

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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022
Bachelor in Computer Application (B.C.A.)
[3 years – Six Semester Full Time Program]

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 form 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.

**Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022**

A Candidate can take admission to pen-ultimate semester if he/she is not failing to more than 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 than 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 $14 \times 5 = 70$ 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 $12 \times 5 = 60$.
- (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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

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	<ul style="list-style-type: none"> • Introduction • 2×2, 3×3 order determinant • Cramer's method for solving linear equation(Two and Three Variables) • Properties of Determinants • Examples
2	Matrices	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Introduction • Quadrants & Axes • Distance between two points in R^2(without proof) • Section formula(without proof) • Area of triangle(without proof) • Typical examples
	Set Theory	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Mean(ungroup data, group data) • Median(ungroup data, group data)

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

	Tendency & Dispersion	<ul style="list-style-type: none"> • Mode(ungroup data, group data) • Range • Quartiles • Standard Deviation • Typical examples
5	Arithmetic & Geometric progression	<ul style="list-style-type: none"> • 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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

CS-02: PROBLEM SOLVING METHODOLOGIS AND PROGRAMMING IN C		
Objectives: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> General Operating Knowledge of Computer 		
Unit No.	Topic	Detail
1	Introduction of C Language	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Introduction of Logic. Necessary Instructions for Developing Logic Basics of Flow Chart Dry-run and its Use. Other Logic development techniques
2	Control Structures	<ul style="list-style-type: none"> Selective control structure <ul style="list-style-type: none"> If statements Switch statement Conditional ternary operator Iterative (looping) control statements <ul style="list-style-type: none"> For loop Do...while loop While loop Nesting of loops

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

		<ul style="list-style-type: none"> • Jumping statements <ul style="list-style-type: none"> ▪ Break statement, Continue statement ▪ Goto statements
3	Functions (Inbuilt and User Defined)	<ul style="list-style-type: none"> • Types of library functions <ul style="list-style-type: none"> ▪ String Function: Strcpy, strncpy, strcat, strncat, strchr, strrchr, strcmp, strncmp, strstr, 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, clrscr, 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	<ul style="list-style-type: none"> • Types of arrays <ul style="list-style-type: none"> ▪ Single dimensional array ▪ Two dimensional array ▪ Multi-dimensional array ▪ String arrays • Use of Arrays in Programming • Arrays and Matrices
	Pointers	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • What is structure

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

	Data Type – Structure, Union & enum	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

CS-03: COMPUTER FUNDAMENTALS AND EMERGING TECHNOLOGY		
Objectives: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Basics of Computers <ul style="list-style-type: none"> ○ What is Computer? ○ Characteristics of Computer ○ Data Processing Cycle (Data → Process → information) • Classification of Computer by Data Processed <ul style="list-style-type: none"> ○ Analog, Digital and Hybrid Computers • Classification of Computer by Processing Capabilities <ul style="list-style-type: none"> ○ Micro, Mini, Mainframe and Super Computers • History and Generations of Computers <ul style="list-style-type: none"> ○ First to Fifth Generation Computers • Simple Model of Computer <ul style="list-style-type: none"> ○ 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	<ul style="list-style-type: none"> • Introduction to Mother board • Types of Processors. <ul style="list-style-type: none"> ○ Dual Core, Core 2 Duo, i2, i3, etc • Memory structure and Types of Memory <ul style="list-style-type: none"> ○ RAM (SRAM, DRAM, SO, DDR, etc.) ○ ROM (ROM, PROM, EPROM, EEPROM, etc.) • Slots <ul style="list-style-type: none"> ○ ISA Slots / PCI Slots / Memory Slots • Sockets

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

		<ul style="list-style-type: none"> • Cables <ul style="list-style-type: none"> ○ Serial Cable / Parallel Cable / USB Cable • Ports <ul style="list-style-type: none"> ○ USB / Serial / Parellel / PS2 / HDMI • Power Devices :UPS • Graphic Cards • Network card, Sound Card
2	Input Devices	<ul style="list-style-type: none"> • Introduction • Types of Input Devices <ul style="list-style-type: none"> ○ 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 <ul style="list-style-type: none"> ○ OCR, OMR, MICR, OBR
	Data Storage	<ul style="list-style-type: none"> • Introduction • Types of Magnetic Storage Devices <ul style="list-style-type: none"> ○ Floppy Disk / Hard Disk (SATA, SSD) / Magnetic Tape / Magnetic Disks • Storage Mechanism of Magnetic Storage Devices <ul style="list-style-type: none"> ○ Tracks / Sectors / Clusters / Cylinders • Reading / Writing Data to and from Storage Devices • Seek Time / Rotational Delay - Latency / Access • Time /Response Time • Other Storage Devices <ul style="list-style-type: none"> ○ USB - Pen Drive / CD / DVD / Blu-Rav Disk etc. ○ Flash Memory, Cloud Storage(Like Google Drive, OneDrive etc.)
3	Output Devices	<ul style="list-style-type: none"> • Types of Output Devices • CRT Display Units • Monitor • Non CRT display Units • LCD / LED / Plasma Displays • Types of Printers Impact and Non Impact Printers

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

		<ul style="list-style-type: none"> • Plotters • Other Devices <ul style="list-style-type: none"> ○ Fascimile(FAX) ○ OLED (Organic LED) ○ Headphone ○ SGD (Speech Generating Device) ○ COM (Computer Output Microfilm) ○ Google Glass
4	Numbering System and Codes	<ul style="list-style-type: none"> • Introduction to Binary Codes / <ul style="list-style-type: none"> ○ Nibble / Bit / Byte / Carry Bit / Parity Bit / Sign Bit ○ KB / MB / GB / TB / HB (etc) • Types of Numbering System <ul style="list-style-type: none"> ○ Binary / Octal/Decimal / Hex-Decimal • Conversion <ul style="list-style-type: none"> ○ 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 <ul style="list-style-type: none"> ○ Addition ○ Subtraction (1's Compliment and 2's Compliment) ○ Division ○ Multiplication • Types of Codes <ul style="list-style-type: none"> ○ ASCII/BCD / EBCDIC / UniCode • Parity Check <ul style="list-style-type: none"> ○ Event Parity System / Odd Parity System
	Languages, Operating Systems and Software Packages	<ul style="list-style-type: none"> • Introduction • Translator (Assembler / Compiler / Interpreter) • Types of Languages <ul style="list-style-type: none"> ○ Machine Level Language ○ Assembly Level Language ○ High Level Language (3GL, 4GL, 5GL, etc.) • Types of Operating Systems <ul style="list-style-type: none"> ○ Batch Operating System ○ Multi Processing Operating System ○ Time Sharing Operating System ○ Online and Real Time Operating System • Uses and applications of Software Packages <ul style="list-style-type: none"> ○ Word Processing Packages ○ Spread Sheet Packages

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

		<ul style="list-style-type: none"> ○ Graphical Packages ○ Database Packages I ○ Presentation Packages ○ Animation / Video / Sound Packages
5	Emerging Technologies and Virus	<ul style="list-style-type: none"> • Different Communication methods <ul style="list-style-type: none"> ○ GIS / GPS / COMA / GSM • Communication Devices I <ul style="list-style-type: none"> ○ Cell Phones / Modem / Infrared / Bluetooth / WiFi/LiFi/SLM(Spatial Light Modulator) • Virus <ul style="list-style-type: none"> ○ Introduction to Virus and related terms ○ Origin and History ○ Types of Virus ○ Problems and Protection from Virus • Cloud Computing <ul style="list-style-type: none"> ○ What is Cloud Computing? ○ Characteristic & Service Models(Iaas, Paas, Saas) ○ Architecture ○ Security & Privacy
	Important Terms and Acronyms	<ul style="list-style-type: none"> • ATM • Backup / Restore • Hard Copy / Soft Copy • Bus / Data Bus • Buffer and types / Spooling • Cursor / Pointer / Icon • E-Mail I Attachment • CLil 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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

