

1st Semester

Semester	Paper Code	*E/C/L	Paper	Teaching Hours		Marks			Credits
				Theory	Practical	IA	Exam	Total	
1	-	L	Kannada	4	-	20	80	100	4
	-	L	English	4	-	20	80	100	4
	16BA21	C	Mathematics-1	4	-	20	80	100	4
	16BA22	C	Computer Concepts and Problem Solving Techniques	4	-	20	80	100	4
	16BA23	C	Programming Fundamentals and C Programming	5	-	20	80	100	5
	16BA24	C	Windows and Office Automation Lab	-	4	20	80	100	4
	16BA25	C	C Programming Lab	-	4	20	80	100	4
	-	C	Foundation Course	4	-	20	80	100	4
	-	C	EC & CC	1	-	50	-	50	1
						210	640	850	34

2nd Semester

Semester	Paper Code	*E/C/L	Paper	Teaching Hours		Marks			Credits
				Theory	Practical	IA	Exam	Total	
2	-	L	Kannada	4	-	20	80	100	4
	-	L	English	4	-	20	80	100	4
	16BB21	C	Mathematics-2	4	-	20	80	100	4
	16BB22	C	Applied Statistics	4	-	20	80	100	4
	16BB23	C	Data Structures using C	5	-	20	80	100	5
	16BB24	C	SPSS Lab	-	4	20	80	100	4
	16BB25	C	Data Structures using C Lab	-	4	20	80	100	4
	-	C	Foundation Course	4	-	20	80	100	4
	-	C	EC & CC	1	-	50	-	50	1
						210	640	850	34

3rd Semester

Semester	Paper Code	*E/C/L	Paper	Teaching Hours		Marks			Credits
				Theory	Practical	IA	Exam	Total	
3		L	Kannada	4	-	20	80	100	4
		L	English	4	-	20	80	100	4
	16BC21	C	Comp. Orgn. & Arch.	4	-	20	80	100	4
	16BC22	C	Data Base Management System	4	-	20	80	100	4
	16BC23	C	Object Oriented Prog. with C++	5	-	20	80	100	5
	16BC24	C	Data Base Management System Lab	-	4	20	80	100	4
	16BC25	C	Object Oriented Prog. with C++ Lab	-	4	20	80	100	4
	-	C	Foundation Course	4	-	20	80	100	4
	-	C	EC & CC	1	-	50	-	50	1
						210	640	850	34

4th Semester

Semester	Paper Code	*E/C/L	Paper	Teaching Hours		Marks			Credits
				Theory	Practical	IA	Exam	Total	
4		L	Kannada	4	-	20	80	100	4
		L	English	4	-	20	80	100	4
	16BD21	C	Operating Systems	4	-	20	80	100	4
	16BD22	C	Internet Programming[HTML,CSS,Java Script]	4	-	20	80	100	4
	16BD23	C	Java Programming	5	-	20	80	100	5
	16BD24	C	Internet Programming Lab	-	4	20	80	100	4
	16BD25	C	Java Programming Lab	-	4	20	80	100	4
	-	C	Foundation Course	4	-	20	80	100	4
-	C	EC & CC	1	-	50	-	50	1	
						210	640	850	34

5th Semester

Semester	Paper Code	*E/C/L	Paper	Teaching Hours		Marks			Credits	
				Theory	Practical	IA	Exam	Total		
5	16BE21	C	Software Engineering	4	-	20	80	100	4	
	16BE22	C	Data Communications & Networks	4	-	20	80	100	4	
	16BE23	C	E-Commerce	4	-	20	80	100	4	
	16BE24	C	Analysis and Design of Algorithms	5	-	20	80	100	5	
	16BE25	C	ADA Lab	-	6	20	80	100	6	
	16BE26	E5.1		PHP and MySQL [Web Programming]	5	-	20	80	100	5
		E5.2		Advanced Microprocessor 8086						
		E5.3		Computer Graphics						
	16BE27	E5.1		PHP & MySQL Lab	-	6	20	80	100	6
		E5.2		Microprocessor Lab						
		E5.3		Computer Graphics Lab						
-	C		SDC	2	-	10	40	50	2	
						150	600	750	36	

6th Semester

Semester	Paper Code	*E/C/L	Paper	Teaching Hours		Marks			Credits	
				Theory	Practical	IA	Exam	Total		
6	16BF21	C	Cloud Computing	4	-	20	80	100	4	
	16BF22	C	Computer Networks.	4	-	20	80	100	4	
	16BF23	C	UNIX	5	-	20	80	100	5	
	16BF24	C	UNIX Lab	-	6	20	80	100	6	
	16BF25	E6.1		VB.NET Programming	5	-	20	80	100	5
		E6.2		Android Programming						
		E6.3		Network Programming with TCP/IP						
	16BF26	E6.1		VB.NET Programming Lab	-	6	20	80	100	6
		E6.2		Android Programming Lab						
		E6.3		Network Programming Lab						
	16BF27	C	Project Work	-	4	20	80	100	4	
-			SDC	2	-	10	40	50	2	
						150	600	750	36	

Practicals 4 hours with 2 slots of 2 hours each per week.

Practicals 6 hours with 2 slots of 3 hours each per week

*L- Language, C- Compulsory, E- Elective.

BCA 1 st Semester		Basic Mathematics	
Subject Code :	16BA21	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits :	4		

01. Symbolic Logic : Proposition and its types, Negation, Disjunction, Conjunction, Tautologies and Contradictions, Logical equivalence, Algebra of propositions, conditional Propositions, Converse, Inverse and ContraPositive Proposition, Bi-conditional Proposition, Arguments (Formation of truth table and simple problems). [07 Hrs]
02. Matrices and Determinants: Matrix, order, types of Matrices, addition, subtraction, scalar multiplication of a matrix, product of two matrices, problems,. Determinants of a square matrix and evaluation, minor, cofactor of element of a square matrix, adjoint, singular matrices, inverse of a square matrix, problems. Solution of a system of linear equations by matrix method, characteristic equation and characteristic roots of a square matrix of orders 2 and 3. [10Hrs]
03. Set Theory: Equivalent sets, identical sets, empty set, union and Intersection of sets, complement of a set, difference of sets and problems. Cartesian product of two sets, relation, domain and range of a Relation, Types of relations, Identities, reflexive, symmetric Transitive, antisymmetric, Inverse Relations and problems. Functions, Into, one-one, onto, Bijective, constant functions, Inverse functions, Inverse of an element, composition of two mappings problems. [10Hrs]
04. Trigonometry : Definitions of Trigonometric functions, Trigonometric ratios of an acute angle, Trigonometric Identities and Problems, Trigonometric Functions of Standards angles (without proof) Problems, Trigonometric functions of allied angles (statement only without proof) and problems. Compound angles, multiple and sub-multiple angles and Transformation formulae (without proof) Simple problems, Inverse trigonometric functions Derivations of standard formulae and problems. [10Hrs]
05. Continuity and Differentiation: Continuity and Differentiability concept, derivatives of standard functions from 1st principle - x^n , e^{ax} , $\log ax$, a^x , $\sin ax$, $\cos ax$, $\tan ax$, $\cot ax$, $\sec ax$ and $\operatorname{cosec} ax$ (with proof). Derivative of composite function, chain rule, derivative of inverse trigonometric functions, derivative of implicit functions. Concepts of exponential and logarithmic functions to base e. Derivatives of exponential and logarithmic functions. logarithmic differentiation, derivatives of functions expressed in parametric forms. Second order derivatives. [10Hrs]
06. Principle of Mathematical Induction: Process of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple application. [5 Hrs]

Reference Books:

01. Set Theory and related Topics – S. Lipschutz.
02. Matrices – F. Ayres
03. Matrices – Shantinarayan
04. Real Analysis-N.P.Bali
05. Mathematics text books(NCERT) vol1 and vol 2-Arora
06. Mathematics text books(NCERT) vol1 and vol 2-S.S.Bosco

BCA 1 st Semester	Computer Concepts and Problem Solving Techniques
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Subject Code : 16BA22	Total Teaching Hours : 52
IA Marks : 20	Teaching Hours/Week : 04
Exam Marks : 80	Examination Hours : 03
Credits : 4	

1. Computer Architecture: Introduction, CPU, Memory, Communication between Various Units of a Computer System, The Instruction format, Instruction Set, Multiprocessor Systems, Primary Memory, Secondary Storage, Input and Output Devices
Computer Software: Introduction, Software – Definition, Relationship between Hardware & Software, Software Categories- System Software, Application Software, Software Terminology. 12Hrs

2. Introduction: The problem solving aspect, top-down design, characteristics of algorithms, implementation of algorithms, program verification, efficiency of algorithms, analysis of algorithms, flow charts.
Fundamental Algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer, base conversion, character to number conversion. 10Hrs

3. Factoring methods: Finding the square root of a number, the smallest divisor of an integer, the GCD of two integers, generating prime numbers, computing the prime factors of an integer, generation of pseudo random numbers, raising a number to a large power. 10Hrs

4. Array Techniques: Array order reversal, array counting, finding the maximum number in a set, removal of duplicates from an ordered array, partitioning an array, finding the kth smallest element, longest monotone sequence. 10Hrs

5. Merging, Sorting and Searching: The two-way merge, sorting by selection, sorting by exchange, sorting by insertion, sorting by diminishing increment, sorting by partition, binary search, hash searching. 10Hrs

Text Book:

1. R. G. Dromey, How to Solve it By Computer, Pearson Education, 11th Impression, 2012
2. Lesley Anne Robertson, A simple Programming Design- A step by step approach, 5/e, Thomson Learning

References:

1. Kenneth A, C Problem Solving and Programming, Prentice Hall.
2. Williams and Sawyer, Using Information Technology, Tata McGraw Hill.

Note: Please follow the following format for all algorithms:

ALGORITHM Name_of_algorithm (argument_list)

//problem statement or what the algorithm does

//Inputs required

BCA 1st SemesterWindows & Office
Automation Laboratory

Subject Code :	16BA23	Total Teaching Hours :	52
IA Marks :	20	Lab Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

The following laboratory exercises should be carried out using latest version of either MS-Office or any of the following Open Source Office suites (Open Office, Star Office, Libre Office) under either Windows or Linux environment.

Each exercise should be of 2 hours duration in one single session.

Exercises in Word Processing :

1. Page and Character settings: Create a new document and set its margins, page size and orientation. Type multiple paragraphs of text and perform Character settings like font, size, style by selecting text using different methods. Edit the text (add new text, delete text, modify character settings, cut/copy and paste text). Create new page (Page Break), add new text and save the document in a new folder.
2. Paragraph settings and Equations: Open document created in previous exercise, perform Paragraph settings like before spacing, after spacing, line spacing, indents(left, right, first line) on selected text. Align the text using different forms of alignment (left, center, right, justify). Add new page and type some mathematical expressions (Equations). Save and Close the document.
3. Page numbers, header, footer, find, replace: Open document saved in previous exercise, add page numbers, Header and Footer to all pages. Search specific text using Find and change specific text using Replace. Protect the document using password. Save and close document.
4. Bullets and Numbering: Create a new document, type a various categories of lists under different headings. Format the lists using bullets, numbering and outline numbering. Interchange the order of the lists using cut/paste. Add text to existing lists. Save and Close the document.
5. Graphic elements and text wrapping: Open any existing document created previously. Add pictures (photos), shapes, wordart and text boxes to the document. Format each of these elements for position, size, color, effects. Layout the flow of text around these added elements using various text wrapping options. Save the document under a different name using Save As.
6. Tables: Create a new document. Type text in the form of a table containing data in rows and columns. Use Insert table or draw table options to create the tabular format. Set row height and column width as desired. Select rows or columns and perform character, paragraph settings and text alignment options. Select individual cells, rows or columns and format for fill color, border color and style. Merge cells and split cells as desired. Try formatting the table using inbuilt table styles (quick tables). Save and close document.
7. Mail Merge: Create a form letter with common matter and empty spaces for text which will change for each letter (fields). Format and save the letter with a new name. Create another document containing a table with rows and columns. The row headings should be fieldnames and each subsequent row should containing data under each field name to be used in the form letter (empty spaces) saved previously. Save this document with a different name. Perform Mail Merge with both the saved files.

