Goa University

P.O. Goa University, Taleigao Plateau, Goa 403 206, India

Syllabus of Bachelor of Computer Applications(B.C.A) Programme

Approved by the Board of Studies on 19th May 2011

Programme Objective: To produce employable IT workforce, that will have sound knowledge of IT and business fundamentals that can be applied to develop and customize solutions for Small and Medium Enterprises (SMEs).

Eligibility for Admission: Any candidate who has passed the XII standard examination in any stream from Goa Board of Secondary & Higher Secondary Education or equivalent is eligible for admission to the first semester. A candidate shall be selected based on a selection test as prescribed by Goa University from time to time. The selection test shall test the general aptitude, logical reasoning and analytical abilities and basic arithmetical skills of the candidate.

Number of Courses/Papers: The instructional scheme for the BCA is based on a system of integrated units called courses/papers. Each Semester, except Semester V and VI, has seven courses of which five are Theory courses and two are Laboratory courses. Semester V and VI each has four theory courses, one Laboratory course and one Project Work. Out of the four theory courses, there is one Computer Science Elective course and one Non-Computer Science Elective course in each of the Semester V and Semester VI. The Elective courses are offered from the list approved by Board of Studies in Computer Science (UG) from time to time. Courses that shall be offered as Non-Computer Science electives will be from disciplines other than Computer Science. Semester I and II includes a two-credit course on Environmental Studies (EVS). The syllabus for Environmental Studies shall be as prescribed by concerned Board of Studies and as applied to B.A/B.Sc./B.Com. programmes.

Total marks/credits assigned to each course/Paper: Semester I and II shall carry a total of 32 credit points, Semester III and IV shall have 35 credits, Semester V shall have 25 credits and Semester VI shall carry 30 credits. Each course having 5 credit points shall be evaluated out of 100 marks. Courses on Environmental Studies having 2 credit points shall be evaluated out of 50 marks per Semester.

Scheme of examination: There shall be both an In-semester element and an End-semester element in the evaluation of the performance of candidates for every course, each carrying equal weightage of 50%. Absolute grading scheme shall be followed to compute grade for each course registered by the candidate. The final grades for the course shall be awarded by the Instructor-in-charge/course co-coordinator taking into account the collective performance in the In-Semester and End-Semester examination.

More details about the BCA Programme can be found in the BCA Ordinances (OC-47A).

Syllabus of the Bachelor of Computer Applications(B.C.A) Curriculum

Revised Course Structure for Bachelor of Computer Applications(BCA) and links from course code to detailed course syllabus:

(T- Theory periods ; P-Practical periods; CS- Computer Science ;NCS – Non Computer Science)

SEMESTER I							
Course Code	Course Name	Periods		Marks		Total	Course Credit
		T	P	Insem	Endsem		
BCA101	Problem Solving and Programming Concepts	5	-	50	50	100	5
BCA102	Computer Organization and Architectures	5	-	50	50	100	5
BCA103	Business Accounting	5	-	50	50	100	5
BCA 104	Basic Mathematics	5	-	50	50	100	5
BCA105	Problem Solving and Programming Laboratory	1	4	50	50	100	5
BCA106	IT Tools Laboratory	1	4	50	50	100	5
BCA 107	Environmental Studies	2	-	20	20	40	2
						Total Credits	32
SEMESTER II							
Course Code	Course Name	Periods		Marks		Total	Credits
		T	P	Insem	Endsem		
BCA201	Data Structures	5	-	50	50	100	5
BCA202	Operating Systems Concepts	5	-	50	50	100	5
BCA203	Cost Accounting	5	-	50	50	100	5
BCA204	Discrete Mathematics	5	-	50	50	100	5
BCA205	Data Structures Laboratory	1	4	50	50	100	5
BCA206	Operating Systems Laboratory	1	4	50	50	100	5
BCA207	Environmental Studies	2	-	20	20	40	2
						Total Credits	32
SEMESTER III							
Course	Course Name	Periods		Marks		Total	Credits

Code		T	P	Insem	Endsem		
BCA301	Object Oriented Concepts	5	-	50	50	100	5
BCA302	Database Management Systems	5	-	50	50	100	5
BCA303	Management Accounting	5	-	50	50	100	5
BCA304	Introduction to Economics	5	-	50	50	100	5
BCA305	Object Oriented Laboratory	1	4	50	50	100	5
BCA306	Database Management Systems Laboratory	1	4	50	50	100	5
BCA307	Communication and Presentation Skills	5	-	50	50	100	5
						Total Credits	35

SEMESTER IV

Course Code	Course Name	Periods		Marks		Total	Credits
		T	P	Insem	Endsem		
BCA401	Software Engineering	5	-	50	50	100	5
BCA402	Computer Networks	5	-	50	50	100	5
BCA403	Management Functions	5	-	50	50	100	5
BCA404	Data Analysis and Statistical Techniques	5	-	50	50	100	5
BCA405	Graphical Interface Design Laboratory	1	4	50	50	100	5
BCA406	Data Analysis and E-Accounting Laboratory	1	4	50	50	100	5
BCA407	Technical Writing Skills	5	-	50	50	100	5
						Total Credits	35

SEMESTER V

Course Code	Course Name	Periods		Marks		Total	Credits
		T	P	Insem	Endsem		
BCA501	Software Testing	5	-	50	50	100	5
BCA502	Web Technology	5	-	50	50	100	5
BCA503	CS Elective-I	5	-	50	50	100	5
BCA504	NCS Elective-I	5	-	50	50	100	5
BCA505	Web Technology Laboratory	1	4	50	50	100	5

BCA506	Project Work	-	5	-	-	-	-
						Total Credits	25

SEMESTER VI

Course Code	Course Name	Periods		Marks		Total	Credits
		T	P	Insem	Endsem		
BCA601	Management Information Systems	5	-	50	50	100	5
BCA602	Multimedia Technology	5	-	50	50	100	5
BCA603	CS Elective-II	5	-	50	50	100	5
BCA604	NCS Elective-II	5	-	50	-	100	5
BCA605	Multimedia Laboratory	1	4	50	50	100	5
BCA606	Project Work	-	5	50	50	100	5
					Total Credits		30

List of Elective Courses Identified – CS and NCS

Computer Science Electives(CS)

Course Code	Course Name	Periods		Marks		Total	Credits
		T	P	Insem	Endsem		
-	Agile Software Development	5		50	50	100	5
-	e-governance	5		50	50	100	5
-	Mobile Technology	5		50	50	100	5
-	E-Commerce Applications	5		50	50	100	5
-	Enterprise Web Applications	5		50	50	100	5
-	IT Project Management	5		50	50	100	5
-	ERP Systems	5		50	50	100	5
-	HCI Systems	5		50	50	100	5
-	Cyber laws	5		50	50	100	5
-	Cryptography	5		50	50	100	5
-	Systems Programming	5		50	50	100	5
-	Systems Simulation and Modeling	5		50	50	100	5
-	Software Cost Estimation	5		50	50	100	5

-	Web Services	5		50	50	100	5
-	Compiler Design	5		50	50	100	5
-	Geographical Information Systems	5		50	50	100	5
-	Information Systems Audit	5		50	50	100	5
-	Data Mining Concepts	5		50	50	100	5
-	PC Hardware and Configuration Management	5		50	50	100	5
-	Game Theory	5		50	50	100	5
-	Embedded Systems	5		50	50	100	5
-	Artificial Intelligence	5		50	50	100	5
-	Image Processing	5		50	50	100	5
Non-Computer Science Electives(NCS)							
Course Code	**Course Name**	**Periods**		**Marks**		**Total**	**Credits**
		T	P	Insem	Endsem		
-	Organizational Behavior	5		50	50	100	5
-	Human Resource Management	5		50	50	100	5
-	Advertising	5		50	50	100	5
-	Marketing and Research Methods	5		50	50	100	5
-	Insurance Management	5		50	50	100	5
-	Electronic Media	5		50	50	100	5
-	Business Ethics and Social Responsibility	5		50	50	100	5
-	Financial Management	5		50	50	100	5
-	Supply Chain and Logistics Management	5		50	50	100	5
-	Training and Development	5		50	50	100	5
-	Entrepreneurship Development	5		50	50	100	5
-	Services Marketing	5		50	50	100	5
-	Product and Brand Management	5		50	50	100	5
-	Operations Research	5		50	50	100	5
-	Business Environment	5		50	50	100	5
-	Banking and Finance	5		50	50	100	5
-	Business Administration	5		50	50	100	5

BCA SEMESTER I

COURSE CODE : BCA101	COURSE TITLE : PROBLEM SOLVING AND PROGRAMMING CONCEPTS

Total marks : 100	Total credits : 05	Total contact hours : 45

Course prerequisites : none

Course objectives : To study the concepts of solving problems using a computer by designing programs as solutions

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	Hours	%	
I	Evolution of Computing	A	Pre-electronic computing systems	To know ancient computing systems	01	10	
		B	The electronic computer	The know the dawn of the electronic computing era			
		C	Generations of Computers	To be aware of the evolution of computing			
		D	Evolution of programming languages	To be aware of the evolution of programming languages and know the strengths and weakness of each generation	01		
		E	Stored Program Concept	The understand the concept of program execution	01		
		F	Bit Interpretation	To understand how the computer interpret instructions			
II	Computer Problem Solving	A	Problem Identification	To recognize the existence of a problem	02	5	
		B	Problem Analysis	To categorize and study the problem			
		C	Problem definition	To present the problem in a systematic and complete statement			
		D	The Problem Solving Aspect	To learn the approaches of solving problems			
		E	Top-Down Design	To study the problem solving aspect			
		F	Stepwise Refinement				
III	Computing	A	Data	To study the basic entity in computing	01	10	

	concepts	B	Instruction	To know what is an instruction and the types of instructions			
		C	Types of data : Integer, Floating-point, Character, String	To learn the different types of data that can be represented in programming			
		D	Concept of a variable and the scope of variable	To learn about the data container			
		E	Constant	To know the difference between varying and fixed data			
		F	Arithmetic operators	To study the different operators available to write instructions	01		
		G	Assignment operator	To know left hand and right hand evaluation of an instruction			
		H	Flow of Control :Sequential flow and branching	To understand the execution sequence of a group of instructions			
		I	Evaluation of expressions	To know the arithmetic behind evaluation of expressions	01		
		J	Relational operators	To learn to relate and compare multiple data entities	01		
IV	**Algorithm Development**	A	Definition	To know what an algorithm is and its origins	02	10	
		B	Algorithm: a solution to a problem	To learn to use the pseudo-code to design solutions			
		C	Structure of an algorithm				
		D	Input-Output Statements				
		E	Decision Making Statements		02		
		F	Looping Statements		02		
		G	Advantages and limitations of algorithms	To know the pros and cons of pseudo-code	01		
		H	Examples	To get a practical hand on writing pseudo-code			
V	**Flowcharting**	A	Definition	To study how to write the graphical representation of an algorithm to check flow of control	01	10	
		B	Symbols				
		C	Input-Output Statements				

		D	Decision Making Statements		01		
		E	Looping Statements		01		
		F	Module representation		01		
		G	Drawing conventions and standards				
		H	Examples	To thorough the nitty-gritties of flowcharting			
VI	**Debugging**	A	Bug : Definition	To know error detection and correction	01	5	
		B	Types of errors : syntax , semantics and runtime				
		C	Program debugging				
VII	**Documentation**	A	**Definition**	To understand the purpose of documentation and naming of files and variables	01		
		B	Comments and need for commenting				
		C	Documentation styles				
VI	**Programming**	A	Conversion of algorithms into programs. Starting with C-structure, I/O statements, main function etc. Preprocessor directives.	To know the limitations of algorithms and overcoming them through programs	01		
		B	Constants, variables and keywords in C.	To learn the programming language specific constructs	01		
		C	Type of arithmetic instruction, integer and float conversion. Data types in C.	To learn the programming specific data types and their usage.	01		
		D	Decision control structure- if statement, if –else statement, nested if-else, switch case, use of logical operators.	To know the various decision control statements, compound conditional statements and it's differences.	02		
		E	The loop structure- while loop, for, do while. Use of break and continue statements. Menu driven	To understand the different looping structures and to combine decision and looping structures	02		

			programs using switch –case.			25	
		F	Functions : passing values between functions. Scope of functions, function declaration and prototype, call by Value and Call by reference. Recursive functions.	To understand the concept of modular programming.	03		
		G	Arrays: Single dimension array, 2-D arrays. String functions(strlen, strcpy,strcat, strcmp, strcmpi etc) using arrays. Functions and Arrays	To know static memory allocation for multiple data storage and it's usage for string manipulation	03		
		H	Dynamic memory allocation: using malloc, calloc,free functions and sizeof operator. Pointers: Introduction, pointer notation, pointers and functions, Array and pointers. Pointers and Strings	To understand the dynamic memory management concepts	04		
		I	User defined data types : Enum, typedef , Structures and unions, Array of structures.	To know the use of user defined data types	05	35	
		J	File I/O : Opening of a file, reading from a file, closing a file, file copy, file opening modes. Command line arguments	To understand the permanent data storage and manipulation using I/O files	02		
		K	Additional features: Storage classes in C- Automatic, register, static, external . Bit wise operators.	To know the various storage techniques for reusability	02		

