નં.એકે/વિજ્ઞાન/૧૦૧૧૩૨/૨૦૨૪

તા.૨૯/૦૩/૨૦૨૪

કોમ્પ્યુટર સાયન્સ

પરિપત્ર:-

    સૌરાષ્ટ્ર યુનિવર્સિટીની વિજ્ઞાન વિદ્યાશાખા હેઠળની સ્નાતક કક્ષાના B.Sc. (I.T.) & B.C.A કોમ્પ્યુટર સાયન્સ ના અભ્યાસક્રમ ચલાવતી સર્વે સંલગ્ન કોલેજોના આચાર્યશ્રીઓને આથી જાણ કરવામાં આવે છે કે, ચેરમેનશ્રી દ્વારા કોમ્પ્યુટર સાયન્સ સેમેસ્ટર ૧ અને ૨ નો નવો સુધારેલો અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિ, વિજ્ઞાન વિદ્યાશાખા, એકેડેમિક કાઉન્સિલ તથા બોર્ડ ઓફ મેનેજમેન્ટની બહાલીની અપેક્ષાએ મંજુરી આપવાં માન ફુલપતિ.સાહેબને ભલામણ કરેલ છે. જે માન.ફુલપતિશ્રીએ મંજુર કરેલ છે. જેથી સંબંધિત તમામે તે મુજબ તેની ચુસ્તપણે અમલવારી કરવી.

(મુસદ્દો ફુલસચિવશ્રીએ મંજુર કરેલ છે.)

સહી/-

(ડૉ.આર.જી.પરમાર)

ફુલસચિવ

બિડાણ:- ઉક્ત અભ્યાસક્રમ (સોફ્ટ કોપી)

રવાના કર્યું

૨૭/૩/૨૪

એકેડેમિક ઓફીસર

પ્રતિ,

(૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની કોમ્પ્યુટર સાયન્સની વિષય ચલાવતી સ્નાતક કક્ષાની સર્વે સંલગ્ન કોલેજોના આચાર્યશ્રીઓ તરફ

(૨) વિજ્ઞાન વિદ્યાશાખા હેઠળની કોમ્પ્યુટર સાયન્સની વિષયની અભ્યાસ સમિતિના સર્વે સભ્યશ્રીઓ

નકલ જાણ અર્થે રવાના:-

૧. માન.ફુલપતિશ્રી/ફુલસચિવશ્રીના અંગત સચિવ

નકલ રવાના (યોગ્ય કાર્યવાહી અર્થે):-

૧. પરીક્ષા વિભાગ   ૨. પી.જિ.ટી.આર.વિભાગ   ૩. જોડાણ વિભાગ

SAURASHTRA UNIVERSITY

RAJKOT – INDIA

CURRICULAM

of

4 Year UG Programme

Bachelor of Science (Information Technology) (Honours)

&

**Bachelor of Science (Information Technology)
(Honours with Research)**

(As per NEP 2020)

To be effective from June – 2023

Ordinances, Regulations:

Ordinances:

O. B.SC. (I.T.) – 1: Candidate for admission to the Bachelor of Science (Information Technology) must have passed standard 12th or equivalent examination from Gujarat Higher Secondary Board or any other board.

O. B.SC. (I.T.) – 2: Candidate who have passed an equivalent examination from any other board or examining body and is seeking admission to the B.SC. (I.T.) course will be required to provide necessary eligibility certificate.

O. B.SC. (I.T.) – 3:

Definitions of Keywords:

1. **Academic Year:** An Academic Year is divided into two semesters and a semester of minimum 15 weeks comprises 90 working days.

2. **Programme:** An educational programme leading to award of the Certificate in B.Sc. (Information Technology), Diploma in B.Sc. (Information Technology), Bachelor of Science (Information Technology), Bachelor of Science (Information Technology) (Honours) or Bachelor of Science (Information Technology) (Honours with Research).

3. **Course:** Usually referred to, as 'paper/subject' is a component of a program. The courses should define learning activities, objectives and learning outcomes. Types of courses / activities constitute the programs of study comprise lectures outreach activities / Practical / Case Study / Group Discussion / Quiz / Project work / Viva / Seminars / Assignment / Internship / Presentations / Research Project etc. or a combination of some of these.

4. **Major & Minor Discipline Course:** Major discipline is grouping of courses of main focus and the degree will be awarded in that discipline. Students should secure the prescribed number of credits (about 50% of total credits) through core courses in the major discipline.
Minor discipline helps a student to gain a broader understanding beyond the major discipline.

5. **Multidisciplinary Courses:** These courses are intended to broaden the intellectual experience and form part of other disciplines.