Exercises on Spreadsheets :

1. Worksheets and Format Cells: Create a new workbook and worksheet, type data in cells in various rows and columns. Select cells and perform formatting for number, alignment and font settings. Resize rows and columns. Rename worksheet. Add another worksheet and copy data from first worksheet to new worksheet. Rename new worksheet. Change data in new worksheet. Save and Close workbook.
2. Autofill, automatic lists, format cells: Open existing workbook, Fill options on data in rows and columns, series data, days of week, months, filling data by trend in continuous cells. Move and copy blocks of cells from one location to another. Explore view, zoom and page break preview options. Format cells using fill, border and protect options. Save and close workbook.
3. Page layout, Print preview and Header/footer: Open existing workbook, change page layout. Set margins, page orientation and size as desired. Define print area and use print preview to view result. Set appropriate header and footer in workbook. Save and Close workbook.
4. Basic formula usage: Create new workbook and create a tabular format to display annual result of student. Use basic arithmetic operators and cell numbers in expressions to perform the calculations. Use Autosum and Logical functions like IF, AND, OR, NOT etc. Save the worksheet. Insert a new worksheet and calculate the IA marks for students using similar basic expressions involving arithmetic operators and cell numbers. Save the workbook.
5. Functions: Create a new workbook and explore the usage of the following groups of inbuilt functions
 - a. TEXT- Concatenate, Dollar, Clean, Trim, Find, Replace, Left, Right, Mid
 - b. Date & Time – Date, DateValue, Day, Month, Year, Days, Now, Hour, Minute, Second, Time, Today.
 - c. Lookup & Reference – Row, Column, Rows, Columns, Match
6. Functions: Create a new workbook and explore the usage of the following groups of inbuilt functions
 - a. Math & Trigonometric – Cos, Sin, Tan, Ceiling, Floor, Decimal, Even, GCD, int, LCM, Log, Round, Roundup, Rounddown, Sqrt, Sum
 - b. Statistical – Average, Count, CountBlank, Countif, Mean, Stddev
 - c. Info – iseven, isodd, isformula, istext
7. Graphs and Charts: Create a new workbook. Feed appropriate tabular data and create column graphs and pie charts using the data. Format the charts for color, data, numbers, legend, axis, effects and 3d options.
8. Validation, conditional formatting and consolidation: In a new workbook, feed appropriate data and perform data validation on rows and columns, circling invalid data. Also using data fed in multiple worksheets (common tabular structure but different data values) perform consolidation of data using sum, average, min, max. Also conditionally format data in some rows and columns. Save the workbook.
9. What if Analysis: Using appropriate data, explore the use of Goal Seek and Scenario Manager.
10. Group, Sort, Filter: Create a new workbook and feed data in a categorywise manner (eg. Individual product's monthly sales figures of different categories of products for a six month period) and group, ungroup, subtotal, sort and filter data according to categories. Also do the same using Advanced filter.

Exercises on Presentations :

1. Basic Presentation creation, themes, backgrounds: Create a new presentation and set theme and background. Create title slide, and insert new slides of different types like title and content (picture, graphic, clipart, video, audio), blank slide, title and text (bulleted list, two column text etc). Save and close presentation.
2. Editing Presentations: Open existing presentation. Perform Spelling Check. Add Pictures, graphs to existing slides. Change Line spacing and bullet styles. Change the theme and background. Save the presentation under a different name.
3. Tables, Header/Footer, Slide numbers: Create new presentation. Insert slides from previous presentation using reuse slides. Add new slides by using slides from outline option. Insert Tables into slides. Add header, footer and slide number. Use Master slide options to change formatting. Save and Close.
4. Transition and Animation: Open existing presentation. Add Transition effects between slides. Used timed transition and on mouse click. Add Animation effects to elements in each slide and set the order and effect of animation. Save and close.
5. Slideshow: Open existing presentation from previous exercise and set up slide show. Use rehearse timings, custom show and show presentation. Stop show in between and navigate between different slides using context menu (right click), blank screen, use pointer to highlight parts of displayed slide, use pen to write on slide during slide show. Save and close presentation.
6. Hyperlinks and interactivity: Open existing presentation. Add notes to each slide using notes master. Add interactivity to slides by using hyperlinks to other slides, word document, other presentations and set up interactive slideshow controlled by buttons (hyperlinks) on slides. Run the slideshow. Use Print preview command to print slides or notes.

Marks Distribution:

- One each question from each categories, Word processing, Spreadsheets, and Presentations.

Criteria		Marks		
		Word Processing	Spreadsheets	Presentations
Practical Proper	Write-up	10	10	10
	Execution	20	20	10
	Total	80		
IA-Report/ Viva		20		
Total		100		

Subject Code :	16BA24	Total Teaching Hours :	60
IA Marks :	20	Lab Hours/Week :	05
Exam Marks :	80	Examination Hours :	03
Credits:	5		

1. Introduction to Computer: Block diagram of computer system, Central processing Unit(CPU) , ALU, CU, Main memory, Input/output unit, Brief history of Hardware: Input device, keyboard, Mouse, Lightpen, joystick, Scanner, Digitizer; Output device: various types of printers(dot matrix, laser, inkjet), Plotters; Secondary storage devices: Hard disk, CD- ROM, Optical disk. Software: System Software, Operating System, Application software, Machine level language, higher level programming languages, Assemblers, Compilers, and editors, Merits and demerits of all the languages. 10 Hrs

2. Overview of C: Introduction, Importance of 'C', sample 'C' programs, Basic structures of 'C' programs, Programming style, Executing a 'C' program, Constants, variables and Data types: 'C' tokens, keywords and identifiers, constants, variables, data types, declarations of variables, assigning values to variables, defining symbolic constants. Operators and expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, increment and decrement operators, conditional operators, bitwise operators, special operators, some computational problems, type conversions in expressions, operator precedence and associativity, mathematical functions 14 Hrs

3. Managing input and output operators: input and output statements, reading character, writing characters, formatted input, formatted output statements. Decision making, Branching and looping: Decision making with if statement, simple if statement, the if-else statement, nesting of if else statements, the ladder if-else. The switch statement. The?: operator, The GOTO statement, The while statement, The do-while statement and for statement, jumps in loops. 12 Hrs

4. Arrays: One dimensional array, two dimensional arrays, initializes two- dimensional array, multidimensional 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 like strlen, strcpy, strcat, strcmp,strupr, strlwr. 12 Hrs

5. User Defined functions: Need for user defined functions, a multi-functional program, the form of 'C' function, return values and their types, calling a function, category of functions- No arguments and no return values, argument but no return values, arguments with return values, nesting of functions, recursion, functions with arrays. 12 Hrs

Text Books :

1. E. Balaguruswamy: Programming in ANSI C, 6th edition, Tata McGraw-Hill.
2. Yashawant Kanetkar : ' Let us C', 2011

References:

1. S. Byron Gottfried: Programming with 'C' Tata McGraw-Hill.
2. Rajesh Hongal : 'Computer Concepts and C Programming, 2008

BCA 1 st Semester		C Programming Lab	
Subject Code :	16BA25	Total Teaching Hours :	39
IA Marks :	20	Lab Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

All programs should be executed in Linux using any open source IDE.

1. Write a Program to find the root of the given quadratic equation using switch case.
2. Write a Program to generate and print first N FIBONACCI numbers.
3. Write a Program to find the GCD and LCM of two integer numbers.
4. Write a 'C' Program that reverse a given integer number and check whether the number is palindrome or not.
5. Write a Program to find whether a given number is prime number or not.
6. Write a Program to input numbers and to find mean variance and standard deviation.
7. Write a 'C' Program to read two matrices and perform addition and subtractions of two matrices.
8. Write a 'C' Program to read a string and check whether it is palindrome or not.
9. Write a 'C' Program to find the factorial of a number using function.
10. Write a 'C' Program to find if a character is alphabetic or numeric special character.
11. Write a 'C' program to compute the sum of even numbers and the sum of odd numbers using a function.
12. Write a C program to find trace and norm of a square matrix using functions.
13. Write a C program to accept a sentence and convert all lowercase characters to uppercase and vice-versa.
14. Write a C program to accept different goods with the number, price and date of purchase and display them using Structures.
15. Write a C Program to find the length of a string without using the built in function.

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
IA-Report/ Viva		20	
Total		100	

BCA 2 nd Semester		Mathematics	
Subject Code :	16BB21	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

01. Complex Numbers : Definition of Complex Number as an ordered pair, real and imaginary parts, modulus and amplitude of a complex number, polar form of a complex number, problems. DeMoire's theorem (statement only) method of finding square roots ,cube roots, and fourth roots of a complex number and their representation in the Argand diagram.
[8 Hrs]
02. Standard Integrals: Integration as inverse process of differentiation. Integration of algebraic, logarithmic, exponential and trigonometric functions, Integration by parts and by partial fraction. Definite Integrals and evaluation of definite integrals . Application of definite Integrals-application in finding the area under simple curves. [10 Hrs]
03. Polar Curves: Introduction, angle between radius vector and tangent, length of the perpendicular from the pole to the tangent, angle between two curves, pedal equations.
[6 Hrs]
04. Three dimensional Geometry: Direction cosines and direction ratios of a line joining two points. Cartesian equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian equation of a plane. Angle between i)Two lines ii) Two planes.
[8 Hrs]
05. Probability: Random experiments, outcomes, sample spaces(set representation). Events: occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events. Probability of an event , probability of 'not', 'and' and 'or' events. Multiplication theorem on probability. Conditional probability, independent events, total probability, Baye's theorem.
[8 Hrs]
06. Linear inequalities: linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Solution of system of linear inequalities in two variables-graphically. Inequalities involving modulus function.
[6 Hrs]

Reference Books:

01. Integral Calculus -Shanthi Narayan
02. Integral Calculus –N.P .Bali
03. Analytical Geometry -Shanthi Narayan
04. Differential Calculus-N.P.Bali
05. Co-ordinate Geometry- Shanthi Narayan
06. Mathematics text books(NCERT) vol1 and vol 2-Arora
07. Mathematics text books(NCERT) vol1 and vol 2-S.S.Bosco