References:

1. How to solve it by Computers; R.G. Dromey
2. Fundamentals of Programming Languages
3. Let us C : Yashwant Kanetkar

BCA SEMESTER I

COURSE CODE : BCA102	COURSE TITLE : COMPUTER ORGANISATION AND ARCHITECTURES	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : none		
Course objectives: The objective of this paper is to provide a broad overview of architecture and functioning of computer systems and to learn the basic concepts behind the architecture and organization of computers.		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	**Introduction to Computer Organization and Architecture**	A	Computer-Definition and Block Diagram	To study the block diagram of the computer system	01	15	Computer organization and architecture (4e) William Stallings
		B	Organization and architecture	To study the underlying structure and functioning of a computer	01		
		C	Structure and Function		01		
		D	Computer Evolution and performance-History of computers, Von Neumann Architecture, Designing for performance, Pentium & PowerPC Evolution.	To learn the evolution of the computer with focus on the present day generation	03		
		E	Computer Components, Computer Function	To study the different components of the computer with emphasis on their functioning	02		
		F	Interconnection Structures, Bus Interconnection	The study the bus architectures and other different interconnection structures	03		

II	**The Memory Subsystem**	A	Memory system overview	To study the storage systems	01	18	Computer organization and architecture (4e) William Stallings
		B	Cache memory – Principle, elements of cache design, Pentium 4 and PowerPC cache organization	To know the functioning of the cache memory with emphasis on Pentium 4 and PowerPC architecture	02		
		C	Internal Memory- Semiconductor main memory, Advanced DRAM organization	To learn the primary memory system	03		
		D	External Memory- Magnetic Disk, RAID, Optical memory, Magnetic Tape	To study the secondary storage medium in detail with emphasis on features of each	04		
III	**The Input/Output and File Subsystem**	A	I/O external devices	To study the different I/O peripheral devices	01	18	Computer organization and architecture (4e) William Stallings
		B	I/O modules	To learn the functioning of the I/O modules			
		C	I/O techniques (programmed, interrupt driven and DMA)	To study the different types of I/O techniques	02		
		D	I/O Channels and processors	To learn about the different channels of I/O and its processors	02		
		E	External interface	To study the external interfacing of I/O devices	01		
		F	Operating system support	To know the relationship of I/O devices with OS			
IV	**The Central Processing Unit**	A	Computer Arithmetic – ALU, Integer representation, Integer Representation – Addition, subtraction. Floating point representation – Addition, subtraction.	To study the representation of data and operations	03	23	Computer organization and architecture (4e) William Stallings
		B	Instruction sets – characteristics & Functions, Addressing modes and formats.	To study the different Instruction sets, addressing modes and the data formats	02		http://www.cpu-world.com/CPUs/CPU.html
		C	CPU structure and function	To study the structure of the CPU	02		
		D	Processor Generation – 8084,8086,Pentium I-IV,i1-i7	To understand the key features of the Processor Generations	03		http://en.wikipedia.org// /wiki/List_of_Int

							el_microprocess ors
V	**The Control Unit**	A	Structure of the Control Unit	To study the structure of the Control Unit	01	16	Computer organization and architecture (4e) William Stallings
		B	Functioning of the Control Unit	To learn the functioning of the control unit	01		
		C	Microprogrammed control	To study microprogrammed control unit	02		
VI	**Assembly Language Programming 8086 instruction sets**	A	Introduction to Assembly language Programming	To introduce low level programming	02	10	Computer organization and architecture (4e) William Stallings
		B	8086 Instructions sets	To study the 8086 Instruction sets in its simplified form	02		

BCA SEMESTER II

COURSE CODE : BCA103	**COURSE TITLE : BUSINESS ACCOUNTING**	
Total marks : 100	Total credits : 05	Total contact hours : 45

Course prerequisites : BCA102

Course objectives : To introduce concepts of financial accounting and management with a scope for applying these concepts into day to day tasks

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**hours**	**%**	
I	**Introduction to Accounting**	A	Definition, scope of accounting	To study the basics of accounting	03	10	L.N. Chopde: Accounting & Financial Management Advanced Accounting, SN Maheshwari
		B	Accounting as financial information system				
		C	Accounting Principles				
		D	Accounting Standards				
II	**Accounting**	A	Transaction/event	To study the recording of financial business accounts	06	16	L.N. Chopde:
		B	Classification of accounts				

	procedure		Voucher				Accounting & Financial Management
		C	Preparation ofvouchers				
		D	Journal/ subsidiary books				
		E	Types of subsidiary books Ledger accounts and trial balance				
III	**Depreciation accounting, Capital & Revenue**	A	Expenditure & receipts	To understand the need for provisions and reserves	08	16	L.N. Chopde: Accounting & Financial Management
		B	Methods of depreciations • Straight-line method • Reducing method • Sinking fund method • Annuity Method • Machine hour rate method • Depletion method				
IV	**Company Final Accounts**	A	Preparation of trading a/c	To determine financial performance and financial position of a business	10	20	Pednecar Sirsat, Book keeping & Accountancy
		B	Profit & Loss a/c				
		C	Balance sheet				
V	**Financial Statement Analysis**	A	Meaning of financial statement	To learn the different business decision making tools	10	18	L.N. Chopde: Accounting & Financial Management Advanced Accounting, SN Maheshwari
		B	Types of analysis				
		C	Tools of financial statement analysis				
		D	Major user groups				
VI	**Funds Statement**	A	Preparation of fund flow statement	To learn to monitor the flow of finance within a business	05	10	L.N. Chopde: Accounting & Financial Management Advanced Accounting, SN Maheshwari
		B	Preparation of cash flow statements				
VII	**Accounting for shares**	A	Kinds of shares	To understand the different types of shares	03	08	L.N. Chopde: Accounting & Financial Management
		B	Accounting for issue of shares				

							Semester II

BCA SEMESTER I

COURSE CODE : BCA103	COURSE TITLE : BASIC MATHEMATICS	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : None		
Course objectives : To introduce basic fundamentals of mathematics		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	**Fundamentals of Mathematics**	A	Number Systems • Properties of integers and types • Divisor – proper & improper • Testing of primes • LCM and GCD	To study the properties of numbers with focus on operations to be performed	03	08	
		B	Factorization				
		C	Ratio and Proportion	To represent ratio and proportion			
		D	Quadratic Equations • Definition • Types • Roots and its nature	To evaluate quadratic equations and find its roots			
II	**Logarithm and Indices**	A	Logarithm • Common Logarithm • Characteristics and mantissa • Antilogarithm	To learn to use logarithms and perform operations on logarithms	02	08	
		B	Indices • Concepts • Properties • Laws	To study indices and its properties			
III	**Mensuration**	A	Two dimensional • Area	To study mensuration with respect to 2D and 3D	02	06	

			• Perimeter				
		B	Three dimensional • Volume • Surface Area				
IV	**Complex Numbers**	A	Introduction Operations on Complex numbers • Addition • subtraction • multiplication • division • conjugate • modulus • reciprocal	To study representation of complex numbers and operations on complex numbers	06	10	
		B	Representation • graphical • polar • vector				
		C	De Moiveor's Theorem				
		D	Nth roots of complex number • Basic properties • Square roots • Cube roots of unity				
V	**Matrices and Determinants**	A	Definition Types of matrices • Row • column • square • diagonal • scalar • unit • null • upper and lower	To study matrices, its properties and solving equations	05	10	
		B	Properties of matrix Algebra of matrices • negative • transpose • equality • addition and subtraction • scalar multiplication, • Matrix multiplication • Adjoint • Inverse				

		C	Solving non homogeneous ns by Matrix inverse d $X=A^{-1}B$			
		D	Determinants • Definition and order • Types • fundamental concepts • minor • co-factors • expansion value, • properties, • cramer's rule	To learn fundamental concepts of determinants and its properties		
VI	**Sequence and Series**	A	Arithmetic Progression Geometric Progression Harmonic Progression	To study sequences and progressions	03	06
VII	**Coordinate Geometry**	A	Cartesian System • Coordinate of a point • Distance between points • Section formula • Area of triangle	To learn concepts of coordinate geometry with respect to straight lines and circle	06	08
		B	Straight Lines • Slope of a line • Parallel and Perpendicular lines • Angle between two intersecting lines • Equation of a straight lines(Through origin, Point slope from, two point form)			
		C	Circle • Standard form of a circle • circle with given radius and center			
VIII	**Trigonometry**	A	Introduction • Relation between degree and radian • Unit Circle definition	To learn trigonometric functions and identities	04	06

		B	Trigonometric function Periodicity of trigonometric function				
		C	Trigonometric identities				
IX	**Limits & Continuity**	A	Introduction • Ordered pairs • Cartesian product • Relation • Function	To study limits, continuity and evaluation of limits	03	10	
		B	Real function and types Domain and Range of function Composition of function				
		C	limit of a function Algebra of limits				
		D	Continuity of a function				
X	**Derivatives**	A	Introduction • Derivatives of simple function in standard forms • Algebra of derivatives • Derivative of composite functions • Intro to Higher order derivatives	To learn to represent derivatives, algebra of derivatives	04	10	
XI	**Integration**	A	Introduction • Meaning • As inverse of integration • Mathematical notations	To study integration, evaluation of integration	05	10	
		B	Indefinite Integrals • Algebra of Integrals • standard integral results • Simple integral methods				
		C	Definite integration • As a limit of sum • Properties • Integration of simple functions				
XII	**Vectors**	A	Vectors in plane Cartesian coordinates Vectors in space	To study the concept of vectors, cross and dot products	02	08	
		B	Dot products				

			Cross products				

References:

1. Common set of Slides and Resource Material by BCA Teachers and Subject Experts

Note: References for each topic will be added in above format at the time of preparing Slides.

BCA SEMESTER I

COURSE CODE : BCA105	**COURSE TITLE : PROBLEM SOLVING AND PROGRAMMING LABORATORY**

Total marks : 100	Total credits : 05	Total lab sessions : 15

Course prerequisites : BCA101

Course objectives : To learn the process of computer problem solving and concepts through some programming language

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**Lab sessions**	**%**	
I	**Programming Environment**	A	Integrated Development Environment	To understand some programming IDE and the different utilities	02	5	
		B	Writing well documented programs that are easy understandable and modifiable.	To write well documented programs			
		C	Program Life Cycle	To learn the phases of program development and execution			
		D	Compilation/Interpretation	To learn program translation as applicable in the programming language			
II	**Basic Programming Constructs**	A	Programs to understand basic Input/Output Statements	To learn the basic programming constructs by implementing them in a programming language	06		
		B	Programs to understand the different data Types	To learn the programming specific data types and their usage.			

		C	Understanding basic Programming constructs: Variables and Constants	To learn to declare variables and constants		40	
		D	Using different logical and relational Operators	To learn Arithmetic, Relational, Logical, and other operators			
		E	Understanding if, if-else, nested if-else, switch statements	To learn if/if..else and switch statements			
		F	Understanding for, while, do while - looping statements. Also programs using break and continue statements	To understand the different looping structures and to combine decision and looping structures			
		G	Understanding use of function with and without return types. Recursive functions.	To understand the concept of modular programming.			
		H	Writing menu driven programs using loops and conditional statements	To implement simple algorithms as executable computer programs			
VI	**Advanced Programming Constructs**	A	Programs using Arrays. 1-D and 2-D arrays. String manipulation functions, string manipulation using character arrays. Programs using Functions and arrays.	To know static memory allocation for multiple data storage and it's usage for string manipulation	07	45	
		B	Programs to understand pointers. Pointers using arrays, array of pointers	To know static memory allocation for multiple data storage and it's usage for string manipulation			
		C	Programs to understand file I/O. opening a file, closing a file,	To understand the permanent data storage and manipulation using I/O files			

References: Common slides and set of problems…

BCA SEMESTER I

COURSE CODE : BCA106	COURSE TITLE : IT TOOLS	
Total marks : 100	Total credits : 05	Total Sessions: 15
Course prerequisites :		
Course objectives : To familiarize and learn use of various types of IT tools		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	Lab sessions	%	
I	PC Setup	A	PC Components Identification	To identify the different components of a PC	02	14	
		B	PC Assembling	To study about the different peripherals connected to a PC			
		C	BIOS Setup	To configure the BIOS setup for a standard PC			
		D	PC Fault Troubleshooting	To learn to troubleshoot a PC			
		E	PC Configuration	To learn to record and state configuration of a PC			
II	Office Productivity tools	A	Word Processor	To learn the different features of a word processor	04	14	
		B	Spreadsheet	To learn the different features of a spread sheet			
		C	Presentation maker	To learn to use a presentation maker software			
		D	Picture Manager	To learn simple image editing utilities			
III	Learning Management System	A	**Basic Setup** • Installation of wampServer • Installation of Moodle LMS • Managing user accounts • Managing course settings • Logging in • Customizing your profile	To learn the basic setup and customization of an LMS	02	14	

			• Customizing course settings • Editing the header block Posting a course syllabus & Lecture Slides				
		B	**Working with Resources** • Creating a text label • Linking to a web site • Creating a text page • Creating a web page • Linking to folder of documents **Working with Media** • Posting image files • Posting a photo gallery • Posting audio Posting video files	To learn to use the resources and other media in a LMS	02		
		C	**Adding Activities** • Creating Assignments • Creating a forum • Creating a wiki • Creating Quiz	To learn to create different activities and exercises	01		
		D	**Administration** • User Accounts (Student, Teacher, Course Creator, Administrator) • Editing, • Settings	To learn to configure and customize users, roles and associated settings	01		
IV	**Internet Applications**	A	Using Web Browsers	To know how to configure a web browser	03	42	
		B	Search Engines	To learn to use search engines by defining search criteria			
		C	E-Mail	To learn to setup an e-mail account and send and receive e-mails			
		D	Blogs	To learn to subscribe and post on a blog			
		E	Torrents	To learn to use torrents for accelerated downloads			

References:

1. Common set of Slides and Resource Material by BCA Teachers and Subject Experts

Note: References for each topic will be added in above format at the time of preparing Slides.