6. **Ability Enhancement Courses:** The courses aim at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and expository and academic writing skills, that help students articulate their arguments and present their thinking clearly

and coherently and recognize the importance of language as a mediator of knowledge and identity.

7. **Skills Enhancement Courses:** These courses are aimed at imparting practical skills, hands-on training, soft skills, etc., to enhance the employability of students.

8. **Value-Added Courses / Indian Knowledge System:** The course aims at enabling the students to acquire and demonstrate the knowledge and understanding of contemporary India with its historical perspective, the basic framework of the goals and policies of national development, and the constitutional obligations with special emphasis on constitutional values and fundamental rights, ethics and duties.

9. **Summer Internship/ Apprenticeship:** Students will have to undergo Internships / Apprenticeships in a firm, industry, or organization or Training in labs with faculty and researchers in their own or other HEIs/research institutions during the summer term. Students will be provided with opportunities for internships with local industry, business organizations, health and allied areas, local governments (such as panchayats, municipalities). Parliament or elected representatives, media organizations, artists, crafts persons, and a wide variety of organizations so that students may actively engage with the practical side of their learning and, as a by-product, further improve their employability.

10. **Vocational Courses:** Vocational Education and Training will form an integral part of the undergraduate programme to impart skills along with theory and practical.

11. **Research Dissertation:** Students choosing a 4-Year Bachelor's degree (Honours with Research) are required to take up research dissertation under the guidance of a faculty member. The students are expected to complete the Research Dissertation in the eighth semester.

O. B.SC. (I.T.) – 4:
Multiple Exit System:

1	**UG Certificate**	UG Certificate will be awarded when a student exits after completion of semester 1 and semester 2 with 44 credits along with successfully completion of *work based* vocational course of 4 credits Online/Offline or internship/Apprenticeship
2	**UG Diploma**	UG Diploma will be awarded when a student exits after completion of semester 1 to semester 4 with 88 credits along with successfully completion of *work based* vocational course of 4 credits Online/Offline or internship/Apprenticeship

3	**UG Degree**	Bachelor's degree will be awarded when a student exits after completion of semester 1 to semester 6 with 132 credits.
4	**UG Degree Honours / Honours with Research**	Bachelor's degree (Honours / Honours with Research) will be awarded when a student exits after completion of semester 1 to semester 8 with 176 credits.

O. B.SC. (I.T.) – 5: Students are permitted to take a break or exit with a UG certificate / UG Diploma / UG Degree are permitted to re-enter within three years and complete the degree programme. But total duration for completing the programme shall not exceed 7 years.

O. B.SC. (I.T.) – 6: No candidate will be admitted to any semester examination for B.SC. (I.T.) unless it is certified by the principal that he/she has attended the course of study to the satisfaction of the principal of the college.

O. B.SC. (I.T.) – 7: Candidate desirous of appearing at any semester examination of the B.SC. (I.T.) programme must forward their application in the prescribed from to the University through the principal of the college on or before the date prescribed for the purpose under the relevant ordinances.

O. B.SC. (I.T.) – 8: No candidate will be permitted to reappear at any semester examination, which he has already passed. The marks of successfully completed course will be carrying forwarded for the award of class.

O. B.SC. (I.T.) – 9: Medium of instruction is English.

O.B.SC. (I.T.) - 10: Any candidate can go up to take admission in successive semester irrespective of failure in any number of courses.

Regulations:
R.S.B.SC. (I.T.) – 1. Standard Of Passing

The standard of passing the B.SC. (I.T.) degree examination will be as under:

(1) To pass any semester examination of the B.SC. (I.T.) degree, a candidate must obtain at least 40% marks in the examination separately in each course.

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

No.	Theory / Practical (SEE)	CCE	Result	Require to appear for
1	PASS	PASS	PASS	N.A.
2	PASS	FAIL	FAIL	CCE ONLY
3	FAIL	PASS	FAIL	SEE ONLY
4	FAIL	FAIL	FAIL	BOTH (SEE & CCE)

CCE = Continuous and Comprehensive Evaluation, SEE = Semester End Evaluation

R.S.B.SC. (I.T.) – 2. Marks and credit hours of each course

(1) 4 Credit Theory Course:

- Total Marks of each theory course are 100 (SEE of 50 Marks + CCE of 50 Marks)
- Marks of Each Unit in the course are equal (i.e., 10 Marks). Total Marks of each course are 10x5=50 for SEE.
- Credit hours (lectures) for each unit in the course are equal (i.e., 12 hours). Total credit hours (lectures) of each course are 12x5 = 60.

(2) 4 Credit Practical / project-viva Course:

- Total Marks of each practical / project-viva course is 100 (SEE of 50 Marks + CCE of 50 Marks).
- Total Credit hours (practical) for this course is 120 hours.

