SAURASHTRA UNIVERSITY

RAJKOT – INDIA

Accredited Grade A by NAAC (CGPA 3.05)

CURRICULAM

FOR

B.C.A.

Bachelor of Computer Application

(Semester - 1 and Semester - 2)

Effective From June – 2022

Ordinance, Regulations and Examination Scheme:
Ordinance:

O. B.C.A. – 1 : Candidate for admission to the Bachelor of Computer Application must have passed standard 12th or equivalent examination from Gujarat higher secondary board or any other board.

O. B.C.A. – 2 : Candidate seeking admission directly in third semester of Bachelor of Computer Application must have passed Examination of Diploma in Engineering in Computer Engineering(CE) / Computer Science(CS) / Information Technology(IT).

O. B.C.A. – 3 : The duration of the course will be of three full time academic years. The examination for the Bachelor of Computer Application course will be divided into six semesters. No candidate will be allowed to join any other course or service simultaneously.

O. B.C.A. – 4 : Candidate who have passed an equivalent examination from any other board or examining body and is seeking admission to the B.C.A. course will be required to provide necessary eligibility certificate.

O. B.C.A. – 5 : No candidate will be admitted to any semester examination for B.C.A. unless it is certified by the Principal that he has attended the course of study to the satisfaction of the principal of the college.

O. B.C.A. – 6 : Candidate desirous of appearing at any semester examination of the B.C.A. course must forward their application in the prescribed from to the University through the principal of the college on or before the date prescribed for the purpose under the relevant ordinances.

O. B.C.A. – 7 : No candidate will be permitted to reappear at any semester examination, which he has already passed. The marks of successfully completed paper will be carrying forwarded for the award of class.

O. B.C.A. – 8 : There shall be an examination at the end of each semesters to be known as first semester examination, second semester examination respectively. At which a student shall appear in that portion of theory papers, practical and viva – voice if any, for which he has kept the semester in accordance with the regulations in this behalf.

A candidate whose term is not granted for what so ever reason shall be required to keep attendance for that semester or term when the relevant papers are actually taken at the college.

O.B.C.A. 9: After successfully passing all the subjects of semester – 1 candidate will be awarded by certificate CCC and after passing all the subjects of Semester – 1 and Semester – 2 candidate will be awarded by CCC+

O. B.C.A. – 10: Medium of instruction is English.

O.B.C.A. -11:

Any candidate can go up to take admission in pre to pen-ultimate semester irrespective of failure in any number of subjects.

A Candidate can take admission to pen-ultimate semester if he/she is not failing to more then two subjects.

A candidate can take admission to ultimate {final} semester if he/she is clear all semesters before pen-ultimate semester and not failing in more then two subjects of pen-ultimate semester.

That is a candidate will be permitted to continue his/her study upto the 4th semester examination without passing his/her previous semester examination.
A candidate can take admission to fifth (pen-ultimate) semester if he/she is failing in NOT more than two subjects of previous (1 to 4) semesters.

A candidate can take admission to Sixth (Ultimate Final) Semester if he/she is not failing in more than two subjects of 5th Semester. Provided he/she should have cleared all 1 to 4 semester.

Regulations:

R.S.B.C.A. – 1. Standard Of Passing

The standard of passing the B.C.A. degree examination will be as under:

(1) To pass any semester examination of the B.C.A. degree, a candidate must obtain at least 40% marks in the university examination separately in each course of theory and practical.

(2) Class will be awarded based on Earned Grade Point, SGPA and CGPA as per rules of University.

(3) A result of candidate who has obtained admission directly in Bachelor of Computer Application semester – 3 will be declared by considering his marks of semester 3 to 6 in aggregate and accordingly class will be awarded.

R.S.B.C.A. – 2. Marks and credit hours of each course

Marks of Internal examination, university examination and credit hours will be as under:

(1) Total marks of each theory course are 100 (university examination of 70 marks + internal examination of 30 marks).
(2) Marks of each unit in the course are equal (i.e. 14 Marks). Total marks of each course are 14x5=70 for university examination.
(3) Credit hours (lectures) for each unit in the course are equal (i.e. 12 hours). Total credit hours (lectures) of each course are 12x5=60.
(4) Total marks of each practical and project-viva course are 100. No internal examination of marks in practical and project-viva courses.

R.S.B.C.A. – 3. Structure of Question Paper

Question Paper contains 5 questions (each of 14 marks). Every question will be asked from corresponding unit as specified in the syllabus of each course. (i.e. Question-1 from Unit No.1 and remaining questions from their corresponding units)

Every question is divided in four parts like (a), (b), (c) and (d). Part (a) contains four objective type questions (not MCQ) like definition, reason, answer in one line, answer in one word etc., each of one marks and no internal option. Part (b) contains two questions each of two marks and student

will attempt any one out of two. Part (c) contains two questions each of three marks and student will attempt any one out of two. Part (d) contains two questions each of five marks and student will attempt any one out of two.

R.S.B.C.A. – 4. Following is the syllabus of each course of B.C.A. Program.