BCA SEMESTER II

COURSE CODE : BCA201	COURSE TITLE : DATA STRUCTURES	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : BCA101		
Course objectives :To introduce concepts of data storage organization on computer, study the access mechanisms of data structures and their applications		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	Introduction to Data Structures	A	Concept of a data structure	To understand the philosophy of a data structure	03	08	
		B	Data type and data structure	To know the difference between the two			
		C	Characteristics of data structures	To learn the properties such as access mechanism, complexity			
		D	Storage gains and trade offs	To study the efficiency considerations w.r.t. space			
		E	Linear and non-linear data structures	To know differences between linear and non-linear structures			
		F	Efficiency considerations and Asymptotic notation	To understand the different asymptotic notations			
II	Arrays	A	Single dimensional arrays	To learn creation, and manipulations	02	10	

		B	Multi-dimensional arrays	To learn creation, operations on matrices			
III	**Sorting and Searching Techniques**	A	Insertion Sort	To study the simple sorting algorithms	10	12	
		B	Selection sort				
		C	Bubble Sort				
		D	Merge Sort	To study the advanced sorting algorithms advanced and their efficiency considerations			
		E	Quick Sort				
		F	Heap Sort				
		G	Shell Sort				
		H	Linear Search	To study algorithms for searching data from a set			
		I	Binary Search				
IV	**Stacks**	A	Concept of a LIFO	To study concept of a LIFO	02	08	
		B	Stack operations	To learn operations and the abnormal conditions of a Stack			
		C	Applications of Stacks in Computer Science	To apply the Stack data structure in implementing a LIFO			
V	**Queues**	A	Concept of a FIFO	To study concept of a LIFO	02	08	
		B	Queue operations	To learn operations and the abnormal conditions of a Queue			
		C	Circular Queue	To study the concept and advantages of a circular queue			
		D	Applications of Queue in computer science	To apply the Queue data structure in implementing a FIFO			
	Linked Lists	A	Concept of a linear list	To study the concept of a list	08	10	

		B	Singly linked list	To study the concept of a singly linked list with focus on its node structure and operations			
		C	Doubly linked list	To study the concept of a singly linked list with focus on its node structure and operations			
		D	Implementation of a stack and queue as a linked list	To learn to implement a stack using a singly linked list and a queue using a doubly linked list			
	Trees	A	Concept of a tree data structure	To study non-linear data structures	09	14	
		B	Binary tree	To study binary trees, node structure and creation of binary trees			
		C	Binary tree Traversals	To study inorder /preorder /postorder traversals on a binary tree			
		D	Binary Search Tree(BST)	To study concept of BST and its construction			
		E	Construction of BST				
		F	Expression tree	To learn to represent an expression in a binary tree			
		G	Construction of expression tree				
		H	Conversion of infix to pre/post fix • Manual method • Expression tree method	To learn to convert expressions from infix to prefix and postfix			
		I	Balanced Binary trees	To learn the concept of a balanced binary tree and perform rotations to balance the tree			
		J	Rotations of a tree				
		K	Heap tree	To study the concept of a heap and its construction			

		L	B-trees	To study the concept of a non-binary tree and its construction			
	Graphs	**A**	Graphs	To study the concept of a graph and its terminology		12	
		B	Graph Terminologies • Vertex • Edge • Degree of a vertex		06		
		C	Types of Graphs • Directed/Undirected Graphs • Directed Acyclic Graph • Weighted Graphs	To study the different types of graphs			
		D	Graph Representation • Adjacency matrix • Adjacency List	To learn to represent a graph using different representations			
		E	Graph Traversals • DFS Traversal • BFS Traversal	To study the graph traversal methods			
		F	Djikstra's Algorithm	To calculate the shortest path between two vertices of a weighted graph			
		G	Spanning Trees	To study the concept of a spanning tree and its applications			
		H	Construction of Minimum Spanning Trees • Prim's Algorithm • Kruskal's Algorithm	To learn the algorithms for constructing minimum spanning trees			
	Hashing	A	Concept of Hashing	To study the concept of hashing data storage	03	08	
		B	Benefits & Limitations of Hashing	To learn the advantages and disadvantages of hashing in comparison to other methods			
		C	Hash Functions	To study the different types			

				of hash functions			
		D	Handling of Hash Collisions □ Open Addressing □ Separate Chaining	To study the methods of collision resolution			

References:

1. Analysis and Design of Algorithm; Anany Levitin
2. Data Structures using C; Tannenbaum

BCA SEMESTER II

COURSE CODE : BCA202	**COURSE TITLE : OPERATING SYSTEM CONCEPTS**	
Total marks : 100	Total credits : 05	Total contact hours : 45

Course prerequisites : BCA102

Course objectives : To study the modern day operating systems with emphasis on its functions and structure so as to enable students to decide the suitable operating system for specific job

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**hours**	**%**	
I	**Introduction to Operating System**	**A**	Basic elements of a computer system • Processor • Main Memory • I/O Modules • System Bus Instruction Execution	To refresh the basic concepts with emphasis on operating systems	02	12	Operating Systems (5e)by William Stallings and OS Principles (7e) by Silberchatz Galvin
		B	Operating Systems □ Definition □ Evolution □ Introduction to Major Functions/Services □ OS Structure □ Relationship between Kernel, OS, Hardware □ Examples(For students to see and	To study the characteristics, functions and examples of operating systems with focus on its structure and organization	04		

			get a feel of OS)				
II	**Processes & Process Management**	A	Process • Definition • Process Control Block • Process States • Operations on Process	To understand the states and structure of a program in execution	03	24	Operating Systems (5e)by William Stallings and OS Principles (7e) by Silberchatz Galvin
		B	Threads and Microkernels • Definition • Multithreading Model	To study the concept of light weight processes and their execution	02		
		C	Process Scheduling • Introduction to the Concept • Scheduling Criteria • Scheduling Algorithms • Multi-Processor Scheduling	To study allocation of resources for efficient throughput and maximum resource utilisation	04		
		D	Concurrency/ Process Coordination • Synchronization • Principles • Mutual Exclusion • The Critical-Section Problem • Peterson's Solution • Semaphores • Monitors • Readers/Writers Problem	To learn process coordination and synchronization required in an operating system	05		
		E	Deadlock • Principles • Deadlock Handling Methods • Prevention • Avoidance • Detection • Recovery From Deadlock	To study the concept of a deadlock, its causes, prevention, avoidance and handling mechanisms	03		

III	**Memory Management**	A	Memory Management Concepts • Introduction • Swapping • Contiguous Memory Allocation • Paging • Page Table • Segmentation	To study the basic issues in memory management as one of the function of an operating system	04	22	Operating Systems (5e) by William Stallings and OS Principles (7e) by Silberchatz Galvin
		B	Virtual Memory • Introduction • Demand Paging • Page Replacement • Frames • Thrashing	To study the virtual memory concepts implemented in modern day operating systems	03		
IV	**Input/ Output & File System**	A	File System • Concepts • File Organization and Access Methods • Directory Structure • File Sharing	To know the directory structuring and file access mechanisms	03	16	Operating Systems (5e) by William Stallings and OS Principles (7e) by Silberchatz Galvin
		B	I/O Management • I/O devices • I/O Hardware • Organization of I/O • I/O Buffering • Disk Structure, Attachment, Scheduling and Management • RAID	To study about the I/O devices and the way operating system manages them	03		
V	**Security**	A	System Protection • Goals • Principles • Access Matrix	To know the reasons for security concerns and implementations	01	10	Operating Systems (5e) by William Stallings and OS Principles (7e) by Silberchatz Galvin
		B	Security • Types of Threats • Intruders	To study the different methods of implementing security in operating systems	02		

			• Cryptography • User Authentication • Trusted Systems				
VI	**Advanced Concepts**	A	Distributed Operating System □ Reasons for Distributed OS □ Types □ Design Issues □ File Systems on Distributed OS □ Synchronization (Introduction)	To understand the concept of distributed computing with emphasis on benefits in contrast to networked operating systems	03	16	Operating Systems (5e)by William Stallings and OS Principles (7e) by Silberchatz Galvin
		B	Web Based Operating Systems □ Types □ Advantages □ Storage Structure □ Resource management	To learn the concepts of cloud computing and understand design issues of web based operating systems	03		

References:

2. Common set of Slides and Resource Material by BCA Teachers and Subject Experts

Note: References for each topic will be added in above format at the time of preparing Slides.

BCA SEMESTER V/VI

COURSE CODE : BCA	**COURSE TITLE : COST ACCOUNTING**	
Total marks : 100	Total credits : 05	Total contact hours : 45

Course prerequisites : BCA 103

Course objectives: The objective of this paper is to provide in-depth knowledge of cost accounting as an important branch of accounting

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**hours**	**%**	

I	**Basic Concepts**	A	Introduction	To introduce the students to cost accounting as a branch of accounting and its objectives	15	20	Cost Accounting by S.P. Jain and K.L Narang 12th Edition Cost accounting by R.S.N. Pillai., V.Bagavathi Cost accounting by Arora
		B	Evolution and objectives of cost accounting				
		C	Importance of cost accounting	To understand the importance of cost accounting an organization			
		D	Difference between cost accounting and financial accounting	To understand how cost accounting differs from financial accounting			
		E	Cost concepts	To familiarize the students with the various cost concepts and classification of cost			
		F	Elements of cost & classification of cost				
		G	Preparation of cost sheet	To learn the preparation of cost sheet			
II	**Materials**	A	Introduction	To familiarize with the most important factor in the process of manufacturing i.e. Materials	15	24	Cost Accounting by S.P. Jain and K.L Narang 12th Edition
		B	• Material Procumbent procedure • Material issue procedure • Stores Record	To understand the material procurement and issue procedure in an organization			
		C	Inventory Control and inventory Levels • Maximum • Minimum • Reorder • Average level	To introduce the various inventory levels			
		D	Valuation of material receipts and issues Selection of pricing method • LIFO Method • FIFO Method • Simple Average	To familiarize with the various methods of Valuation of Materials			

			• Weighted Average • Periodic Simple Average • Periodic Weighted Average • Standard Price Method				
III	**Labour**	A	Introduction to Labour	To familiarize with Labour as a factor of production	10	24	Cost Accounting by S.P. Jain and K.L Narang 12th Edition
		B	• Attendance and Pay roll Procedure • Preparation of Pay roll sheet • Idle time • Overtime • System of wage payment and incentive i. Time rate ii. Piece rate iii. Halsey plan iv. Rowan plan v. Taylor differential plan	To understand the preparation of wage sheet and the systems of incentives			
		C	Labour Turnover: Causes and How to Overcome Them	To understand the causes for labour turnover and absenteeism and how to avoid it in organizations			
IV	**Methods and techniques of Costing**	A	Introduction	To introduce the various methods of costing	20	32	Cost Accounting by S.P. Jain and K.L Narang 12th Edition
		B	□ Job Costing □ Batch Costing □ Operating Costing,	To familiarize with Job Costing, Batch costing and Operating costing as methods of costing			
		C	Practical problems on • Contract costing • Process costing	To learn the preparation of Contract account and the various processes in manufacturing a product and how it is accounted for.			

