FYBCA Course Details under CBCS

	SEMESTER- I	
Course Code	Subjects	Course Credits
CAC-101	Problem Solving and Programming Concepts	4
CAC-102	Computer Organization and Architecture	4
CAC-103	Basic Mathematics	4
CAC-104	Problem Solving and Programming Laboratory	2
	GE To be selected by College from approved list	4
ESA-101	Environmental Studies	2
	SEC To be selected by College from approved list	2
	Total	22
	SEMESTER – II	
Course Code	Subjects	Credits
CAC-105	Data Structures	4
CAC-106	Operating Systems Concepts	4
CAC-107	Applied Mathematics	4
CAC-108	Data Structures Laboratory	2
	GE To be selected by College from approved list	4
ESA-102	Environmental Studies	2
	SEC To be selected by College from approved list	2
	Total	22

List of Generic Electives (GE)		
Course Code	Subjects	Course Credits
CAG-101	Business Accounting	4
CAG-102	Cost Accounting	4
CAG-103	Advertising	4
CAG-104	Human Resource Management	4
CAG-105	Entrepreneurship Development	4
CAG-106	Marketing Fundamentals	4

List of Skill Enhancement Courses (SEC)		
Semester I		
Course Code	Subjects	Course Credits
CAS-101	IT Tools Laboratory	2
CAS-102	Programming in Scratch	2
CAS-103	Digital Photography	2
CAS-104	Open Source Software	2
Semester II		
CAS-105	Operating Systems Laboratory	2
CAS-106	Programming in Python	2
CAS-107	HTML & CSS	2
CAS-108	PHP Programming	2

Core Courses

Total marks : 100		Total credits : 04	
PROBLEM SOLVING AND PROGRAMMING CONCEPTS			
Course Objective: To study the concepts of solving problems using a computer by designing programs as solutions			
Unit		**Topic**	
#	**Title**	**# Content**	**Learning Objectives**
I	**Evolution of programming languages**	A Evolution of programming languages - Introduction to machine level language, Assembly language and Higher level languages.	To become familiar with the evolution of programming languages and know the strengths and weakness of each generation of language
II	**Computer Problem Solving**	A Programing Life Cycle – Understanding the Problem Statement, Planning Program design using Hierarchy charts, Expressing Program logic using flowcharts / Pseudocode, Coding using a programing language such as 'C', Documenting, Compiling, Debugging and Executing	To understand the importance of each step in the programing life cycle and thereby learn to write structured and well documented modular programs.
		B Structured / Goto Less Programming concept, Modular Programming - Top-Down Design, Bottom –up design , Stepwise Refinement	
III	**Computing concepts**	A Data	To study the basic entity in computing
		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
		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
		J	Relational operators	To learn to relate and compare multiple data entities
IV	**Algorithm Development**	A	Definition	To know what an algorithm is and its origins
		B	Algorithm: a solution to a problem	To learn to use pseudo-code to design solutions
		C	Input-Output Statements	
		D	Decision Making Statements	
		E	Looping Statements	
		F	Examples	To get a practical hands on for writing pseudo-code
V	**Flowcharting**	A	Definition	To study how to write the graphical representation of an algorithm to check flow of control
		B	Symbols	
		C	Input-Output Statements	
		D	Decision Making Statements	
		E	Looping Statements	
		F	Module representation	
		G	Drawing conventions and standards	
		H	Examples	To thorough the nitty-gritties of flowcharting
VI	**Debugging**	A	Bug : Definition	To learn error detection and correction skills
		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
		B	Comments and need for commenting	
		C	Documentation styles	
VI	**Programming**	A	Structure of a C Program, library functions, Pre-processor directives.	To understand the conversion of algorithms expressed using pseudocode / flowchart into computer program using C as the programing language.
		B	Constants, variables and keywords in C.	To learn the programming language specific constructs
		C	Type of arithmetic instruction, integer and float conversion. Data types in C.	To learn the programming specific data types and their usage.
		D	Decision control structure- if statement, if –else statement, nested	To know the various decision control statements and compound conditional statements.

			if-else, switch case, use of logical operators.	
		E	The loop structure- while loop, for, do while. Use of break and continue statements. Menu driven programs using switch – case.	To use the different looping structures and to combine decision and looping structures
		F	Functions: passing values between functions. Scope of functions, function declaration and prototype, call by Value and Call by reference. Storage classes in C. Recursive functions.	To use the concept of modular programming.
		G	Arrays: one dimensional array, two dimensional arrays. Algorithm for String functions (strlen, strcpy,strcat, strcmp, strcmpi etc) using arrays. Functions and Arrays	To know static memory allocation for multiple data storage and its usage for string manipulation