B.C.A. (Semester – 1)

SR. NO.	COURSE	No. OF LECT./Lab. PER WEEK	CREDIT
1.	**CS – 01** MATHEMATICAL AND STATISTICAL FOUNDATION OF COMPUTER SCIENCE	**5**	**5**
2.	**CS – 02** PROBLEM SOLVING METHODOLOGIS AND PROGRAMMING IN C	**5**	**5**
3.	**CS – 03** COMPUTER FUNDAMENTALS AND EMERGING TECHNOLOGY	**5**	**5**
4.	**CS – 04** NETWORKING & INTERNET ENVIRONMENT	**5**	**5**
5.	**CS – 05** PRACTICALS-1 (BASED ON CS-04 & PC SOFTWARE)	**5**	**5**
6.	**CS – 06** PRACTICALS-2 (BASED ON CS-2)	**5**	**5**
Total Credits of Semester – 1			**30**

CS-01: MATHEMATICAL AND STATISTICAL FOUNDATION OF COMPUTER SCIENCE

Objectives:

- To aware about basic Mathematics and Statistics
- To develop Reasoning ability and Logical ability
- To develop Arithmetic's ability
- To develop a positive attitude towards learning Mathematics & statistics
- To perform mathematical & statistical operations and manipulations with confidence, speed and accuracy.

Prerequisites:

- Basic knowledge of Mathematics and Statistics

Unit No.	Topic	Details
1	**Determinants**	• Introduction • 2 × 2 , 3×3 order determinant • Cramer's method for solving linear equation(Two and Three Variables) • Properties of Determinants • Examples
2	**Matrices**	• Introduction • Different types of matrix(square matrix, column matrix, row matrix, Diagonal matrix, Unit matrix, null matrix) • Transpose of matrix • Addition, subtraction & multiplication of two matrices • Adjoint of a square matrix • Inverse of matrix
3	**Co-ordinate Geometry**	• Introduction • Quadrants & Axes • Distance between two points in R2(without proof) • Section formula(without proof) • Area of triangle(without proof) • Typical examples
	Set Theory	• Introduction • Method of representation of a set • Operation on sets & its properties(with only Logical proof) • De'Morgan laws with Logical proof • Difference of two sets • Cartesian products(up to two sets) • Typical examples
4	**Measures of Central**	• Mean(ungroup data, group data) • Median(ungroup data, group data)

	Tendency & Dispersion	• Mode(ungroup data, group data) • Range • Quartiles • Standard Deviation • Typical examples
5	**Arithmetic & Geometric progression**	• Sequence • Series • Arithmetic progression(Definition & Nth term, sum of n terms) • Geometric progression • (Definition & Nth term, sum of n terms) • Harmonic Progression • Relation Between AM GM HM (Two Numbers) • Typical examples

Student Seminar – 5 Lectures
Expert Talk – 5 Lectures
Student Test – 5 Lectures
Total Lectures 60 + 15 = 75

Course Outcome:

- Able to Understand basics of Mathematics and Statistics
- Able to Develop reasoning ability and Logical ability
- Able to Develop Arithmetic's ability
- Able to Develop a positive attitude towards learning Mathematics & statistics
- Able to Perform mathematical & statistical operations and manipulations with accuracy.

Reference Books:

1. Business Mathematics By Sancheti & Kapoor Sultan & Chand
2. Statistical Method By Gupta Sultan & Chand
3. Discrete Mathematical Structures with Applications to Computer Science By J.P. Tremblay & R. Manohar TMH
4. Business Mathematics : V.K. Kapoor
5. Business Mathematics : Dr Kachot
6. Fundamentals of Statistics : S. C. Gupta

CS-02: PROBLEM SOLVING METHODOLOGIS AND PROGRAMMING IN C

Objectives:

- To develop basic programming skill and logic, concept of memory management and file handling.
- To be able to understand preprogramming techniques
- To become familiar with programming concepts
- To become familiar with different problem-solving methodologies

Prerequisites:

- General Operating Knowledge of Computer

Unit No.	Topic	Detail
1	**Introduction of C Language**	• Introduction of Computer Languages • Introduction of Programming Concept • Introduction of C Language (History & Overview) • Difference between traditional and modern c. • C character set • C tokens ▪ Keywords ▪ Constants ▪ Strings ▪ Identifiers and variables ▪ Operators (all 8 operators) • Hierarchy of operators • Type casting • Data types in c • PRE-PROCESSORS IN C
	Introduction of Logic Development Tools	• Introduction of Logic. • Necessary Instructions for Developing Logic • Basics of Flow Chart • Dry-run and its Use. • Other Logic development techniques
2	**Control Structures**	• Selective control structure ▪ If statements ▪ Switch statement • Conditional ternary operator • Iterative (looping) control statements ▪ For loop ▪ Do…while loop ▪ While loop • Nesting of loops