		D	Techniques of costing • Standard Costing • Marginal Costing • Budgetary Control • Break even Analysis	To introduce the various techniques of costing			

BCA SEMESTER II

COURSE CODE : BCA204	**COURSE TITLE : DISCRETE MATHEMATICS**	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : BCA103		
Course objectives : To introduce fundamentals of digital electronics and the basic terminologies used in computer science to solve practical problems		

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**hours**	**%**	
I	**Number System**	**A**	Decimal Number System	To identify the different number systems used and be able to perform its various conversions from system to the other	03	8	Discrete Mathematical Structures with Applications to Computer Science, Trembly J.P and Manohar R Discrete Mathematics and its Applications(5e), Kenneth H.Rosen
		B	Binary Number System				
		C	Octal Number System				
		D	Hexadecimal Number System				
II	**Mathematical Logic**	**A**	Introduction to Logic	To learn the basic concepts of logic	05	12	Discrete Mathematical Structures with Applications to
		B	Logical Connectives	To study the various connectives used in logic reasoning			

		C	Well formed formulas (WFF)	To design WFF using the logical connectives			Computer Science, Trembly J.P and Manohar R Discrete Mathematics and its Applications(5e), Kenneth H.Rosen
		D	Tautology and Contradiction statements	To learn how to identify the tautology and contradictory statements in logic			
		E	Converse and Contra positive statements	To identify the converse and contra positive statements in logic			
		F	Equivalence Formulas	To be able to identify if the formulas are equivalent in nature through proofs			
III	**Mathematical Induction**	A	Principle of Induction	To learn the principle of mathematical induction used in computer science	02	06	Discrete Mathematics and its Applications(5e), Kenneth H.Rosen
IV	**Boolean Algebra and Circuits**	A	Boolean Algebra • Introduction • Representation of Logic Variables: 0 and 1; Low and High; Off and On; No and Yes; Closed and Open Switch	To be able to represent the logic variable in various forms	05	16	Discrete Mathematical Structures with Applications to Computer Science, Trembly J.P and Manohar R Discrete Mathematics and its Applications(5e), Kenneth H.Rosen
		B	Truth table • Unary Operations: Logical Identity, Logical Negation • Binary Operations: Conjunction, Disjunction, Implication, Equality, Exclusive Disjunction, Logical NAND, Logical NOR • Applications: Logical Equivalences	To study various operations that be used along with the Boolean variables and will also be able construct truth tables for the same			
		C	Boolean functions • Commutative Law • Associative Law • Distributive Law • Identity Law	To learn the various laws associated to the Boolean operations			

			• Negation Law				
		D	De-Morgan's theorem				
		E	Logic gates □ AND, OR, NOT, NAND, NOR, XOR, XNOR □ Logic Gate Diagram and Truth Table □ Circuit Diagrams	To learn the basic fundamentals of digital electronics i.e. using logic gates and will be able to construct circuit diagrams from the same			
V	**Set Theory**	A	Introduction to Sets	To learn to represent real world concepts using the basic concept of Sets	06	18	Discrete Mathematical Structures with Applications to Computer Science, Trembly J.P and Manohar R Discrete Mathematics and its Applications(5e), Kenneth H.Rosen
		B	Set Operations □ Union □ Intersection □ Complement □ Differences	To learn to use the various Set operations			
		C	Algebraic Properties of Sets and De Morgan's Laws	To study the fundamental laws used in Set theory			
		D	Venn diagrams	To learn to graphically represent the Sets used in problem solving			
VI	**Relations**	A	Cartesian Product	To learn to implement Cartesian product	05	10	Discrete Mathematical Structures with Applications to Computer Science, Trembly J.P and Manohar R Discrete Mathematics and its Applications(5e), Kenneth H.Rosen
		B	Introduction to Relations	To learn concept of Relati			
		C	Properties of Relations • Reflexive • Symmetric • Asymmetric • Anti-symmetric • Transitive	To learn various properties of Relation			
		D	Equivalence Relation	To learn the Equivalence Relation			
VII	**Functions**	A	Introduction to functions	To learn concept of	05	08	Discrete

				functions			Mathematical Structures with Applications to Computer Science, Trembly J.P and Manohar R Discrete Mathematics and its Applications(5e), Kenneth H.Rosen
		B	Types of Functions • Identity function • Composite function • Injection (One-to-One) • Surjection (Onto) • Bijection (One-to-One and Onto) • Invertible • Composition of functions (fog, gof)	To learn the different types of functions			
VIII	**Permutations and Combinations**	A	Principle of counting	To learn the principle of counting	06	08	Discrete Mathematical Structures with Applications to Computer Science, Trembly J.P and Manohar R Discrete Mathematics and its Applications(5e), Kenneth H.Rosen
		B	Factorial Notation	To learn the concept of factorial			
		C	Permutations i) Permutations with and without repetition ii) Circular Permutations	To learn to use permutations using its factorial form and in solving problems			
		D	Combinations	To learn the concept of using combinations using its factorial form and in solving problems			
IX	**Binomial Theorem**	A	Binomial Theorem	To learn the concept of using the Binomial theorem	03	04	
X	**Grammars, Languages and Automation**	A	• Grammars and Languages • Finite Automaton • Regular Languages • Regular Expressions	To introduce the concept of finite automata and regular expressions	05	10	

BCA SEMESTER II

COURSE CODE : BCA205	COURSE TITLE : DATA STRUCTURES LABORATORY	
Total marks : 100	Total credits : 05	Total lab sessions : 15
Course prerequisites : BCA201		
Course objectives: To learn different ways of organizing data encountered in real life applications.		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	Lab sessions	%	
I	Arrays	A	Single dimensional Arrays	To implement programs using single dimensional arrays	01	10	
		B	Multi-dimensional Arrays Matrices	To implement programs using multi-dimensional arrays especially matrices	01		
II	Searching	A	Linear Search	To implement searching algorithms over a list	01	12	
		B	Binary Search				
III	Sorting	A	Bubble Sort	To implement simple sorting algorithms over an array of data elements	01	18	
		B	Insertion Sort				
		C	Selection Sort				
		D	Merge Sort	To implement advanced sorting algorithms over an array of data elements	02		
		E	Quick Sort				
		F	Shell Sort				
IV	Stacks	A	Stack Operations	To implement push , pop operations on a Stack by handling abnormal conditions of overflow and underflow	02	12	
		B	Handling Stack Overflow/Underflow				
V	Queues	A	Queue Operations	To implement insert , delete operations on a Queue by handling the abnormal conditions of	02	12	
		B	Handling Queue Overflow/Underflow				

				overflow and underflow			
		C	Circular Queue	To implement a circular queue			
VI	**Linked Lists**	A	Singly Linked List	To implement insert/delete operations at front end, rear end and in-between the singly linked list	02	12	
		B	Doubly Linked List	To implement insert/delete operations at front end, rear end and in-between the doubly linked list			
		C	Stack/Queue as Linked List	To implement a Stack as a singly linked list and a queue as a doubly linked list			
VII	**Binary trees**	A	Construction of a Binary Search Tree	To create a BST and perform the traversals	02	12	
		B	In/Pre/Post order Traversals				
VII	**Graphs**	A	Adjacency Matrix Representation and applications of graph	To construct a graph and representing it using the adjacency matrix representation	01	12	

References:

3. Common set of Slides and Resource Material by BCA Teachers and Subject Experts

Note: References for each topic will be added in above format at the time of preparing Slides.

BCA SEMESTER II		
COURSE CODE : BCA206	**COURSE TITLE : OPERATING SYSTEMS LABORATORY**	
Total marks : 100	Total credits : 05	Total lab sessions: 15

Course prerequisites : BCA201

Course objectives :To learn the setup, functioning and structure of desktop and advanced operating systems

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	Lab sessions	%	
I	Installation and configuration of Operating System	A	Disk Partitioning	To learn disk preparation before installation	03	20	
		B	Operating System Installation	To learn to install an Operating System			
II	Desktop based GUIOperating Systems	A	Desktop	To learn to configure and customize the desktop	06	50	
		B	Directory Explorer	To learn to navigate the file system using explorer			
		C	Control Center	To learn to configure the operating system through the control panel			
		D	Command Prompt Basic file and directory commands	To learn basic Commands			
		E	Shell Programming	To learn to create shell scripts for common routine tasks			
			Applications Installation	To learn to install an application			
III	Web Based Operating System	A	Introduction	To learn the concept of an online OS	04	15	
		B	Features	To learn the features of the online OS			
		C	Configuration	To learn to configure and customize the operating system			
		D	Resources	To learn to use the resources available			
		E	File System	To learn file formats and directory structure			
IV	Network Configuration	A	TCP/IP Configuration	To study network connectivity by configuring TCP/IP	02	15	

References:

4. Common set of Slides and Resource Material by BCA Teachers and Subject Experts

Note: References for each topic will be added in above format at the time of preparing Slides.

BCA SEMESTER III

COURSE CODE : BCA301	COURSE TITLE : OBJECT ORIENTED CONCEPTS	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : BCA 101		
Course objectives : To study the object- oriented concepts that can be applied for developing software using the object oriented methodology		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	**Procedure-oriented to OO Programming shift**	A	• Introduction to Procedure Oriented Programming (POP) • Example of POP	To revise the concepts of Procedure Oriented Programming	3	10	
		B	Problems/Limitations of Procedure-Oriented Programming/Paradigm	To understand the problems of Procedure Oriented Programming			
		C	Introduction to Object-Oriented Programming	To understand the concepts of Object-Oriented Programming			
		D	Basic concepts of OO Programming				
		E	Comparison of Procedure-Oriented And Object Oriented Paradigms				
		F	Benefits and limitations of Object-Oriented Programming				
II	**Objects, classes**	A	Objects • Meaning	To understand the concepts of using Objects	4	7	

	and relationships		• Examples • Identification of objects in real world				
		B	Attributes • Meaning • Examples				
		C	Procedures/ Functions/ Operations • Meaning • Examples • Nested functions				
		D	Classes • Meaning • Examples in real world • Encapsulation	To understand the concepts of creating and using Classes	5	8	
		E	Abstraction • Meaning • Classes as ADTs				
		F	Relationship between classes/objects • Types • Representation as diagram				
III	**Constructors and Destructors**	A	Constructors • Introduction • Parameterized constructors • Copy constructors	To understand the concept of constructors and its type	3	8	
		B	Destructors	To understand the concept of destructors			
	Polymorphism	A	Function Overloading • Introduction • Examples	Students are expected to know the meaning of function overloading	5	6	

		B	Operator Overloading • Introduction • Unary operators • Binary operators	To understand overloading of unary and binary operators		8	
V	**Inheritance**	A	• Introduction • Derived classes • Single inheritance • Private, public and protected members • Multilevel inheritance • Multiple inheritance • Hierarchical inheritance • Hybrid inheritance	To understand the methods of deriving classes from base class as well as deriving members of the class	5	10	
		B	• Virtual base classes • Abstract classes	To understand the use of virtual base class and abstract class	2	8	
VI	**Aggregation**	A	Introduction and Examples	To understand the concept of part-whole relationship	2	5	
	Generic Programming	A	• Introduction • Class Template • Function templates	To understand generic variables and their uses	4	8	
VIII	**Exception Handling**	A	Introduction	To understand meaning of Exception and the methods of handling exceptions	5	10	
		B	Types of errors				
		C	Exception handling mechanism • Throwing mechanism • Catching mechanism				
VIII	**Managing input/output files**	A	• Introduction • Streams • Types of streams • I/O stream	To understand the methods of creation of file and perform read and write operation on them	7	4	
		B	• Creation of file • Reading/writing characters/bytes			8	

References :

1. Object oriented analysis and design; James Rambough.
2. Object oriented programming using C++; (5e) E. Balagurusamy
3. Object oriented programming using Java; E.Balagurusamy.

BCA SEMESTER III

COURSE CODE : BCA302	COURSE TITLE : DATABASE MANAGEMENT SYSTEMS	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : none		
Course objectives : To provide a strong formal foundation in database concepts, technology and to apply it in the field of software development		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	Introduction to DBMS	A	Basic Concepts: Database system, Database Management System	To know the basic database concepts and its terminology.	06	14	
		B	File oriented systems	To know the File Oriented System			
		C	Limitations of Traditional File Systems	To Understand the Limitations of the Traditional File Systems			
		D	Data independence	To know the concept of data independence in database systems			
		E	Database Architecture - Three-level Architecture	To understand the three level database architecture.			
		F	Data specification, security, integrity and access mechanisms	To understand the various mechanisms used in database systems namely the security, integrity and access			

		G	Data Definition Language (DDL) , SDDL	To know Data dictionary and DDL commands			
		H	Data Manipulation Language (DML)	To know the various DML commands			
		I	Database Users	To understand the various Database Users			
		J	DBMS: Functions, Capabilities, Advantages and Disadvantages	To be able to know its functions capabilities and advantages/disadvantages			
		K	Database Administration and Control	To understand the database administration and its control			
II	**Data Models**	A	Introduction to Data models	To introduce to the students the various Data Models	08	20	
		B	Brief overview of Hierarchical, Network, Relational, Object-relational and Object-oriented data models	To briefly introduce the data models, its kind and usage			
		C	Outline of the Data definition and data manipulation constructs in each of the above data models				
		D	Comparison of the above data models	To understand the comparisons of the above models			
		E	Introduction to Current Direction	To introduce the students to current direction			
		F	Database Server, ODBC	To know the concepts of Database Server, ODBC and its usage			
		G	Client/Server Platforms	To understand C/S platforms, its architecture and application			
		H	Distributed Databases	To understand distributed databases and their applications			
		I	Data Warehousing and Data Mining	To introduce to the students the concepts of data ware housing and datamining			

III	**Database Design Process**	A	Database Design Approach	To understand the entire database design process	12	**22**	
		B	Conceptual modeling: Logical Model, Physical Model				
		C	Database Design tools	To know about the various database designtools			
		D	ER Concepts, Terminology, Diagrams	To introduce to the students the ER concepts its terminology and drawing the ERD's using case studies			
		E	Mapping Conceptual model into relational schema	To know how to convert ER model to Relational Model			
		F	Concepts of keys	To understand the concept of key, the various kinds of keys and its usage			
		G	Entity integrity, Unique Requirement and Fundamental integrity rules: entity integrity, referential integrity	To know the various integrity rules			
IV	**Data Normalization Process**	A	Introduction to data normalization and normal forms	To learn Data Normalization and the various normal forms	10	20	
		B	Benefitsof normalization	To understand the benefits of normalization			
		C	Normalization Rules,1NF, 2NF, 3NF and Higher NF	To know the normalization rules for the various normal forms			
		D	First Normal Form:1NF, Why convert to 1NF, Conversion to 1NF	To know what is 1NF, why is it required to convert to 1NF and how to convert to 1NF			
		E	Second Normal Form: 2NF Functional Dependency and Fully Functional Dependency	To know what is 2NF, why is it required to convert to 2NF and how to convert to 2NF			

			Why convert to 2NF Conversion to 2NF				
		F	Third Normal Form: 3NF Transitive Dependence Why convert to 3NF Conversion to 3NF	To know what is 3NF, why is it required to convert to 3NF and how to convert to 3NF			
		G	Normalization considerations: Good and bad decompositions	To know what are good and bad decompositions, lossless and lossy decompositions			
		H	Multi-valued dependencies and Join dependencies	To know about multi valued dependencies and join dependencies			
		I	Higher Normal Forms: Boyce-Codd NF, 4NF, 5NF, Domain-Key NF	To introduce to higher normal forms such as BCNF, 4NF, 5NF, DKNF			
V	**Transaction processing concepts**	A	Transaction processing system	To introduce the students to Transaction Processing Sytem	05	14	
		B	Schedule, Recoverability, Serializability, locks	To briefly cover concepts of schedule, recoverability, serializability and locks			
		C	ACID Properties	To know about the ACID properties of a transaction			
VI	**Emerging Trends in Database Technology**	A	Multimedia Databases	To introduce the students to the newer emerging trends in database technology such as:- multimedia, Gnome, Knowledge and Mobile databases	04	10	
		B	Gnome Databases				
		C	Knowledge Databases				
		D	Mobile Databases				

References

1. Database System Concepts; (3e) A. Silberschatz, H.F. Korth and S. Sudarshan.
2. Fundamentals of Database Systems; (3e) R. Elmasri and S.B. Navathe.
3. Database Management Systems; (5e) A.K. Majumdar and P. Bhattacharyya.

