishers.  
Kabburi, S.K (2006), *Indian constitution-institutions and process.*  
Kagzi, M.C. (2001), *The Constitutional of India Vol.1 & 2.* New Delhi: India law house.  
Pylee, M.V (2002), *Constitution Government and Politics* New Delhi: Universal Law publishing Co.Pvt.Ltd.  
Raj, Hans (1998), *The Constitution of India:* New Delhi: Surjeet Publications.

## 13NCS0101 COMPUTER FUNDAMENTALS

**1 Credit**

**Total: 30 Hours**

### Objectives:

- To provide basic knowledge of Computer and its Usage.

### UNIT 1: Introduction to Computers

**05 hrs**

General features of a Computer – Generation of Computers - Personal Computer – Workstation – Mainframe Computer and Super Computers. Computer Applications – Data Processing – Information Processing – Commercial – Office Automation – Industry and Engineering – Healthcare – Education – Graphics and Multimedia.

### UNIT 2: Computer Organization

**05 hrs**

Central Processing Unit – Computer Memory – Primary Memory – Secondary Memory – Secondary Storage Devices – Magnetic and Optical Media – Input and Output Units – OMR – OCR – MICR – Scanner – Mouse - Modem.

### UNIT 3: Computer Hardware and Software

**10 hrs**

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

### UNIT 4: Microsoft Office

**05 hrs**

Word processing and electronic spread sheet. An overview of MS WORD, MS EXCEL and MS POWERPOINT. Elements of BASIC programming. Simple illustrations

### UNIT 5: Computer Networks

**05 hrs**

Types of networks. LAN, Intranet and Internet. Internet applications. World wide web. E-mail, browsing and searching. Search engines. Multimedia applications

### LIST OF PRACTICAL ASSIGNMENTS: (12 Sessions of 2 hours each)

System use, keyboard, mouse operations. Word pad and paint brush.

Creating a folder and saving a document – 2 sessions.

Simple MS. DOS commands – 1 Session

Windows operating system – icons, menus and submenus, my computer – 2 sessions

Desktop publishing – preparation of a document using MS.WORD – 2 sessions

Installation of a software, virus scanning – illustrations – 1 session.

Spreadsheet calculations using MS.EXCEL – 1 session.

BASIC programming – illustrations – 1 session.

Internet use. Surfing, browsing, search engines, E-mail. – 2 sessions.

### References:

Alexis Leon and Mathews Leon (1999): *Fundamentals of information technology*, Leon Techworld Pub.

Archanakumar – *Computer Basics with office automation*, I.K. International Publishers.

Jain, S.K. (1999): *Information Technology* “O” level made simple, BPB Pub.  
Jain, V.K. (2000): “O” Level Personal Computer Software, BPB Pub.  
Rajaraman, V. (1999): *Fundamentals of Computers*, Prentice Hall India.  
Sinha, *Computer Fundamentals*, BPB Pub.

## **13NHU0101 ENVIRONMENTAL STUDIES AND CIVIC SENSE**

**1 Credit**

**Total: 30 Hours**

### **Objectives:**

- Understand the various aspects of Environment
- To harness the concern for the environment and its resources
- Comprehend the correlation between human population, social issues with that of environment

### **UNIT 1: Nature of Environmental Studies:**

**03 hrs**

Definition, scope and importance, Multi - disciplinary 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.

### **UNIT 2: Ecosystems**

**03 hrs**

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).

### **UNIT 3: Biodiversity and its Conservation**

**03 hrs**

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 bio-diversity, 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.

**UNIT 4: Environmental Pollution****05 hrs**

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: floods, earthquake, cyclone and landslides, Tsunami.

**UNIT 5: Social Issues, Human Population and Environment****06 hrs**

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. 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.

**CIVIC SENSE****Objectives:**

- To sensitize students to the concept and practice of civic sense
- Understanding the pivotal role in the transformation of urban attitudes along with the local government for sustainable change
- Fortifying experiential understanding of initiating and sustaining good civic sense in the community

**UNIT I: Introduction to Civic Sense / Social Ethics****03 hrs**

Concept nature and scope of civic sense, need and importance of civic sense, inter-relation between civic sense, citizenship and community.

**UNIT II: Issues of Promoting Civic Sense****03 hrs**

Spitting, urinating and defecating in public, lettering, shop lifting, consuming alcohol in public, smoking in public, consuming drugs, mugging, vandalizing public property, vulgar graffiti on public spaces, loud and rude behavior, argumentativeness, lack of humility and conduct, general disregard to the law of the land, disrespect to elders, ragging, eve teasing, women subjugation, stalking, lack of traffic discipline, jay walking, honking without reason, willful noise pollution, road rage, use of cell phones while driving. Reporting Instances of Poor Civic Sense: Highlighting the manifestations and ramifications including the moral and the legal consequences of the victims and the accused. Preventive / precautionary measures for the innocent victims who are soft targets.

**UNIT III: Promotion of Civic Sense****02 hrs**

Role of educational institutions and media; the role of family / teachers, local self-Government and non-Government organization –

**UNIT IV: Success stories signifying good Civic Sense within India and Foreign Countries****01 hr****UNIT V: Group Project****01 hr**

Sensitizing students to the practice and inculcation of civic sense.

**References:**

- Agarwal, K.C., (2001) *Environmental Biology*, Nidi Publ. Ltd. Bikaner
- Bharucha Erach, *The Biodiversity of India*, Mapin publishing Pvt. Ltd. Ahmedabad-
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. (2001) *Environmental Chemistry*, Wiley Eastern Ltd.,
- Heywood, Vh & Watson R.T. 1995 *Global biodiversity Assement* Cambridge Univ.
- Jadhav H & Bhosle V.M. 1995 *Environmental Protection and laws*. Himalayas Pub. House Delhi, 284p
- Mckinney M.L. & Schoel R.M. 1996 *Environmental Science systems & Solutions* Web.Enhanced edition 639p.