		• Jumping statements ▪ Break statement, Continue statement ▪ Goto statements
3	**Functions (Inbuilt and User Defined)**	• Types of library functions ▪ String Function: Strcpy, strncpy, strcat, strncat, strchr, strrchr, strcmp, strncmp, strspn, strcspn, strlen, strpbrk, strstr, strtok ▪ Mathematical Functions: Acos, asin, atan, ceil, cos, div, exp, fabs, floor, fmod, log, modf, pow, sin, sqrt ▪ Date & Time Functions: clock, difftime, mktime, time, asctime, ctime, gmtime, localtime, strftime ▪ I/O Formatting Functions: printf, scanf, getc, getchar, gets, putc, putchar, puts, ungetc ▪ Miscellaneous Functions: delay, clrscr, clearer, errno, isalnum, isalpha, iscntrl, isdigit, isgraph, islower, isprint, isspace, isupper, isxdigit, toupper, tolower ▪ Standard Library functions: abs , atof , atol , exit , free, labs , qsort , rand , strtoul , srand ▪ Memory Allocation Functions: malloc , realloc , calloc • Types of user defined functions • Function call by value • Function call by reference • Recursion • Storage classes • Passing and returning values
4	**Array**	• Types of arrays ▪ Single dimensional array ▪ Two dimensional array ▪ Multi-dimensional array ▪ String arrays • Use of Arrays in Programming • Arrays and Matrices
	Pointers	• Introduction of Pointers • Use of pointers in Dynamic Programming • Pointer to Variables • Pointer to Array • Pointer within Array • Array of Pointer • Pointer To Structure • Pointers within structure • Pointer to Pointer
5	**User Defined**	• What is structure

	Data Type – Structure, Union & enum	• Initializations and declarations • Memory allocation functions • Pointers with structures • Array with structures • User defined function with structures • Nested structures • Introduction to union • Difference between Structure & Union • Enumerated Type
	File Handling	• Concept of data files • File handling • Use of file handling functions fopen, fclose, fprintf, fscanf, getw, putw, fseek, ftell, rewind ,freopen, remove, rename, feof, ferror, fflush, fgetpos, sprintf, snprintf, vsprintf, vsnprintf, fscanf, vfscanf, setbuf, setvbuf • I/O operations • Command line arguments

Seminar - 5 Lectures
Expert Talk - 5 Lectures
Test - 5 Lectures

Total Lectures 60 + 15 = 75

Reference Books:

1. Programming in C, by Pradip Dey & Manas Ghosh, Publisher – Oxford
2. C: The Complete Reference, by Herbert Schildt, Publisher – Tata McGraw Hill.
3. Programming in ANSI C Author : E. Balaguruswami.
4. Schaum's Outline of Programming with C, By: Byron Gottfried, Publisher Shaum Series
5. Programming with ANSI and Turbo C, by Ashok N Kamthane, Publisher – Pearson Education
6. Let Us C Author : Yashwant Kanetkar.
7. Working with C Author: Yashwant Kanitkar.

Course Outcome:

- ✓ Able to illustrate and explain basic concepts of programming
- ✓ Able to understand the concept of control statements.
- ✓ Able to translate the real-life situations in programming form and solve them using some fundamentals of Programming.
- ✓ Able to translate the real-life situations in programming form and solve them by storing data into files and analysed user defined data types and test and detect that it is optimized applications.

CS-03: COMPUTER FUNDAMENTALS AND EMERGING TECHNOLOGY

Objectives:

- Bridge the fundamental concepts of computers with the present level of knowledge of the students.
- Familiarize peripheral devices, internal and external parts of computer system.
- Understand Number System like binary, hexadecimal and octal number systems and their arithmetic.

Unit No.	Topics	Details

1	**Introduction to Computers**	• Basics of Computers
		  ○ What is Computer?
		  ○ Characteristics of Computer
		  ○ Data Processing Cycle (Data → Process →information)
		• Classification of Computer by Data Processed
		  ○ Analog, Digital and Hybrid Computers
		• Classification of Computer by Processing Capabilities
		  ○ Micro, Mini, Mainframe and Super Computers
		• History and Generations of Computers
		  ○ First to Fifth Generation Computers
		• Simple Model of Computer
		  ○ Input Devices
		  ○ CPU (Central Processing Unit)
		  ○ Arithmetic & Logic Unit
		  ○ Control Unit
		  ○ Internal Memory
		• Output Devices
		• Secondary Storage Devices

	Internal/External parts used with Computer Cabinet	• Introduction to Mother board
		• Types of Processors.
		  ○ Dual Core, Core 2 Duo, i2, i3, etc ....
		• Memory structure and Types of Memory
		  ○ RAM (SRAM, DRAM, SO, DDR, etc.)
		  ○ ROM (ROM, PROM, EPROM, EEPROM, etc.)
		• Slots
		  ○ ISA Slots / PCI Slots / Memory Slots
		• Sockets

		• Cables
		  ○ Serial Cable / Parallel Cable / USB Cable
		• Ports
		  ○ USB / Serial / Parellel / PS2 / HDMI
		• Power Devices :UPS
		• Graphic Cards
		• Network card, Sound Card