BCA SEMESTER V/VI

COURSE CODE : BCA	COURSE TITLE : MANAGEMENT ACCOUNTING	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : none		
Course objectives: The objective of this paper is to provide in-depth study of the body of knowledge comprising of various techniques of costing		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	**Introduction to Management Accounting**	A	• Evolution • Meaning • Definition • Scope • Objectives • Functions and limitations of management accounting	To study the function of management accounting	8	20	Cost Accounting by S.P. Jain and K.L Narang 12th Edition Management Accounting by J. Madegowda Management Accounting by R.S.N. Pillai Bagvathi
		B	• Management Accounting v/s Financial accounting • Management Accounting v/s Cost Accounting				
		C	Management Accounting: Tools and Techniques • Tools based on Financial accounting • Tools based on cost accounting • Tools based on Budgeting and Forecasting • Tools based on Mathematics	To familiarize with the different tools and techniques of management accounting			Cost Accounting by S.P. Jain and K.L Narang 12th Edition Management Accounting by R.S.N. Pillai
		D	Management Accountant • Role	To understand the role and importance of a			

			• Responsibilities • Functions	management accountant in an organization			Bagvathi
II	**Budgeting and Budgetary Control**	A	□ Meaning □ Definitions of Budgeting and Budget □ The essentials of a good budget	To study the meaning of budget and budgeting and the overall function of budgetary control	13	24	Cost Accounting by S.P. Jain and K.L Narang 12th Editio Edition Management Accounting by J. Madegowda Management Accounting by R.S.N. Pillai Bagvathi Management Accounting and Financial Control by Dr. S.N. Maheshwari
		B	Budgetary Control: • Meaning • Definition • Objectives • Advantages and limitations				
		C	Classification of Budgets • On the basis of time i. Short Term budget ii. Medium term budget iii. Long term budget • On the basis of Function i. Master Budget ii. Functional Budgets • On the basis of flexibility i. Fixed budget ii. Flexible budget • On the basis of nature of business activities i. Capital Budget ii. Revenue Budget	To familiarize with the different types of budgets			
		D	Preparation of Budgets: • Production Budget • Sales Budget • Flexible Budget • Cash Budget • Master Budget	To study the preparation of various types of budgets			
III	**Marginal Costing**	A	• Concept • Meaning • Definition • Advantages and	To study the technique of Marginal Costing	12	20	Cost Accounting by S.P.

			Limitations of Marginal Costing				Jain and K.L Narang 12th Edition
		B	• Marginal Cost Statement • Profit Planning – Calculation of P/V Ratio • Break-Even Analysis • Break-even point and Chart Margin of Safety	To learn the preparation of marginal cost statement and calculation of P/V ratio, Break-even point and margin of safety			
		C	• Marginal Costing v/s Decision Making • Product Decision • Pricing Decision • Market Decision • Key Factor • Profitable Sales Mix	To study the various types of decisions affecting an organization			
IV	**Standard Costing**	A	• Concept • Meaning • Definition of Standard Costing	To study the meaning and definition of standard costing	10	20	Cost Accounting by S.P. Jain and K.L Narang 12th Edition
		B	Variance Analysis: Meaning and Types □ Material Variances □ Labour Variances □ Overhead Variances □ Sales Variances	To study the different types of variances			
V	**Management Reporting**	A	□ Meaning □ Essentials of reporting	To study the meaning and essentials of a good report	7	16	Cost Accounting by S.P. Jain and K.L Narang 12th Edition
		B	Kinds of Reports	To study the various types of reports used in organizations			
		C	Steps in Effective Reporting	To make the students understand how reporting is done in organizations			Management Accounting and Financial Control by Dr. S.N. Maheshwari

							Cost and Management accounting (theory and problems) by M.N. Arora

BCA SEMESTER III

COURSE CODE : BCA304	COURSE TITLE : INTRODUCTION TO ECONOMICS	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : none		
Course objectives : To introduce and study the concepts of economics and the factors that affect the social economy		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	Introduction to Economics	A	Origins Definitions of Economics	To study the meaning of economics and the different markets	08	16	
		B	Problem of scarcity				
		C	Different types of markets				
		D	Positive Economics and Normative Economics				
II	Demand Supply and Equilibrium	A	Total and marginal utility Law of diminishing marginal	To learn the concepts of marginal utility	12	24	

			utility				
		B	Relationship between the diminishing marginal utility and demand				
		C	Law of Demand Demand curve Demand for a commodity Law of Supply Single Producer's supply of a commodity Shape of the supply curve	To learn the laws of demand and supply			
		D	Equilibrium Types of Equilibria Shift in Demand and Supply and equilibrium	To learn the concepts equilibrium			
III	**Measurement of Elasticity**	A	• Price elasticity of demand • Arc elasticity of demand • Income elasticity of demand • Cross elasticity of demand • Price elasticity of supply Importance of elasticity	To study the concepts and types of elasticity of demand	12	20	
IV	**Theory of Production**	A	Production function: Meaning and importance	To study the function of production	07	16	
		B	The law of variable proportion				
		C	Returns Scale				
V	**Factor Pricing**	A	Rent • Meaning of rent • Ricardian Theory of rent	To study the pricing factor of rent	06	24	

			• Modern theory of rent				
		B	Wages • Meaning of wages in economics • Nominal and real wages • Factors determining wages	To study the pricing factor of wages			
		C	Interest • Meaning of interest • Abstinence theory of rent • Loanable funds • Liquidity Preference theory of Interest	To study the pricing factor of Interest			

References

1. Managerial Economics: Concepts and Applications; (8e) Christopher R. Thomas & S. Charles Maurice

BCA SEMESTER III

COURSE CODE : BCA305	**COURSE TITLE : OBJECT ORIENTED PROGRAMMING LABORATORY**	
Total marks : 100	Total credits : 05	Total lab sessions : 15
Course prerequisites : BCA301		
Course objectives : To learn to implement object oriented concepts through some object oriented programming language		
Course contents :		

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**hours**	**%**	
I	**Introduction to OO language**	**A**	• Application/Use of language • Simple program • Data types	To know what a program and its output looks like. To know basic syntax of a language	**01**	**5**	

			○ Basic ○ User-defined • Basic statements ○ Declaration ○ Assignment ○ Read/write ○ If-else ○ Loops				
		B	• Referencing variables(C++) • Operators • Scope resolution operator • Data Conversions			5	
II	**Functions**	A	• Introduction • Main function • Function prototyping • Modes of parameter passing • Return statement	To know to write functions, passing and returning parameters	01	7	
III	**Classes and Objects**	A	• Classes and objects • Arrays within classes • Static members	Implementing classes	03	8	
			• Arrays of objects • Objects as function arguments • Friendly functions(C++)			8	
IV	**Constructors and destructors**	A	• Simple constructors • Parameterized	To implement different types of constructors		8	

			constructors • Multiple Constructors • Copy constructors				
		B	Destructors	To understand the implementation and use of destructors		4	
V	**Function overloading and operator overloading**	A	Function overloading	Write programs to overload functions	03	4	
		B	• Unary operator overloading • Binary overloading	Write programs to overload unary and binary operators		8	
		C	Manipulating strings	To create string as a class with functions to perform basic string operations and create objects of it		8	
VI	**Inheritance**	A	• Single inheritance • Multilevel inheritance • Multiple inheritance • Hierarchical inheritance • Hybrid inheritance • Virtual base classes	To implement all the types of inheritance and understand the way members are derived. To implement virtual base	02	8 4	
VII	**Generic Programming**	A	• Class templates • Function templates • Template functions	To know to write programs using generic variables	01	7	
VIII	**Exception Handling**	A	• Syntax for exception handling code • Throwing mechanism • Catching mechanism	To know the methods of exception handling	02	7	
IX	**Managing input/output**	A	Streams Types of streams I/O stream	Students should know to create files and perform read/write operations using	02	2	

	files		Creation of files Reading/writing characters/bytes	a program		7	

BCA SEMESTER III

COURSE CODE : BCA306	**COURSE TITLE : DATABASE MANAGEMENT SYSTEMS LABORATORY**

Total marks : 100	Total credits : 05	Total lab sessions: 15

Course prerequisites : BCA302

Course objectives : To implement the relational database concepts, practically using some database management system software that can be used as a backend tool for an application

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**hours**	**%**	
I	**Entity-Relationship Model**	A	□ Identifying entities of the system □ Identifying the relationships of the system □ Identify specialization, generalization and aggregation within the system	The learn to model the real world concepts using ER modeling	02	15	
II	**Normalization**	A	Conversion of ER model into normalized tables	To learn to convert the ER model into tables as a fundamental concept for building applications	03	10	
III	**Data Definition Language**	A	Database creation, alteration and deletion	To learn to create, alter and delete the database	04	25	
		B	Table creation, alteration and deletion	To learn to create, alter and delete the table			
		C	Data Types	To learn to identify and assign the appropriate data types to the fields of the tables			
		D	Primary Key, Foreign Key, Domain Creation	To learn to identify and assign the appropriate keys to the fields of the tables			

		E	Specify Integrity constraints □ Check □ Unique □ Null	To learn to apply the integrity constraints on the tables			
		F	Row insertion, updating and deletion.	To learn to update the rows through the various operations of DDL			
IV	**Data Manipulation language**	A	• Simple select query • Select with where clause • Group function and having clause	To learn to execute the basic queries available in DML	03	25	
		B	• Operators • Functions • Aggregate Functions • Set operations • Sorting data	To learn to execute the various functions available in DML			
		C	Sub query □ Returning single row □ Returning multiple rows □ Returning more than one column □ Correlated sub query □ Joining tables	To learn to execute the sub-queries available in DML			
		D	Views	To learn to execute views using the DML constructs			
V	**Transaction Processing**	A	• Start Transaction • Commit • Rollback • Save point • Locks	The student should be able to learn the concept of transactions	02	15	
		B	• Triggers • Stored procedures	To learn to create and execute triggers and procedures			
		C	• Database Privileges and Roles: • Grant • Revoke • Public	To learn to assign database privileges and roles to users of the system			
VI	**Report Generation**	A	Report Generation	To learn to generate reports for the system	01	10	

BCA SEMESTER I

COURSE CODE : BCA307	COURSE TITLE : COMMUNICATION AND PRESENTATION SKILLS	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : none		
Course objectives : To teach the process of interpersonal and group communication and develop skills of communication and idea presentation		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	**Fundamentals of communication**	A	The concept of communication	To study the basic concept of communication	01	18	Principles and Practice of Business communication by Aspi Doctor & Rhoda Doctor.
		B	Communication process	To study the complete communication process	01		
		C	Role of sender and receiver		01		
		D	Encoding, decoding feedback		03		
		E	How to achieve effective communication	To study the aspects of effective communication	02		
II	**Types of communication**	A	Formal and informal communications	To differentiate between formal and informal communications	01	18	Principles and Practice of Business communication by Aspi Doctor & Rhoda Doctor. Business communication – Urmila Rai, Himalaya Publishing House - Mumbai.
		B	Horizontal, Vertical, Downward, Upward, communications	To study the different types of communication	02		
		C	Grapevine		03		
		D	Consensus & Consultation		04		
		E	Methods of communication:	To learn the different methods of communication			
		F	Verbal, Face to face, Non-verbal				