BCA 2 nd Semester		Applied Statistics	
Subject Code :	12BB22	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Introduction and statistical investigation: Origin and development, Definition, Importance and scope of business Statistics, Meaning and definition of data, Methods of data collection. Type of data (primary, secondary, dichotomous, continuous, nominal, categorical, ordinal, etc.); proportions, ratios and rates; building, cleaning and administering databases in SPSS (including defining, computing, selecting and recoding variables for data analyses). 8hrs.
2. Presentation of data, Diagrammatic and Graphical Representation: Definition of Classification, Objectives of classification, Types of classification, Formation of a Discrete Frequency Distribution and Formation of continuous frequency Distribution. Definition of tabulation, objectives of tabulation, parts of table. Significance of diagrams and graphs, Types of diagrams-one dimensional or Bar Diagrams, Two dimensional or area diagrams, pictograms and cartograms. Graphs of frequency distribution-Histogram, frequency polygon, Frequency curve, gives or cumulative frequency curves 10hrs
3. Measures of central tendency and Measures of dispersion: Definition of averages, objectives of averages, requisites of ideal averages. Types of averages- A mean, median, Mode, Harmonic mean, Geometric Mean – Definition computation, merits and demerits, Application in Business. Definition and properties of Ideal Measure of dispersion, Absolute and Relative Measures of dispersion-Range and co-efficient of range, Quartile and co-efficient of Q.D., Average Deviation(AD) and co-efficient of A.D., Standard Deviation and co-efficient of S.D. and co-efficient of variation. 12hrs
4. Correlation and regression: Meaning and definition, types of correlation, methods of studying correlation- Scatter diagram method, Karlpearson's co-efficient of correlation, Spearman's Rank correlation coefficient. properties of correlation co-efficient. Meaning and definition of regression, regression equations, difference between correlation and regression, construction regression equations with simple examples. 10hrs
5. Time series analysis: Meaning and Definition of Time series, Uses and objectives, components of Time series - Trend, Seasonal variation, Cyclic variation and Irrigular variation their detail study. Additive and Multiplicative models. Methods of measurement of Time series-Moving averages (3, 4 and 5 yr), link relative method and Least square method 12hrs

References:

- Medhi J. 1992, Statistical Methods (An Introductory Text), New Age International.
 Business Statistics by - J K Sharma , Pearson Publication.
 Gupta S. C.andKapoor V. K. 2005 Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi.
 Gupta S. C.andKapoor V. K. 2005 Fundamentals of Applied Statistics, S. Chand and Sons, New Delhi.
 Ross S. M. 2006 A First Course In Probability 6th Edition, Pearson publication.

BCA 2 nd Semester		Statistics Lab using SPSS	
Subject Code :	16BB23	Total Teaching Hours :	39
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

Assignment 1:

- Open a new data set in SPSS
- Create a nominal variable called cat_dog that has a width of 3 with 0 decimal places. The label should be "Do you like cats or dogs better?". The values should be 1 for cats and 2 for dogs (or vice versa). Do not worry about missing data codes.
- Create a scale variable called neatness that has a width of 8 with 3 decimal places. The label should be "Eric Cartman's Neatness Scale (higher = neater)". There will be no value labels.
- Enter data for the following cases
 - case 1 prefers cats and has a neatness of 4
 - case 2 prefers dogs and has a neatness of 3
 - case 3 prefers dogs and has a neatness of 7
 - case 4 prefers dogs and has a neatness of 2
 - case 5 prefers cats and has a neatness of 5
 - case 6 prefers cats and has a neatness of 1
 - case 7 prefers cats and has a neatness of 3
 - case 8 prefers dogs and has a neatness of 6
- Change the neatness of the second case from 3 to 6, like you would if you discovered a data entry error.
- Save your data set

Assignment 2:

- Create a data set in SPSS for the following data:

Group	Gender	Hw1	Hw2	Hw3
expt	Male	92	84	93
expt	Female	77	84	85
expt	Male	87	86	81
expt	Female	89	90	93
expt	Male	64	73	78
control	Female	81	84	93
control	Male	83	90	91
control	Female	84	88	86
control	Male	82	80	78
control	Female	96	91	88

- Using the Frequencies option, find the mean, median, mode, quartiles, 95th percentile, variance, standard deviation, minimum, and maximum of Hw1, Hw2, and Hw3.
- Using the Descriptives option, find the means and standard deviations of Hw1, Hw2, and Hw3.
- Using the Compare Means --Means procedure, find the means on Hw1, Hw2, and Hw3 for everyone, for the experimental group, for the control group, for men, for women, and for all combinations of gender and group.

Assignment 3:

A researcher has created a data table showing the anthropometrical measurements of tribal subjects under each of the four social categories, namely GM, OBC, SC and ST as shown in table.

GM			
Gender	HT	WT	Biceps
1	137.8	30.5	5.50
2	130.2	29.5	5.65
2	135.6	29.0	5.15
2	137.8	30.0	5.25
1	131.5	30.5	4.95
1	132.8	31.5	5.65
1	139.8	30.5	5.50
1	136.7	30.0	5.65
1	138.6	30.5	5.15
1	139.5	30.5	5.25

SC			
Gender	HT	WT	Biceps
2	132.4	25.0	4.37
1	133.5	24.5	4.95
1	130.6	25.5	4.65
1	132.5	26.5	4.45
1	130.6	26.0	6.48
2	132.4	25.5	5.01
1	130.5	25.0	4.37
1	132.4	24.5	4.95
2	133.5	25.5	4.65
2	130.6	26.5	4.45

OBC			
Gender	HT	WT	Biceps
1	124.4	23.5	4.61
2	125.5	23.0	4.52
1	126.3	24.0	4.45
2	128.0	23.5	4.39
1	129.0	25.0	4.37
2	130.0	22.0	4.69
1	129.5	23.5	4.61
1	130.0	23.0	4.52
2	126.0	24.0	4.45
2	128.5	23.5	4.39

ST			
Gender	HT	WT	Biceps
1	124.5	20.5	3.54
1	125.8	21.0	3.55
1	123.5	20.5	3.95
1	124.8	22.0	4.05
1	122.5	21.5	3.55
1	122.8	22.0	3.54
1	122.5	22.5	3.55
1	121.5	21.5	3.95
1	124.5	20.5	4.05
2	125.8	21.0	3.55

- Create a data file in SPSS (The Data in SPSS has to be entered with category 1=GM, 2=OBC, 3=SC and 4=ST. The codes for Gender are 1=Male and 2= Female).
- Generate central tendency and measures of dispersion output using the descriptives command in SPSS for the variables Height, Weight and Biceps.
- Generate two-way cross table Gender versus Category.

Assignment 4:

The marks obtained by 50 students of a class in mathematics are given below.

32, 42, 41, 51, 41, 30, 39, 18, 48, 53, 54, 32, 31, 46, 15, 37, 32, 56, 42, 48, 38, 26, 50, 40, 38, 42, 35, 22, 62, 51, 44, 21, 45, 31, 37, 41, 44, 18, 37, 47, 38, 41, 30, 52, 52, 60, 42, 38, 38, 34.

- Create a data file in SPSS.
- Generate a frequency table.
- Draw the Histogram.
- Generate central tendency output using the frequencies command in SPSS.
- Generate central tendency output using the descriptives command in SPSS.
- Generate central tendency output using the explore command in SPSS.

Assignment 5:

The number of blood donations in the years 1995 and 2000 in various blood groups are as follows

Year:	O	A	B	AB
1995	1154	526	775	155
2000	700	1125	1280	560

- Create a data file in SPSS and hence represent the data by multiple bar diagram.

Assignment 6:

The following data represent the Number of Students by faculty in a college

Year	Humanity	Science	Commerce
1996	2810	890	540
1997	3542	1363	471
1998	4301	1662	652
1999	6593	2752	1113

- Create a data file in SPSS and hence represent the data by subdivided bar plot.

Assignment 7:

Marks obtained by students in Mathematics and Statistics in a class are given below.
pearson's and spearman's method.

Mathematics	Statistics
68	65
54	60
75	72
50	53
64	60
80	85
75	70
40	43
55	55
64	61
56	68
23	40
78	89
89	87
65	63

- Create a data file in SPSS and hence Generate Correlation Coefficient output by Pearson's and Spearman's method.

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
IA-Report/ Viva		20	
Total		100	

BCA 2 nd Semester		Data Structures Using C	
Subject Code :	16BB24	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	05
Exam Marks :	80	Examination Hours :	03
Credits:	5		

1. A Unit I.: Structure and union: Structure definition, giving values to members, structure initialization, comparison of structure variables, arrays of structure, self-referential structures, union. Pointers: Understanding pointers, accessing the address of variables, Declaring and initializing pointers, accessing a variable through its Pointer. Dynamic memory allocation: Meaning of static and dynamic memory allocation. Memory allocation functions: malloc(), calloc(), free() and realloc(). Files: Introduction, definition, Basic file operations: Naming a file, opening a file, Reading data from file, writing data to a file and closing a file, Input/Output operations on files, Error Handling in files, Random Access to files. 12 Hrs
2. Unit II: : Introduction to Data Structures & Stack: Definition, Applications, Classification of data structures: primitive and non-primitive, Operations on data structures Definition, Array Implementation of stack(using structure) and operations on stack, Applications of stacks, Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix. 12 Hrs
3. Unit III: Queue and Recursion: Definition, Types of queue: Simple queue, circular queue, double ended queue, priority queue, Array Implementations of queue (using structure) and operations on all types of queues. Definition, Recursion in C, Writing Recursive programs – Binomial coefficient, Fibonacci, GCD, towers of Hanoi. 12 Hrs
4. Unit IV: Linked list: Definition, components of linked list, Representation of linked list, Advantages and disadvantages of linked list, Types of linked list: singly linked list, doubly linked list, Circular list and circular doubly linked list, operations on all types of linked lists: Creation, insertion, deletion, search and display. 12Hrs
5. Unit V Tree: Definition: Tree, Binary tree, complete binary tree, Binary search tree, Tree terminology: root, Node, Degree of a node, ancestors of a node, Binary tree, Array representation of tree, Creation of Binary tree, Traversal of Binary tree: Preorder, In order and post order. 12Hrs

Text books:

1. Langsam, Augenstein and Tenenbaum, Data structures Using C and C++, Prentice Hall of India, 2nd Edition.
2. Kamthane :Introduction to Data structures in C Pearson Education.

References:

1. Weiss Data structures and Algorithm Analysis in C II Edition , Pearson Education.
2. LipschutzSchaum's outline series Data structures Tata McGraw-Hill.

BCA 2 nd Semester		Data Structures Using C Lab	
Subject Code :	16BB25	Total Teaching Hours :	39
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

- Write a C program to create a structure Employee that stores empno, name, age, salary and include the following tasks:

- Accept details of N employees
- Display the details of N employees in the following format"

Empno	Name	age	salary
1.			
2.			
3.			
:			
:			

- Write a C program to demonstrate pointer arithmetic.
- Write a C program to create file N students, it should contain Rollno, Name, marks in two subjects, Using the above created file, create an output file which contains Rollno, Name, marks in subjects, Total and average.
- Write a C program to create a character file and count the number of characters, words and blank spaces present in it.
- Write a C program to demonstrate the working of stack of size N using an array the elements of the stack may be assumed to be of type integer by creating an array, the operations to be supported are 1. PUSH 2. POP 3. DISPLAY. The program to should print the appropriate message for stack is underflow and overflow.
- Write a C program to convert and print valid fully parenthesized infix arithmetic expression to postfix.
- Write a C program to simulate the working of a Queue using an array Provide the operations QINSERT, QDELETE and QDISPLAY, check the Queue status for empty and full.
- 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.
- Write a C program to demonstrate the working of a Dequeue using array and provide for all its basic operations.
- Write a C program to find the Binomial Coefficient using recursion.
- Write a C program to find the nth Fibonacci number by using recursion.
- Write a C program to simulate the working of towers of Hanoi for N disks, print the total number of moves taken.
- Using Dynamic variables and pointers write a C program to construct a singly linked list consisting of the following information in each node: Rollno(integer), name (string):
The operations to be supported are:
 - LINSERT – Inserting a node in the front of the list
 - LDELETE – deleting a node based on rollno
 - LSEARCH – searching a node on rollno
 - LDISPLAY –Displaying the data in all the nodes
- Write a C program to create a doubly linked list where each node consists of the following information: left link, data(integer), right link. The operations to be supported are:
 - INSERT – Insert a node at the end of the doubly linked list
 - DELETE – Delete any node from the doubly linked list
 - DISPLAY – Display the data in all the nodes
- Using dynamic variables and pointer create a binary search tree of integers and perform the following operations:

1. Given a key, perform a search in the binary search tree and insert the key if it is not a duplicate key.
2. Traverse the tree using inorder traversal method.