(3) 2 Credit Course (AEC, IKS and SEC):

- Total marks for this course are 50 Marks (SEE of 25 Marks + CCE of 25 Marks).
- Total Credit hours for this course is 30 hours.

R.S.B.SC. (I.T.) – 3. Structure of Question Paper (50 Marks) for SEE

Question Paper contains 5 questions (each of 10 marks). Every question will be asked from respective unit as specified in the syllabus of each course. (i.e. Question-1 from Unit No.1 and remaining questions from their respective units)

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

B.Sc. (I.T.) SEM 1

Sr. No.	Type of Course	Course Title	Credit	CCE	SSE	Total
1	MAJOR	CS-01: Problem Solving Methodologies and Programming In C	4	50	50	100
2	MAJOR	CS-02: Networking & Internet Environment	4	50	50	100
3	MINOR	CS-03: Computer Fundamentals and Emerging Technologies	4	50	50	100
4	MDC	CS-04: Practical Based on Problem Solving Methodologies and Programming In C and Networking & Internet Environment	4	50	50	100
5	AEC	CS-05: Critical Thinking and Problem Solving	2	25	25	50
6	SEC	CS-06: Mathematical and Statistical Foundation of Computer Science	2	25	25	50
7	IKS	CS-07: Mathematics in Ancient India: Exploring the Rich Heritage of Vedic Mathematics	2	25	25	50
			22	**300**	**250**	**550**

B.Sc. (I.T.) SEM 2

Sr. No.	Type of Course	Course Title	Credit	CCE	SEE	Total
1	MAJOR	CS-08: Data Structure Using C Language	4	50	50	100
2	MAJOR	CS-09: Web Programming	4	50	50	100
3	MINOR	CS-10: SAD, Software Quality Assurance & Testing	4	50	50	100
4	MDC	CS-11: Practical Based on Data Structure Using C Language and Web Programming	4	50	50	100
5	AEC	CS-12: Modern Indian Language	2	25	25	50
6	SEC	CS-13: Computer Organization & Architecture	2	25	25	50
7	VAC	CS-14: Environmental Science: Understanding the Earth's Ecosystems and Sustainability	2	25	25	50
			22	**300**	**250**	**550**

CCE = Continuous and Comprehensive Evaluation, SEE = Semester End Evaluation

B.SC. (I.T.) (Semester – 1)

Sr. No.	Type of Course	Course Title	Credit
1	MAJOR	**CS-01:** Problem Solving Methodologies and Programming In C	4
2	MAJOR	**CS-02:** Networking & Internet Environment	4
3	MINOR	**CS-03:** Computer Fundamentals and Emerging Technologies	4
4	MDC	**CS-04:** Practical Based on Problem Solving Methodologies and Programming In C and Networking & Internet Environment	4
5	AEC	**CS-05:** Critical Thinking and Problem Solving	2
6	SEC	**CS-06:** Mathematical and Statistical Foundation of Computer Science	2
7	IKS	**CS-07:** Mathematics in Ancient India: Exploring the Rich Heritage of Vedic Mathematics	2
		Total Credits of Semester 1	**22**

	CS-01: PROBLEM SOLVING METHODOLOGIS AND PROGRAMMING IN C	

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

Prerequisites:
- Basic Computer Skills and Command-line knowledge

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

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

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

Total Lectures 60 + 15 = 75

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

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

CS-02: NETWORKING & INTERNET ENVIRONMENT		
Objectives: • To give brief idea about Computer Network and Internet Environment • To be able to design and develop static and/or interactive website using HTML5, CSS and Javascript. • To become familiar with different web elements. • To get intermediate knowledge of CSS3, Javascript and Bootstrap Framework		
Prerequisites: • Basic Knowledge of Computer Network and Web Surfing		
Unit No.	**Topic**	**Detail**
1	**Introduction to Computer Network and it's Applications**	• Computer Network • Type of Computer Network • Different Terminologies used in Computer Network Internet, ISP (Internet Service Provider), Intranet, VSAT (very small aperture terminal), URL, Portal, Domain Name Server, World Wide Web (WWW), Search Engine, Remote Login, Telnet, Email, E-Commerce, E-Business, E-Governance, Mobile Commerce • Website Basics (WebPages; Hyper Text Transfer Protocol, File Transfer Protocol, Domain Names; URL; Protocol Address; Website[Static, Dynamic, Responsive etc], Web browser, Web Servers; Web Hosting
2	**Basic of HTML & Advance HTML 5**	• Fundamental of HTML • Basic Tag and Attribute • The Formatting Tags • The List Tags • Link Tag • inserting special characters, • adding images and Sound, • lists types of lists • Table in HTML • Frame in HTML • Forms • HTML 5 & Syntax o HTML5 Document Structure (section, article, aside, header, footer, nav,

		dialog, figure) ○ Attributes of HTML 5 ○ Web Form (datetime, date, month, week, time, number, range, email, url) ○ Audio / Video - Canvas