III	**Oral Communication**	A	Direct Face-to-Face verbal Communication	To study the different forms of oral communication	01	18	Principles and Practice of Business communication by Aspi Doctor & Rhoda Doctor. Communication – DR. C.S. Rajvinder, Himalaya Publishing House – Mumbai
			Remote Verbal Communication				
IV	**Interview Techniques**	A	How to prepare for an Interview	To learn to prepare for an interview	03	23	Principles and Practice of Business communication by Aspi Doctor & Rhoda Doctor.
		B	Types of Interviews	To study the different types of Interviews	02		
		C	Candidates preparation for a Job Interview	To understand the preparation for facing a job interview	02		
		D	Planning and Conducting a Job Interview	To learn the process of conducting a job interview	03		
		E	Advantages and drawbacks of Interviews	To know the advantages and drawbacks of interviews			
V	**Presentation Skills**	A	Preparation of a presentation	To study the aspects of presentation preparation	01	18	Persuasive Presentations – Geoffrey Moss, Vikas Publishing House Pvt. Ltd.
		B	Matter researching	To learn the different forms of matter researching	01		
		C	Understanding the audience	To study audience's frame of mind and manipulation techniques	02		
		D	Placing plants within audience				
VI	**Methods of Presentation**	A	Use of technology	To learn to use modern aids of presentation	02	20	Persuasive Presentations – Geoffrey Moss, Vikas Publishing
		B	Presentation Softwares	To study the common presentation maker softwares	02		

		C	Use of language, Gestures and Body language	To learn to use body language to assist better expression of thought			House Pvt. Ltd. Public Speaking and Influencing Men in Business. – Dale Carvegie, D B Taraporevala Sons & Co. Pvt. Ltd.
		D	Obtaining real –time feedback	To learn to use real-time feedback for instant reaction			
		E	Case Studies on presentation making	To apply all skills learnt to prepare class presentations			

BCA SEMESTER IV

COURSE CODE : BCA401	**COURSE TITLE : SOFTWARE ENGINEERING**	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : none		
Course objectives : To study the concepts of software engineering with the aim of acquiring skills to develop software applications, following all standardized procedures and techniques		

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**hours**	**%**	
I	**Introduction to Software Engineering**	A	Introduction to Software • Definitions	To know the meaning of Software	04	10	
		B	• Dual role of Software • Need to discuss Software	To know that software has a dual role and is in demand today			
		C	Characteristics of Software	To learn the various characteristics of Software			
		D	Introduction to Software Engineering • Definition	To know what we mean by software engineering			
		E	History, motivation and challenges of Software Engineering	To learn why, how and when the concept of software engineering evolved			
		F	Software Engineering: The	To learn that as why is			

			Layered Technology	software engineering called as a layered technology			
		D	Introduction to Software Quality: • Characteristics/Attributes	To study the characteristics of a good quality software			
II	**Software Development Process and methodologies**	A	Introduction to Software Process Model • Definition • Characteristics of software process.	To understand the meaning of Software Process and the characteristics of the software development process	09	14	
		B	Software development processes and methodologies • Waterfall • Prototyping • Iterative • Spiral • Unified process • Agile methodology	To introduce the different types of process models and methodologies available in software development			
		C	Water fall Model • Introduction • Diagram • Characteristics • Strengths • Weakness/Problems	To learn the concept of the Waterfall Model			
		D	Prototyping • Introduction • Diagram • Characteristics • Strengths • Weakness/Problems	To learn the concept of Prototyping			
		E	Iterative Model • Introduction • Diagram • Characteristics • Strengths • Weakness/Problems	To learn the concept of the Iterative Model			
		F	Spiral Model • Introduction • Diagram • Characteristics • Strengths • Weakness/Problems	To learn the concept of the Spiral Model			

		G	Unified Process • Introduction • Characteristics • Phases of Unified Process • Diagram • Strengths • Weakness/Problems	To learn the concept of the Unified Process			
		H	Agile Methodology • Introduction • Characteristics • Phases of Unified Process • Diagram • Strengths • Weakness/Problems	To learn the concept of the Agile Methodology			
		I	Benefits of iterative and incremental approach with emphasis on Unified process	To know the differences, benefits and limitations of iterative and incremental process			
III	**Requirements**	A	Requirement • Definition	To know the meaning of Requirement in software engineering	02	08	
		B	Types of Requirements: • User Requirements • System Requirements • Functional, Non-functional, Domain Requirements	To learn the types of requirements found in software systems			
		C	Problems with Requirements using Natural Language	To learn the problems faced when gathering requirements using natural language			
IV	**Unified Modeling Language**	A	UML • Introduction to UML • Origins of UML • Need for UML	To know the origins and the need of UML in software development	03	04	
		B	Types of UML diagrams • Use case diagram • Class diagram • Activity diagram • Sequence diagram • State Chart Diagram • Collaboration Diagram • Deployment Diagram • Object Diagram	To study a brief introduction to the different UML diagrams			

		C	Behaviour Diagram I: Use Case Modeling (Scenario Based Modeling) • Introduction • Need • Components of Use Case ▪ Actor ▪ Use Case ▪ Use Case Relationship ▪ (Include, Extend and Use Case Generalization) • Writing Use Cases Formally • Use Case Diagram	To identify the functional requirements of the system with the help of Use Case Modeling	03	08	
		D	Structure Diagrams: Static Modeling using Class Diagram • Introduction • Need • Class ▪ Attributes ▪ Operations • Associations ▪ One-to-One • One-to-Many • Many-to-Many • Role Names • Association Class • Ternary Association • Recursive Association • Aggregation • Generalization	To able to use the various components to model a system using Class Diagram	05	10	
		E	Interaction Diagram: Sequence Diagram • Introduction • Need • Object Representation, Life Line and Activation Boxes • Combining Fragments ▪ Alt Fragment • Loop Fragment • Opt Fragment	To be able to learn and show the flow of control and data among the things in the system being modeled using Sequence Diagram	03	06	

			• Break Fragment				
		F	Behaviour Diagram II: Dynamic Modeling using Activity Diagram • Introduction • Need • States ▪ Start State ▪ End State ▪ Activities State • Flow Line • Fork and Join • Swim Lanes	To be able to learn and model the functionality of the system with work flows using Activity Diagram	04	08	
		G	Behaviour Diagram II: Dynamic Modeling using State Chart Diagram • Introduction • Need • Representation of State • Simple events	To be able to learn and model the various states of the objects of the system using State Chart Diagram	03	06	
V	**Requirements Engineering Process**	A	Introduction • Definition	To know the meaning of Requirements Engineering Process	02	08	
		B	Phases of Requirements Engineering Process: • Requirements elicitation • Requirements analysis and negotiation • Requirements specification • Requirements validation • Requirements management	To learn briefly the various phases of Requirements Engineering Process			
		C	Techniques for Requirements Elicitation • Brainstorming • Interview • Prototyping • Requirement Workshop	To learn the various techniques in brief used in requirements elicitation	01		
VI	**Feasibility Study**	A	Feasibility Study • Definition • Importance	To learn the importance and the types of feasibility study that can be used for a software system	02	06	

			• Types of Feasibility study ▪ Technical ▪ Operational ▪ Resource ▪ Legal/Ethical ▪ Economical				
VII	**Software Requirement Specification**	A	Software Requirements Document (SRS) • Definition • Importance of SRS • Characteristics of SRS • Format of SRS	To learn the importance and how to document the SRS for a software system	02	06	
VIII	**Project Scheduling using Gantt Chart**	A	Introduction to Project Scheduling	To study in brief the need for project scheduling for a software project	02	06	
		B	Timeline Chart: Gantt Chart • Introduction • Components of a Gantt Chart • Drawing a Gantt Chart	To study the use of Gantt Chart as tool for scheduling in a software project			

References:

1- Software Engineering By Roger Pressman (4e)
2- Software Engineering- A Practioner's approach by Pankaj Jalote
3- Software Engineering by Ian Sommerville
4- UML Distilled by Martin Fowler
5- Object Oriented Analysis and Design Using UML by Mahesh Matha
6- Requirements:
   a. http://www.inf.ed.ac.uk/teaching/courses/ip/CS2Ah0405-SoftwareRequirements.pdf
7- Feasibility Study
   a. http://www.exforsys.com/tutorials/programming-concepts/feasibility-study-why-needed-before-programming.html
   b. http://www.learn.geekinterview.com/it/sdlc/project-planning-and-feasibility-study.html
   c. http://www.indiastudychannel.com/resources/102399-Feasibility-Types-Fesibility.aspx

BCA SEMESTER IV		
COURSE CODE : BCA 402	**COURSE TITLE : COMPUTER NETWORKS**	
Total marks : 100	Total credits : 05	Total contact hours : 45

Course prerequisites : none

Course objectives: To introduce the concepts, terminologies and technologies used in modern day data communication and computer networking.

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	**Data Communications**	A	Beginnings of Networking and data communication • ARPAnet	To study the origins of modern day Internet	05	10	
		B	Networks • Components and Categories • Types of Connections • Topologies	To study the classification of networks			
		C	Protocols and Standards • Layered Architecture • ISO/OSI model • TCP/IP model	To understand the need of layered architecture			
		D	Applications of Networks	To know the applications of networks in all fields of modern world			
		E	Examples of Network	To understand the Internet architecture			
II	**Physical layer**	A	Functions of Physical layer	To know the functions of physical layer	08	15	
		B	Data Encoding • Manchester • Differential Manchester	To understand the techniques used in data encoding			
		C	Transmission Media • Twisted pair • Coaxial Cable • Fiber Optics • Wireless Media	To study the different data transmission media			
		D	Physical layer Devices	To know the function of repeaters			

			• Repeaters				
III	**Data Link Layer**	A	Functions of Data link layer	To know the functions of data link layer	10	25	
		B	Data Framing techniques • Character Count • Character Stuffing • Bit Stuffing	To understand the data framing techniques			
		C	Error detection and correction • Parity • CRC • Hamming code	To study the different error detection and correction methods			
		D	Protocols • Stop and wait • Go back-N ARQ • Selective repeat ARQ • Sliding window • HDLC	To learn the data link layer protocols			
		E	Network Standards • Ethernet IEEE 802.3 • IEEE 802.4 • IEEE 802.5 • IEEE 802.11 • FDDI • SONET	To study the different IEEE standards for computer networking			
		F	Data Link layer devices • Bridges	To know the function of bridges			
IV	**Network layer**	A	Functions of Network layer	To know the role of the network layer in data communication	10	20	
		B	Network Service types • Virtual Circuits • Datagrams	To study the two network service types			
		C	Routing Algorithms • Shortest path routing • Distance Vector routing • Link State routing	To the concept of routing and the different algorithms used for routing			
		D	Internetworking	To learn the concepts of internetworking			

		E	Internet Protocol • Frame Format • Addressing • Subnetting	To study the IP protocol suite			
		F	Network layer devices • Gateways	To know the function of gateways			
V	**Transport layer**	A	Functions of Transport layer	To know the functions of the transport layer	06	15	
		B	Transport Service • Connection less • Connection oriented	To study the differences between the two services of the transport layer			
		C	Protocols • User Datagram Protocol • Transmission Control Protocol	To learn the transport layer service protocols			
		D	Quality of Services parameters	To understand the parameters that determine the quality of a transport service			
		E	DSL Service	To know the concept of a DSL service			
VI	**Application layer**	A	Functions of Applications layer	To know the role of the application layer in data communication	06	15	
		B	Protocols • FTP • SMTP	To study the two main protocols of network applications			
		C	Domain Name System	To understand the concept and the working of a DNS			
		D	Principles of Cryptography	To know the concept of data security and cryptography			

Reference

1. Data Communications and Networking; Behrous A. Forouzan.
2. Computer Networks; (3e) Andrew S. Tanenbaum.

BCA SEMESTER III

COURSE CODE : BCA303	COURSE TITLE : MANAGEMENT FUNCTIONS	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : none		
Course objectives : To introduce the different concepts of management functions within an organizational framework		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	Planning	A	Concept of Planning Definitions of Planning Importance of Planning	To study the function of planning	08	20	
		B	Types of Planning :- • Corporate and Functional Planning • Strategic and Operational Planning • Long-term and Short-term Planning • Proactive and Reactive Planning • Formal and Informal Planning	To familiarize with the different types of planning			
		C	Planning in Indian Organizations Objectives :- Meaning and Definition	To understand the function of planning in the Indian perspective			
		D	Management by Objectives :- Meaning and definitions Features of M.B.O.	To study the concept of management by objectives			

			Process of M.B.O Advantages of M.B.O.				
II	**Organizing**	A	Meaning and Definitions Concept of Organization Organization as a structure	To study the various concepts of organizing	12	24	
		B	Factors affecting organization structure :- □ Environment □ Strategy □ Technology □ Size □ People				
		C	Authority and Responsibility :- Concept of authority Sources of Authority Limits of Authority Power Sources of Power Responsibility	To study the different types of power and authority			
		D	Delegation of authority Blocks to Effective Delegation Measures for Effective Delegation Centralization and Decentralization	To study delegation of authority within an organization			
III	**Leadership**	A	Concept of Leadership Difference between Leadership and Management	To understand the need for provisions and reserves	10	20	
		B	Leadership Theories :-	To study the different theories of leadership			

			• Charismatic Leadership Theory • Trait Theory • Behavioral Theory • Situational Theory Successful Leadership V/s Effective Leadership				
		C	Leadership Development: - Ingredients of Leadership Development Leadership Development process	To learn the traits and qualities of a leader			
IV	**Motivation**	A	Concept of Motivation Motivation and Performance	To learn the relationship between motivation and performance	08	20	
		B	Theories of Motivation:- • Maslow's Need Hierarchy • Herzberg's Motivation – hygiene Theory • Mc Clelland's Needs Theory • Alderfer's ERG Theory • McGregon's Theory X and Theory Y	To study the different theories of motivation			
V	**Decision Making**	A	Meaning importance steps Types	To learn the different aspects of decision making	07	16	
		B	Controlling :- Meaning Process Essentials				
		C	Communication:-				

			Meaning Process Types Barriers and how to overcome them				

References

1. Management Concepts and Practices; Manmohan Prasad
2. Management concepts and Practices; Pradeep Kumar
3. Management Concepts and Strategies; J.S. Chandan

BCA SEMESTER IV

COURSE CODE : BCA404	**COURSE TITLE : DATA ANALYSIS AND STATISTICAL TECHNIQUES**	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : none		
Course objectives : To introduce the concepts of analyzing data using mathematical and statistical techniques.		