CS-04: NETWORKING & INTERNET ENVIRONMENT		
Objectives: <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> HTML5 Document Structure (section, article,

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> ○ 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	<ul style="list-style-type: none"> • Introduction to JavaScript • Variables • JavaScript Operators • Conditional Statements

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

		<ul style="list-style-type: none"> • JavaScript Loops • JavaScript Break and Continue Statements • Dialog Boxes
		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 4.0 -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

**Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022**

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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

CS-07: DATA STRUCTURE USING C LANGUAGE		
Objectives: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Computer Programming Knowledge 		
Sr. No.	Topic	Detail
1	Algorithm Analysis	<ul style="list-style-type: none"> The analysis of algorithm. Time and space complexities. Asymptotic notation. Classes of algorithm. Big-Oh Notation Big-Omega Notation
	Advanced Concepts of C	<ul style="list-style-type: none"> Dynamic allocation and de-allocation of memory <ul style="list-style-type: none"> function malloc(size) function calloc(n,size) function free(block) Dangling pointer problem. Enumerated constants
2	Sorting and Searching	<ul style="list-style-type: none"> 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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

		<p>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 Dequeues Priority queues</p>
4	Linked List & Implementation	<ul style="list-style-type: none"> • Applications of the linked lists • Types of Linked Lists <ul style="list-style-type: none"> ○ Singly Linked List ○ Doubly linked list ○ Header Linked List ○ Circular Linked List • Implementation using Singly Linked List, Doubly Linked List and Circular Singly Linked List <ul style="list-style-type: none"> ○ Insertion of a node at the beginning ○ Insertion of a node at the end ○ Insertion of a node after a specified node ○ Traversing the entire linked list ○ Deletion of a node from linked list ○ Updating of a specific node • Implementation of merging of two Singly Linked List Implementation of reversing of Singly Linked List
5	Tree & Graph	<p>Objectives Properties of a tree Binary trees Properties of binary trees Implementation Traversals of a binary tree In order traversal Post order traversal</p>

**Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022**

		Preorder traversal Binary search trees (bst) Insertion in bst Deletion of a node Search for a key in bst <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

CS-08: WEB PROGRAMMING		
Objectives: <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> argument function default argument variable function return function Variable Length Argument Function <ul style="list-style-type: none"> func_num_args func_get_arg, func_get_args Built in Functions <ul style="list-style-type: none"> - Variable Functions - String Function - Math Function - Date Function - Array Function - Miscellaneous Function - File handling Function
2	Handling Form, Session Tracking & PHP	<ul style="list-style-type: none"> Handling form with GET & POST Cookies Session

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

	Components	<ul style="list-style-type: none"> • Server variable • PHP Components <ul style="list-style-type: none"> - PHP GD Library - PHP Regular expression - Uploading file - Sending mail
	AJAX & JSON	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Working with MySQL using PhpMyAdmin • SQL DML Statement (Insert, Update, Select, Delete) Command • PHP-MySQLi Connectivity • PHP-MySQLi Functions <ul style="list-style-type: none"> • mysqli_connect, mysqli_close, mysqli_error, mysqli_errno, mysqli_select_db, mysqli_query, mysqli_fetch_array, mysqli_num_Rows, mysqli_affected_Rows, mysqli_fetch_assoc, mysqli_fetch_field , mysqli_fetch_object, mysqli_fetch_row, mysqli_insert_id, mysqli_num_fields, mysqli_data_seek
4	jQuery	<ul style="list-style-type: none"> • What is jQuery? • jQuery Syntax • jQuery Selector <ul style="list-style-type: none"> - Element Selector - Class Selector - id Selector • jQuery Events <ul style="list-style-type: none"> Click, dbclick, keypress, keydown, keyup, submit, change, focus, blur, load, resize, scroll, unhide • jQuery Effects <ul style="list-style-type: none"> hide show, fade, slide

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

		<ul style="list-style-type: none"> jQuery Methods Css, height, width, innerWidth, innerHeight, outerWidth, outerHeight, html, text, append, prepend, after, before, addClass, removeClass, toggleClass, remove, empty
5	OOP	<ul style="list-style-type: none"> Concept of OOP <ul style="list-style-type: none"> Class Object Property Visibility Constructor, Destructor Inheritance Scope Resolution Operator (::) Autoloading Classes 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]

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

CS-09: COMPUTER ORGANIZATION AND ARCHITECTURE		
Objectives: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> General Knowledge of Computer 		
Unit No.	Topic	Detail
1	Digital Logic Circuits	<ul style="list-style-type: none"> Logic Gates <ul style="list-style-type: none"> AND, OR, NOT, NAND, NOR, XOR, Exclusive NOR gates Boolean Algebra <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> Clock pulses Combinational circuit, sequential circuit and adder Flip Flops <ul style="list-style-type: none"> SR, Clocked SR, D, JK, JK – Master Slave, T Universal Gate
2	Digital Component	<ul style="list-style-type: none"> Integrated Circuits <ul style="list-style-type: none"> Decoders (2 X 4, 3 X 8) Encoders (Octal to Binary – 8 X 3) Multiplexer (4 X 1) Demultiplexer (1 X 4) Register <ul style="list-style-type: none"> Block diagram of register Parallel register and shift register

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

		<ul style="list-style-type: none"> ▪ Asynchronous 4-bits Binary Counter
3	Data Representation	<ul style="list-style-type: none"> • Multiplication and division of two binary numbers • Floating point representation • Fixed point representation • Error Detection code – (Parity Bit)
4	Central Processing Unit	<ul style="list-style-type: none"> • Introduction Of CPU • Major component of CPU • General Register Organization <ul style="list-style-type: none"> ▪ control word ▪ Accumulator Register • Stack Organization <ul style="list-style-type: none"> ▪ Register stack ▪ Memory stack ▪ Polish notation and reverse polish notation • Arithmetic And Logic Unit <ul style="list-style-type: none"> ▪ Block diagram of ALU • Interrupts
5	Input-Output Organization	<ul style="list-style-type: none"> • 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

**Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022**

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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

CS – 10 : SAD, Software Quality Assurance and Testing		
Objectives: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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

**Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022**

2	Basics of Software Testing, Types of Software Testing, Verification and Validation	<ul style="list-style-type: none"> • Introduction to software Testing • Software faults and failures <ul style="list-style-type: none"> • Bug/Error/Defect/Faults/Failures • Testing Artifacts <ul style="list-style-type: none"> • Test case • Test Script • Test Plan • Test Harness • Test Suite • Static Testing <ul style="list-style-type: none"> • Informal Review • Walkthrough • Technical Review • Inspection • Dynamic Testing • Test levels <ul style="list-style-type: none"> • Unit Testing • Integration Testing • System Testing • Acceptance Testing <p>Techniques of software Testing</p> <ul style="list-style-type: none"> • Black Box Testing <ul style="list-style-type: none"> • Equivalence Partitioning • Boundary Data Analysis • Decision Table Testing • State Transition Testing • White Box Testing <ul style="list-style-type: none"> • Statement testing and coverage • Decision testing and coverage • Grey Box Testing • Nonfunctional Testing <ul style="list-style-type: none"> • Performance Testing • Stress Testing • Load Testing • Usability Testing • Security Testing
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**Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022**