3	**Cascading Style Sheet & CSS 3**	• Introduction to CSS
		• Types of Style Sheets
		• Class & ID Selector
		• CSS Pseudo
		• CSS Font Properties
		• CSS Text Properties
		• CSS Background Properties
		• CSS List Properties
		• CSS Margin Properties
		• CSS Comments
		• CSS 3
		   ○ Border Property
		   ○ Background & Gradient Property
		   ○ Drop Shadow Property - 2D & 3D Transform Property
		   ○ Transition Property
		   ○ Box Sizing Property
		   ○ Position Property
		• Media Query
		• CSS Flexbox Properties
		(display, flex-direction, flex-wrap, flex-flow, justify-content, align-items, align-content, gap row-gap, column-gap)
		• CSS Advance Properties
		(Overflow, text-overflow, Cursor, Visibility, filter, backdrop-filter, object-fit)
		• How to use Google Fonts & Custom Fonts (@font-face)
		• BEM Naming Convention

4	**Java Script**	• Introduction to JavaScript • Variables • JavaScript Operators • Conditional Statements • JavaScript Loops, Break and Continue Statements

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

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

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

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

	CS-03: COMPUTER FUNDAMENTALS AND EMERGING TECHNOLOGY	

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

Prerequisites:
- Basic Computer Literacy

Unit No.	Topics	Details
1	**Introduction to Computers**	- Basics of Computers - What is Computer? - Characteristics of Computer - Data Processing Cycle (Data → Process →information) - Classification of Computer by Data Processed - Analog, Digital and Hybrid Computers - Classification of Computer by Processing Capabilities - Micro, Mini, Mainframe and Super Computers - History and Generations of Computers - First to Fifth Generation Computers - Simple Model of Computer - Input Devices - CPU (Central Processing Unit) - Arithmetic & Logic Unit - Control Unit - Internal Memory - Output Devices - Secondary Storage Devices
	Internal/External parts used with Computer Cabinet	- Introduction to Mother board - Types of Processors. - Dual Core, Core 2 Duo, i2, i3, etc .... - Memory structure and Types of Memory - RAM (SRAM, DRAM, SO, DDR, etc.) - ROM (ROM, PROM, EPROM, EEPROM, etc.) - Slots: ISA Slots / PCI Slots / Memory Slots - Sockets - Cables: Serial Cable / Parallel Cable / USB Cable

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

2	**Input Devices**	• Introduction
		• Types of Input Devices
		   o 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)
		   o MIDI(Musical Instrument Digital Interface) Keyboard,
		   o Wireless Devices (Keyboard, Mouse, etc)
		• Types of Scanners
		   o OCR, OMR, MICR, OBR

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

3	**Output Devices**	• Types of Output Devices
		• CRT Display Units
		• Monitor
		• Non CRT display Units
		• LCD / LED / Plasma Displays
		• Types of Printers Impact and Non Impact Printers
		• Plotters
		• Other Devices
		   o Fascimile(FAX)
		   o OLED (Organic LED)
		   o Headphone
		   o SGD (Speech Generating Device)

		o COM (Computer Output Microfilm) o Google Glass

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

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

5	**Emerging Technologies and Virus**	• Different Communication methods ○ GIS / GPS / CDMA / GSM • Communication Devices ○ Cell Phones / Modem / Infrared / Bluetooth / WiFi/LiFi/SLM(Spatial Light Modulator) • Virus ○ Introduction to Virus and related terms ○ Origin and History ○ Types of Virus ○ Problems and Protection from Virus • Cloud Computing ○ What is Cloud Computing? ○ Characteristic & Service Models(Iaas, Paas, Saas) ○ Architecture ○ Security & Privacy
	Important Terms and Acronyms	• ATM • Backup / Restore • Hard Copy / Soft Copy • Bus / Data Bus • Buffer and types / Spooling • Cursor / Pointer / Icon • E-Mail I Attachment • 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

Total Lectures 60 + 15 = 75

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

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

Additional Topics (Not to be asked in examination):
Student should be aware of followings
- To Format Hard Disk
- Installation of OS, multi-OS and other packages
- Use of DOS commands
- Operating of Accounting Software

CS-04: Practical Based on Problem Solving Methodologies and Programming In C and Networking & Internet Environment	Total Marks - 100	
Topics	**CCE**	**SEE**
Problem Solving Methodologies and Programming in C	25	25
Networking and Internet Environment	25	25

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

CS-05: CRITICAL THINKING AND PROBLEM SOLVING

Objective:
- Identify and define problems clearly and accurately
- To use logic, reasoning and analytical tools to evaluate information
- To recognize the value of ongoing learning and reflection in problem-solving, and continuously work to improve skills and approaches.
- To generate creative and innovative solutions to complex problems, and evaluate potential outcomes and consequences.