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**hours**	**%**	
I	**Probability and Distribution**	A	Introduction Experiments Counting Rules and Assigning Probabilities Events and their Probabilities	To understand the concept of probability and probability distributions	09	15	
		B	Distribution Some basic Relationships of Probability				

			Conditional Probability Baye's Theorem Normal Distribution Poisson Distribution				
II	**Sampling, Sampling Distribution & Testing of Hypothesis**	A	Introduction to Sampling Simple Random Sampling Estimation Point Estimation Interval Estimation	To develop the ability to carry out testing of hypothesis on a population based on statistical measures of samples	09	20	
		B	Introduction to Sampling Distributions • Sampling Distribution • Other Sampling Methods ❖ Population Mean: σ Known, σ Unknown ❖ Determining the Sample Size ❖ Population Proportion				
III	**Correlation and Regression**	A	Measures of Association between Two Variables • Covariance • Correlation	To be able to carry out simple linear regression analysis	06	15	
		B	Introduction to Regression • Simple linear Regression Model • Least Square Method				
IV	**Statistics**	A	Introduction:	To develop the ability to	12	35	

			• Definition of statistics • Data and Collection of data • Summarizing Qualitative and Quantitative Data: • Frequency Distribution • Graphs ❖ Frequency Polygon ❖ Histogram	compute descriptive statistics including diagrammatic representation and interpretation			
		B	Measures of location • Mean • Median • Mode • Percentiles • Quartiles • Weighted Mean • Working with Grouped Data Measures of Variability				
		C	• Range • Quartile Deviation • Standard Deviation and Variance				
V	**Data Mining**	A	Data Mining • Introduction • Knowledge Discovery Process • Use and Applications	To know about some basic tasks in data mining and their applications	09	15	
		B	Mining Item Sets and Association Rules • Frequent Item Set Mining • Apriori Algorithm • Association Rule Mining				
		C	Classification and Clustering • Classification ❖ Definition ❖ Model Construction ❖ Model Usage				

			• Clustering ❖ Definition ❖ Distance Measure ❖ Clustering Types ❖ K-means ❖ K-medoid • Outlier Analysis ❖ Definition ❖ Example				
		D	Data Mining • Introduction • Knowledge Discovery Process • Use and Applications				
		E	Mining Item Sets and Association Rules • Frequent Item Set Mining • Apriori Algorithm • Association Rule Mining				

Reference

1. S P Gupta, “Statistical Methods”, 30th edition, S Chand
2. R J Shah “Statistical Techniques”

BCA SEMESTER IV			
COURSE CODE : BCA405	**COURSE TITLE : GRAPHICAL INTERFACE DESIGN LABORATORY**		
Total marks : 100	Total credits : 05	Total lab sessions : 15	
Course prerequisites : BCA201			
Course objectives : To learn to design software applications using the graphical interface designing programming language			
Course contents :			
Unit	**Topic**	**Weightage**	**References**

#	Title	#	Content	Learning outcomes	Sessions	%	
I	**Introduction to GUI**	A	Components of the GUI • Windows • Interactive Input Devices • Forms	To study the different components of a graphical user interface	01	05	
		B	Features of GUI				
		C	Laboratory exercises to observe and record different components of a graphical interface	To identify the different components by observing GUI software			
II	**Components of GUI**	A	GUI based forms controls • TextBoxes • ComboBoxes • PasswordBoxes • Check Boxes • Grid • Lists • Dialog Boxes • Command Buttons • Radio Buttons • Sliders • Progress Bars • Frames • Tabs etc	To learn the different form controls in a GUI and understand the characteristics and use of each	01	10	
		B	Characteristics of each control Advantages and limitations of each control				
		C	Laboratory Exercises to test each component and record its behavior in execution	To know the behavior of each of the form control in execution			
III	**Form Design**	A	Planning the layout of forms for accepting user input	To plan and design a neat, simple and user friendly forms	01	10	
		B	Using suitable controls to match the type of data to be input				

		C	Laboratory exercises to plan the layout and design forms for different cases	To implement form design principles for effective forms			
IV	**Events**	A	Types of events • Click • Double Click • KeyPress • MouseMove etc	To learn the different events in form design	01	15	
		B	Event Listening	To learn to capture different events			
		C	Laboratory exercises on capturing events in response to actions				
V	**Programming**	A	Programming Language	To study a suitable Graphical Interface designing programming language	03	20	
		B	Laboratory exercises to demonstrate the usage of all the constructs of the programming language	To study the different constructs of a Graphical Interface designing language			
VI	**Form Processing**	A	Form Validation	To learn to handle form data validations	05	25	
		B	Error handling	To learn to handle runtime errors caused by some abnormal conditions			
		C	Database Connectivity	To learn to connect to a suitable database to store data			
		D	Laboratory exercises to demonstrate form validations, error handling and database connectivity	To learn to create a full-fledged data input forms			
VII	**Reports**	A	Planning the Layout of a report	To learn to design reports for effective information presentation	01	10	
		B	Using suitable controls to display information using reports				
		C	Laboratory exercises to use reports to display	To learn to use reports for displaying information			

			information, based on data retrieved from the database				
VIII	**Software Creation**	A	Developing a simple database application	To create a simple database software Application	02	05	

BCA SEMESTER IV

COURSE CODE : BCA406	**COURSE TITLE : DATA ANALYSIS AND E-ACCOUNTING LABORATORY**

Total marks : 100	Total credits : 05	Total lab sessions : 15

Course prerequisites : None

Course objectives : To develop basic skills in data analysis by implementing different techniques of data analysis and maintaining accounts using common software applications

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	#	**Content**	**Learning outcomes**	**Sessions**	**%**	
I	**Equation Solver**	A	• Introduction to Equation Solver • Solving Linear equations in one variable • Solving Linear equations in two	To know to use Equation Solver to solve the simple problems	03	20	
		B	• Linear Programming Problem Formulation • Solving LPP using MS Equation Solver • Perform sensitivity analysis				
		C	• Solving Transportation Cost Problems • Work Assignment Problems • Perform sensitivity analysis				

II	**Functions & Images**	A	**Functions** • Plot Graphs for simple functions • Derivatives • Integration	To use algorithms for plotting graphs, image processing etc.	03	25	
		B	**Image Processing** • Matrices • Simple processing of Grey Scale images • Colour images				
		C	**Algorithm Implementation** • Implementing simple data analysis algorithms as standalone applications using -means(any programming language 1. K clustering) 2. Finding frequent item sets(apriori)				
III	**Statistical Analysis**	A	**Managing Data** • Listing cases, • Replacing missing values • Computing new variables • Recording variables • Exploring data • Selecting cases • Sorting cases • Merging files	To use the different statistical concepts for data representation	03	35	
		B	**Graphs** • Creating and editing graphs and charts				
		C	**Frequencies** • Bar charts • Histograms • Percentiles				
		D	**Descriptive Statistics** • Measures of central tendency • Variability • Deviation from normality				

			• Size and stability • Cross Tabulation • Chi-square analyses • The means Procedure				
		E	**Bivariate Correlation** □ Bivariate Correlation □ Partial Correlations □ Correlation matrix				
		F	**The T-test procedure** • Independent – samples □ Paired samples □ One sample tests				
IV	**E-Accountancy**	A	• Creation of Company • Ledgers and Accounts • Creation of Journal and Ledgers • Creating and editing graphs and charts	To learn to use computer software for managing accounts	03	20	

References

1. SPSS
2. Microsoft Excel Resources

BCA SEMESTER IV

COURSE CODE : BCA406	**COURSE TITLE : DATA ANALYSIS AND E-ACCOUNTING LABORATORY**	
Total marks : 100	Total credits : 05	Total lab sessions : 15

Course prerequisites : None

Course objectives :To develop basic skills in data analysis by implementing different techniques of data analysis and maintaining accounts using common software applications

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**Sessions**	**%**	
I	**Equation Solver**	A	• Introduction to Equation Solver	To know to use Equation	03	20	

			• Solving Linear equations in one variable • Solving Linear equations in two	Solver to solve the simple problems			
		B	• Linear Programming Problem Formulation • Solving LPP using MS Equation Solver • Perform sensitivity analysis				
		C	• Solving Transportation Cost Problems • Work Assignment Problems • Perform sensitivity analysis				
II	**Functions & Images**	A	**Functions** • Plot Graphs for simple functions • Derivatives • Integration	To use algorithms for plotting graphs, image processing etc.	03	25	
		B	**Image Processing** • Matrices • Simple processing of Grey Scale images • Colour images				
		C	**Algorithm Implementation** • Implementing simple data analysis algorithms as standalone applications using -means(any programming language 3. K clustering) 4. Finding frequent item sets(apriori)				
III	**Statistical Analysis**	A	**Managing Data** • Listing cases, • Replacing missing values • Computing new	To use the different statistical concepts for data representation	03	35	

			variables • Recording variables • Exploring data • Selecting cases • Sorting cases • Merging files				
		B	**Graphs** • Creating and editing graphs and charts				
		C	**Frequencies** • Bar charts • Histograms • Percentiles				
		D	**Descriptive Statistics** • Measures of central tendency • Variability • Deviation from normality • Size and stability • Cross Tabulation • Chi-square analyses • The means Procedure				
		E	**Bivariate Correlation** □ Bivariate Correlation □ Partial Correlations □ Correlation matrix				
		F	**The T-test procedure** • Independent – samples □ Paired samples □ One sample tests				
IV	**E-Accountancy**	A	• Creation of Company • Ledgers and Accounts • Creation of Journal and Ledgers • Creating and editing graphs and charts	To learn to use computer software for managing accounts	03	20	

References

3. SPSS
4. Microsoft Excel Resources

BCA SEMESTER V

COURSE CODE : BCA401	COURSE TITLE : SOFTWARE TESTING	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : none		
Course objectives : To study the concepts of software engineering with the aim of acquiring skills to develop software applications, following all standardized procedures and techniques		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	hours	%	
I	**Software testing principles**	A	**Software Testing** • Need for testing Psychology of testing • Testing economics • SDLC and Testing • Verification & Validation • Quality Assurance • Quality Control	To understand the concept of software testing, and software quality maintenance	04	18	
II	**Testing strategies and types**	A	**White box testing techniques** • Statement coverage • Branch Coverage • Condition coverage • Decision/Condition coverage • Multiple condition coverage • Dataflow coverage • Automated code coverage analysis □ Inspections □ Walkthroughs □ Code Review	To learn to inspect and detect errors by going through each and every code segment	08	20	
		B	**Black box testing techniques** • Boundary value analysis				

			Robustness testing Equivalence partitioning Syntax testing Finite state testing Levels of testing Unit, Integration and System Testing Compatibility Testing Domain Testing Adhoc Testing Use of Requirements Traceability Matrix				
		C	**Integration Testing Waterfall** • Top-down • Bottom up • Big bang • Sandwich				
		D	**System and Performance Testing** Types of system testing Functional and non-functional testing Acceptance Testing Setting entry and exit criteria for phases and typical product release scenarios Basic factors governing performance testing Methodology for performance testing Tools for performance testing				
			Regression Testing Purpose Timing Choice of tests Smoke tests Best practices				
			Internationalization and Localization testing • Preliminary concepts • Adhoc testing				

			□ Pair testing □ Extreme testing □ Agile testing □ Exploratory testing □ Defect seeding				
			Usability Testing • Factors in usability testing • Aesthetics testing • Accessibility testing • Tools for usability testing				
III	**Testing object oriented software**		□ Definitions and Challenge differences from testing non-OO Software □ Class testing strategies Class Modality □ State-based Testing □ Message Sequence Specification		05	15	
IV	**People and organizational issues in testing**	A	□ Common people issues and myths in testing □ Providing career paths in testing □ Organizational structures for testing teams □ Geographically distributed testing teams and success factors		05	15	
V	**Test Management and Automation**	A	• Test Planning • Test Management • Test Process • Test Reporting • Test Automation • Factors to consider in automation • Challenges in test automation • Test Metrics • Product Metrics • Process Metrics • Progress Metrics		04	10	

			• Use of metrics in ascertaining product release				
VI	**Importance of documentation**	A	• Need for Software Documentation • Different types of documentation • Understanding task orientation • Analyzing users • Writing user scenarios • User informational needs • Document goals • User work motivations • User analysis checklist • Constructing a task list • Categorization • Writing steps as actions • Task analysis		04	12	
VII	**Maintenance**	A	**The Context of Maintenance** □ Definitions □ Economics of Maintenance □ Evolution of Software Products □ Maintaining Systems Effectively □ Categorizing Software products Deployment Models □ Types of maintenance		10	20	
VIII	**Software Configuration Management**	A	• Baseline identification • Accounting • Control • Audit • Source and version control • Change control procedure • Tools used in SCM		05	06	

References :

1. Software Testing – Principles and Practices; Srinivasan Desikan and Gopalaswamy Ramesh.
2. Integrated Approach to Software Engineering (3e); Pankaj Jalote, Narosa Edition.