3	Software Development Life Cycle Models and Automated Testing	<ul style="list-style-type: none"> • Waterfall Model • Iterative Model • V-Model • Spiral Model • Big Bang Model • Prototyping Model • Introduction to Automated Testing <ul style="list-style-type: none"> • Concept of Freeware, Shareware, licensed tools • Theory and Practical Case-Study of Testing Tools <ul style="list-style-type: none"> • Win runner • Load runner • QTP • Rational Suite
4	Project Economics, Project scheduling and Tracking	<ul style="list-style-type: none"> • 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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

5	CAD Project Management Tool UML	<ul style="list-style-type: none">• MS – VISIO for designing & Documentation• MS – Project for controlling and Project Management• UML designing and skill based tools Overview of <ul style="list-style-type: none">◆ Class Diagram◆ Use Case Diagram◆ Activity Diagram
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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 – Rajib Mall (PHP)
5. Software Engineering – A Practitioner's Approach – Pressman
6. UML – A Beginner's Guide – Jason 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

Bachelor of Computer Application
(Semester - 1 and Semester - 2)
Saurashtra University
Effective from June – 2022

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

SAURASHTRA UNIVERSITY
RAJKOT – INDIA



CURRICULAM

FOR

B.C.A.

Bachelor of Computer Application

(Semester - 3 and Semester - 4)

Effective From June – 2023

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

B.C.A. (Semester – 3)			
SR. NO	SUBJECT	NO. OF LECT. PER WEEK	Credit
1	CS – 13 Network Technology and Administration	5	5
2	CS – 14 C++ and Object Oriented Programming	5	5
3	CS – 15 RDBMS Using Oracle	5	5
4	CS – 16 Content Management System using Word Press	5	5
5	CS – 17 Practical (Based On CS-14)	5	5
6	CS – 18 Practical (Based On CS-15, CS-16)	5	5
Total Credits			30

Note:

1. Credit of each subject is 5. Total credit of semester is 30.
2. Total marks of each theory paper are 100 (university examination 70 marks + internal examination 30 marks).
3. Total marks of each practical paper are 100. No internal examination marks in practical papers.

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

CS – 21 NETWORK TECHNOLOGY AND ADMINISTRATION				
Objectives: <ul style="list-style-type: none"> • Build an understanding of the fundamental concepts of computer networking. • Familiarize with the basic taxonomy and terminology of the computer networking area and advanced networking. • Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. Prerequisites: <ul style="list-style-type: none"> • Basic knowledge of computer networking. 				
No	Topics	Details	Marks weight In %	Min Lec.
1	Basics of Network, Network Models and LAN Sharing	<ul style="list-style-type: none"> • Network concepts <ul style="list-style-type: none"> - What is network? - Use of network • Network model <ul style="list-style-type: none"> - peer – to – peer, - client – server • Network Services <ul style="list-style-type: none"> - File service, - Print service, - Comm. service, - Data base service, - Security service, - Application service • Network Access Methods <ul style="list-style-type: none"> - CSMA / CD, CSMA / CA, - Token passing - Polling • Network Topologies <ul style="list-style-type: none"> - Bus, Ring, Star, Mesh, Tree, Hybrid • Advanced <input type="checkbox"/> Network Topologies Ethernet, CDDI, FDDI • Communication Methods <ul style="list-style-type: none"> - Unicasting - Multicasting - Broadcasting • OSI reference model with 7 layers • TCP/IP network model with 4 layers • File And Print Sharing in LAN. • Mapping of network drive • Disk quota • Encryption • Compression • Net meeting 	20	12

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

2	Transmission Media Multiplexing & Switching Concepts Network devices	<ul style="list-style-type: none"> • Transmission Media <ul style="list-style-type: none"> - Types of Transmission media - Guided media - Co – Axial Cable, - Twisted Pair Cable, - Crimping of Twisted pair cable - Fiber Optic Cable • Unguided media <ul style="list-style-type: none"> - Infrared, Laser, Radio, Microwave, Bluetooth tech. • Different Frequency Ranges • Multiplexing & De-multiplexing • Multiplexing Types <ul style="list-style-type: none"> - FDM, - TDM, - CDM, - WDM • Switching Tech. <ul style="list-style-type: none"> - Circuit Switching, - Message Switching, - Packet Switching • CABLE NETWORK DEVICES • LAYER1 DEVICES <ul style="list-style-type: none"> - LAN CARD, - MODEM , - DSL & ADSL - HUB(Active, Passive, Smart hub) - REPEATER • LAYER2 DEVICES <ul style="list-style-type: none"> - SWITCH(Manageable, non-manageable) - BRIDGE(Source route, Transactional) • LAYER3 DEVICES <ul style="list-style-type: none"> - ROUTER - LAYER3 SWITCH - BROUTER - GATEWAY - Network Printer • WIRELESS NETWORK DEVICES <ul style="list-style-type: none"> Wireless switch Wireless router, ACCESSPOINT 	20	15
3	Network Protocols, Network Routing	<ul style="list-style-type: none"> • Packets & Protocols • <input type="checkbox"/> Conn. Oriented protocols -TCP & connection less protocols-UDP 	20	10

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> • TCP/IP STACK <ul style="list-style-type: none"> - HTTP, - FTP, - SMTP, - POP3 - SNMP, - TELNET, - ARP - RARP • IPX/SPX • AppleTalk, • NetBIOS Name PROTOCOL • L2CAP, RFCOMM Protocol • What is routing • Requirements of routing • Types of Routing <ul style="list-style-type: none"> - static, - dynamic, - default • Routing protocols <ul style="list-style-type: none"> - Exterior Routing protocol <ul style="list-style-type: none"> 1)BGP - Interior Routing protocol <ul style="list-style-type: none"> (1)Distance vector routing <ul style="list-style-type: none"> - RIP - IGRP - EIGRP (2)Link state routing <ul style="list-style-type: none"> - OSPF - IS IS 		
4	IP ADDRESSING, Windows 2008 server	<ul style="list-style-type: none"> • What is ip address? • Types of ip address • □ipv4 <ul style="list-style-type: none"> - Class structure - subnetting, supernetting • ipv6 <ul style="list-style-type: none"> - Basic structure of ipv6 - Implementation of ipv6 • Migration from ipv4 to ipv6 • Installation of 2008 enterprise server • Various editions of windows 2008 server • Installation & Configuration of Active Directory <ul style="list-style-type: none"> - Domains, Trees, Forests concept • Accounts(User, Group, Computer) 	20	11

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> • Policy (Security and audit) • Logging Events • MMC(Microsoft Management console) 		
5	Basics of Network Security, Internet connection & Sharing	<ul style="list-style-type: none"> • Fundamental of Network Security • Requirements of network Security • Policies, Standard, Procedures, Baselines, Guide lines • Security methods <ul style="list-style-type: none"> - Encryption, Cryptography - Authentication • Security Principle –CIA Model • Basics of Internet • How internet is connecting with computer • Technology related internet <ul style="list-style-type: none"> - Dial up tech. - ISDN network tech. - Lease line tech. • VPN <ul style="list-style-type: none"> - Types of VPN - Use of VPN - VPN protocols (PPTP, L2TP, IPsec.) • Proxy server, Firewall • GPS, GPRS • CCTV tech. 	20	12
		Total	100	60

Students seminar - 5 Lectures

Expert Talk - 5 Lectures

Students Test - 5 Lectures

TOTAL LECTURES 60+15=75

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

Course outcomes:

- Understand various types of computer networks
- Enumerate the layers of the OSI model and TCP/IP
- Understand principles of LAN design such as topology and configuration
- Apply transmission media and various networking devices to establish networks
- Compare and Analyze various spread spectrum and multiplexing techniques
- Understand network industry trends such as: Routing Protocols, IP Addresses, Error Detection

Reference Books:

1. Networking Essential - Glenn Berg Tech. Media
2. MCSE Self-Paced Training Kit (Server 2003)
Data Communication and Networking - B A Forouzan
3. Networking Essential - Glenn Berg Tech. Media
4. MCSE Self-Paced Training Kit (Server 2003)
5. Data Communication and Networking - B A Forouzan

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

CS - 14 : C++ and Object Oriented Programming				
Objectives: <ul style="list-style-type: none"> To provide of OOPs concepts, input/output data management, arrays in C++, functions, classes, objects, pointers, and much more. Object-Oriented features, which allow the programmer to create objects within the code. Prerequisites: concepts of OOPs and their implementation.				
No	Topics	Details	Marks weight in %	Min. Lect.
1	Principles of object oriented programming Tokens, expressions and control statements	<ul style="list-style-type: none"> Procedure – oriented programming Object oriented programming paradigm Basic concepts of object oriented Programming Benefits of object oriented programming Application of object oriented programming What is c++? Application of c++ Input/output operators Structure of c++ program Introduction of namespace Tokens : keywords, identifiers, basic data types, user- defined types, derived data types, symbolic constants, type compatibility, declaration of variables, dynamic initialization of variables, reference variables Operators in C++: scope resolution operator, member referencing operator, memory management operator, manipulators, type cast operator. Expression : Expression and their types, special assignment operator, implicit conversions, operator precedence 	20	15

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> Control structures <ul style="list-style-type: none"> ◆ Conditional control structure :- simple if, if...else , nested if else, switch etc. ◆ Looping control structure:- for, while , do...while 		
	Functions in C++	<ul style="list-style-type: none"> The main function Function prototype Call by reference Return by reference Inline function Default arguments Const arguments Functions overloading Adding C Functions turbo C++ 		
2	Classes and Objects, Constructor and Destructor	<ul style="list-style-type: none"> C structures revisited Specifying a class Local Classes Nested Classes Defining member functions, nesting of Member functions, private member function, making outside function inline Arrays within a class Memory allocation for objects Static data member Static member functions Arrays of objects Objects as function arguments Friendly functions Returning objects Const member function Pointer to members 	20	12
		<ul style="list-style-type: none"> Characteristics of constructor Explicit constructor Parameterized constructor Multiple constructor in a class Constructor with default argument Copy constructor Dynamic initialization of objects Constructing two dimensional array 		

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> • Dynamic constructor • MIL , Advantage of MIL • Destructors 		
3	Operator overloading and type conversion, Inheritance	<ul style="list-style-type: none"> • Concept of operator overloading • Over loading unary and binary operators • Overloading of operators using friend Function • Manipulation of string using operators • Rules for operator overloading • Type conversions. • Comparison of different method of conversion • Defining derived classes • Types of inheritance (Single, Multiple, Multi-level, Hierarchical, Hybrid) • Virtual base class & Abstract class • Constructors in derived class • Application of Constructor and Destructor in inheritance • Containership, Inheritance V/s Containership 	20	11
4	Pointer, Virtual functions and Polymorphism, RTTI Console I/O operations	<ul style="list-style-type: none"> • Pointer to Object • Pointer to derived class • this pointer • Rules for virtual function • Virtual function and pure virtual function. • Default argument to virtual function • Run Time Type Identification • C++ streams • C++ stream classes • Unformatted and formatted I/O operations • Use of manipulators. 	20	10
5	Working with Files, Exception handling,	<ul style="list-style-type: none"> • File stream classes • Opening and closing a file • Error handling • File modes 	20	12

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

	Introduction to Template STL	<ul style="list-style-type: none"> • File pointers • Sequential I/O operations • Updating a file (Random access) • Command line arguments • Overview of Exception Handling • Need for Exception Handling • various components of exception handling • Introduction to templates • Class templates • Function templates • Member function templates • Overloading of template function • Non-type Template argument • Primary and Partial Specialization • Introduction to STL • Overview of iterators, containers 		
TOTAL			100	60

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

Course outcomes:

- Understand the concept and underlying principles of Object-Oriented Programming.
- Understand implementation issues related to object-oriented techniques.
- Apply the techniques of object-oriented programming to solve real problems
- Analyze, apply and write programs that make appropriate use of object-oriented functionality such as classes, overloading and inheritance
- Implement the file handling techniques for back-end storage problems solutions

Reference Books:

1. Complete Reference C++ by Herbert Schildt McGraw Hill Publications
2. Computer Science- A Structured approach using C++ by Forouzan, Gilburg, THOMSON
3. Object Oriented Programming in C++ - E.Balagurusamy, BPB
4. Object Oriented programming in C++ by Robert Lafore, Pearson Education
5. Mastering C++ - Venugopal
6. The C++ Programming Language by Bjarne Stroustrup, Pearson Education
7. Object Oriented Programmin in C++ - Robaret Laphore
8. Let us C++ - Yashvant Kanitkar, BPB

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

CS – 15 : RDBMS Using Oracle				
Objectives: <ul style="list-style-type: none"> To provide the basic concept, theory and practices in design and implementation of DBMS. To be able to handling different type of data transaction by using SQL commands. Prerequisites: <ul style="list-style-type: none"> Theoretical as well as practical knowledge of database management system. 				
No.	Topics	Details	Marks weight In %	Min Lect.
1	DBMS Overview, SQL, SQL*Plus	<ul style="list-style-type: none"> Introduction to DBMS Introduction to RDBMS Dr.E.F.Codd Rules Importance of E.R.Diagram in Relational DBMS. Normalization Introduction to SQL SQL Commands and Datatypes Introduction to SQL*Plus SQL*Plus formatting commands Operator and Expression SQL v/s SQL*Plus 	20	10
2	Managing Tables and Data, Data Control And Transaction Control Command	<ul style="list-style-type: none"> Creating , Altering & Dropping tables Data Manipulation Command like Insert, update, delete Different type of constraints and applying of constration SELECT statement with WHERE, GROUP BY and HAVING,ROLLUP AND CUBE, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL, BETWEEN, EXISTS, LIKE Join (Inner join ,outer join, self join) subquery, minus, intersect, union Built in functions 	20	15

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> • Numeric Function abs, ceil, cos, decode, exp, floor, greatest, least, log, log10, max, min, rem, round, sign, sin, sinh, sqrt, tan, trunc • Character Function chr, concat, initcap, lower, lpad, ltrim, replace, rpad, rtrim, soundex, substr, treat, trim, upper • Date Function add_months, last_day, months_between, next_day, round (date), sysdate, systimestamp, trunc (date), to_date, to_char • Aggregate function Sum, Count, AVG, MAX, MIN • General Functions COALESCE, CASE WHEN, DECODE • Creating user & role • Grant, Revoke command • What is transaction? • Starting and Ending of Transaction Commit, Rollback, SavePoint 		
3	Other ORACLE Database Objects, Concurrency control using lock	<ul style="list-style-type: none"> • View • Sequence • Synonyms, • Database Links • Index <ul style="list-style-type: none"> ○ B*Tree Indexes ○ Bitmap Indexes ○ Function-Based Indexes ○ Application Domain Indexes • Cluster • Snapshot • What Are Locks? • Locking Issues <ul style="list-style-type: none"> ○ Lost Updates ○ Pessimistic Locking ○ Optimistic Locking ○ Blocking ○ Deadlocks ○ Lock Escalation • Lock Types <ul style="list-style-type: none"> ○ DML Locks ○ DDL Locks ○ Latches ○ Manual Locking & User-Defined Locks 	20	10