2	**Input Devices**	• Introduction
		• Types of Input Devices
		  ○ Keyboard / Mouse / Trackball / Glide - Pad / Game Devices Joystick, etc.) / Light Pen / Touch Screen / Digitizers and Graphic Tablet / Mic (Sound Input) / Camera (Photo and Video Input) / POS (Point of Sale) Terminal (Scanners, etc)
		  ○ MIDI(Musical Instrument Digital Interface) Keyboard,
		  ○ Wireless Devices (Keyboard, Mouse, etc)
		• Types of Scanners
		  ○ OCR, OMR, MICR, OBR

	Data Storage	• Introduction
		• Types of Magnetic Storage Devices
		  ○ Floppy Disk / Hard Disk (SATA, SSD) / Magnetic Tape / Magnetic Disks
		• Storage Mechanism of Magnetic Storage Devices
		  ○ Tracks / Sectors / Clusters / Cylinders
		• Reading / Writing Data to and from Storage Devices
		• Seek Time / Rotational Delay - Latency / Access
		• Time /Response Time
		• Other Storage Devices
		  ○ USB - Pen Drive / CD / DVD / Blu-Rav Disk etc.
		  ○ Flash Memory, Cloud Storage(Like Google Drive, OneDrive etc.)

3	**Output Devices**	• Types of Output Devices • CRT Display Units • Monitor • Non CRT display Units • LCD / LED / Plasma Displays • Types of Printers Impact and Non Impact Printers

		• Plotters
		• Other Devices
		  ○ Fascimile(FAX)
		  ○ OLED (Organic LED)
		  ○ Headphone
		  ○ SGD (Speech Generating Device)
		  ○ COM (Computer Output Microfilm)
		  ○ Google Glass

4	**Numbering System and Codes**	• Introduction to Binary Codes /
		  ○ Nibble / Bit / Byte / Carry Bit / Parity Bit / Sign Bit
		  ○ KB / MB / GB / TB / HB (etc ....
		• Types of Numbering System
		  ○ Binary / Octal/Decimal / Hex-Decimal
		• Conversion
		  ○ Binary to Octal, Decimal and Hexa-Decimal
		  ○ Decimal to Binary, Octal and Hexa-Decimal
		  ○ Octal to Binary, Decimal and Hexa-Decimal
		  ○ Hexa-Decimal to Binary, Octal and Decimal
		• Binary Arithmetic
		  ○ Addition
		  ○ Subtraction (1's Compliment and 2's Compliment)
		  ○ Division
		  ○ Multiplication
		• Types of Codes
		  ○ ASCII/BCD / EBCDIC / UniCode
		• Parity Check
		  ○ Event Parity System / Odd Parity System

	Languages, Operating Systems and Software Packages	• Introduction
		• Translator (Assembler / Compiler / Interpreter)
		• Types of Languages
		  ○ Machine Level Language
		  ○ Assembly Level Language
		  ○ High Level Language (3GL, 4GL, 5GL, etc.)
		• Types of Operating Systems
		  ○ Batch Operating System
		  ○ Multi Processing Operating System
		  ○ Time Sharing Operating System
		  ○ Online and Real Time Operating System
		• Uses and applications of Software Packages
		  ○ Word Processing Packages
		  ○ Spread Sheet Packages

		○ Graphical Packages ○ Database Packages I ○ Presentation Packages ○ Animation / Video / Sound Packages
5	**Emerging Technologies and Virus**	• Different Communication methods ○ GIS / GPS / COMA / GSM • Communication Devices I ○ Cell Phones / Modem / Infrared / Bluetooth / WiFi/LiFi/SLM(Spatial Light Modulator) • Virus ○ Introduction to Virus and related terms ○ Origin and History ○ Types of Virus ○ Problems and Protection from Virus • Cloud Computing ○ What is Cloud Computing? ○ Characteristic & Service Models(Iaas, Paas, Saas) ○ Architecture ○ Security & Privacy
	Important Terms and Acronyms	• ATM • Backup / Restore • Hard Copy / Soft Copy • Bus / Data Bus • Buffer and types / Spooling • Cursor / Pointer / Icon • E-Mail I Attachment • CLiI GUI • Compiler and its types • Drive I Directory (Folder) / File / Path • Menu / Popup Menu / Toolbar • Shutdown / Reboot / Restart • Syntax / Wild Card Characters • Optical Fiber (Fiber Optic) . • Net meeting • Printing Speed (CPS, CPM, LPM, DPI, PPM) • Peripherals

Seminar - 5 Lectures
Expert Talk - 5 Lectures
Test - 5 Lectures

Total Lectures 60 + 15 = 75

Reference Books:

1. Computer Fundamentals – By P.K.Sinha.
2. Fundamental of IT for BCA – By S.Jaiswal.
3. Engineering Physics – By V.K.Gaur.
4. Teach Yourself Assembler – By Goodwin.