BCA SEMESTER V

COURSE CODE : BCA502	**COURSE TITLE : WEB TECHNOLOGY**	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : none		
Course objectives : To understand the fundamentals of web designing and acquire skills in developing web applications using latest tools in web technology		

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	#	**Content**	**Learning outcomes**	**hours**	**%**	
I	**Introduction to Web Technology**	A	History of World wide web	To study the origins and background of world wide web	05	10	
		B	Protocols governing web	To know the protocols of world wide web			
		C	Client/Server paradigm	To study the concept of client/server paradigm			
		D	Tiers • Concept of a Tier • Two-tier applications • Three-tier applications	To study the concept of a tier, the difference between two tier and three tier web applications			
II	**Web Servers and Web Browsers**	A	Concept of a web server	To understand the role of a webserver, its functions and types of webservers	02	06	
		B	Functions of a webserver				
		C	Concept of a web browser	To understand the types of web browsers, features and types of web browsers			
		D	Features of a web browser				
III	**Hypertext Markup Language**	A	Introduction • Concepts of a markup language • Interpretation of tags	To study the concept of a markup language	10	20	
		B	Basic tags	To study the various types			

		C	Table tags	of HTML tags			
		D	Form tags				
		E	Meta tags				
		F	Framesets				
IV	**Cascading Style Sheets**	A	Introduction Applying CSS □ Inline □ Internally embedded □ Externally linked	To learn the role of style sheets for webpage formatting	03	10	
		B	Borders	To study the various CSS elements			
		C	Backgrounds				
		D	Text Effects				
		E	Fonts				
V	**Client-side Scripting**	A	Functions of client-side scripting	To study a client-side scripting language	06	14	
		B	Input/Output Statements				
		C	Decision Statements				
		D	Looping Statements				
		E	Functions				
		F	Form Validation				
VI	**Document Object Model**	A	Concept of DOM	To understand the document object model, and its applicability in client-side scripting	04	06	
		B	DOM Hierarchy				
		C	DOM Objects				
		D	DOM Methods				
		E	Advantages and limitations of DOM				
VII	**Server-side Scripting**	A	Introduction • Function of server-side scripting	To understand the concept of server-side scripting	06	14	

			• Types of server-side scripting				
		B	Input/Output Statements	To learn a server-side scripting language			
		C	Decision Statements				
			Looping Statements				
			Functions/Subroutines				
			Database Connectivity				
			Report Generation				
VIII	**Extensible Markup Language**	A	Introduction □ Need for XML □ Features of XML	To study XML as a language for data exchange between applications	03	8	
		B	XML Namespaces				
		C	XML DTD				
		D	XML Schemas				
		E	XML Sheets				
		F	Types of XML packages				
IX	**Web Security**	A	Principles of Security	To learn how to apply security to web applications	06	12	
		B	Cryptography				
		C	Digital Certificates				
		D	Digital Signatures				
		E	Secure Socket Layer				

References :

1. Internet & World Wide Web - How to Program(2e); Deitel
2. HTML for the World Wide Web with XHTML and CSS; Elizabeth Castro
3. HTML5 24-Hour Trainer; Joseph W. Lowery, Mark Fletcher
4. Beginning HTML, XHTML, CSS, and JavaScript; Jon Duckett

BCA SEMESTER V

COURSE CODE : BCA505	COURSE TITLE : WEB TECHNOLOGY LABORATORY	
Total marks : 100	Total credits : 05	Total lab sessions: 15
Course prerequisites : BCA502		
Course objectives :To acquire skills in developing web applications using latest tools and technology in web designing		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	Sessions	%	
I	Webservers	A	Installation	To setup up and use a webserver for testing and deploying web applications	01	05	
		B	Configuration and setup				
II	Hypertext Markup Language	A	Basic tags	To learn to create simple static webpages using html tags	02	20	
		B	Table tags				
		C	Form tags				
		D	Meta tags				
		E	Framesets				
III	Cascading Style Sheets	A	Basic Style sheets	To learn styling using standardized pure CSS	01	05	
		B	Classes and identifiers				
IV	Exercise – I	A	Develop a simple website using static pages	To implement all concepts learnt in Unit I,II and III	02	10	
V	Client-side Scripting	A	Input/Output Statements	To learn client side scripting using a scripting language	02	15	
		B	Decision Statements				
		C	Looping Statements				
		D	Functions				
		E	Form Validation				
VI	Document	A	DOM Hierarchy	To use DOM concepts for	01	10	

	Object Model	B	DOM Identifiers	client side scripting			
		C	DOM methods				
VII	**Exercise – II**	A	Develop a web based game application	To implement all concepts learnt in Unit I, II, III, IV and V	02	10	
VIII	**Server-side Scripting**	A	Input/Output Statements	To learn server side scripting using database connectivity and report generation	02	15	
		B	Decision Statements				
		C	Looping Statements				
		D	Functions/Subroutines				
		E	Database Connectivity				
		F	Report Generation				
IX	**Exercise – III**	A	Develop a web based online database application	To implement all concepts learnt in Unit I, II, III, IV, V and VI	02	10	

BCA SEMESTER V

COURSE CODE : BCA601	**COURSE TITLE : MANAGEMENT INFORMATION SYSTEMS**	
Total marks : 100	Total credits : 05	Total contact hours : 45

Course prerequisites : none

Course objectives : To develop an in-depth understanding of essential components comprising management information systems implemented through software

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**hours**	**%**	
I	**Introduction to MIS**		Definition of MIS	This topic introduces the concept of MIS and explains the definition of MIS.	03	16	
			Distinction between Data and Information	To learn the subtle yet important differences between ‘data’ and			

				'information'			
			Information and Management	To explore the vital role 'information' plays in organisational management			
II	**Information and Decisions**		Types and Sources of Information	To le various types of organisational information and the sources that are tapped in order to acquire information.	08	15	
			Attributes of Information	To learn how to assess the quality of any information by understanding the attributes/characteristics of information.			
			Types of Decisions (Idealistic vs. Realistic)	To learn the differences between the classical/idealistic and administrative/realistic decisions			
			Models of Decision Making	To expose to important decision making models			
			Tools for Decision Making	To describe various tools used by managers for making decisions in organisations.			
III	**Information and Knowledge**		Distinction between Information, Knowledge and Wisdom	To explore the process of how information leads to knowledge and how knowledge helps in attaining wisdom of judgement.	06	15	
			Introduction to Knowledge Management	To introduce the concept of knowledge management explaining the importance of capturing, storing and utilizing knowledge in an organisation			

			Types of Knowledge	To learn the classifications of knowledge and different perspectives on knowledge.			
			The Spiral of Knowledge Creation	To describe the process of how knowledge is created and converted from one form to another in order to utilise it for the benefit of the organisation.			
			Tools for Knowledge Conversion	To covers some basic tools like metaphors, analogies and models for converting knowledge from tacit to explicit form.			
IV	**Types of Information Systems**		Office Automation System (OAS) • Features • Advantages and limitations	To study the concept of office automation systems	12	24	
			Expert System (ES) • Features • Advantages and limitations	To study the concept of an expert system			
			Executive Support System (ESS) • Features • Advantages and limitations	To study the concept, features and benefits of an ESS			
V	**Information Systems in Organizations**		Overview of Various Information Systems	To give an overview of different information systems like ERP, SCM and CRM systems	10	20	
			ERP Systems	To learn the basics of Enterprise Resource Planning systems, which have become a part and parcel of today's corporate world.			

			SCM Systems	To provide elementary knowledge of Supply Chain Management systems.			
			CRM Systems	To provide introductory information about Customer Relationship Management systems and how they help marketing people.			
VI	**Information Systems - Case Studies**		Information systems for □ Accounting □ Finance □ Production □ Manufacturing □ Marketing □ HRM functions	To study some real-world information systems	06	10	

References :

1. Management Information Systems;(10e) Kenneth J Laudon, Jane P. Laudon
2. Management Information Systems; (3e) W. S. Jawadekar
3. MIS; Ralph Stair
4. Introduction to Information System;(12e) James A. O' Brien McGraw Hill
5. Management Information Systems;(1e) S.Sadagopan
6. Management Information Systems; (3e) Effy Oz, Thomson Course Technology
7. Corporate Information Strategy and Management;(7e) Lynda M AppleGate, Robert D Austin et al

BCA SEMESTER VI

COURSE CODE : BCA602	**COURSE TITLE : MULTIMEDIA TECHNOLOGY**	
Total marks : 100	Total credits : 05	Total contact hours : 45
Course prerequisites : BCA201		
Course objectives :To learn the design concepts of computer multimedia and its applications		

Course contents :

Unit		**Topic**			**Weightage**		**References**
#	**Title**	**#**	**Content**	**Learning outcomes**	**hours**	**%**	

I	**Introduction to Multimedia**	A	Multimedia • Types • Applications	To study the different aspects of multimedia	06	15	
		B	Multimedia Design Principles	To know the issues and principles in design and use of multimedia			
		C	Multimedia Technologies • Image(Graphic) • Sound(Audio) • Motion Picture(Video)	To learn the different forms of multimedia			
III	**Graphic Media**	A	Definition	To study the concepts of graphic media	12	25	
		B	Types of graphics • Vector Graphics				
		C	Graphic Formats • JPEG • GIF • TIFF • CGM • PNG • BMP	To study the different file formats of graphic media, with focus on its storage and representation			
		C	Graphic Formats Design Issues • File Storage principle • Differences between the different formats • Use of each format				
		D	Conversion from one format to another	To learn the issues in inter-conversion of graphic formats			
		E	Color modes • RGB • CMYK • Grayscale	To study the different color modes of graphics			
		F	Graphic manipulation effects	To study the different effects used for graphic quality enhancement			
IV	**Audio Media**	A	Definition	To study the concepts of audio media	10	25	
		B	Audio Formats • WAV	To study the different file formats of audio media, with focus on its storage			

			• MP3 • WMA • OGG	and representation			
		C	Common Audio Formats • Storage issues • Differences between the different formats • Use of each format	To study the different application packages to create and edit audio streams			
		D	Audio Streaming	To understand the need and concept of audio streaming			
		E	Audio Effects	To study the different effects used for audio quality enhancement			
V	**Video Media**	A	Definition	To study the concepts of video media	12	25	
		B	Video Formats • AVI • MPEG • MP4 • DIVX • 3GP • VCD • DAT • DVD • SWF	To study the different file formats of video media, with focus on its storage and representation			
		C	Common Vide Formats • Storage issues • Differences between the different formats • Use of each format				
		D	Video Codecs	To know the concept of video coding and decoding			
		E	Video Effects	To study the different effects used for video enhancement			
VI	**Other Media**	A	Web culture and Media	To learn the characteristics of the different multimedia used on the web	05	10	
		B	Print Media	To know the newer concepts in print media			

BCA SEMESTER VI

COURSE CODE : BCA605	COURSE TITLE : MULTIMEDIA LABORATORY	
Total marks : 100	Total credits : 05	Total lab sessions: 15
Course prerequisites : BCA201		
Course objectives :To learn different multimedia formats and use the different media to create applications		

Course contents :

Unit		Topic			Weightage		References
#	Title	#	Content	Learning outcomes	Sessions	%	
I	Introduction Multimedia	A	Multimedia	To study the different multimedia components	01	05	
		B	Types of Multimedia				
		C	Applications of Multimedia	To learn the different forms of multimedia as applicable for effective presentation			
II	Components of Multimedia	A	Graphics	To study the major components of multimedia and their integrated effect	01	10	
		B	Audio				
		C	Video				
III	Graphic Media	A	Graphic Formats □ JPEG □ GIF □ TIFF □ BMP	To study the different formats and application packages to create and edit graphics	04	25	
		B	Graphic Packages				
		C	Animation Techniques	To learn the concepts and techniques of computer animation			
IV	Audio Media	A	Audio Formats □ Wav □ MP3 □ CDDA	To study the different audio file formats	03	25	

		B	Audio Editing	To study the different application packages to create and edit audio streams			
V	**Video Media**	A	Video Formats □ Avi □ MPEG □ MP4	To study the different video file formats	04	25	
		B	Video Capturing and Editing	To learn the techniques of video capturing and conversion using different software applications			
		C	Video Effects and transitions	To learn to apply different video editing effects			
VI	**Web Media**	A	Web Multimedia Formats • swf	To learn to use the different multimedia components customized for the web	02	10	
		B	Conversion of Formats	To study the transportation of media through the web			