References :

1. A Structured Programming Approach Using C, Behrouz A. Forouzan, RichardF. Gilberg
   ISBN:9788131500941, Cengage Learning India
2. Introduction to algorithms – Cormen, Leiserson, Rivest, Stein
3. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie,ISBN:9788120305960, PHI Learning
4. How to Solve it by Computer, R.G. Dromey, ISBN: 9788131705629, Pearson Education
5. Programming in ANSI C, E. Balaguruswamy, ISBN: 9781259004612, Tata Mc-Graw Hill Publishing Co Ltd.-New Delhi
6. Let us C : Yashwant Kanetkar

MOOCs:

NPTEL: http://nptel.ac.in/courses/106104128/

COURSE CODE : CAC-102

Total marks : 100		Total credits : 04	
COMPUTER ORGANISATION AND ARCHITECTURE			
Course objective: The objective of this course 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.			
Unit		**Topic**	
#	**Title**	**#** **Content**	**Learning outcomes**
I	**Introduction to Computer Organization and Architecture**	A Computer-Definition and Block Diagram	To study the block diagram of the computer system
		B Organization and architecture	To study the underlying structure and functioning of a computer
		C Structure and Function	
		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
		E Computer Components, Computer Function	To study the different components of the computer with emphasis on their functioning
		F Interconnection Structures, Bus Interconnection	The study the bus architectures and other different interconnection structures
II	**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
		B Instruction sets – characteristics & Functions, Addressing modes and formats.	To study the different Instruction sets, addressing modes and the data formats
		C CPU structure and function	To study the structure of the CPU
		D Processor Generation – 8086,Pentium I-IV,i1-i7	To understand the key features of the Processor Generations
III	**The Input/Output**	A I/O external devices	To study the different I/O peripheral devices

	and File Subsystem			
		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
		D	I/O Channels and processors	To learn about the different channels of I/O and its processors
		E	External interface	To study the external interfacing of I/O devices
		F	Operating system support	To know the relationship of I/O devices with OS
IV	**The Memory Subsystem**	A	Memory system overview	To study the storage systems
		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
		C	Internal Memory- Semiconductor main memory, Advanced DRAM organization	To learn the primary memory system
		D	External Memory- Magnetic Disk, RAID, Optical memory, Magnetic Tape	To study the secondary storage medium in detail with emphasis on features of each
V	**The Control Unit**	A	Structure of the Control Unit	To study the structure of the Control Unit
		B	Functioning of the Control Unit	To learn the functioning of the control unit
		C	Micro programmed control	To study micro programmed control unit

References –
1. Computer Organization and Architecture (7ᵗʰ Edition): William Stalling, Prentice-Hall.
2. Computer System Architecture: Morris Mano, Prentice-Hall.

E- Books:
1. Computer Organization: TMH, Ace series.
2. Computer Organization and Architecture by William Stallings, 5ᵗʰ Edition, Prentice-Hall

MOOCs:

1. NPTEL:http://nptel.ac.in/courses/106106092/
2. http://freevideolectures.com/Course/2277/Computer-Organization

COURSE CODE : CAC-103

Total marks : 100		Total credits : 04	

BASIC MATHEMATICS

Course objectives : To introduce basic fundamentals of mathematics

Unit		Topic		
#	Title	#	Content	Learning Objectives
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
		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
		B	Indices • Concepts • Properties • Laws	To study indices and its properties
III	**Mensuration**	A	Two dimensional • Area • Perimeter	To study mensuration with respect to 2D and 3D
		B	Three dimensional • Volume • Surface Area	
IV	**Complex Numbers**	A	Introduction Operations on Complex numbers • Addition • subtraction • multiplication • division	To study representation of complex numbers and operations on complex numbers

			• conjugate • modulus • reciprocal	
		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
		B	Properties of matrix Algebra of matrices • negative • transpose • equality • addition and subtraction • scalar multiplication, • Matrix multiplication • Adjoint • Inverse	
		C	Solving non homogeneous equations by Matrix inverse method $X=A^{-1}B$	
		D	Determinants • Definition and order • Types • fundamental concepts • minor • co-factors • expansion value,	To learn fundamental concepts of determinants and its properties

			• properties, • cramer's rule	
VI	**Sequence and Series**	A	Arithmetic Progression Geometric Progression Harmonic Progression	To study sequences and progressions
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
		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
		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