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
IA-Report/ Viva		20	
Total		100	

BCA 3 rd Semester		COMPUTER ORGANIZATION & ARCHITECTURE	
Subject Code :	16BC21	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Basic Structure of Computer- Functional Units, Basic operational Concepts, Bus Structures, software, Performance- Processor clock, Basic performance equation, clock rate, performance measurements. Machine instructions & programs: number, character representations, addition of positive numbers, addition & subtraction of signed numbers, overflow in integer arithmetic, characters; Memory locations & Addresses- byte addressability, Big-endian & little endian Assignments, Word alignment, accessing numbers, characters, & character strings; Memory operations; 10Hrs
2. Instructions & instruction sequencing-Register transfer notations, assembly language notations, Basic instruction types, instruction execution & Straight line sequencing, branching, condition codes, Generating memory addresses 8hrs
3. Addressing modes: Implementation of variables & constants, Indirection & pointers, Relative addressing, additional modes; Assembly language- assembly directives, assembly & execution of programs; Basic I/O operations; Stacks & queues; Subroutines (brief study). 8hrs
4. Arithmetic: Addition & subtraction of signed numbers; Design of Fast adders; Booths algorithm for Multiplication, IEEE standard for floating point numbers. 8hrs
5. Input Output organizations: Accessing IO devices, Interrupts-Interrupt hardware, Enabling & disabling interrupts, handling multiple devices, controlling device request, exceptions, direct memory access, buses. 8hrs
6. Basic processing Unit: fundamental concepts- register transfers, performing an arithmetic or logical operation, fetching a word from memory, Storing a word in memory; Execution of a complete instruction- branch instructions; Multiple bus organization; Hard wired Control- a complete processor; Micro programmed control-micro instructions. Memory System: Basic concepts, semiconductor RAM, ROM, CACHE and Virtual Memories. 10hrs

TEXT BOOKS

1. Hamacher C.V. "Computer Organization " MGH
2. Hayes J.P. "Computer Organization & Architecture MGH.
3. Goankar" Microprocessor Architecture Programming and Applications, John Wesley

REFERENCES:

1. Bartee.T.C "Digital Computer Fundamental MGH.
2. Mano "Computer System Architecture –PHI.
3. L Krishanaananda ElitePublications

BCA 3 rd Semester		Data Base Management System	
Subject Code :	16BC22	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Introduction: application, database system vs. file system, view of data models-Hierarchical, Relational, database languages, database users and administrators, transaction management, Database system structure, application architecture. 8Hrs
2. E_R Model: Basic-concepts, constraints, keys, Design Issues, E-R diagram, weak entity sets, Extended E-R features, Design of an ER database schema, Reduction of an E-R schema to tables, UML. 6Hrs
3. Relational Model: Structure of Relational Databases, Relational Algebra, Extended Relational Algebra Operations, Modification of the database, Views. 8Hrs
4. SQL: Background, Basic structure, set operation, aggregate functions, NULL values, subqueries, views, Modification of the Database, joined Relations, DDL. Introduction to PL/SQL (brief study). 12Hrs
5. Normalization: Introduction, 1NF, 2NF and FDs, 3NF and BCNF, 4NF and MVDs, 5NF and PJNF, Closure of a set of FDs, MVDs, Loss less join. 6Hrs
6. Transaction Management: Introduction, Transaction concepts and properties, States, concurrent execution, Scheduling of Transactions, Operations Conflicts, Testing for serializability. 6Hrs
7. Concurrency Control Techniques: Introduction, Lock-based Protocols, Time stamp Protocols, Failure Classification. Recovery and Atomicity: Introduction, Categorization of Recovery Algorithms. 6Hrs

TEXT BOOK:

1. "Database System Concepts" by Silberchatz-Korth-sudarshan , Mcgraw Hill-IV Edition.
2. "Database Management Systems", A Practical Approach (DBMS) by Rajiv Chopra.

REFERENCES:

1. Navathe and Elmarri "Fundamentals of Database Systems"-Addison Wesley-200.
2. C.j. Data "introduction to Database systems" Addison-wesley.
3. Ullman "Principals of Data base systems" computer science press".
4. Bipin C Desai "Introduction to Data base system" Galotia.

BCA 3rd SemesterObject Oriented
Programming with C++

Subject Code :	16BC23	Total Teaching Hours :	60
IA Marks :	20	Teaching Hours/Week :	05
Exam Marks :	80	Examination Hours :	03
Credits:	5		

1. Introduction to OPP: Programming paradigms: -Procedure oriented programming (POP), Object oriented programming (OOP), Basic concepts of OOP and Features: - Objects, Classes, Abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing / Communication. Benefits of OOP, object oriented languages, Applications of OOP. 10 Hrs
2. C++ Programming: Introduction, C++ Features, C with classes, applications of C++, Data Types, Literals, constants, variable, pointer types, type definition, string types, constant qualifier, reference types, enumeration types, array types, input output operators, structure of C++ program, key words, symbolic constants, type compatibility, declaration of variable, reference variables, operators in C++, control structures. 10 Hrs
3. Functions: Overview of functions, return types, function prototyping, call by reference, call by value, return by Reference, inline functions, default arguments, constant arguments, function overloading, friend function and virtual function. 8 Hrs
4. Classes and Objects: Introduction, Limitations of C Structures, Specifying a Class, creating object, Defining a Member Function, Making an Outside Function Inline, Nesting of Member Functions, private member functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Array of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects, Constant Member Functions, Pointers to Members, Local Classes. 10 Hrs
5. Constructors and Destructors: Introduction, Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructors, Dynamic Constructors, Constructing 2-D Arrays, Constant Objects, and Destructors. 6 Hrs
6. Operator Overloading and Type Conversion: Introduction, Definition, rules, unary operators overloading, and Binary operator overloading Using Member Function and friend functions. Mention operators, which are not possible to over load, Manipulation of Strings using Operators, type conversion. 8 Hrs
7. Inheritance and Templates: Introduction, definition, types of inheritance, virtual base class, abstract class. Defining derived class constructors, member classes: - nesting of classes. Templates: Introduction, class templates, class templates with multiple parameters, function templates, function templates with parameters. 8 Hrs.

Text Books:

1. Object oriented Programming with C++ -- E Balagurusamy
2. Object oriented Programming with C++, "P.B. Kotur"
3. Object oriented Programming with C++, "Rabort Laffer"

BCA 3 rd Semester		Data Base Management System Lab	
Subject Code:	16BC24	Total Teaching Hours:	52
IA Marks:	20	Teaching Hours/Week:	04
Exam Marks:	80	Examination Hours:	03
Credits	4		

Consider the following database :

1. employee(emp_id, first_name, last_name, job_id, doj, salary, dept_id, manager_id)
2. departments (dept_id,dept_name,manager_id)
3. customer (cust_id, first_name,last_name,address,city, phone, email)
4. salgrade (grade, highsals, lowsals)

Insert values into tables depending on the requirements for the queries. Each of these Following Subtopics should have at least 4 Queries Each.

1. Working with Table and data using another table.
2. Modifying table structure and updating data.
3. Queries adding deleting and verifying Keys:
4. Using Where Clause(Comparison, between and set comparison).
5. Using Where Clause(Matching Characters and NULL values).
6. Using Where Clause (Using Logical operators to join more than one conditions).
7. Formatting the output Result by putting Column aliases, using expressions and ordering the Data.
8. Using SubQueries in where Clause. (Set Membership, Set comparison, Test for Empty Relations)
9. Sub Queries in From Clause.
10. Aggregate Functions:
11. Joining Tables using SQL Joins (Inner Join, Outer Joins).
12. Set Operators.
13. Creating and working with views.

Examination:

- Any one set of questions may be given to student for examination.
- Required tables has to be created by the student during examination
- Table creation 20 marks.
- At least 10 rows or as required for generating output of the queries, has to be inserted.
- Inserting values 20marks (Can be awarded only if the rows inserted are able to generate desired output from the queries).
- 4 queries 40 marks (If number of queries varies in particular set 40marks can be divided accordingly).

Marks Distribution:

Exam	Marks
Practical Proper	80
IA/Viva/Report	20
Total	50

BCA 3 rd Semester		Object Oriented Programming with C++ Lab	
Subject Code :	16BC25	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

- WAP to Demonstrate Class, Object (OOP) Concept
- WAP to find the largest of three numbers using inline function.
- WAP to implement function overloading in order to compute power (m, n),
Where i) m is double and n is int
ii) m and n are int
- Create a DISTANCE class with:
Feet and inches as data members
Member function to input distance
Member function to output distance
Member function to add two distance objects
Write a main function to create objects of DISTANCE class.
Input two distances and output the sum.
- Create a Class called TIME that has
Three integer data members for hours, minutes and seconds.
Constructor to initialize the object to zero.
Constructor to initialize the object to some constant value.
Member functions to add two TIME objects.
Member function to display time in HH:MM:SS format.
- Create a class COMPLEX to hold a complex number, write a friend function to add two complex Numbers. Write a main function to add two complex objects.
- Create a MATRIX class of size m X n. Overload the '+' operator to add two MATRIX objects. Write a main function to implement it.
- Derive a class MAT from MATRIX class created in above program, add a member function to Overload '*' operator to multiply two objects (Single Inheritance).
- WAP to Illustrate Multilevel Inheritance.
- WAP to Demonstrate Multiple Inheritances.
- Create a STRING class which overloads '==' operator to compare two STRING objects.
- WAP to demonstrate Virtual Base Class Concept.
- WAP to demonstrate template class
- WAP to demonstrate template function.
- WAP to demonstrate the concept of call by reference.