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

4	Introduction to PL/SQL, Advanced PL/SQL	<ul style="list-style-type: none"> • SQL v/s PL/SQL • PL/SQL Block Structure • Language construct of PL/SQL • (Variables, Basic and Composite Data type, Conditions looping etc.) • %TYPE and %ROWTYPE • Using Cursor(Implicit, Explicit) • Exception Handling • Creating and Using Procedure, Functions, Package, • Triggers • Creating Objects, Object in Database-Table • PL/SQL Tables, Nested Tables, Varrays 	20	15
5	Oracle Database Structure and Storage Database, Resource Management and Task Scheduling	<ul style="list-style-type: none"> • Instance Architecture <ul style="list-style-type: none"> ○ Database Processes ○ Memory Structure. ○ Data files • Creating & Altering Database • Opening & shutdown Database • Initialization Parameter • Control Files, Redo Logs files • Tablespace(Create, Alter, Drop) • Rollback Segment (Create, Alter) (System & Transaction RBS) • Oracle Blocks • Import • Export • SQL*Loader • Managing Automated Database Maintenance Tasks • Managing Resources with Oracle Database Resource Manager • Oracle Scheduler Concepts • Scheduling Jobs with Oracle Scheduler • Administering Oracle Scheduler 	20	10
	Total		100	60

Students seminar - 5 Lectures

Expert Talk - 5 Lectures (Managing a Multitenant Environment using Oracle 12c)

Students Test - 5 Lectures.

TOTAL LECTURES 60+15=75

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

Course outcomes:

- Describe the fundamentals of data design and relation database concepts
- Design entity-relationship diagrams to represent database application scenarios
- Develop relational database
- Apply normalization techniques on relational database
- Describe the knowledge of transaction processing and various concurrency problems
- Apply knowledge of SQL queries to perform various database related operations
- Develop various PL/SQL programs

Reference Books:

1. Oracle Database 12c The Complete Reference (Oracle Press) by Bob Bryla , Kevin Loney – Oracle Press
2. Oracle Database 12c SQL – Jason Price – Oracle Press
3. Oracle Database 12c PL/SQL Programming by McLaughlin – Oracle Press
4. SQL,PL/SQL The programming - Lang.Of Oracle Ivan Bayross - BPB

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

CS – 16: Content Management System using WordPress

Objectives:

- Learn how to create custom themes and pages
- Work with custom post types and taxonomies
- In detail knowledge of the Wordpress CMS backend
- Working with widgets and widget areas.
- Working in default cms functions and extending its core.

Prerequisites:

- Basic knowledge of web development and CMS.

No.	Topic	Details	Marks weight In %	Min. Lect.
1	Introduction Installation & Configuration	What is Content Management System (CMS)? - Introduction of Wordpress - Features of Wordpress <ul style="list-style-type: none"> • Advantages & Disadvantages of Wordpress - Installation of Wordpress. - Wordpress Directory & file structure. - Dashboard overview - How to add, edit and delete page, category, post, tag. - Add new media file (image, pdf, doc etc.) & attach to post or page. - Gutenberg Introduction <ul style="list-style-type: none"> • Gutenberg Blocks (Paragraph, Heading, Subheading, Quote, Image, Cover Image, Gallery, Video, Audio, Columns, Code, List, Button, Embeds) - User Roles and Capabilities. - Setting (General, writing, Reading, Discussion, Media, Permalinks) - Updating Wordpress <ul style="list-style-type: none"> • One-click Update • Manual Update - Database Structure	15	9
2	Theme	- What is theme? - How to install & activate theme. - Theme Customize Options (Site Identity,	25	15

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		Menus, Widgets, HomePage Settings, Additional CSS)		
3	Widget	<ul style="list-style-type: none"> - What is widget & widget Areas? - Widget Management <ul style="list-style-type: none"> • Available Widgets (Archive, Calendar, Categories, Navigation Menu, Meta, Pages, Recent Comments, Recent Posts, RSS, Search, Tag Cloud, Text, Image, Gallery, Video, Audio, Custom HTML) • Inactive Sidebar (not used) • Inactive Widgets 	15	10
	Plugin	<ul style="list-style-type: none"> - What is plugin? - How to install and activate plugin. - Useful plugins for website. <ul style="list-style-type: none"> • Seo yoast • Contact form 7 • Woocommerce • WP Super Cache • Regenerate Thumbnails • Advanced Custom Fields • All-in-One WP Migration • Custom Post Type Widgets 		
3	Theme development	<ul style="list-style-type: none"> - Anatomy of a Theme: header.php, footer.php and sidebar.php - Template Files (style.css, index.php, page.php, home.php, archive.php, single.php, comments.php, search.php, attachment.php, 404.php, category.php, tag.php, author.php, date.php) - The Loop (have_posts (), the_post()) - Template Tags <ol style="list-style-type: none"> 1. General tags (wp_head(), get_footer(), get_header(), get_sidebar(), get_search_form(), bloginfo(), wp_title(), single_post_title(), wp_footer(), comments_template(), add_theme_support(), get_template_directory_uri(), 	30	14

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<p>body_class())</p> <p>2. Author tags (the_author(), get_the_author(), the_author_link(), get_the_author_link(), the_author_meta(), the_author_posts())</p> <p>3 Category tags (category_description(), single_cat_title(), the_category())</p> <p>4. Link tags (the_permalink(), get_permalink(), home_url(), get_home_url(), site_url(), get_site_url())</p> <p>5 Post tags (the_content(), the_excerpt(), the_ID(), the_tags(), the_title(), get_the_title(), the_date(), get_the_date(), the_time(), next_post_link(), previous_post_link(), posts_nav_link(), post_class())</p> <p>6 Post Thumbnail tags (has_post_thumbnail(), get_post_thumbnail_id(), the_post_thumbnail(), get_the_post_thumbnail())</p> <p>7 Navigation Menu tags (wp_nav_menu())</p> <p>8 Conditional Tags (is_archive(), is_category(), is_front_page(), is_home(), is_page(), is_single(), is_search(), is_attachment(), is_active_sidebar())</p> <p>- functions.php file</p>		
4	Advanced development	<p>- Advanced functions</p> <ul style="list-style-type: none"> • add_action() • add_filter() • add_shortcode() • do_shortcode() • register_nav_menu() 	15	12

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		- Custom Post Types <ul style="list-style-type: none"> • register_post_type() • register_taxonomy() • Display custom Post Type & Taxonomy - Widget Area <ul style="list-style-type: none"> • register_sidebar() • dynamic_sidebar() • 		
TOTAL:			100	60

Students seminar - 5 Lectures.
 Expert Talk - 5 Lectures
 Students Test - 5 Lectures.

TOTAL LECTURES 60+15=75

Course outcomes:

- Work with and configure the cms backend
- Know when to use a custom post type or custom field
- Extend the Wordpress cms core to match requirements
- Create stunning dynamic themes

Reference Books:

1. Build Your Own Wordpress Website: An Ultimate Guide for Small Business Owners Paperback by Wordpress Genie
2. Teach Yourself VISUALLY Word Press Paperback –by George Plumley 3rd Edition.
3. Wordpress for Beginners: A Visual Step-by-step Guide to Mastering Word press Paperback –by Dr. Andy Williams.
4. Wordpress to Go: How to Build a Wordpress Website on Your Own Domain, from Scratch, Even If You Are a Complete Beginner Paperback –by Sarah Mcharry (Author)

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

CS-17 : Practical Based On CS – 14	
Topics	Marks
CS – 14	100

Note : Each session is of 3 hours for the purpose of practical examination.