		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	**Vectors**	A	Vectors in plane Cartesian coordinates Vectors in space	To study the concept of vectors, cross and dot products
		B	Dot products Cross products	

References:

1) Elementary Engineering Mathematics -B S Grewal
2) Calculus – Thomas Finney
3) Mathematical Techniques – Maria Ester Rebelo Abranches
4) Mathematics for computer- Neeta Mazumdar

COURSE CODE : CAC-104

Total marks : 50		Total credits : 02	
PROBLEM SOLVING AND PROGRAMMING LABORATORY
Course objective: To learn the process of computer problem solving and concepts through some programming language

Unit		Topic		
#	Title	#	Content	Learning Objectives
I	**Programming Environment**	A	Integrated Development Environment	To understand some programming IDE and the different utilities
		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
		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
		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**	A	Programs using Arrays. 1-D and 2-D arrays. String	To know static memory allocation for multiple data storage and it's usage for string manipulation

Programming Constructs	manipulation functions, string manipulation using character arrays. Programs using Functions and arrays.	

References :

1. A Structured Programming Approach Using C, Behrouz A. Forouzan, RichardF. Gilberg
   ISBN:9788131500941, Cengage Learning India
2. Introduction to algorithms – Cormen, Leiserson, Rivest, Stein
3. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie,ISBN:9788120305960, PHI Learning
4. How to Solve it by Computer, R.G. Dromey, ISBN: 9788131705629, Pearson Education
5. Programming in ANSI C, E. Balaguruswamy, ISBN: 9781259004612, Tata Mc-Graw Hill Publishing Co Ltd.-New Delhi
6. Let us C : Yashwant Kanetkar

MOOCs:

NPTEL: http://nptel.ac.in/courses/106104128/

Total credits : 04				

Unit		Topic		
#	Title	#	Content	Learning Objectives
I	**Introduction to Data Structures**	A	Concept of a data structure	To understand the philosophy of a data structure
		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	Space-Time 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
II	**Arrays**	A	Multi-dimensional arrays	To learn creation, operations on matrices
III	**Sorting and Searching Techniques**	A	Insertion Sort	To study the simple sorting algorithms
		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
		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
		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
		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
		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	Heap tree	To study the concept of a heap and its construction
Graphs		A	Graphs	To study the concept of a graph and its terminology
		B	Graph Terminologies • Vertex • Edge • Degree of a vertex	
		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
Hashing		A	Concept of Hashing	To study the concept of hashing data storage
		B	Benefits & Limitations of Hashing	To learn the advantages and disadvantages of hashing in comparison to other methods

References :

1. Behrouz A. Forouzan, Richard F. Gilberg, Data Structures – A Pseudocode Approach Using C, Cengage Learning India
2. Deepali Srivastava, Data Structures through C in Depth, BPB Publication

3. Tremblay .1 P, and Sorenson P G, Introduction to Data Structures and Applications, Tata McGraw-Hill,

MOOCs:

NPTEL: http://nptel.ac.in/courses/106102064/

COURSE CODE : CAC-106

Total marks : 100		Total credits : 04	
OPERATING SYSTEMS CONCEPTS			
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			
Unit		Topic	
#	Title	# Content	Learning Objectives
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
		B	Operating Systems • Definition • Evolution • Introduction to Major Functions/Services • OS Structure • Relationship between Kernel, OS, Hardware • Examples(For students to see and get a feel of OS)	To study the characteristics, functions and examples of operating systems with focus on its structure and organization
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
		B	Threads and Microkernels • Definition • Multithreading	To study the concept of light weight processes and their execution

				Model	
		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 utilization
		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
		E	Deadlock • Principles • Deadlock Handling Methods • Prevention • Avoidance • Detection • Recovery From Deadlock	To familiarize the concept of a deadlock, its causes, prevention, avoidance and handling mechanisms
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
		B	Virtual Memory	To study the virtual memory concepts implemented in

			• Introduction • Demand Paging • Page Replacement • Frames • Thrashing	modern day operating systems
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
		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
V	**Security**	A	System Protection • Goals • Principles • Access Matrix	To know the reasons for security concerns and implementations
		B	Security • Types of Threats • Intruders • Cryptography • User Authentication • Trusted Systems	To study the different methods of implementing security in operating systems

References-
1. Modern Operating System by Andrew S. Tanenbaum, Prentice Hall, 3rd Edition, 2007.
2. Abraham Silberschatz and Peter Baer Galvin, "Operating System Concepts", 7th Edition, Pearson Education, 2002.
3. William Stallings, "Operating Systems", 6th Edition, Pearson Education, 2010.
4. Stuart, "Operating systems: Principles, Design and Implementation", 1st Edition 2008, Cengage Learning India
5. Schaum's Outline of Operating Systems (Schaum's Outline Series), by J. Archer Harris, Publisher: McGraw-Hill, 2001.