Prerequisites:
- A willingness to engage in self-evaluation.

Unit No.	Topic	Details
1	**Personality Development**	- Self-awareness Conducting self-assessment exercises, personality tests. - Emotional Intelligence Practicing emotional regulation and social skills - Motivation Setting personal and academic goals and developing strategies to achieve them.
2	**Introduction to Critical Thinking and Problem Solving**	- Definition of critical thinking and problem solving - Importance of critical thinking and problem solving in personal and professional life - Approaches to critical thinking and problem solving - Techniques of problem solving
3	**Time Management and Goal Setting**	- Importance of time management - Techniques for managing time effectively - Goal setting and its importance - SMART goal setting - Prioritizing tasks

Course Outcome:
- ➢ Develop a deep understanding of critical thinking concepts.
- ➢ Develop the ability to identify and analyze problems critically, using logic and reasoning to evaluate different solutions and arrive at an effective decision.
- ➢ Enhance the ability to collaborate and communicate effectively with others, and work together to solve complex problems.

➤ Develop a creative mindset and an ability to think outside the box, and generate innovative solutions to complex problems.

➤ Develop the ability to learn from failure, and use these experiences to grow and improve problem-solving skills.

Reference Books:

➤ Thinking, Fast and Slow" by Daniel Kahneman

➤ "Critical Thinking: An Introduction to Analytical Reading and Reasoning" by Larry Wright

➤ "The Art of Thinking Clearly" by Rolf Dobelli

➤ "Critical Thinking: A User's Manual" by Debra Jackson and Paul Newberry

	CS-06: MATHEMATICAL AND STATISTICAL FOUNDATION OF COMPUTER SCIENCE	

Objectives:
- To create awareness of about basic Mathematics and Statistics
- To develop Reasoning ability, Logical ability and Arithmetic ability
- To develop a positive attitude towards learning Mathematics & statistics
- To perform mathematical & statistical operations and manipulations with confidence, speed and accuracy.

Prerequisites:
- Basic knowledge of Mathematics and Statistics

Unit No.	Topic	Details
1	**Determinants**	- Introduction 2×2 , 3×3 order determinant - Cramer's method for solving linear equation (Two and Three Variables) - Properties of Determinants - Examples
	Matrices	- Introduction - Different types of matrix(square matrix, column matrix, row matrix, Diagonal matrix, Unit matrix, null matrix) - Transpose of matrix - Addition, subtraction & multiplication of two matrices - Adjoint of a square matrix - Inverse of matrix
2	**Measures of Central Tendency & Dispersion**	- Mean (ungroup data, group data) - Median (ungroup data, group data) - Mode (ungroup data, group data) - Range - Quartiles - Standard Deviation - Typical examples
3	**Arithmetic & Geometric progression**	- Sequence - Series - Arithmetic progression (Definition & Nth term, sum of n terms) - Geometric progression (Definition & Nth term, sum of n terms) - Harmonic Progression - Relation Between AM GM HM (Two Numbers) - Typical examples

Student Seminar – 5 Lectures
Expert Talk   – 5 Lectures
Student Test   – 5 Lectures
Total Lectures 30 + 15 = 45

Course Outcome:
- Able to Understand basics of Mathematics and Statistics
- Able to Develop reasoning ability, logical ability and arithmetic ability
- Able to Develop a positive attitude towards learning Mathematics & statistics
- Able to Perform mathematical & statistical operations and manipulations with accuracy.

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

CS-07: Mathematics in Ancient India: Exploring the Rich Heritage of Vedic Mathematics

Objectives:

- Helps students understand the contributions made by ancient civilizations to the field of mathematics.
- Ancient mathematics helps to establish connections between past and present mathematical ideas.
- Exploring Mathematical concepts.

Prerequisites:

- Eagerness to know rich heritage of Indian Mathematics.