CS-18 : Practical And Viva Based On CS – 15 & CS – 16	
Topics	Marks
CS – 15 and CS - 16	100

Note:

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

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

B.C.A. (Semester – 4)			
SR.NO	SUBJECT	NO. OF LECT. PER WEEK	CREDIT
1	CS – 19 Programming with JAVA	5	5
2	CS – 20 Programming with C#	5	5
3	CS – 21 Web Searching Technology and Optimization	5	5
4	CS – 22 Operating Systems Concepts With Unix / Linux	5	5
5	CS – 23 Practical (Based On CS- 19, CS-22)	5	5
6	CS – 24 Practical (Based On CS- 20, CS-21)	5	5
Total Credit			30

Note:

1. Credit of each subject is 5. Total credit of semester is 30.
2. Total marks of each theory paper are 100 (university examination 70 marks + internal examination 30 marks).
3. Total marks of each practical paper are 100. No internal examination marks in practical papers.

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

CS – 19 PROGRAMMING WITH JAVA				
Objectives: <ul style="list-style-type: none"> To provide fundamental concepts of Object Oriented Programming and familiar with Java environment and its applications. To be able to understand Control structures, Classes, methods and argument passing and iteration graphical user interface basics Programming and documentation style. Prerequisites: <ul style="list-style-type: none"> Basic knowledge of object-oriented approach in programming with basic skills using Java. 				
No	Topics	Details	Marks weight In %	Min Lec.
1	History, Introduction and Language, Basics Classes and Objects	<ul style="list-style-type: none"> - History and Features of Java - Java Editions - JDK, JVM and JRE - JDK Tools - Compiling and Executing basic Java Program - Java IDE (NetBeans and Eclipse) - Data Type (Integer, Float, Character, Boolean) - Java Tokens (Keyword, Literal, Identifier, Whitespace, Separators, Comments, Operators) - Operators (Arithmetic, Relational, Boolean Logical, Bitwise Logical, Assignment, Unary, Shift, Special operators) - Java Keywords (assert, strictfp, enum) - Type Casting - Decision Statements (if, switch) - Looping Statements (for, while, do..while) - Jumping Statements (break, continue, return) - Array (One Dim., Rectangular, Jagged) - Command Line Argument Array 	20	10
		<ul style="list-style-type: none"> - OOP Concepts (Class, Object, 		

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> - Encapsulation, Inheritance, Polymorphism) - Creating and using Class with members - Constructor - finalize() method - Static and Non-Static Members - Overloading (Constructor & Method) - Varargs, IIB (Instance Initialization Block) in Java 		
2	Inheritance, Java Packages	<ul style="list-style-type: none"> - Universal Class (Object Class) - Access Specifiers (public, private, protected, default, private protected) - Constructors in inheritance - Method Overriding - Interface, Object Cloning, - Nested and Inner Class - Abstract and Final Class - Normal import and Static Import - Introduction to Java API Packages and imp. Classes <ul style="list-style-type: none"> o java.lang o java.util o java.io o java.net o java.awt o java.awt.event o java.applet o java.swing - java.lang Package Classes (Math, Wrapper Classes, String, String Buffer) - java.util Package Classes (Random, Date, GregorianCalendar, StringTokenizer, Collection in Java - Vector, HashTable, LinkedList, SortedSet, Stack, Queue, Map - Creating and Using UserDefined package and sub-package 	20	15
3	Exception Handling, Threading and Streams (Input and Output)	<ul style="list-style-type: none"> - Introduction to exception handling - try, catch, finally, throw, throws - Creating user defined Exception class - Thread and its Life Cycle (Thread States) 	20	10

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> - Thread Class and its methods - Synchronization in Multiple Threads (Multithreading) - Deamon Thread, Non-Deamon Thread 		
		<ul style="list-style-type: none"> - Stream and its types (Input, Output, Character, Byte) - File and RandomAccessFile Class - Reading and Writing through Character Stream Classes (FileReader, BufferedReader, FileWriter, BufferedWriter) - Reading and Writing through Byte Stream Classes (InputStream, FileInputStream, DataInputStream, OutputStream, FileOutputStream, DataOutputStream) - StreamTokenizer Class - Piped Streams, Bridge Classes : InputStreamReader and OutputStreamWriter - ObjectInputStream, ObjectOutputStream 		
4	Applets	<ul style="list-style-type: none"> - Introduction to Applet - Applet Life Cycle - Implement & Executing Applet with Parameters - Graphics class 	20	10
	Layout Managers	<ul style="list-style-type: none"> - FlowLayout - BorderLayout - CardLayout - GridLayout - GridBagLayout with GridBagConstraints - Intro. to BoxLayout, SpringLayout, GroupLayout - Using NO LAYOUT Manager 		
5	GUI using SWING Event Handling	<ul style="list-style-type: none"> - Introduction to AWT and Swing - Difference Between AWT and Swing Components 	20	15

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> - Swing Components <ul style="list-style-type: none"> o JFrame, JPanel o JLabel, JButton, JRadioButton, JCheckBox, JProgressBar, JFileChooser o JTextField, JPasswordField, JTextArea o JScrollBar, JComboBox, JList o Menus (JMenuBar, JMenu, JMenuItem) - Introduction to Event Handling - Event Delegation Model - Event Packages <ul style="list-style-type: none"> o AWT Event Package o Swing Event Package - Event Classes (ActionEvent, ItemEvent, FocusEvent, MouseEvent, MouseWheelEvent, AdjustmentEvent, TextEvent, WindowEvent, etc.) - Listener Interfaces (ActionListener, ItemListener, FocusListener, AdjustmentListener, KeyListener, MouseListener, MouseMotionListener, TextListener, WindowListener, etc.) - Adapter Classes (FocusAdapter, KeyAdapter, MouseAdapter, MouseMotionAdapter) 		
		Total	100	60

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

Course outcomes:

- Understand basic concepts and Java Programming Constructs
- Demonstrate Object Oriented Programming Concepts using JAVA
- Develop robust application by demonstrating professionally acceptable coding
- Design attractive user interface using AWT
- Apply parallel computations in solutions
- Develop programs to solve numeric and string-based problems

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

Reference Books:

1. Java: A Beginner's Guide – Jul 2014 by Herbert Schildt
2. Java Programming (Oracle Press) by Poornachandra Sarang
3. Java The Complete Reference, 8th Edition –by Herbert Schildt
4. Ivor Horton's "Beginning Java 2" JDK 5 Edition, Wiley Computer Publishing.
5. Ken Arnold, James Gosling, David Holmes, "The Java Programming Language", Addison-Wesley Pearson Education.
6. Cay Horstmann, "Big Java", Wiley Computer publishing (2nd edition – 2006).
7. James Gosling, Bill Joy, Guy Steele, Gilad Bracha, "The Java Language Specifications", Addison-Wesley Pearson Education (3rd edition) Download at <http://docs.oracle.com/javase/specs/>