E-Books:
1. Operating Systems Guide :by Tim Bower
2. Operating Systems Course Notes: by Dr. John T.Bell
3. Schaum's Outline of Operating Systems (Schaum's Outline Series) [Kindle Edition] by J. Archer Harris.

MOOCs:
1. http://onlinevideolecture.com/?course=computer-science&subject=operating-systems
2. http://www.nptel.ac.in/courses/106108101/

Total marks : 100		Total credits : 04	
APPLIED MATHEMATICS

Objective: To introduce basic fundamentals of applied mathematics and understand its applications to solve real world problems

Unit		Topic		
#	Title	#	Content	Learning Objectives
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
		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
		B	Logical Connectives	To study the various connectives used in logic reasoning
		C	Well formed formulas (WFF)	To design WFF using the logical connectives
		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
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
		B	Truth table • Unary Operations: Logical Identity, Logical Negation • Binary Operations: Conjunction, Disjunction,	To study various operations that be used along with the Boolean variables and will also be able construct truth tables for the same

			Implication, Equality, Exclusive Disjunction, Logical NAND, Logical NOR • Applications: Logical Equivalences	
		C	Boolean functions • Commutative Law • Associative Law • Distributive Law • Identity Law • Negation Law	To learn the various laws associated to the Boolean operations
		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
		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
		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 functions
		B	Types of Functions	To learn the different 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)	
VIII	**Permutations and Combinations**	A	Principle of counting	To learn the principle of counting
		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
X	**Principles of Counting**	A B	The Pigeonhole Principle The Inclusion-Exclusion Principle	To understand the Pigeonhole Principle and the Inclusion-Exclusion principle and apply it to real life situations in computer

COURSE CODE : CAC-108

Total marks : 50	Total credits : 02

DATA STRUCTURES LABORATORY

Course objectives
:To learn different ways of organizing data encountered in real life applications.

	Unit		Topic	
#	**Title**	**#**	**Content**	**Learning Objectives**
I	**Arrays**	B	Multi-dimensional Arrays Matrices	To implement programs using multi-dimensional arrays especially matrices
II	**Searching**	A	Linear Search	To implement searching algorithms over a list
		B	Binary Search	
III	**Sorting**	A	Bubble Sort	To implement simple sorting algorithms over an array of data elements
		B	Insertion Sort	
		C	Selection Sort	
		D	Merge Sort	To implement advanced sorting algorithms over an array of data elements
		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
		B	Handling Stack Overflow/Underflow	
V	**Queues**	A	Queue Operations	To implement insert , delete operations on a Queue by handling the abnormal conditions of overflow and underflow
		B	Handling Queue Overflow/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
		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
		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

References :

1. Behrouz A. Forouzan, RichardF. Gilberg, Data Structures – A Pseudocode Approach Using C, Cengage Learning India
2. Deepali Srivastava, Data Structures through C in Depth, BPB Publication
3. Tremblay .1 P, and Sorenson P G, Introduction to Data Structures and Applications, Tata McGraw-Hill,

MOOCs:
NPTEL: http://nptel.ac.in/courses/106102064/

<h2 style="text-align:center">Generic Electives (GE)</h2>

COURSE CODE : CAG-101

Total marks : 100		Total credits : 04	
BUSINESS ACCOUNTING			
Course objectives : To introduce concepts of financial accounting and management with a scope for applying these concepts into day to day tasks			
Unit		**Topic**	
#	**Title**	**#** **Content**	**Learning Objectives**
I	**Introduction to Accounting**	A Definition, scope of accounting	To study the basics of accounting
		B Accounting as financial information system	
		C Accounting Principles	
		D Accounting Standards	
II	**Accounting procedure**	A Transaction/event	To study the recording of financial business accounts
		B Classification of accounts Voucher	
		C Preparation of vouchers	
		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
		B Methods of depreciations • Straight-line method • Reducing method • Sinking fund method • Annuity Method • Machine hour rate method • Depletion method	
IV	**Company Final**	A Preparation of trading a/c	To determine financial performance and financial position of a business

	Accounts	B	Profit & Loss a/c	
		C	Balance sheet	
V	Accounting for shares	A	Kinds of shares	To understand the different types of shares
		B	Accounting for issue of shares	

Reference Book :
1. Advanced Accounting Vol-I, S.BN. Maheshwari.