Course Outcome:

- ✓ Able to explore the fundamental concepts of computers
- ✓ Able to Understand peripheral devices, internal and external parts of computer system.
- ✓ Able to Understand Number System like binary, hexadecimal and octal number systems and their arithmetic.
- ✓ Able to recognize the emerging technologies
- ✓ Able to differentiate the types of virus

Additional Topics (Not to be asked in examination):

Student should be aware of followings

- To Format Hard Disk
- Installation of OS, multi-OS and other packages
- Use of DOS commands
- Operating of Accounting Software

CS-04: NETWORKING & INTERNET ENVIRONMENT

Objectives:

- To give brief idea about Computer Network and Internet Environment
- To be able to design and develop static and/or interactive website using HTML5, CSS and Javascript.
- To become familiar with different web elements.
- To get intermediate knowledge of CSS3, Javascript and Bootstrap Framework

Unit No.	Topic	Detail
1	**Introduction to Computer Network and it's Applications**	• Computer Network • Type of Computer Network • Different Terminologies used in Computer Network Internet, ISP (Internet Service Provider), Intranet, VSAT (very small aperture terminal), URL, Portal, Domain Name Server, World Wide Web (WWW), Search Engine, Remote Login, Telnet, Email, E-Commerce, E-Business, E-Governance, Mobile Commerce • Website Basics (WebPages; Hyper Text Transfer Protocol, File Transfer Protocol, Domain Names; URL; Protocol Address; Website[Static, Dynamic, Responsive etc], Web browser, Web Servers; Web Hosting
2	**Basic of HTML & Advance HTML 5**	• Fundamental of HTML • Basic Tag and Attribute • The Formatting Tags • The List Tags • Link Tag • inserting special characters, • adding images and Sound, • lists types of lists • Table in HTML • Frame in HTML • Forms • HTML 5 & Syntax ○ HTML5 Document Structure (section, article,

		aside, header, footer, nav, dialog, figure) ○ Attributes of HTML 5 ○ Web Form (datetime, date, month, week, time, number, range, email, url) ○ Audio / Video - Canvas
3	**Cascading Style Sheet & CSS 3**	• Introduction to CSS • Types of Style Sheets • Class & ID Selector • CSS Pseudo • CSS Font Properties • CSS Text Properties • CSS Background Properties • CSS List Properties • CSS Margin Properties • CSS Comments • CSS 3 ○ Border Property ○ Background & Gradient Property ○ Drop Shadow Property - 2D & 3D Transform Property ○ Transition Property ○ Box Sizing Property ○ Position Property • Media Query • CSS Flexbox Properties (display, flex-direction, flex-wrap, flex-flow, justify-content, align-items, align-content, gap row-gap, column-gap) • CSS Advance Properties (Overflow, text-overflow, Cursor, Visibility, filter, backdrop-filter, object-fit) • How to use Google Fonts & Custom Fonts (@font-face) • BEM Naming Convention
4	**Java Script**	• Introduction to JavaScript • Variables • JavaScript Operators • Conditional Statements

		• JavaScript Loops • JavaScript Break and Continue Statements • Dialog Boxes
		• JavaScript Arrays • JavaScript User Define Function • Built in Function (string, Maths, Array, Date) • Events (onclick, ondblclick, onmouseover, onmouseout, onkeypress, onkeyup, onfocus, onblur, onload, onchange, onsubmit, onreset) • DOM & History Object • Form Validation & E-mail Validation
5	**Bootstrap Framework**	• Introduction to Bootstrap • Bootstrap Layout (Container, Row, Columns, Responsive classes, Offset Column, Reordering Columns) • Bootstrap Content (Typography, Tables, Images, Forms) • Bootstrap Components (Navbar, Navs and tabs, Dropdowns, Buttons, Button Groups, Breadcrumb, Pagination, Labels, Alerts, Progress Bars, Accordion, Card, Modal)Bootstrap Utilities (Colors, Background, Borders, Display, Overflow, Position, Spacing, Text, Vertical align)

Seminar – 5 Lectures
Expert Talk – 5 Lectures
Test – 5 Lectures
Total Lectures: 60 + 15 = 75

Reference Books:

1. HTML in 10 steps or less - Laurie Ann Ulrich, Robert G. Fuller
2. Internet: The Complete Reference –Young.
3. World Wide Web Design with Html -C Xavier.
4. Internet for Every One –Leon.
5. Practical Html 4.O -Lee Philips.
6. MCSE Networking Essential Training Guides.
7. Benjamin Jakobus, Jason Marah, "Mastering BootStrap 4" 2nd Edition
8. Matt Lambert "Learning BootStrap 4", Packt Publishing

Course Outcome

- ✓ Able to understand Computer Network and Internet Environment
- ✓ Able to understand design and develop static and/or interactive website using HTML5, CSS and Javascript.
- ✓ Able to explore different web elements.
- ✓ Able to understand knowledge of CSS3, Javascript and Bootstrap Framework

CS-05 : PRACTICALS-1 (based On CS – 04 & PC Software)	
Topics	**Marks**
HTML-5, CSS-3, MS – Word, MS – Excel, MS – Power Point, MS-Access and Macromedia Dream weaver	**100**

CS-06 : PRACTICALS-2 (based On CS – 02)	
Topics	**Marks**
Programming in C Language	**100**

Note :

- Each session is of 3 hours for the purpose of practical Examination.
- Practical examination may be arranged before or after theory exam

Additional Topics to be taught during the semester – 1 (Not to be asked in examination):

- Case studies of DBMS

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B.C.A. (Semester – 2)