Unit No.	Topic	Details
1	**Biographies of Ancient Indian Mathematicians**	• A brief introduction to the lives and information on the works of the following mathematicians: Aryabhata, Varahmihira, Brahmagupta, Bhaskara I & II
2	**Biographies of Remarkable Indian Mathematicians**	• A brief introduction to the lives and information on the works of the following mathematicians: Shrinivasa Ramanujan, C. R. Rao, P. C. Mahalanobis, D. R. Kaprekar, Satyendranath Bose, Shakuntala Devi
3	**Vedic Mathematics and Mathematics**	• Overview of Vedic Mathematics and its historical background. • Introduction to the 16 Sutras and 13 Upa-Sutras used in Vedic Mathematics. • Use of Vedic Mathematics • Importance of Vedic Mathematics

Course Outcome:

- ➢ Student will know the Mathematical advancements of Ancient India.
- ➢ Student will gain a deeper understanding of the historical development of mathematics in ancient civilizations.
- ➢ Enhance their problem-solving skills and discovering the connections between ancient mathematical ideas and modern mathematical concepts.

Reference Books:

- The History of Ancient Indian Mathematics. The World Press Private Ltd. Calcutta. Digitized Book (2009) - Srinivasiengar, C. N. (1988).
- "Vedic Mathematics" by Swami Bharati Krishna Tirtha

B.SC. (I.T.) (Semester – 2)

Sr. No.	Type of Course	Course Title	Credit
1	MAJOR	CS-08: Data Structure Using C Language	4
2	MAJOR	CS-09: Web Programming	4
3	MINOR	CS-10: SAD, Software Quality Assurance & Testing	4
4	MDC	CS-11: Practical Based on Data Structure Using C Language & Web Programming	4
5	AEC	CS-12: Modern Indian Language	2
6	SEC	CS-13: Computer Organization & Architecture	2
7	VAC	CS-14: Environmental Science: Understanding the Earth's Ecosystems and Sustainability	2
		Total Credit of Semester - 2	**22**

CS-08: DATA STRUCTURE USING C LANGUAGE

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

Prerequisites:
- Computer Programming Knowledge
- Fundamental knowledge of C Programming

Sr. No.	Topic	Detail
1	**Algorithm Analysis**	- The analysis of algorithm. - Time and space complexities. - Asymptotic notation. - Classes of algorithm. - Big-Oh Notation - Big-Omega Notation
	File Handling	- Concept of data files - File handling - Use of file handling functions fopen, fclose, fprintf, fscanf, getw, putw, fseek, ftell, rewind ,freopen, remove, rename, feof, ferror - I/O operations - Command line arguments
2	**Sorting and Searching**	- Bubble sorting - Insertion sorting - Quick sorting - Bucket sorting - Merge sorting - Selection sorting - Shell sorting - Basic searching technique: Index searching, Sequential searching, Binary searching
3	**Introduction To data Structure**	Primitive and simple structures Linear and nonlinear structures file organization.
	Elementary Data Structure	- Stack - Definition - Operations on stack

		o 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
		o Recursion and stacks
		o Evaluation of expressions using stacks
		    ▪ Postfix expressions
		    ▪ Prefix expression
		• Queue
		  o Introduction
		  o Array implementation of queues
		  o Function to insert an element into the queue
		  o Function to delete an element from the queue
		• Circular queue
		  o Function to insert an element into the queue
		  o Function for deletion from circular queue
		  o Circular queue with array implementation
		• Deques
		• Priority queues

4	**Linked List & Implementation**	• Applications of the linked lists
		• Types of Linked Lists
		  o Singly Linked List
		  o Doubly linked list
		  o Header Linked List
		  o Circular Linked List
		• Implementation using Singly Linked List, Doubly Linked List and Circular Singly Linked List
		  o Insertion of a node at the beginning
		  o Insertion of a node at the end
		  o Insertion of a node after a specified node
		  o Traversing the entire linked list
		  o Deletion of a node from linked list
		  o Updating of a specific node
		• Implementation of merging of two Singly Linked List
		• Implementation of reversing of Singly Linked List

5	**Tree**	• Objectives
		• Properties of a tree
		• Binary trees
		  o Properties of binary trees
		  o Implementation
		  o Traversals of a binary tree

		- In order traversal
		- Post order traversal
		- Preorder traversal
		• Binary search trees (bst)
		o Insertion in bst
		o Deletion of a node
		o Search for a key in bst
		• Height balanced tree
		• B-tree Algorithm
		o Insertion, Deletion
	Graph	• Adjacency matrix and adjacency lists
		• Graph traversal
		o Depth First Search (DFS)
		o Implementation
		o Breadth First Search (BFS)
		o Implementation
		• Shortest path problem
		• Minimal spanning tree

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

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

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

Additional Topics to be taught during the semester – 2 (Not to be asked in examination):
- Case studies of data structure