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

CS – 20 PROGRAMMING WITH C#				
Objectives: <ul style="list-style-type: none"> Demonstrate knowledge of object-oriented concepts Design user experience and functional requirements C#.NET application. Prerequisites: <ul style="list-style-type: none"> Basic Knowledge of C # programming language and .NET environment. 				
No	Topics	Details	Marks weight In %	Min Lec.
1	.NET Framework and Visual Studio IDE, Language Basics	Introduction to .NET Framework Features / Advantages CLR, CTS and CLS BCL / FCL / Namespaces Assembly and MetaData JIT and types Managed Code and Unmanaged Code Introduction to .NET Framework and IDE versions Different components (windows) of IDE Types of Projects in IDE (Console, Windows, Web, Setup, etc.) Data Types (Value Type & Reference Type) Boxing and UnBoxing Operators (Arithmetic, Relational, Bitwise, etc.) Arrays (One Dimensional, Rectangular, Jagged) Decisions (If types and switch case) Loops (for, while, do..while, foreach)	20	10
2	Class and Inheritance, Property, Indexer, Pointers, Delegates, Event, Collections	Concept of Class, Object, Encapsulation, Inheritance, Polymorphism Creating Class and Objects Methods with “ref” and “out” parameters Static and Non-Static Members Constructors	20	15

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		Overloading Constructor, Method and Operator Inheritance Sealed Class & Abstract Class Overriding Methods Interface inheritance Creating and using Property Creating and using Indexer Creating and using Pointers (unsafe concept) Creating and using Delegates (Single / Multicasting) Creating and using Events with Event Delegate Collections (ArrayList, HashTable, Stack, Queue, SortedList) and their differences.		
3	Windows Programming	Creating windows Application MessageBox class with all types of Show() method Basic Introduction to Form and properties Concept of adding various Events with event parameters Different Windows Controls <ul style="list-style-type: none"> - Button - Label - TextBox - RadioButton - CheckBox - ComboBox - ListBox - PictureBox - ScrollBar - TreeView - Menu (MenuStrip, ContextMenuStrip) - ToolStrip - Timer - Panel and GroupBox Dialog Boxes (ColorDialog, FontDialog, SaveFileDialog and OpenFileDialog) MDI Concept with MDI Notepad	20	15

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		Concept of Inheriting Form		
4.	Database Programming with ADO.NET	Concept of Connected and Disconnected Architecture Data Providers in ADO.NET Connection Object Connected Architecture <ul style="list-style-type: none"> - Command - DataReader Disconnected Architecture <ul style="list-style-type: none"> - DataAdapter - DataSet - DataTable - DataRow - DataColumn - DataRelation - DataView Data Binding GridView Programming	20	12
5	User Controls (Components), Crystal Reports, Setup Project	Creating User Control with <ul style="list-style-type: none"> - Property - Method - Event Using User Control in Windows, Projects as component, Creating Crystal Reports Types of Reports Report Sections Formula, Special Field and Summary in Report Types of Setup Projects Creating Setup Project <ul style="list-style-type: none"> - File System Editor - User Interface Editor - Launch Conditions Editor 	20	8
		Total	100	60

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

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

Course outcomes:

- Use the Microsoft Visual Studio development environment to create a windows application
- Understand the basics of object-oriented programming, CLR and .NET framework
- Demonstrate C# programming constructs to solve given problem
- Perform CRUD operations in windows application
- Use the trace and debug utility that are provided with Visual Studio .NET
- Develop, configure and deploy windows application

REFERENCE BOOKS

1. Pro C# 5.0 and .NET 4.5 Framework (By: **Andrew Troelsen**)
2. Head First C# - (By: **Jennifer Greene, Andrew Stellman**)
3. C# 5.0 Unleashed - (By: **Bart De Smet**)
4. Adaptive Code Via C# (By: **Gary McLean Hall**)
5. C#.NET Programming Black Book - steven holzner –dreamtech publications
6. Introduction to .NET framework - Wrox publication
7. Microsoft ADO. Net - Rebecca M. Riordan, Microsoft Press

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

CS – 21 WEB SEARCHING TECHNOLOGY AND OPTIMIZATION				
Objectives: <ol style="list-style-type: none"> 1. Understand basic of search engines and reflecting 2. Understand SEO objectives and defining site audience. 3. Apply and Implement SEO friendly website with all SEO concept. 4. Understand keyword research and apply it for website developments. 5. Understand the new trends of digital technologies. 				
Prerequisites: Basic knowledge of SEO, search engine and E-commerce.				
No	Topics	Details	Marks weight In %	Min Lec.
1	The Search Engines: Reflecting Consciousness and Connecting Commerce Search Engine Basics	<ul style="list-style-type: none"> • The Mission of Search Engines The Market Share of Search Engines • The Human Goals of Searching • Determining Searcher Intent: A Challenge for Both Marketers and Search Engines • How People Search? • How Search Engines Drive Commerce on the Web? • Eye Tracking: How Users Scan Results Pages? • Click Tracking: How Users Click on Results? Natural Versus Paid • Understanding Search Engine Results • Algorithm-Based Ranking Systems: Crawling, Indexing, and Ranking • Determining Searcher Intent and Delivering Relevant • Fresh Content • Analyzing Ranking Factors • Using Advanced Search Techniques • Vertical Search Engines • Country-Specific Search Engines 	20	12

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

2	Determining SEO Objectives and Defining Site's Audience First Stages of SEO	<ul style="list-style-type: none"> • Setting SEO Goals and Objectives • Developing an SEO Plan Prior to Site Development • Understanding Audience and Finding Niche • SEO for Raw Traffic • SEO for E-Commerce Sales • SEO for Mindshare/Branding • SEO for Lead Generation and Direct Marketing • SEO for Reputation Management • SEO for Ideological Influence • The Major Elements of Planning • Identifying the Site Development Process and Players • Defining Site's Information Architecture • Auditing an Existing Site to Identify SEO Problems • Identifying Current Server Statistics Software and Gaining Access • Determining Top Competitors • Assessing Historical Progress • Benchmarking Current Indexing Status • Benchmarking Current Rankings • Benchmarking Current Traffic Sources and Volume • Leveraging Business Assets for SEO • Combining Business Assets and Historical Data to Conduct SEO/Website SWOT Analysis 	20	12
3	Developing an SEO-Friendly Website	<ul style="list-style-type: none"> • Making Site Accessible to Search Engines • Creating an Optimal Information Architecture • Root Domains, Subdomains, and Microsites • Optimization of Domain Names/URLs • Keyword Targeting 	20	12

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> • Content Optimization • Duplicate Content Issues Controlling Content with Cookies and Session IDs • Content Delivery and Search Spider Control • Redirects, Content Management System (CMS) Issues • Optimizing Flash • Best Practices for Multilanguage/Country Targeting 		
4	Keyword Research, Optimizing for Vertical Search	<ul style="list-style-type: none"> • The Theory Behind Keyword Research • Traditional Approaches: Domain Expertise • Site Content Analysis • Keyword Research Tools • Determining Keyword Value/Potential ROI, Leveraging the Long Tail of Keyword Demand, Trending, Seasonality, and Seasonal Fluctuations in Keyword Demand • The Opportunities in Vertical Search • Optimizing for Local Search • Optimizing for Image Search • Optimizing for Product Search • Optimizing for News, Blog, and Feed Search • Others: Mobile, Video/Multimedia Search 	20	12
5	Tracking Results and Measuring Success An Evolving Art Form: The Future of SEO	<ul style="list-style-type: none"> • Why Measuring Success Is Essential to the SEO Process • Measuring Search Traffic • Tying SEO to Conversion and ROI • Competitive and Diagnostic Search Metrics Key Performance • Indicators for Long Tail SEO 	20	12

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> • The Ongoing Evolution of Search • More Searchable Content and Content Types, Search becoming More Personalized and User-Influenced • Increasing Importance of Local, Mobile, and Voice • Recognition Search • Increased Market Saturation and Competition • SEO As an Enduring Art Form 		
		Total	100	60

Students seminar - 5 Lectures
Expert Talk - 5 Lectures
Students Test - 5 Lectures

TOTAL LECTURES 60+15=75

Course outcomes:

- Understand the main elements that help a website rank organically and in the paid search space in Google.
- Learn how to perform keyword research using Google's free tools.
- Learn how to develop landing pages that are search engine friendly.
- Learn how to carry out inbound linking practices.