SR. NO.	COURSE	No. OF LECT./Lab. PER WEEK	CREDIT
1.	**CS – 07** DATA STRUCTURE USING C LANGUAGE	5	5
2.	**CS – 08** WEB PROGRAMMING	5	5
3.	**CS – 09** COMPUTER ORGANIZATION & ARCHITECTURE	5	5
4.	**CS – 10** SAD, SOFTWARE QUALITY ASSURANCE AND TESTING	5	5
5.	**CS – 11** PRACTICALS-1 (BASED ON CS-07)	5	5
6.	**CS – 12** PRACTICALS-2 (BASED ON CS-08)	5	5
Total Credits of Semester – 2			**30**

CS-07: DATA STRUCTURE USING C LANGUAGE

Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving

Prerequisites:

- Computer Programming Knowledge

Sr. No.	Topic	Detail
1	**Algorithm Analysis**	• The analysis of algorithm. • Time and space complexities. • Asymptotic notation. • Classes of algorithm. • Big-Oh Notation • Big-Omega Notation
	Advanced Concepts of C	• Dynamic allocation and de-allocation of memory ▪ function malloc(size) ▪ function calloc(n,size) ▪ function free(block) • Dangling pointer problem. • Enumerated constants
2	**Sorting and Searching**	• Bubble sorting • Insertion sorting • Quick sorting • Bucket sorting • Merge sorting • Selection sorting • Shell sorting • Basic searching technique • Index searching • Sequential searching • Binary searching
3	**Introduction To data Structure**	Primitive and simple structures Linear and nonlinear structures file organization.
	Elementary Data Structure	Stack Definition Operations on stack

		Implementation of stacks using arrays Function to insert an element into the stack Function to delete an element from the stack Function to display the items Recursion and stacks Evaluation of expressions using stacks Postfix expressions Prefix expression Queue Introduction Array implementation of queues Function to insert an element into the queue Function to delete an element from the queue Circular queue Function to insert an element into the queue Function for deletion from circular queue Circular queue with array implementation Deques Priority queues
4	**Linked List & Implementation**	• Applications of the linked lists • Types of Linked Lists o Singly Linked List o Doubly linked list o Header Linked List o Circular Linked List • Implementation using Singly Linked List, Doubly Linked List and Circular Singly Linked List o Insertion of a node at the beginning o Insertion of a node at the end o Insertion of a node after a specified node o Traversing the entire linked list o Deletion of a node from linked list o Updating of a specific node • Implementation of merging of two Singly Linked List Implementation of reversing of Singly Linked List
5	**Tree & Graph**	Objectives Properties of a tree Binary trees Properties of binary trees Implementation Traversals of a binary tree In order traversal Post order traversal

		Preorder traversal Binary search trees (bst) Insertion in bst Deletion of a node Search for a key in bst • Height balanced tree • B-tree Algorithm Insertion, Deletion
	Graph	Adjacency matrix and adjacency lists Graph traversal Depth first search (dfs) Implementation Breadth first search (bfs) Implementation • Shortest path problem Minimal spanning tree

Seminar - 5 Lectures
Expert Talk - 5 Lectures
Test - 5 Lectures
Total Lectures 60 + 15 = 75

Reference Books:

1. Data Structure through C/C++ Author : Tennaunbuam.
2. Let us C Author : Kanitkar.
3. Pointer in C Author : Kanitkar.
4. Data and File Structure Author : Trembley & Sorrenson.

Course Outcome:

- Able to Understand basic data structures and their implementations.
- Able to Understand importance of data structures in context of writing efficient programs.
- Able to Develop skills to apply appropriate data structures in problem solving
- Able to Explore tree and graph data structure

Additional Topics to be taught during the semester – 2 (Not to be asked in examination):

- Case studies of data structure

CS-08: WEB PROGRAMMING

Objectives:

- To create dynamic website / web based applications using PHP - MySQL Database.
- Able to develop website with the use of jQuery, AJAX and JSON.
- To become familiar with OOPs concept.

Prerequisites: Basic knowledge of Programming

Unit No.	Topic	Detail
1	**PHP Basic**	• Introduction to PHP • PHP configuration in IIS & Apache Web server • Understanding of PHP.INI file • Understanding of PHP .htaccess file • PHP Variable • Static & global variable • GET & POST method • PHP Operator • Conditional Structure & Looping Structure • Array • User Defined Functions: ▪ argument function ▪ default argument ▪ variable function ▪ return function • Variable Length Argument Function ▪ func_num_args ▪ func_get_arg, func_get_args • Built in Functions - Variable Functions - String Function - Math Function - Date Function - Array Function - Miscellaneous Function - File handling Function
2	**Handling Form, Session Tracking & PHP**	• Handling form with GET & POST • Cookies • Session