Examination:

- One Question has to be given from the above list (Carries 25 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 15 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
Viva/Report		20	
Total		100	

BCA 4 th Semester		Operating Systems	
Subject Code :	16BD21	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Introduction: What Operating Systems Do, Computer System Organization, Computer System Architecture, OS Structure, OS Operations, Protection and Security, Distributed Systems, Special-Purpose Systems, Computing Environments 8 Hrs
2. Process Management: Overview, Process Scheduling, Operations on Processes, IPC, Examples of IPC Systems, Communication in C/S Systems, Multithreaded Programming, Overview, Multithreading Models, Thread Libraries, Threading Issues, OS Examples, Process Scheduling, Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Thread Scheduling, OS Examples, Algorithm Evaluation 10 Hrs
3. Process Coordination: Synchronization: Critical Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples, Atomic Transactions, Deadlocks: System Model, Characterization, Methods of Handling Deadlocks, Deadlock prevention , Avoidance and Detection, Recovery from Deadlock. 10 Hrs
4. Deadlock: Deadlock problems, deadlock characteristics, deadlock prevention and avoidance, Deadlock detection and recovery from deadlock. 8 Hrs
5. Memory Management: Memory Management Strategies: Background, Swapping, Contiguous Memory Allocation, Paging, Structure of page Table, Segmentation. Virtual Memory Management: Demand Paging, Copy-on-write, Page replacement, Allocation of Frames, Thrashing. 10 Hrs
6. File System: File Concepts, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection. 6 Hrs

Text book:

1. Abraham Silberschatz and Peter Baer Galvin, Greg Gagne, "Operating System Principles", Seventh edition

References:

1. Milan Milonkovic, Operating System Concepts & Design, II Edition, McGraw Hill 1992.
2. Stallings, Operating Systems, Pearson Edition.
3. Tanenbaum, Operating System Concepts, Pearson Education
4. Nutt : Operating System, 3/e Pearson Education 2004
5. System Programming by John J. Donovan.

BCA 4th Semester

Internet Programming

[HTML,CSS,Java Script]

Subject Code :	16BD22	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Fundamentals of Web, XHTML-1: Internet, WWW, Web Browsers and Web Servers; URLs; MIME; HTTP; Security; The web Programmers Toolbox, XHTML: Origin and Evolution of HTML and XHTML; Basic Syntax; Standard XHTML Document Structure; Basic Text Markup. 8Hrs
2. XHTML-2: Images, Hypertext Links, Lists, Tables, Forms, Frames, Syntactic Differences between HTML and XHTML. 6Hrs
3. CSS: Introduction, Levels of Style Sheets, Style Specification Formats, Selector Forms, Property Value Forms, Font Properties, List properties, Color, Alignment of Text, The Box Model, Background Images, The and <div> tags, Conflict Resolution. 8Hrs
4. Javascript: Overview of Javascript, Object Orientation and Javascript, General Syntactic Characteristics, Primitives, Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions, Errors in scripts; examples. 8Hrs
5. Javascripts and HTML Documents: The Javascript Execution Environment, The Document Object Model, Element Access in Javascript, Events and Event Handling, Handling Events from the Body Elements, Button Elements and Textbox and Password Elements, The DOM-2 Event Model, The Navigator Object, DOM Tree Traversal and Modification. 8Hrs
6. XML: Introduction, Syntax, Document Structure, Document Type Definitions, Name Spaces, XML Schemas, Displaying Raw XML Documents, Displaying XML Documents with CSS, XSLT Style Sheets, XML Processors, Web Services. 6Hrs
7. Perl, CGI Programming: Origins and Uses of Perl, Scalars and their Operations, Assignments Statements and Simple Input and Output; Control Statements, Fundamentals of Arrays, Hashes, References, functions, Pattern Matching, File Input and Output; Examples. The Common Gateway Interface, CGI Linkage, Query String Format, CGI.pm module, a Survey Example, Cookies. 8Hrs.

Text book:

1. Programming the World Wide Web- Robert W. Sebesta, 4th Edition, Pearson Education, 2008

Reference Books:

1. Internet and World Wide Web – How to program by Dietel and Nieto Pearson Education Asia.
2. The complete Reference Java 2 Third Edition by Patrick Naughton and Herbert Schildt.
3. Java Server Pages by Hans Bergstan.

BCA 4 th Semester		Java Programming	
Subject Code :	16BD23	Total Teaching Hours :	60
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	5		

1. Java Evolution: Java Features, java and Internet, java and World Wide Web, web browsers, overview of java language, Constants, Variables and data types, Operators and Expressions, Decision making and Branching, Decision making and looping. 16 Hrs
2. Classes, Objects and methods: Defining a class, Adding Variables, Adding Methods, creating objects, Accessing Class members, Constructors, Method Overloading, Inheritance: Extending a Class, Overriding Methods, Final Variables and methods, Final Classes, Abstract classes and methods, Visibility control, Arrays, Strings, and Vectors, Interfaces: Multiple inheritance 16Hrs.
3. Packages: putting classes together: Java API Packages, Creating Packages, Accessing a package, Using a package, Hiding classes Multi threaded programming: Creating Threads, Extending a Thread Class, Stopping and blocking a thread, Life cycle of a thread, Using thread methods, Thread Exceptions, Thread priority, Synchronization 10 Hrs
4. Managing Errors and Exceptions: Types of Errors, Syntax of Exception handling code, Multiple catch statement, Throwing our Exceptions 4 Hrs
5. Applet Programming: Local and Remote Applets, Building applet code, Applet life cycle, Creating an Executable Applet, Applet Tag Adding Applet to HTML File, Running the Applet, Graphics Programming: The Graphics class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs 8 Hrs
6. Java database connectivity: Event handling, java Networking, A tour of swing, Introduction to java servlets, the collection frame work, java. util package 6 Hrs

Text Book:

- 1) Programming with java, by E. Balagurusamy, Tata M.C.Graw-Hill publishing company limited.
- 2) The complete reference java by Herbert Schildt , Tata M.C.Graw-Hill publishing company limited.

BCA 4 th Semester		Internet Programming [HTML,CSS,Java Script]Lab	
Subject Code :	16BD24	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Develop and demonstrate a XHTML document that illustrates the use external style sheet, ordered list, table, borders, padding, color and the tag.
2. Develop and demonstrate a XHTML file that includes Javascript for the following problems:
 - a) Input: A number N obtained using prompt
Output: The first N Fibonacci numbers
 - b) Input: A number N obtained using prompt
Output: A table of numbers from 1 to n and their squares using alert.
3. Develop and demonstrate a XHTML file that includes Java script that uses functions for the following problems:
 - a) Parameter: A string
Output: The position in the string of the left-most vowel
 - b) Parameter: A Number
Output: The Number with its digits in the reverse order
4.
 - a) Develop and demonstrate, using Java script , a XHTML document that collects the USN (The valid format is : a digit from 1 to 4 followed by two upper case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event Handler must be included for the form element that collects this information to validate the input messages in the alert windows must be produced when errors are detected.
 - b) Modify the above program to get the current semester also (restricted to be a number from 1 to 8).
5.
 - a) Develop and demonstrate, using Java script , a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them, when the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.
 - b) Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.
6.
 - a) Design an XML document to store information about a student in an engineering college affiliated to Davangere University. The information must include USN, Name, Name of the college, Branch, Year of joining and e-mail ID. Make up sample data for 3 students. Create a css style sheet and use it to display the document.
 - b) Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.
7.
 - a) Write a perl program to display various Server information like Server Name, Server Software, Server Protocol, CGI revision etc.
 - b) Write a perl program to accept UNIX command from a HTML form and to display the output of the command executed.

8. a) Write a perl program to accept the user name and display a greeting message randomly chosen from a list of 4 greeting messages.
b) Write a perl program to keep track of the number of visitors visiting the web page and to display this count of visitors with proper headings
9. Write a perl program to display a digital clock which displays the current time of the server.
10. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.

Examination:

- One Question has to be given from the above list (Carries 25 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 15 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
Viva/Report		20	
Total		100	

BCA 4 th Semester		Java Programming Lab	
Subject Code :	16BD25	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Java program to accept names as commandline arguments and convert them to capitals.
2. Java program to implement basic arithmetic binary operations.
3. Java program to enter names and sort in alphabetical order.
4. Java program to implement vector operations add,insert and displaying items.
5. Java program to implement method overloading and nesting of methods.
6. Java program to create class employee and super class college input and display employee information using inheritance.
7. Java program to demonstrate interfaces.
8. Java program to implement matrix addition.
9. Java program to accept numbers as command line arguments and handle exception if data is non-numeric.
10. Java program to implement threads use yield(), stop() and sleep() methods
11. Applet program for addition of two numbers
12. Applet program for drawing rectangle, line, rounded rectangle and put appropriate labels.
13. Applet program for drawing oval, circle, arc and put appropriate labels.
14. Program to draw bar chart using applets.
15. Applet program to implement checkboxes and display the status of all checkboxes.
16. Applet program to accept student information and display.

Examination:

- One Question has to be given from the above list (Carries 25 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 15 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
Viva/Report		20	
Total		100	

5th Semester

Semester	Paper Code	*E/C/L	Paper	Teaching Hours		Marks			Credits
				Theory	Practical	IA	Exam	Total	
5	16BE21	C	Software Engineering	4	-	20	80	100	4
	16BE22	C	Data Communications	4	-	20	80	100	4
	16BE23	C	E-Commerce	4	-	20	80	100	4
	16BE24	C	Analysis and Design of Algorithms	5	-	20	80	100	5
	16BE25	C	ADA Lab	-	6	20	80	100	6
	16BE26	E5.1	PHP and MySQL [Web Programming]	5	-	20	80	100	5
		E5.2	Advanced Microprocessor 8086						
		E5.3	Computer Graphics						
	16BE27	E5.1	Web Programming Lab	-	6	20	80	100	6
		E5.2	Microprocessor Lab						
E5.3		Computer Graphics Lab							
-	C	SDC	2	-	10	40	50	2	
						150	600	750	36

BCA 5th Semester**Software Engineering**

Subject Code :	16BE21	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Introduction: Software definition, program versus software, software process, software characteristics, software applications, terminologies and role of management in Software development. 12Hrs
2. Software life cycle models: SDLC models: Build and fix, The waterfall, Prototyping, Interactive, Evolutionary development, Spiral, Rapid Application Development. Selection of a life cycle model, characteristics of requirements, status of development team, involvement of users, type of project and risk. 12Hrs
3. Software requirements analysis and specification: Requirements engineering, Requirements elicitation, analysis documentation. 6Hrs
4. Software Design: Design concepts and techniques, objects and importance, modularity, strategy of design, function oriented design, IEEE recommended practice for software design and object oriented design. 12Hrs
5. Software Testing: Testing process, terminologies, introduction to functional and structural testing, levels of testing, debugging and testing tools. 10Hrs

Text Books:

1. Software Engineering (New Age International Publishers), "K.K. Aggarwal and Yogesh Singh".
2. An Integrated Approach to Software Engineering, "Pankaj Jalote".