Unit		Topic		
#	Title	#	Content	Learning outcomes
I	**Basic Concepts**	A	Introduction	To introduce the students to cost accounting as a branch of accounting and its objectives
		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
		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 • Weighted Average • Periodic Simple Average • Periodic Weighted Average • Standard Price Method	To familiarize with the various methods of Valuation of Materials

III	Labour	A	Introduction to Labour	To familiarize with Labour as a factor of production
		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
		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

Reference Books :
1. Cost Accounting by S.P. Jain and K.L Narang 12th Edition
2. Cost accounting by R.S.N. Pillai., V.Bagavathi
3. Cost accounting by Arora

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3. Cost accounting by Arora

Total marks : 100		Total credits : 04	
ADVERTISING			
Course objectives : To introduce the concepts of advertising as a publicity tool for launching product and services.			
Unit		**Topic**	
#	**Title**	**#**	**Content**	**Learning outcomes**

#	Title	#	Content	Learning outcomes
I	**Introduction**	A	History of Advertising,	To introduce the concept of advertising.
		B	Advertising Ethics	
II	**Advertising Lifecycle**	A	• Finding a client • Get/Suggest a requirement • Idea and Pitching • Client Confirmation	To teach the process of advertisement creation
		B	• Media Planning • Story Boarding • Scratch Audio Recording • Design / Creatives	To learn different tools for advertisement creation
		C	• Video Shoot • Audio Recording / Sound Design • Editing • Render • Follow-up	
III	**Advertising Types**	A	• Product Launch • Product Re-launch/ Image Change • Publicity	To learn the process and steps of product launch.
		B	• Market Research Methods	To understand the different market research methods
IV	**Media Planning**	A	Channels of Distribution: • Print- Magazines, Newspapers • Audio / Visual-Radio-Ads, • Contests • Show Sponsoring	To understand the different media available and used for advertising.
		B	Television • Ads • Contests • Show Sponsoring.	

		C	• Web- Static / Flash • Banners, Layered	
		D	• Ads, Interactive Ads, Contests/Games Virals	
V	**Advertising Campaigns**	A	• Basic Principles • Continuity • Re-emphasization • Progressive Legal Aspects	To introduce the steps and procedures for managing advertising campaigns.
		B	• Advertising Contracts • Copyrights & Trade Marks • Laws Affecting Advertising • Legal vs Ethical Standpoint	
VI	**Advertising Media**		Graphic Design: • Manual, Computer Aided • Lettering & Typography • Photography,	To learn the use of multimedia in creating effective advertisements.
			Audio: • Sound Recording • Sound Design Video: • Shoot • Editing	

References -
1. Kotler and Armstrong, Principles of Marketing, PHI, N.Delhi
2. Stanton, Etzel and Bruce, Fundamentals of Marketing, McGraw Hill International
3. Ramaswamy V.S. and Namakumari S., Marketing Management – Planning Implementation and Control, Tata McGraw Hill Publication

COURSE CODE : CAG-104

Total marks : 100	Total credits : 04
HUMAN RESOURCE MANAGEMENT	
Course objectives : To introduce the different concepts of Human Resource Management within	

an organization.				
Unit		**Topic**		
#	Title	#	Content	Learning outcomes
I	**Human Resource Planning**	A	• Meaning of Human Resource Planning • Definition of Human Resource Planning	To gain an insight into the contribution of HRM in an organization.
		B	Need of Human Resource Planning • Objectives • Scope & Benefits • Process of Human Resource • Planning	
II	**Advertising Lifecycle**	A	Concept of Recruitment • Meaning and Definition of Recruitment • Sources of Recruitment • Internal Sources • External Sources • Advantages and Limitations	The students will gain understanding of the recruitment policy and discuss the internal and external factors influencing recruitment decisions.
		B	Process of Recruitment • Concept of Selection • Meaning and Definition • Process of Selection;	
		C	Recruitment • Concept of Selection • Meaning and Definition • Process of Selection Interviews: • Meaning of Interview • Importance of Interview • Types of Interviews;	
		D	Job Analysis • Meaning • Components • Job Description • Job Specification • Advantages of Job Analysis • Job Enrichment • Job Enlargement	