	Components	• Server variable • PHP Components - PHP GD Library - PHP Regular expression - Uploading file - Sending mail
	AJAX & JSON	• What is AJAX • PHP with AJAX • MySql with AJAX • What is JQuery AJAX • JQuery AJAX with PHP • Introduction to JSON • Installation & Configuration • Resource Types • JsonSerializable • JSON Functions : json_decode, json_encode
3	**Introduction of SQL**	• Working with MySQL using PhpMyAdmin • SQL DML Statement (Insert, Update, Select, Delete) Command • PHP-MySQLi Connectivity • PHP-MySQLi Functions • mysqli_connect, mysqli_close,mysqli_error, msyqli_errno, mysqli_select_db, mysqli_query, mysqli_fetch_array, mysqli_num_Rows, mysqli_affe cted_Rows, mysqli_fetch_assoc, mysqli_fetch_field , mysqli_fetch_object,mysqli_fetch_row, mysqli_insert_id, mysqli_num_fields, mysqli_data_seek
4	**jQuery**	• What is jQuery? • jQuery Syntax • jQuery Selector - Element Selector - Class Selector - id Selector • jQuery Events Click, dbclick, keypress, keydown, keyup, submit, change, focus, blur, load, resize, scroll, unlode • jQuery Effects hide show, fade, slide

		• jQuery Methods Css, height, width, innerWidth, innerHeight, outerWidth, outerHeight, html, text, append, prepend, after, before, addClass, removeClass, toggleClass, remove, empty
5	**OOP**	• Concept of OOP o Class o Object o Property o Visibility o Constructor, Destructor o Inheritance o Scope Resolution Operator (::) o Autoloading Classes o Class Constants • Mysql Database handling with oop (insert, update, select, delete

Seminar - 5 Lectures
Expert Talk - 5 Lectures
Test - 5 Lectures
Total Lectures: 60+15=75

Reference Books:

1. Modern PHP: New Features and Good Practices by Josh Lockhart (ORELLY)
2. PHP Cookbook: Solutions & Examples for PHP Programmers by David Sklar and Adam Trachtenberg (ORELLY)
3. Programming PHP by Kevin Tatroe and Peter MacIntyre ORELLY)
4. PHP for the Web: Visual QuickStart Guide (4th Edition) by Larry Ullman (Peachpit Press)

Course Outcome:

- Able to Understand Creation of dynamic website / web-based applications using PHP - MySQL Database.
- Able to Understand development of website with the use of jQuery, AJAX and JSON.
- Able to Understand practical and real-life examples of OOP.

Additional Topics (Not to be asked in examination):

Student should be aware of followings

- Case Study
- Uses and Advantages of CMS
- Wordpress [Introduction & Installation]
- Joomla [Introduction & Installation]
- Magento [Introduction & Installation]

CS-09: COMPUTER ORGANIZATION AND ARCHITECTURE

Objectives:

- Understand how logic circuits and boolean algebra forms as the basics of digital computer.
- Demonstrate the building up of Sequential and Combinational logic from basic gates

Prerequisites:

- General Knowledge of Computer

Unit No.	Topic	Detail
1	**Digital Logic Circuits**	• **Logic Gates** ▪ AND,OR,NOT,NAND,NOR,XOR, Exclusive NOR gates • **Boolean Algebra** ▪ Boolean algebra? ▪ Boolean variable and Boolean function (Analog and Digital Signals) ▪ Truth table ▪ Postulates ▪ Theorem related to postulates ▪ Simplified Boolean function using postulates and draw logical diagram of simplified function ▪ Simplified Boolean function using Karnaugh map method with DON'T CARE condition • **Sequential And Combinational Circuits** ▪ Clock pulses ▪ Combinational circuit, sequential circuit and adder • **Flip Flops** ▪ SR, Clocked SR, D, JK, JK – Master Slave, T • **Universal Gate**
2	**Digital Component**	• Integrated Circuits ▪ Decoders (2 X 4, 3 X 8) ▪ Encoders (Octal to Binary – 8 X 3) ▪ Multiplexer (4 X 1) ▪ Demultiplexer (1 X 4) • **Register** ▪ Block diagram of register ▪ Parallel register and shift register

		▪ Asynchronous 4-bits Binary Counter
3	**Data Representation**	• Multiplication and division of two binary numbers • Floating point representation • Fixed point representation • Error Detection code – (Parity Bit)
4	**Central Processing Unit**	• Introduction Of CPU • Major component of CPU • General Register Organization ▪ control word ▪ Accumulator Register • **Stack Organization** ▪ Register stack ▪ Memory stack ▪ Polish notation and reverse polish notation • **Arithmetic And Logic Unit** ▪ Block diagram of ALU • **Interrupts**
5	**Input-Output Organization**	• Memory buses • Block diagram and function • Data Bus, Address Bus and Control lines • Input Output Buses • Concept of input output interface • Input Out Processor (IOP) • Direct Memory Access • DMA controller

Students seminar - 5 Lectures
Expert Talk - 5 Lectures
Students Test - 5 Lectures
Total Lectures 60 + 15 = 75

Reference Books:

1. Computer System Architecture – By Morris Mano (PHI).
2. Digital Logic And Computer Design – By Morris Mano.
3. Digital Computer Electronics – By Malvino And Leach.