BCA 5 th Semester		Data Communications	
Subject Code :	16BE22	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Introduction: Data Communications, Networks, The Internet, Protocols and Standards, Layered Tasks, The OSI Model and the Layers in OSI Model, TCP/IP Protocol Suite.
8Hrs
2. Data, Signals and Digital Transmission: Analog and Digital Signals, Transmission Impairment, Data Rate Limits, Performance, Digital-to-Digital Conversion, Analog-to-Digital Conversion, Transmission Modes.
10Hrs.
3. Analog Transmission and Multiplexing: Digital-to-Analog Conversion, Analog-to-Analog Conversion, Multiplexing, Spread Spectrum.
8Hrs
4. Transmission Media, Error Detection and Correction: Twisted Pair Cable, Co-axial Cable, Fiber-optic Cable, Radio Waves, Micro Waves, Infrared, Introduction to Error Detection, Correction, Block Coding, Linear Block Codes, Cyclic Codes, Checksum
10Hrs
5. Data Link Control: Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-to-point Protocol.
8Hrs
6. Multiple Access, Ethernet: Random Access, Controlled Access, Chanellization, Ethernet: IEEE Standards, Standard Ethernet and Changes in the Standard, Fast Ethernet, Gigabit Ethernet.
8Hrs

Text books:

1. Data Communications and Networking- Behrouz A. Forouzan, 4th edition, Tata McGraw-hill, 2006

References:

1. "Communication Networks: Fundamental Concepts and Key Architectures", - Alberto Leon, Garcia and Indra widjaja, 3rd edition, Tata McGraw-hill, 2004
2. Computer Networks — Andrew S Tanenbaum, 3rd Edition. Pearson Education/PHI
3. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
4. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

BCA 5 th Semester		E - Commerce	
Subject Code :	16BE23	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Electronic Commerce-Frame work, anatomy of E-Commerce applications, E-Commerce Consumer. Applications, E-Commerce organization applications. 8Hrs
2. Consumer Oriented Electronic commerce – Consumer Oriented Applications, Mercantile Process models. 6Hrs
3. Electronic payment systems – Types of Electronic Payment systems, Digital-Token Based Electronic Payments Systems, Smart cards and Electronic Payments Systems, Credit Card Based Electronic Payments Systems, Risk and Electronic and Designing Electronic Payments Systems. 10Hrs
4. Inter Organizational Commerce - EDI, EDI Implementation, Value added networks. Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management. 08Hrs
5. Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing - Information based marketing, Advertising on Internet, on-line marketing process, market research. 08Hrs
6. Consumer Search and Resource Discovery - Information search and Retrieval, Commerce Catalogues, Information Filtering. 4Hrs
7. Multimedia and Digital Video - key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing, Desktop video conferencing. 8Hrs.

Text books:

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson.

Reference books:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
2. E-Commerce, S.Jaiswal – Galgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
4. Electronic Commerce – Gary P.Schneider – Thomson.
5. E-Commerce – Business, Technology, Society, Kenneth C.Taudon, Carol Guyerico Traver.

BCA 5 th Semester		Analysis and Design of Algorithms	
Subject Code :	16BE24	Total Teaching Hours :	60
IA Marks :	20	Teaching Hours/Week :	05
Exam Marks :	80	Examination Hours :	03
Credits:	5		

1. Notion of algorithm, Fundamentals of algorithmic problem solving, linear data structures, graphs, trees, sets and dictionaries.
2. Analysis of algorithm efficiency: Analysis frame-work, asymptotic notations and basic efficiency classes, mathematical analysis of non recursive and recursive algorithms, empirical analysis of algorithms.
3. Brute Force and Divide and Conquer- General method, Binary Search, Finding the maximum and minimum, merge sort, quick sort, Strassen's matrix multiplication.
4. Decrease-and-Conquer and Transform-and-Conquer: Insertion sort, depth first search, topological sorting, presorting, Gaussian elimination, balanced search trees, heap sort, Horner's rule.
5. Greedy Method: General method, optimal storage on tapes, knapsack problem, job sequencing, Minimum Cost Spanning Trees- Prim's algorithm and Kruskal's algorithm.
6. Optimal storage on tapes, optimal merge patterns, single source shortest paths, Huffman trees.

References:

1. Computer Algorithms/C++ : Ellis Horowitz, Sartaj Sahani, Sanguthevar Rajashekar

BCA 5 th Semester		ADA Lab	
Subject Code :	16BE25	Total Teaching Hours :	72
IA Marks :	20	Teaching Hours/Week :	06
Exam Marks :	80	Examination Hours :	03
Credits:	6		

1. Program for binary search (Simple and Recursive)
2. Programs for heap sort, merge sort and quick sort
3. Strassen's Matrix multiplication
4. Program for optimal merging
5. Program for Knapsack problem
6. Program for finding out cost of spanning tree by kruskal's/Prim's algorithm
7. Program for single source shortest path
8. Program for Graph coloring
9. Program to find Hemiltonion Cycle from given graph
10. Program for BFS and DFS

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
Viva/Report		20	
Total		100	

BCA 5 th Semester		PHP and MySQL	
Subject Code :	16BE26.1	Elective	5.1
IA Marks :	20	Total Teaching Hours :	60
Exam Marks :	80	Teaching Hours/Week :	05
Credits:	5	Examination Hours :	03

1. HTML: Introduction, Elements, Tags, Attributes, Paragraph, Headings, Line Breaks, Horizontal Rule, Lists, Formatting, Color Codes, Font, Text Links, Email, Images, Image Link, Forms, Table, Frames. 4hrs
2. Introduction: Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, The Building Blocks & Flow Control functions in PHP : Variables Data types, Operators and Expressions, Constants switching, Flow Loops, Code Blocks and Browser Output. 6Hrs.
3. Working with Functions, Arrays and Objects: Function, Calling Function, Defining a Function, Returning Values from User Defined Functions, Variable Scope, Saving State between Function Calls with the static statement, More about Arguments. Testing for the existence of a Function. Arrays: Creating, Array related Constructs and Functions. Objects: Creating, Inheritance. 08Hrs
4. Functions with Forms Cookies and User Sessions: Creating simple input form, accessing form input with User-Defined Arrays, Combining HTML and PHP Code on a Single Page, Using Hidden fields to save state. Redirecting the User. Sending mail on form submission, creating the form, creating the script to send the mail working with file uploads. Cookies: Setting up and Deleting a cookie with PHP. Session function overview, starting and working with a session variables. Destroying sessions and Unsetting variables, using sessions in an environment with registered users. 08Hrs
5. Working with files,directories & Images: Including Files, Using include_once, Validating Files, Creating and Deleting Files, opening a file for writing reading or appending, reading from files, writing , appending to a file. Working with directories, opening pipes to and from processes using popen(), running commands with exec(), running commands with system() or passthru(), understanding the image creation process, necessary modifications to PHP, Drawing a New Image,Modifying existing Images, Image creation from user Input, Using Images Created By Scripts. 06Hrs
6. Database Design Process & Basic SQL Commands: The Importance of good database design,Types of table relationships, understanding Normalization. Following the design Process, Learning the MySQL Data Types, Table Creation Syntax, Insert Command, Select Command, Where, Selecting from Multiple Tables, Using UPDATE command to modify Records, Using REPLACE, DELETE Commands. Frequently used string Functions, Date and Time Functions in MySQL. 07Hrs.

Text Books:

1. PHP, MySQL and Apache ALL in ONE by LJulie C Meloni, SamsTeach Yourself.
2. PHP 5 and MySQL Bible 1st Edition By Joyce Park with Clark Morgan, Tim Converse.

BSc 5 th Semester		PHP and MySQL Lab	
Subject Code :	16BE27.1	Elective Lab	5.1
IA Marks :	20	Total Teaching Hours :	72
Exam Marks :	80	Teaching Hours/Week :	06
Credits:	6	Examination Hours :	03

LAB PROGRAMS

1. Program to find largest among three numbers using ternary operator.
2. Program to print sum of digits of a given number using While Loop.
3. Program to print fibonacci series upto a given number.
4. Program to generate prime number upto a given number.
5. Program to enter numbers in an array, and then display the count of positive and negative and zeros in that array (using do-while loop)
6. Function to count number of occurrences of each word from a string of characters inputted. (Not Case sensitive).
7. Form to find string length, reverse of string, Uppercase of the string, lowercase of string, using the text entered in a text field.
8. Program using javascript to convert decimal number to its binary equivalent. Use an html form to accept number from the user.
9. Program to store current date-time in a Cookie and display the last visited on [], date time on the reopening of same webpage again.
10. Program to store page views count in SESSION, to increment the count on each refresh, and to show the count on the web page.
11. PHP code that define class student with attributes RollNo, Name, Branch, and Year, create 3 instances of it, sets the values of each instance appropriately and print the values of all attributes and store it in database.
12. PHP function for searching and deleting a student information based on rollNo for the above program(Prog No 11).
13. Program using PHP and MySQL, to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with title specified by the user to display the search results with proper headings.

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
Viva/Report		20	
Total		100	

BCA 5 th Semester		Advanced Microprocessor 8086	
Subject Code :	16BE26.2	Elective	5.2
IA Marks :	20	Total Teaching Hours :	60
Exam Marks :	80	Teaching Hours/Week :	05
Credits:	5	Examination Hours :	03

1. Introduction to Microprocessor, Evolution of Microprocessor, Overview of Intel Pro-Pentium, Motorola 68000 Series, Introduction to DEC Alpha, Power PC RISC & CISC Characteristics, 12Hrs
2. BASIC MICROPROCESSOR ARCHITECTURE AND INTERFACE, Internal Architecture, External System Bus Architecture, Memory and Input/Output Interface. 12Hrs
3. PROGRAMMING MODE,,Register Organization of 8086, Memory Addressing and Instruction Formats, Memory Interfacing, Cache Memory and Cache Controllers. 12Hrs
4. BASIC I/O INTERFACE, I/O Interface, 8255 Programmable Interface, 8254 Programmable Timer, 8251 Programmable/Communication Interface, Interrupts, 8259 Programmable Interrupts Controller, Real Time Clock DMA, 8237/8257 DMA Controller. 12Hrs
5. 8086 ASSEMBLY LANGUAGE PROGRAMMING, Instruction set of 8086, Assembler Directives and Operators, A Few Machine Level Programs, Machine coding and Programs, Programming with an Assembler. 12Hrs

References:

1. 16-bit microprocessors: architecture, software, and interface techniques, Walter A Triebel, Pearson Technology Group
2. 8080a 8085 Assembly Language Programming, Lance Leventhal / Osborne & Associates
3. The 8086/8088 family of microprocessors: software, hardware, and system applications, Wunnava Subbarao / Delmar
4. Crash Course in Microcomputers, Louis E. Frenzel, Newnes.
5. Embedded Controllers: 80186, 80188, and 80386ex, Barry B Brey, Prentice Hall
6. Introduction to Microprocessors, John Crisp, Butterworth-Heinemann.
7. The 8088 and 8086 microprocessors: programming, interfacing, software, hardware, and applications, Walter Triebel, Pearson Technology Group
8. 8088 assembler language programming :the IBM PC, David Willen, Pearson Indiana

BCA 5 th Semester		Microprocessor Lab	
Subject Code :	16BE27.2	Elective	5.2
IA Marks :	20	Total Teaching Hours :	60
Exam Marks :	80	Teaching Hours/Week :	06
Credits:	6	Examination Hours :	03

Programs:

1. Write a program for addition of two numbers.
2. Write a program for the addition of a series of 8-bit numbers. The series contains 100 (numbers).
3. A program to find out the largest number from a given unordered array of 8-bit numbers, stored in the locations starting from a known address.
4. Modify the above 3rd program for a series of words.
5. A program to find out the number of even and odd numbers from a given series of 16-bit hexadecimal numbers.
6. Write a program to find out the number of positive numbers and negative numbers from a given series of signed numbers.
7. Write a program to move a string of data words from offset 2000H to offset 3000H the length of the string is 0FH.
8. Write an assembly language program to arrange a given series of hexadecimal bytes in ascending order.
9. Write a program to perform a one byte BCD addition.
10. Write a program that performs addition, subtraction, multiplication and division of the given operands. Perform BCD operation for addition and subtraction.
11. Write a program to find out whether a given byte is in the string or not. If it is in the string, find out the relative address of the byte from the starting location of the string.
12. Write a program to convert the BCD numbers 0 to 9 to their equivalent seven segment codes using the look-up table technique. Assume the codes [7-seg] are stored sequentially in CODELIST at the relative addresses from 0 to 9. The BCD number (CHAR) is taken in AL.
13. Decide whether the parity of a given number is even or odd. If parity is even set DL to 00; else, set DL to 01. The given number may be a multibyte number.
14. Write a program for the addition of two 3 x 3 matrices. The matrices are stored in the form of lists (rowwise). Store the result of addition in the third list.
15. Write a program to find out the product of two matrices. Store the result in the third matrix. The matrices are specified as in the Program Above 14.
16. Write a program to add two multibyte numbers and store the result as a third number. The numbers are stored in the form of the byte lists stored with the lowest byte first.