III	Training and Performance Appraisal	A	Concept of Training • Meaning and Definition of Training • Importance of Training • Appraisal	The students will get an insight into the benefits of Training employees; understand the various methods of training used for workers and managers.
		B	Methods of Training • Methods of Training Managers • Methods of Training • Workers • On the Job Methods • Off-The Job Methods Types of training • Meaning and Definition of Performance Appraisal • Objectives • Process of Performance Appraisal • Methods of Performance Appraisal • Traditional Methods • Modern Methods • Problems encountered in Performance	
IV	Communication and Time Management	A	• Meaning of Communication • Effective Business Presentations • Interpersonal Skills;	The students will recognize the importance of business presentations and interpersonal skills and describe how good communication with others can influence our working relationships.
		B	• Meaning and Nature of Time Management • Techniques of Time Management • Pareto's 80/20 Principle • Managing oneself and outside influences • Time Tabling and Planning	
V	Career and Succession Planning	A	• Meaning of Career and Career Planning • Need for Career Planning • Career Development Lifecycle	The students will understand the need of planning a career in today's competitive world and the various opportunities available.

		• Career Opportunities	
VI	**Counselling**	• Meaning of Counseling • Definition of Counseling • Objectives of Counseling • Need for Counseling • Types of Counseling • Steps in Counseling	The students be able to understand the importance of counseling and the various types of counseling.

Reference Book :
1. Industrial Organization and Management by N.G. Kale

COURSE CODE : CAG-105

Total marks : 100			Total credits : 04	
ENTREPRENEURSHIP DEVELOPMENT				
Course objectives : To provide students with substantial knowledge about the requirements of setting up a firm and exercising entrepreneurship skills.				
Unit		**Topic**		
#	**Title**	**#**	**Content**	**Learning outcomes**
I	**Introduction**	A	• Self employer • Entrepreneur • Intrapreneur • Entrepreneurship Development	To gain an insight into the concept of entrepreneurship
II	**Identification of Business Opportunities**	A	Three stages- 1) Who am I? 2) Study of Local Market 3) Selection stage	The students will gain understanding of the stages of business opportunities
III	**Market Research**	A	• Meaning of market research • Importance of market research • Sources of market research	To understand the concept of market research.
IV	**Project Report**	A	• Meaning • Importance of project report, • Contents of project report	The learn the purpose and structuring of a project report.
V	**Introduction of Managerial Skills**	A	• Human Resource Management • Financial Management • Marketing Management.	To understand the different aspects of managerial skills

VI	Purposeful Innovation		• Seven sources of purposeful innovation • unexpected success / unexpected failure / • unexpected event, Incongruities • Process need • Change in Industry/Market structure • Change in • Demography • Change in perception • New knowledge.	To understand the concept of purposeful innovation.

Reference Books :

1. Bhattacharya S.N- Entrepreneurship Development in India & the South East countries – Metropolitan Book Comp.
2. Desai Arvind – Environment & Entrepreneurship – New Delhi, Ashish Publishing House - New Delhi
3. Dr. Deshpande Manohar – Entrepreneurship of Small Scale Industries – Deep & Deep Publication, New Delhi
4. Drucker Peter – Innovation & Entrepreneurship Affiliated East-West Press Pvt. Ltd.,- New Delhi
5. Khan M.A - Entrepreneurial Development Programmes in India – Kanishka Publishing House, New Delhi.

COURSE CODE : CAG-106

Total marks : 100		Total credits : 04	
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MARKETING FUNDAMENTALS

Course objectives : To learn to the basic concepts of marketing.

Unit		Topic		
#	Title	#	Content	Learning outcomes
I	**Introduction to Marketing**	A	• Meaning and Definition of Marketing - Importance of Marketing – Concepts of • Marketing – Selling v/s Marketing. Market Segmentation – Meaning and Definition. Bases for • Segmentation – Geographic, Demographic, Psychographic and	To introduce the concept of marketing, and market structures.

			Behavioristic(meaning only).	
			• Marketing Mix – Meaning and Elements.	
II	**Designing Products**	A	• Meaning and Definition of Product – Classification of Products: Consumer goods and • Industrial goods (in brief). Individual Product Decisions – a. Product Attribute Decisions b. • Brand Decisions – Meaning and Definition of Brand, Brand Strategies and Brand Positioning c. • Packaging and Labeling Decisions d. Product Support Decisions.	The students will gain understanding of designing products.
III	**Pricing Products**	A	• Meaning and Definition of Price – Factors affecting pricing decisions. General Pricing • Approaches – a. Cost-Based Pricing, b. Buyer-Based Pricing, c. Competition-Based Pricing. • New Product Pricing Strategies – a. Skimming and b. Penetration	To understand the concepts of pricing products.
IV	**Placing Products**	A	• Meaning and Definition of Place – Components of Place – a. Distribution Channels b. • Physical Distribution. Distribution Channels – Meaning and Importance - Number of Channel • Levels – Factors affecting choice of a channel. Physical Distribution – Meaning and Nature of • Physical Distribution.	To learn product placement and distribution.