	CS-09: WEB PROGRAMMING	

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

Prerequisites: Basic knowledge of Programming

Unit No.	Topic	Detail

1	**PHP Basic**	• Introduction to PHP
		• PHP configuration in IIS & Apache Web server
		• Understanding of PHP.INI file
		• Understanding of PHP .htaccess file
		• PHP Variable
		• Static & global variable
		• GET & POST method
		• PHP Operator
		• Conditional Structure & Looping Structure
		• Array
		• User Defined Functions:
		  ▪ argument function
		  ▪ default argument
		  ▪ variable function
		  ▪ return function
		• Variable Length Argument Function
		  ▪ func_num_args
		  ▪ func_get_arg, func_get_args
		• Built in Functions
		  - Variable Functions
		  - String Function
		  - Math Function
		  - Date Function
		  - Array Function
		  - Miscellaneous Function
		  - File handling Function

2	**Handling Form, Session Tracking & PHP Components**	• Handling form with GET & POST • Cookies • Session • Server variable • PHP Components

		- PHP GD Library - PHP Regular expression - Uploading file - Sending mail

	AJAX & JSON	• What is AJAX?
		• PHP with AJAX
		• MySql with AJAX
		• What is JQuery AJAX
		• JQuery AJAX with PHP
		• Introduction to JSON
		    ◦ Installation & Configuration
		    ◦ Resource Types
		    ◦ JsonSerializable
		    ◦ JSON Functions: json_decode, json_encode

3	**Introduction of SQL**	• Working with MySQL using PhpMyAdmin • SQL DML Statement (Insert, Update, Select, Delete) Command • PHP-MySQLi Connectivity • PHP-MySQLi Functions • mysqli_connect, mysqli_close,mysqli_error, msyqli_errno, mysqli_select_db, mysqli_query, mysqli_fetch_array, mysqli_num_Rows, mysqli_affe cted_Rows, mysqli_fetch_assoc, mysqli_fetch_field , mysqli_fetch_object,mysqli_fetch_row, mysqli_insert_id, mysqli_num_fields, mysqli_data_seek

4	**jQuery**	• What is jQuery?
		• jQuery Syntax
		• jQuery Selector
		   - Element Selector
		   - Class Selector
		   - id Selector
		• jQuery Events: Click, dbclick, keypress, keydown, keyup, submit, change, focus, blur, load, resize, scroll, unlode
		• jQuery Effects: hide show, fade, slide
		• jQuery Methods: css, height, width, innerWidth, innerHeight, outerWidth, outerHeight, html, text, append, prepend, after, before, addClass, removeClass, toggleClass, remove, empty

5	**OOP**	• Concept of OOP
		    ◦ Class
		    ◦ Object
		    ◦ Property
		    ◦ Visibility

		o Constructor, Destructor
		o Inheritance
		o Scope Resolution Operator (::)
		o Autoloading Classes
		o Class Constants
		• Mysql Database handling with oop (insert, update, select, delete

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

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

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

Additional Topics (Not to be asked in examination):
Student should be aware of followings
- Case Study
- Uses and Advantages of CMS
- Wordpress [Introduction & Installation]
- Joomla [Introduction & Installation]
- Magento [Introduction & Installation]

CS – 10: SAD, Software Quality Assurance and Testing

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

Prerequisites:
- Problem-Solving Skills
- Basic concepts of Database
- Basic knowledge of Software Development Fundamentals

Unit No.	Topics	Details
1	**System Analysis & Design, Software Engineering & Concept of Quality Assurance**	- Definitions: System, Subsystem, Business System, Information System (Definitions only) - Systems Analyst (Role: Information Analyst, Systems Designer & Programmer Analyst) - SDLC - Fact – finding techniques (Interview, Questionnaire, Record review and observation) - Tools for Documenting Procedures and Decisions Decision Trees and Decision Tables - Data Flow analysis Tool DFD (context and zero level) and Data Dictionary - Software Engineering (Brief introduction) - Introduction to QA - Quality Control (QC) - Difference between QA and Q - Quality Assurance activities

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

3	**Software Development Life Cycle Models and Automated Testing**	- Waterfall Model - Iterative Model - V-Model - Spiral Model - Big Bang Model - Prototyping Model - Introduction to Automated Testing - Concept of Freeware, Shareware, licensed tools - Theory and Practical Case-Study of Testing Tools - Selenium - Neoload - Junit - Nunit - Acunetix - ZAP
4	**Project Economics, Project scheduling and Tracking**	- Concepts of Project Management - Project Costing based on metrics - Empirical Project Estimation Techniques. - Decomposition Techniques. - Algorithmic methods. - Automated Estimation Tools - Concepts of project scheduling and tracking - Effort estimation techniques - Task network and scheduling methods - Timeline chart - Pert Chart - Monitoring and control progress - Graphical Reporting Tools

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

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

Reference Books

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

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

CS-11: Practical Based on Data Structure Using C Language & Web Programming	Total Marks - 100	
Topics	**CCE**	**SEE**
Data Structure using C language	25	25
Web Programming	25	25

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

CS-12: MODERN INDIAN LANGUAGE

Objective:
- To enable students to develop basic proficiency in reading, writing, speaking and listening in the target language.
- To introduce students to the script or writing system used in the language.