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
Viva/Report		20	
Total		100	

BCA 5 th Semester		Computer Graphics	
Subject Code :	16BE26.3	Elective	5.3
IA Marks :	20	Total Teaching Hours :	72
Exam Marks :	80	Teaching Hours/Week :	05
Credits:	6	Examination Hours :	03

1. Graphics Output Primitives and Attributes: Introduction to open GL, Coordinate reference frames, Specifying two dimensional world coordinate reference frame in Open GL, Open GL point functions, Open GL line functions, Line drawing algorithms, Circle generation algorithms, Ellipse generation algorithms, Fill area primitives, Polygon fill areas, OpenGL polygon fill area functions, General scan line polygon fill algorithm, Fill methods for areas with irregular boundaries, Open GL fill area attribute functions. 12Hrs.
2. Two – Dimensional and Three - Dimensional Geometric Transformations: Basic two dimensional geometric transformations, Matrix representations and homogeneous coordinates, Inverse transformations, Two dimensional composite transformations, Other two dimensional transformations. 08Hrs
3. Three dimensional Translation, Rotation, Scaling, Other three dimensional transformations, Affine transformations, Open GL geometric transformation functions. 04 Hrs
4. Two Dimensional Viewing. The two dimensional viewing, Clipping window, Normalization and viewport transformations, Clipping algorithms, Two dimensional point clipping, Two dimensional line clipping algorithms, Polygon fill area clipping, Curve clipping, Text clipping. 10Hrs
5. Three Dimensional Viewing: The three dimensional viewing concepts, Three dimensional viewing pipeline, Three dimensional viewing coordinate parameters, Transformation from world to viewing coordinates. 5Hrs.

Text books:

1. Donald Hearn, M.Pauline Baker, Computer Graphics with Open GL, Pearson (Indian Edition),

Reference Books:

1. Edward Angel, 'Interactive Computer Graphics' – A top down approach using Open GL, Pearson, Fifth Edition
2. Peter Shirley, Steve Marschner, 'Computer Graphics, Cengage Learning (Indian edition).

BCA 5 th Semester		Computer Graphics Lab	
Subject Code:	16BE27.3	Elective	5.3
IA Marks:	20	Total Teaching Hours:	72
Exam Marks:	80	Teaching Hours/Week:	06
Credits:	6	Examination Hours:	03

- Write a program to create a chess board using DDA line algorithm
- Write a program to implement Bresenham's line drawing algorithm with all values of slopes
- Write a program to implement Midpoint circle generation algorithm
- Write a program to create a wireframe model of globe using equation of ellipse
- Write a program to create and fill the two dimensional object by using boundary fill algorithm
- Write a program to create (without using built in function) a cube by implementing translation algorithm by translating along 1. X-axis, 2.Y-axis and 3. X and Y plane
- Write a program to create (without using built in function) and rotate (1. given an angle 2. Around x and y axis) a triangle by implementing rotation algorithm.
- Write a program to create (without using built in function) a triangle by implementing scaling algorithm by zooming/un-zooming along 1. X-axis, 2.Y-axis and 3. X and Y plane
- Write a program to create (without using built in function) a Cube by implementing reflection algorithm
1. X-axis, 2.Y-axis
- Write a program to create (without using built in function) a square by implementing shear algorithm along 1. X-axis, 2.Y-axis

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
IA-Viva/Report		20	
Total		100	

6th Semester

Semester	Paper Code	*E/C/L	Paper	Teaching Hours		Marks			Credits
				Theory	Practical	IA	Exam	Total	
6	16BF21	C	Cloud Computing	4	-	20	80	100	4
	16BF22	C	Computer Networks.	4	-	20	80	100	4
	16BF23	C	UNIX	5	-	20	80	100	5
	16BF24	C	UNIX Lab	-	6	20	80	100	6
	16BF25	E6.1	VB.NET Programming	5	-	20	80	100	5
		E6.2	Android Programming						
		E6.3	Network Programming with TCP/IP						
	16BF26	E6.1	VB.NET Programming Lab	-	6	20	80	100	6
		E6.2	Android Programming Lab						
		E6.3	Network Programming Lab						
	16BF27	C	Project Work	-	4	20	80	100	4
-		SDC	2	-	10	40	50	2	
						150	600	750	36

BCA 6th Semester**Cloud Computing**

Subject Code :	16BF21	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Cloud Computing Fundamentals, Introduction, Enabling Technologies, Cloud Computing Features, Cloud Computing Platforms, Example of Web Application Deployment, Cloud Computing Challenges. 10Hrs
2. Cloud Computing Technologies and Applications, Cloud Computing: IT as a Service, Cloud Computing Security, Cloud Computing Model Application Methodology, Cloud Computing in Development/Test, Cloud-Based High Performance Computing Clusters, Use Cases of Cloud Computing. 10Hrs
3. Key Enabling Technologies for Virtual Private Clouds, Virtual Private Clouds, Virtual Data Centers and Applications, Policy-Based Management 8Hrs
4. The Role of Networks in Cloud Computing, Cloud Deployment Models and the Network, Unique Opportunities and Requirements for Hybrid Cloud Networking 8Hrs
5. Data-Intensive Technologies for Cloud Computing, Characteristics of Data-Intensive Computing Systems, Data-Intensive System Architectures, Hadoop vs. HPC Comparison. 8Hrs
6. Survey of Storage and Fault Tolerance Strategies Used in Cloud Computing, xFS, Amazon S3, Dynamo, Google File System, Bigtable, Microsoft Azure. 8Hrs

Text Book:

1. Handbook of Cloud Computing - Borko Furht Armando Escalante -Springer

BCA 6 th Semester		Computer Networks	
Subject Code :	16BF22	Total Teaching Hours :	52
IA Marks :	20	Teaching Hours/Week :	04
Exam Marks :	80	Examination Hours :	03
Credits:	4		

1. Introduction: Uses of Computer Networks, Social Issues, Network Hardware, Network Software, Reference Models: OSI and TCP/IP, Comparison. 10Hrs
2. The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, QOS, The Network Layer in the Internet. 12Hrs
3. The Transport Layer: The Transport Service, Elements of Transport Protocols, A Simple Transport Protocol, UDP, TCP 12Hrs.
4. The Application Layer: DNS, e-mail, www. 8Hrs
5. Network Security: Cryptography, Symmetric-Key Algorithms, Public-Key Algorithms, Digital Signatures. 10Hrs.

Text books:

1. Computer Networks, 4th edition, Pearson Education, Andrew S. Tanenbaum.

Reference books:

1. Data Communications and Networking- Behrouz A. Forouzan- 4th edition, Tata McGraw Hill, 2006
2. Computer Networks A Systems Approach- Larry L. Peterson and Bruce S. David- 4th edition, Elsevier, 2007

BCA 6 th Semester		UNIX	
Subject Code :	16BF23	Total Teaching Hours :	60
IA Marks :	20	Teaching Hours/Week :	05
Exam Marks :	80	Examination Hours :	03
Credits:	5		

1. Introduction: The operating System, The Unix OS, Knowing Your Machine, A Brief Session, Conclusion, Background: How It all Clicked, POSIX and the Single Unix Specification, Linux and GNU, The Unix Architecture, Features of Unix, Conclusion. 10Hrs
2. Understanding the Unix Command: Locating Commands, Internal and External Commands, Command Structure, Flexibility of Command Usage, man, Understanding the man Documentation, Further Help with man -k, apropos and What is, When Things Go Wrong, Conclusion, General Purpose Utilities: cal, date, echo, printf, bc, script, passwd, who, uname, tty, sty, Conclusion. 12Hrs
3. The File System: The File, What's a (File) name?, The Parent-Child Relationship, The HOME Variable, pwd, cd, mkdir, rmdir, Absolute Pathnames, Relative Pathnames, ls, The UNIX File System, Conclusion, Handling Ordinary Files: cat, cp, rm, mv, more, the lp subsystem, file, wc, od, cmp, comm., diff, dos2unix and unix2dos, Compressing and Archiving Files, gzip and gunzip, tar, zip and unzip, Conclusion. 10Hrs.
4. Basic File Attributes: ls-l, The -d Option, File Ownership, File Permissions, chmod, Directory Permissions, Changing File Ownership, Conclusion, The vi Editor: vi Basics, I/P Mode, The ex ode, Navigation, Editing Text, Undoing Last Editing Instructions (u and U), Repeating the Last Command, Searching for a pattern, Substitution, Conclusion. 8Hrs
5. The Shell: The Shell's Interpretive Cycle, Shell Offerings, Pattern Matching, Escaping and quoting, Redirection, /dev/null and /dev/tty, pipes, tee, Command Substitution, Shell Variables, Conclusion. 8Hrs
6. The Process: Process Basics, Process Status, System Processes, Mechanism of Process Creation, Running Jobs in Background, Killing Processes with Signal, Job Control. 4Hrs
7. Essential Shell Programming: Shell Scripts, Making Scripts Interactive, Using Command Line Arguments, exit and exit Status of Command, The Logical Operators && and || -Conditional execution, The if Conditional, Using test and [] to evaluate Expressions, The case Conditional, expr: Computation and String Handling, Calling a Script by Different Names, while: Looping, for: Looping with a list, Manipulating the Positional Parameters, The here document (<<), trap: Interrupting a Program, Debugging Shell Scripts with set -x, Sample Validation and Data entry scripts, Conclusion. 10Hrs

Text book:

1. "UNIX Concepts and Applications" by Sumitabha Das, Third Edition, Tata McGraw-Hill

Reference book:

1. Unix Complete Reference Ken Rosen, Rachel Klee.

BCA 6th Semester

UNIX Lab

Subject Code :	12BF24	Total Teaching Hours :	72
IA Marks :	20	Teaching Hours/Week :	06
Exam Marks :	80	Examination Hours :	03
Credits:	6		

- Write Shell script program to read two numbers (start and ending endlimit) and display all the odd numbers between start and endlimit.
- Write Shell script program to verify whether string is palindrome or not.
- Write Shell script program to sort given list of numbers using bubble sort.
- Write Shell script program to change filename Extension.
- Write shell script to show various system configuration like
 - Currently logged user and his logname,
 - Your current shell,
 - Your home directory
 - Your operating system type,
 - Your current path setting,
 - Your current working directory,
 - Show currently logged number of users
 - About your os and version, release number, kernel version,
 - Show all available shells
 - Show mouse settings,
 - Show computer CPU information like processor type, speed etc
 - Show memory information
 - Show hard disk information like size of hard-disk, cache memory, model etc
- Write a shell script that adds, subtracts, multiplies and divides the given 2 integers (using case conditional).
- Write a shell script to reverse the rows and Columns of a matrix.
- Write Shell script program to find biggest of 3 numbers.
- Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.
- Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.
- Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
- Write a shell script to compute gross salary of a employee according to the following rules:
 - If basic salary is < 1500 then HRA =10% of the basic and DA =90% of the basic.
 - If basic salary is >=1500 then HRA =Rs500 and DA=98% of the basic
 - The basic salary is entered interactively through the key board.
- Write an interactive file handling shell program. Let it offer the user the choice of copying, removing, renaming or linking files. Once the use has made a choice, have the program ask the user for necessary information, such as the file name, new name and so on.
- Develop an interactive script that asks for a word and file name and then tells how many times that word occurred in the file.
- Write a shell script to perform the following string operations. a) To extract a sub string from a given string b) To find the length of a given string
- To Count number of character, words, & blank in a given text
- Write a shell program to generate prime numbers up to given limit.
- write a shell script to convert decimal to binary and vice versa
- Write a shell script to lock terminal.
- Write a shell script which receives two files names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks). Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
IA-Viva/Report		20	
Total		100	