V	Promoting Products	A	• Meaning and Definition of Promotion – Elements of Promotion – a. Advertising b.	To learn the concepts of promoting products.
			• Sales Promotion c. Personal Selling d. Public Relations. Advertising – Meaning and Definition –	
			• Features – Advantages and Limitations. Sales Promotion – Meaning and Definition – Tools –	
			• Advantages and Limitations. Personal Selling – Meaning and Definition – Process – Advantages	
			• and Limitations. Public Relations - Meaning and Definition – Tools – Advantages and	
			• Limitations.	

(Previous row above: Elements of Physical Distribution.)

References :

1. Kotler and Armstrong, Principles of Marketing, PHI, N.Delhi
2. Stanton, Etzel and Bruce, Fundamentals of Marketing, McGraw Hill International
3. Ramaswamy V.S. and Namakumari S., Marketing Management – Planning Implementation and Control, Tata McGraw Hill Publication.

Skill Enhancement Courses (SEC) Courses

Total marks : 50	Total credits : 02	
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IT TOOLS LABORATORY		
Course objectives : To familiarize and learn use of various types of IT tools		

Unit		Topic		
#	Title	#	Content	Learning Objectives
I	**PC Setup**	A	PC Components Identification	To identify the different components of a PC
		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
		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 wamp Server • Installation of Moodle LMS • Managing user accounts • Managing course settings • Logging in • Customizing your profile • Customizing course settings • Editing the header block Posting a course syllabus & Lecture Slides	To learn the basic setup and customization of an LMS
		B	**Working with Resources**	To learn to use the resources and other media in a

			• 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	LMS
		C	**Adding Activities** • Creating Assignments • Creating a forum • Creating a wiki • Creating Quiz	To learn to create different activities and exercises
		D	**Administration** • User Accounts (Student, Teacher, Course Creator, Administrator) • Editing, • Settings	To learn to configure and customize users, roles and associated settings
IV	**Internet Applications**	A	Using Web Browsers	To know how to configure a web browser
		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

COURSE CODE : CAS-102

Total marks : 50		Total credits : 02	
Programming in Scratch			
Unit		**Topic**	
#	**Title**	**#**	**Content**
I	**UNIT 1**		Moving blocks, creating scripts, and repeating blocks
II	**UNIT 2**		Drawing with a computer
III	**UNIT 3**		Tempo, variables, and the hat block
IV	**UNIT 4**		Coordinates and conditionals
V	**UNIT 5**		Drawing with iteration
VI	**UNIT 6**		Broadcast and random numbers
VII	**UNIT 7**		Updating variables in repeats, iterative development, and the ask and join blocks
VIII	**UNIT 8**		Scratch tools, gravity, and mazes
IX	**UNIT 9**		Building your own blocks
X	**UNIT 10**		Strategies for games

COURSE CODE : CAS-103

Total marks : 50	Total credits : 02

Digital Photography

Unit		Topic		
#	**Title**	**#**	**Content**	**Learning Objectives**
I	**UNIT 1**		Introduction to Digital Photography	To learn and understand digital photography basics including the colour palette and camera basics
II	**UNIT 2**		Photography basics including tools and palette	
III	**UNIT 3**		Factors to consider in a digital camera	
IV	**UNIT 4**		Photography vocabulary: aperture, shutter speed, ISO	
V	**UNIT 5**		Camera Metering & Camera Modes, Lenses and Optics	To understand the different camera modes its lenses and optics
VI	**UNIT 6**		Composition and Learning	To learn and understand how to See Ways to get images with strong composition
VII	**UNIT 7**		Learning the Photoshop and Light room workspace Toolbar and Option Bar Image Adjustments, Image Extensions Saving and sizing image	Basic understanding of photoshop and its toolbar
VIII	**UNIT 8**		Lighting Techniques Natural vs. Artificial Lighting	Basic understanding of lighting techniques for indoor and outdoor shoots including natural and artificial lighting. Improving and developing the skill through various photo shoots as assignments and critically analysing with the peers and experts.
IX	**UNIT 9**		Critiquing, analyzing and evaluating photography	
X	**UNIT 10**		Explore work by photographers	

COURSE CODE : CAS-104

Total marks : 50	Total credits : 02

Open Source Software

Unit		Topic	
#	**Title**	**#**	**Content**
I	**UNIT 1**		The philosophy of OSS, commercial software vs OSS, free software vs freeware.
II	**UNIT 2**		The Linux operating system, GPL, LGPL and other licenses
III	**UNIT 3**		Categories of OSS Application Software's
IV	**UNIT 4**		Study of Commercial Application software vs OSS,
V	**UNIT 5**		Open Office, GAMBAS, GIMP etc.