Reference Books:

- (1) The Art of SEO : Mastering Search Engine Optimization By Eric Enge, Stephan Spencer, Rand Fishkin, Jessie C Stricchiola, O'Reilly Media, 3rd Edition October, 2015
(2) Google SEO Bible, Beginner's Guide to SEO, ISBN-978-1700098733, moaml mohammed, 2019
(3) SEO Warrior: Essential Techniques for Increasing Web Visibility By John I Jerkovic, O'Reilly Media, November, 2009

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

CS – 22 : Operating Systems Concepts With Unix / Linux				
Objectives: <ul style="list-style-type: none"> To provide the basic feature, function and interface with the hardware and application software to run the computer smoothly. Prerequisites: Basic knowledge of operating system and it's functionality along with its types.				
Sr. No	Topic	Details	Marks in Weight %	Min. Lec.
1	Introduction, Process and Thread, Process Scheduling	<ul style="list-style-type: none"> Meaning of OS Functions of OS Features of OS OS Types (User Point of View) OS Types (Features Point of View) 	20	18
		<ul style="list-style-type: none"> Process Definition , Process states , Process State transitions , Process Control Block , Context switching , Threads, Concept of multithreads , Benefits of threads, Types of threads. 		
		<ul style="list-style-type: none"> Types of Schedulers CPU scheduling algorithms <ul style="list-style-type: none"> FCFS SJN Round Robin Priority Base Non Preemptive Priority Base Preemptive 		

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

2	Deadlocks Memory management	<ul style="list-style-type: none"> • Deadlocks: Definition, • Deadlock Prevention • Deadlock Avoidance • Deadlock Detection <hr/> <ul style="list-style-type: none"> • Physical Memory and Virtual Memory • Memory Allocation • Internal and External fragmentation • Contiguous Memory Allocation • Noncontiguous Memory Allocation • Virtual Memory Using Paging • Virtual Memory Using Segmentation 	20	12
3	Getting Started with Unix Unix Shell Command	<ul style="list-style-type: none"> • Unix Architecture • Unix Features • Types Of Shell (C, Bourn, Korn) • Unix File System • Types Of Files <ul style="list-style-type: none"> o Ordinary Files o Directory Files o Device Files • Unix File & Directory Permissions <hr/> <ul style="list-style-type: none"> • Connecting Unix Shell : Telnet • Login Commands <ul style="list-style-type: none"> o passwd, logout, who, who am i, clear,uname • File / Directory Related Command <ul style="list-style-type: none"> o ls, cat, cd, pwd, mv, cp, ln, rm, rmdir, mkdir, chmod, chown, chgrp, find,more,less,head,tail,wc,touch, stat, alias,type • Operators in Redirection & Piping <ul style="list-style-type: none"> o <, >, <<, >>, • Finding Patterns in Files <ul style="list-style-type: none"> o grep,fgrep,egrep • Working with columns and fields <ul style="list-style-type: none"> o cut,paste,join 	20	15

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> • Tools for sorting :sort,uniq • Comparing files : cmp,comm,diff • Changing Information in Files : tr,sed, • Examining File Contents : od • Tools for mathematical calculations: bc,factor • Monitoring Input and Output :tee,script • Tools For Displaying Date and Time : cal,date • Co • mmunications : telnet,wall,write,mail,finger,mesg, ping • Process Related Commands : • ps, command to run process in background, nice,kill,at,batch,wait,sleep,top,jobs • Concept of Mounting a File System : mount command • Concept of DeMounting a File System : umount command 		
4	Text Editing With vi and nano Editor, Shell Programming	<ul style="list-style-type: none"> • Introduction of vi editor • Modes in vi • Switching mode in vi • Cursor movement • Screen control commands • Entering text, cut, copy, paste in vi editor • Introduction of nano editor 	20	08
		<ul style="list-style-type: none"> • Shell Keywords • Shell Variables • System variables <ul style="list-style-type: none"> ○ PS2, PATH, HOME,LOGNAME, MAIL, IFS, SHELL, TERM, MAILCHECK • User variables <ul style="list-style-type: none"> ○ set, unset and echo command with shell variables • Positional Parameters • Interactive shell script using read and echo • Decision Statements <ul style="list-style-type: none"> ○ if then fi ○ if then else fi 		

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

		<ul style="list-style-type: none"> ○ if then elif else fi ○ case esac • test command • Logical Operators • Looping statements <ul style="list-style-type: none"> ○ for loop ○ while loop ○ until loop ○ break, continue command • Array • Function • Various shell script examples 		
5	Getting Started with Linux, Linux Booting, Linux Admin (Ubuntu)	<ul style="list-style-type: none"> • History of Linux • GNU, GPL Concept • Open Source & Freeware • Structure and Features of Linux • Installation and Configuration of Linux <ul style="list-style-type: none"> ○ Using with Ubuntu • Startup, Shutdown and boot loaders of Linux 	20	07
		<ul style="list-style-type: none"> • Linux Booting Process <ul style="list-style-type: none"> ○ LILO Configuration ○ GRUB Configuration 		
		<ul style="list-style-type: none"> • Creating Linux User Account and Password • Installing and Managing Samba Server • Installing and Managing Apache Server • Optimizing LDAP Services • Optimizing DNS Services • Optimizing FTP Services • Optimizing Web Services • Configure Ubuntu's Built-In Firewall • Working with WINE 		

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

Students seminar - 5 Lectures.
Expert Talk - 5 Lectures
Students Test - 5 Lectures.

TOTAL LECTURES 60+15=75

Course outcomes:

- Understand design and implementation aspects of modern operating system
- Acquire knowledge of four major OS components: process management, memory management, file systems, and input/output mechanisms
- Analyze and Compare various process scheduling algorithms
- Learn the concepts, design, and structure of the UNIX operating system
- Design Shell scripts using various UNIX utilities

Reference Books

1. Operating System Concept , Abraham Silberschatz, Peter B. Galvineg Gagne, Wiley-Indian Edition, 9th Edition
2. Operating Systems, Internals And Design Principles , William Stallings, Seventh Edition
3. Unix Shell Programming - Y. Kanetkar- Bpb Publications
4. Unix Concepts And Applications- Sumitabha Das
5. The complete reference Linux, Richard Petersen, McGraw Hill, Sixth Edition.

Hands-On (Not to be asked in the examination)

- ◆ Installation of Unix / Linux
- ◆ User and Group Creation
- ◆ Demo of Various Applications available in Unix / Linux like Star Office, Games and other productivity tools.
- ◆ Demo of GNOME, KDE Desktops in Linux.

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

CS - 23: Practical based on CS – 19 & CS – 22	
Topics	Marks
CS – 19 and CS – 22	100

CS - 24: Practical Based on CS –20 & CS – 21	
Topics	Marks
CS – 20 and CS - 21	100

Note:

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