BSc 6 th Semester		Programming With Visual Basic.Net	
Subject Code :	16BF25.1	Elective	6.1
IA Marks :	20	Total Teaching Hours :	60
Exam Marks :	80	Teaching Hours/Week :	05
Credits:	5	Examination Hours :	03

1. Visual Basic .NET and the .NET Framework. Introduction to .net framework -Features, Common Language Runtime (CLR) , Framework Class Library(FCL), Visual Studio.Net – IDE, Languages Supported, Components. Visual Programming, VB.net- Features, IDE- Menu System, Toolbars, Code Designer, Solution Explorer, Object Browser, Toolbox, Class View Window, Properties Window, Server Explorer, Task List, Output Window, Command Window. (4 Hours)
2. Elements of Visual Basic .net Properties, Events and Methods of Form, Label, TextBox, ListBox, Combo Box, Radio Button, Button, Check Box, Progress Bar, Date Time Picker, Calendar, Picture Box, HScrollbar, VScrollbar, Group Box, ToolTip, Timer. (8 Hours)
3. Programming in Visual basic .net Data Types, Keywords, Declaring Variables and Constants, Operators, Understanding Scope and accessibility of variables, Conditional Statements- If- Then, If-Then-Else, Nested If, Select Case, Looping Statement- Do loop, For Loop, For Each-Next Loop, While Loop, Arrays- Static and Dynamic. (5 Hours)
4. Functions, Built-In Dialog Boxes, Menus and Toolbar Menus and toolbars- Menu Strip, Tool Strip, Status Strip, Built-In Dialog Boxes – Open File Dialogs, Save File Dialogs, Font Dialogs, Color Dialogs, Print Dialogs, InputBox, MsgBox, Interfacing With End user- Creating MDI Parent and Child, Functions and Procedures- Built-In Functions- Mathematical and String Functions, User Defined Functions and Procedures. (6 Hours)
5. Advanced Concepts in VB.Net Object Oriented Programming- Creating Classes , Objects, Fields, Properties, Methods, Events, Constructors and destructors, Exception Handling- Models, Statements, File Handling- Using File Stream Class, File Mode, File Share, File Access Enumerations, Opening or Creating Files with File Stream Class, Reading and Writing Text using StreamReader and StreamWriter Classes. (10 Hours)
6. Data Access with ADO.Net – Databases. Data Access with ServerExplorer, Data Adapter and DataSets, ADO.NET Objects and Basic SQL. (6 Hours)

Text Books:

1. Visual Basic.Net Black Book by Steven Holzner Dreamtech Press
2. The Complete Reference Visual Basic .NET Jeffery R. Shapiro Tata McGraw Hills

Reference Books:

- 1 .Murach's Beginning Visual basic .Net By Anne Bohem
2. Visual Basic .Net by Vijay Mukhi

BSc 6 th Semester		Programming With Visual Basic.Net Lab	
Subject Code :	16BF26.1	Elective	6.1
IA Marks :	20	Total Teaching Hours :	72
Exam Marks :	80	Teaching Hours/Week :	06
Credits:	6	Examination Hours :	03

Practice Programs:

1. Write a program to convert a given temperature from Fahrenheit to Celsius and viceversa.
2. Write a program to accept roll number, name, marks in 2 subjects of a student and calculate total, average and display the grade. (using nested if)
3. Write a program to generate n random numbers .(using rnd() function)
4. Write a program to find frequency of a given character in a string .(using for each loop)
5. Write a program to accept array elements and find the minimum and maximum among them.

Journal Programs:

1. Design an application to create a login form and validate it using msgbox.
2. Design an application to simulate the working of a font dialog box using combo box.
3. Design a reminder application to schedule a meeting using calendar and input box.
4. Design a screen saver application using timer control.
5. Design an application to create an MDI form having a menu with options- programs and exit. The program menu should have sub menu items that calls separate child forms such as Fibonacci and factorial.
6. Design an Pizza Order application using check box and radio buttons and also generate a bill for the same.
7. Design a color pallet application using scroll bars.
8. Design an application which calculates EMI of a loan using functions.
9. Design an application to implement various string operations such as reversing, case conversion, length, concatenation.
10. Write a program to accept sides of a triangle and then find its area, perimeter and type of triangle using classes (OOP).
11. Design an application to open a text file, modify it and save the changes using built in dialog boxes.
12. Write a program to perform various arithmetic operations and implement exception handling.
13. Design a Student Registration Application to store the student data in the database using ADO.Net.

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks). Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
IA-Viva/Report		20	
Total		100	

BSc 6 th Semester		Android Programming	
Subject Code :	16BF25.2	Elective	6.2
IA Marks :	20	Total Teaching Hours :	60
Exam Marks :	80	Teaching Hours/Week :	05
Credits:	5	Examination Hours :	03

1. Introduction: History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture. 6Hrs
2. Overview of object oriented programming using Java: OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine. 10Hrs
3. Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating a android project – Hello Word, run on emulator, Deploy it on USB-connected Android device. 16Hrs
4. User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes. 8Hrs
5. User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes), Images, Menu, and Dialog. 10Hrs
6. Database: Understanding of SQLite database, connecting with the database. 10Hrs

Text Books:

1. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning.

BSc 6 th Semester		Android Programming Lab	
Subject Code :	16BF26.2	Elective	6.2
IA Marks :	20	Total Teaching Hours :	72
Exam Marks :	80	Teaching Hours/Week :	06
Credits:	6	Examination Hours :	03

1. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the emulator. Also display "Hello World" in the middle of the screen in the Android Phone.
2. Create an application with login module. (Check username and password).
3. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.
4. Create a menu with 5 options and selected option should appear in text box.
5. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
6. Create an application with three option buttons, on selecting a button colour of the screen will change.
7. Create and Login application as above. On successful login, pop up the message.
8. Create an application to Create, Insert, update, Delete and retrieve operation on the database.

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
Viva/ Report		20	
Total		100	

BSc 6 th Semester		Network Programming with TCP/IP	
Subject Code :	16BF25.3	Elective	6.3
IA Marks :	20	Total Teaching Hours :	60
Exam Marks :	80	Teaching Hours/Week :	05
Credits:	5	Examination Hours :	03

1. INTRODUCTION TO TCP/IP: Origin of TCP/IP and Internet, Communication ,Why do we Need the Internet, Need of Protocol on Communication, Problems in Computer Communication, Dealing with Incompatibility, A Brief History of the Internet, Architecture of the Internet, TCP/IP Layer and Protocols, Network Access Layer, Internet Layer, Need for IP Address, Classes of IP Address, Special Meanings, Who Decides the IP Addresses, Internet Protocol, Address Resolution Protocol (ARP), Reverse Address Resolution Protocol (RARP), Internet Control Message Protocol (ICMP), Transport Layer, Transmission Control Protocol, User Datagram Protocol (UDP), Application Layer, Electronic Mail, Domain Name System (DNS), How does the DNS Server Works? Simple Network Management Protocol (SNMP), Remote Login: TELNET, World Wide Web: HTTP, Networking Example. 10Hrs
2. INTERNET PROTOCOL: Overview of Internet Protocol, IP Header, IP Address, IP Address Classes, Subnet Masks and CIDR Networks (Classless IP Addresses), Internet-Legal Versus Private Addressing, IP Routing, Routing Protocol, Routing Algorithms. 8Hrs
3. TRANSPORT LAYER PROTOCOLS: Overview of TCP, Transmission Control Protocol (TCP), TCP Header, TCP Connection Establishment and Termination, TCP Connection Establishment, TCP Connection Termination, User Datagram Protocol (UDP). 8Hrs
4. APPLICATION LAYER PROTOCOLS: Domain Name System (DNS), Hierarchical Name Space, Domain Servers, How does DNS Work in Internet, Domain Name Resolution, Messages Used in DNS, Dynamic DNS (DDNS), Electronic Mail, Simple Mail Transfer Protocol (SMTP), Message Transfer Agent, User Agent, Post Office Protocol (POP), Internet Mail Access Protocol (IMAP), Multipurpose Internet Mail Extension (MIME), Telnet , File Transfer Protocol (FTP). 8Hrs
5. TCP/IP PROGRAMMING CONCEPTS: Client Server Communication, Designing Client/Server Programs, Socket Concepts, IP Address and Ports, Byte Ordering, Sketch of Networking Connection, Active and Passive Sockets, Socket Fundamentals, Networking Example. 8Hrs
6. SOCKET INTERFACE: Elementary Socket System Calls, Socket System Call, Bind System Call, Connect System Call, Listen System Call, Accept System Call, Elementary Data Transfer Calls, Closing a Socket, TCP and UDP Architectures, Networking Example. 8Hrs
7. SOCKET PROGRAMMING: Advance System call, Data Transfer, Byte Operations and Addressing, Socket Options, Select System Call Raw Socket, Multiple Recipients, Unicasting, Broadcasting, Multicasting, Quality of Service Issues. 10Hrs

Text Books:

1. Advance UNIX Programming Richard Stevens, Second Edition Pearson Education.
2. Advance UNIX Programming, N.B. Venkateswarlu, BS Publication.

BSc 6 th Semester		Network Programming with TCP/IP Lab	
Subject Code :	16BF26.3	Elective	6.3
IA Marks :	20	Total Teaching Hours :	72
Exam Marks :	80	Teaching Hours/Week :	06
Credits:	6	Examination Hours :	03

1. Working with system calls
2. Programs on Shell Programming using UNIX
3. Programs on Client/Server Model
4. Programs on Socket Programming
5. Programs on IPC

Examination:

- One Question has to be given from the above list (Carries 45 Marks).
- One more question has to be given by the examiner by his choice and that question need not be in the list (Carries 35 Marks).
- Student has to answer and execute both questions.

Marks Distribution:

Criteria		Marks	
		Question from The List	Examiner's Question
Practical Proper	Writing Program	25	20
	Execution	20	15
	Total	80	
Viva/ Report		20	
Total		100	

BCA 6 th Semester		Project Work	
Subject Code :	16BF27		
IA Marks :	20	Total Teaching Hours :	52
Exam Marks :	80	Teaching Hours/Week :	04
Credits:	4	Examination Hours :	03

A Team of 1 to 4 students must develop the project. However, during the examination, each student must demonstrate the project individually.

The Team may implement a project of their choice

The team must submit a Project Report that must include the following: 1. Introduction, 2. Requirements, 3. Software Development Process Model Adopted, 4. Analysis and Design Models, 5. Implementation, 6. Testing and conclusion.

Examination:

- Student has to write description about his project based on the questions given by the examiner.
- Each individual team member has to demonstrate the project.

Marks Distribution:

Exam	Marks
Write Up	40
Demonstration	40
IA- Report	20
Total	100