References :
Understanding Open Source and Free Software Licensing – O'Reilly Media, 2011

List of Practical :
- Find out various Open source software for the concepts studied by you till now.
- Install the software like Open office, MySQL etc. and perform comparative study of their salient features
- Use GIMP for Image Editing
- Use GAMBAS for creating Admission Forms
- Use GAMBAS for creating Exam Mark sheet

COURSE CODE : CAS-105

Total marks : 50	Total credits : 02

OPERATING SYSTEMS LABORATORY

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

Unit		Topic		
#	**Title**	**#**	**Content**	**Learning Objectives**
I	**Installation and configuration of Operating System**	A	Disk Partitioning	To learn disk preparation before installation
		B	Operating System Installation	To learn to install an Operating System
II	**Desktop based GUI Operating Systems**	A	Desktop	To learn to configure and customize the desktop
		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
		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

COURSE CODE : CAS-106

Total marks : 50		Total credits : 02	

Programming with Python

Unit		Topic		
#	**Title**	**#**	**Content**	**Learning Objectives**
I	**Overview of Programming**	A	Structure of a Python Program,	To learn the basic programming constructs by implementing them in a programming language
		B	Elements of Python	
II	**Introduction to Python**	A B C D E F	Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators(Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator)	To learn the programming specific data types and their usage, use of different operators, declare variables

#	Title		Content	Learning Objectives
III	**Creating Python Programs**		**:**Input and Output Statements, Control statements(Branching, Looping, Conditional Statement, , nested conditions, Difference between break, continue and pass.), Defining Functions, default arguments, iteration and Recursion, Strings and lists	To learn and understand the use of if/if..else and switch statements, the different looping structures and to combine decision and looping structures, use of functions, recursion and iteration
IV	**OO programming, Data Structures overview**		Introduction to Classes, Objects and Methods, Arrays, list, set, stacks, queues	To implement classes, arrays, stacks and queues
V	**Sorting and searching techniques**		Linear and Binary Search, Bubble, Selection and Insertion sorting	To implement the different sorting and searching techniques

COURSE CODE : CAS-107

Total marks : 50			Total credits : 04	
HTML & CSS				
	Unit		**Topic**	
#	**Title**	**#**	**Content**	**Learning Objectives**
I	**Web Designing Principles**	A	• Introduction • Why need of website designing • Golden Rule of web Designing • Page Design • Home Page layout • Design Concepts	Understand the importance of the web as a medium of communication. Understand the principles of creating an effective web page, including an in-depth consideration of information architecture.
II	**Basic of Web Design**	A	• Meaning of www • www Standards • W3C	
III	**Introduction to HTML**	A	• Web Servers • Web Clients • HTML TAGS • Paired Tags • Singular Tags	

		B	• Structure of HTML • Text Formatting • Heading Style • Text Style • text Effects	
IV	**Graphics in HTML**	A	• Border attribute • Width & Height • Align • DIV Tags	
V	**Tables & linking Documents**	A	• Table tags • Cell padding & spacing • Colspan & rowspan • External and Internal Links • Hyper Linking • Images ad Linking	
VI	**CSS**	A	• Concepts of css • Creating Stylesheets • Css Property & Stying • Id and class • Box Model • CSS Advanced(Grouping, Dimension, Display, • Positioning, Floating, Align,Pseudo class, Navigation Bar, • Image Sprites, Attribute sector) • CSS Color	

COURSE CODE : CAS-108	
Total marks : 50	Total credits : 02

PHP Programming

Unit		Topic	
#	**Title**	**#**	**Content**
I	**UNIT 1**		Design and write PHP programs- To learn Basic PHP syntax, structure and coding techniques, variables, constants, expressions and operators
II	**UNIT 2**		Use of arrays, string, numbers, built-in functions and global variables

	UNIT 3	Use PHP to send email, upload files dynamically
III		
IV	UNIT 4	MySQL Database- setup, connection, insert, update, delete, display records

References :
1. Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India), 2007.
2. Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited, 2008.
3. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition Paperback, O'reilly, 2014.
4. Luke Welling, Laura Thompson, PHP and MySQL Web Development", 4th Edition, Addition Paperback, Addison-Wesley Professsional,2008.
5. David Sklar, Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers", 2014.