Prerequisites:
- Knowledge of communication and interpersonal skills
- Interest to develop the language proficiency

Unit No.	Topic	Details
1	**Language Practice**	- Role-playing exercises - Group Discussion and presentation - Language games and activities
2	**Language Proficiency**	- Reading comprehension and speed - Speaking and Listening skills - Technical and academic vocabulary
3	**Activities**	- Creating - Short-Story - Poem - Dialog

Course Outcome:
- Students will develop basic communication skills in the target language, including reading, writing, speaking and listening.
- Students will develop an appreciation for the language and its cultural significance.

Reference Books:
- Language Practice By Michael Vince – Published By macmillan
- The Handbook of Advanced Proficiency in Second Language Acquisition – Editors:
  Alessandra G. Benati, Paul A. Malovrth – Published By Willey

CS-13: COMPUTER ORGANIZATION AND ARCHITECTURE

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

Prerequisites:
- General Knowledge of Computer

Unit No.	Topic	Detail

1	**Digital Logic Circuits**	• **Logic Gates**
		  ▪ AND,OR,NOT,NAND,NOR,XOR, Exclusive NOR gates
		• **Boolean Algebra**
		  ▪ Boolean algebra?
		  ▪ Boolean variable and Boolean function (Analog and Digital Signals)
		  ▪ Truth table
		  ▪ Postulates
		  ▪ Theorem related to postulates
		  ▪ Simplified Boolean function using postulates and draw logical diagram of simplified function
		  ▪ Simplified Boolean function using Karnaugh map method with DON'T CARE condition
		• **Sequential And Combinational Circuits**
		  ▪ Clock pulses
		  ▪ Combinational circuit, sequential circuit and adder
		• **Flip Flops**
		  ▪ SR, Clocked SR, D, JK, JK – Master Slave, T
		• **Universal Gate**

2	**Central Processing Unit**	• Introduction Of CPU
		• Major component of CPU
		• General Register Organization
		  ▪ control word
		  ▪ Accumulator Register
		• **Stack Organization**
		  ▪ Register stack
		  ▪ Memory stack
		  ▪ Polish notation and reverse polish notation

		• **Arithmetic And Logic Unit** ▪ Block diagram of ALU • **Interrupts**
3	**Input-Output Organization**	• Memory buses • Block diagram and function • Data Bus, Address Bus and Control lines • Input Output Buses • Concept of input output interface • Input Out Processor (IOP) • Direct Memory Access • DMA controller

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

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

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

Hands On (Not to be asked in examination):
- Instruction Formats   - Simulator Base Program

Additional Topics to be taught during the semester-2 (Not to be asked in examination):
   Following tools should be used to train students.
- Simulator 8051
- Using Trainer kit

CS-14: Environmental Science: Understanding the Earth's Ecosystems and Sustainability

Objective:

- The primary objective is to introduce students to the fundamental concepts of Environmental Science, including ecosystems, biodiversity, natural resources, pollution, climate change, and sustainability.
- The course aims to raise awareness about pressing environmental challenges faced globally and locally, such as air and water pollution, deforestation, habitat destruction, and climate change.
- Students will become familiar with environmental laws, regulations, and policies at local, national, and international levels, which govern environmental protection and conservation efforts.

Prerequisites:

- A fundamental understanding of basic science subjects.

Unit No.	Topic	Details
1	**Introduction to Environment Science**	- Definition - Environmental Issues and Challenges - Principles and Scope - Concepts of Ecology and Ecosystem
2	**Environmental Pollution**	- Types of Pollution (air, water, soil, noise, etc.) - Sources and impact of pollution - Mitigation and control measures
3	**Climate Change and Global Warming**	- Greenhouse effect and its implications - Causes and consequences of climate change - Sustainable practices to combat global warming

Course Outcome:

- Students will demonstrate a solid understanding of environmental concepts.
- Students will develop an increased awareness of pressing environmental issues facing the planet today and recognize the interconnections between human activities and the environment.

Reference Books:

- "Environmental Science" by G. Tyler Miller and Scott Spoolman
- Environmental Impact assessment – L W Canter – McGraw Hill