Course Outcome:

- Able to Understand logic circuits and boolean algebra forms as the basics of digital computer.
- Able to Explore the building up of Sequential and Combinational logic from basic gates
- Able to explore digital components
- Able to Understand data representation

Hands On (Not to be asked in examination):

- Instruction Formats - Simulator Base Program

Additional Topics to be taught during the semester-2 (Not to be asked in examination):

Following tools should be used to train students.

- Simulator 8051
- Using Trainer kit

CS – 10 : SAD, Software Quality Assurance and Testing		
Objectives: • To Understand and explore concept of System Analysis • To Understand concept of System Development Life Cycle • To Understand Quality Assurance • To Understand concept of Software Testing • To explore the concept of Project Tracking and Scheduling • To Understand the concept of Quality Control and Testing • To Understand the software models and Automated Testing • To Understand the UML Diagram • To Understand the concept of CAD Project Management		
Unit No.	**Topics**	**Details**
1.	**System Analysis & Design, Software Engineering & Concept of Quality Assurance**	• Definitions: System, Subsystem, Business System, Information System (Definitions only) • Systems Analyst (Role: Information Analyst, Systems Designer & Programmer Analyst) • SDLC • Fact – finding techniques (Interview, Questionnaire, Record review and observation) • Tools for Documenting Procedures and Decisions Decision Trees and Decision Tables • Data Flow analysis Tool DFD (context and zero level) and Data Dictionary • Software Engineering (Brief introduction) • Introduction to QA • Quality Control (QC) • Difference between QA and Q • Quality Assurance activities

2	**Basics of Software Testing, Types of Software Testing, Verification and Validation**	• Introduction to software Testing
		• Software faults and failures
		  • Bug/Error/Defect/Faults/Failures
		• Testing Artifacts
		  • Test case
		  • Test Script
		  • Test Plan
		  • Test Harness
		  • Test Suite
		• Static Testing
		  • Informal Review
		  • Walthrough
		  • Technical Review
		  • Inspection
		• Dynamic Testing
		• Test levels
		  • Unit Testing
		  • Integration Testing
		  • System Testing
		  • Acceptance Testing
		Techniques of software Testing
		• Black Box Testing
		  • Equivalence Partitioning
		  • Boundary Data Analysis
		  • Decision Table Testing
		  • State Transition Testing
		• White Box Testing
		  • Statement testing and coverage
		  • Decision testing and coverage
		• Grey Box Testing
		• Nonfunctional Testing
		  • Performance Testing
		  • Stress Testing
		  • Load Testing
		  • Usability Testing
		  • Security Testing

3	**Software Development Life Cycle Models and Automated Testing**	• Waterfall Model
		• Iterative Model
		• V-Model
		• Spiral Model
		• Big Bang Model
		• Prototyping Model
		• Introduction to Automated Testing
		  • Concept of Freeware, Shareware, licensed tools
		• Theory and Practical Case-Study of Testing Tools
		  • Win runner
		  • Load runner
		  • QTP
		  • Rational Suite

4	**Project Economics, Project scheduling and Tracking**	• Concepts of Project Management • Project Costing based on metrics • Empirical Project Estimation Techniques. • Decomposition Techniques. • Algorithmic methods. • Automated Estimation Tools • Concepts of project scheduling and tracking • Effort estimation techniques • Task network and scheduling methods • Timeline chart • Pert Chart • Monitoring and control progress • Graphical Reporting Tools

5	**CAD Project Management Tool** **UML**	• MS – VISIO for designing & Documentation • MS – Project for controlling and Project Management • UML designing and skill based tools Overview of ♦Class Diagram ♦Use Case Diagram ♦Activity Diagram

Students seminar - 5 Lectures.
Expert Talk - 5 Lectures
Students Test - 5 Lectures.
TOTAL LECTURES 60+15=75

Reference Book

1. Analysis & Design of Information System - James A. Senn.
2. Pankaj Jalote, "Software Engineering – A Precise Approach", Wiley India
3. UML Distilled by Martin Fowler, Pearson Edition, 3rd Edition
4. Fundamentals of Software Engineering – RajibMall (PHP)
5. Software Engineering – A Practitioner's Approach – Pressman
6. UML – A Beginner's Guide –Jasson Roff – TMH
7. Roger Pressman , "Software Engineering"
8. http://en.wikipedia.org/wiki/Software_testing
9. http://www.onestoptesting.com/
10. http://www.opensourcetesting.org/functional.php

Course Outcome

- Able to Understand and explore concept of System Analysis
- Able to Understand concept of System Development Life Cycle
- Able to Understand Quality Assurance
- Able to Understand concept of Software Testing
- Able to Explore the concept of Project Tracking and Scheduling
- Able to Understand the concept of Quality Control and Testing
- Able to Understand the software models and Automated Testing
- Able to Understand the UML Diagram
- Able to Understand the concept of CAD Project Management

CS-11 : PRACTICAL-1 (based on CS – 07)	
Topics	**Marks**
DATA STRUCTURE USING C LANGUGAE	**100**

CS-12 : PRACTICAL-2 (based on CS – 08)	
Topics	**Marks**
WEB PROGRAMMING	**100**

Note :

- Each session is of 3 hours for the purpose of practical Examination.
- Practical examination may be arranged before or after theory exam