

Bachelor of Computer Applications (BCA)

Tentative Template

Terminologies

Abbreviation	Full-form	Remarks	Related to Major and Minor Courses
Major(Core)	Main Discipline		
Major(Elective)	Elective Options		related to the Major Discipline
Minor Stream	Other Disciplines (Inter/Multidisciplinary) not related to the Major	either from the same Faculty or any other faculty	
OEC	Open Elective Courses/ Generic		Not Related to the Major and Minor
VSEC	Vocational and Skill Enhancement Courses		
VSC	Vocational Skill Courses		Not Related to the Major and Minor
SEC	Skill Enhancement Courses		Not Related to the Major and Minor
AEC	Ability Enhancement Courses	Communication skills, critical reading, academic writing, etc.	Not Related to the Major and Minor
VEC	Value Education Courses	Understanding India, Environmental science /education, Digital and technological solutions, Health & Wellness, Yoga education, sports, and fitness	Not Related to the Major and Minor

IKS	Indian Knowledge System	I. Generic IKS Course: basic knowledge of the IKS II. Subject Specific IKS Courses: advanced information pertaining to the subject: part of the major credit.	Subject Specific IKS related to Major
OJT	On-Job Training (Internship/Apprenticeship)	corresponding to the Major Subject	Related to the Major
FP	Field projects	corresponding to the Major Subject	Related to the Major
CC	Co-curricular Courses	Health and Wellness, Yoga education sports, and fitness, Cultural Activities, NSS/NCC and Fine/Applied/Visual/Performing Arts	Not Related to the Major and Minor
CE	Community Engagement and service		Not Related to the Major and Minor
RP	Research Project	corresponding to the Major Subject	Related to the Major

ProgrammeTemplate:

Programme Degree	Bachelor of Computer Applications (BCA)
Parenthesis if any(Specialization)	NA
Preamble(Brief Introduction to the programme)	<p>The Bachelor of Computer Applications (BCA) program is a four-year undergraduate degree program as per NEP-2020 designed to provide students with a strong foundation in computer science and its applications. The program aims to equip students with the knowledge and skills required to excel in the rapidly evolving field of computer science and information technology.</p> <p>The BCA program combines theoretical knowledge with practical applications to ensure that students develop a comprehensive understanding of computer systems, software development, database management, networking, and other core areas of computer science. It is an ideal choice for students who are interested in pursuing a career in the IT industry or furthering their studies in computer science.</p> <p>During the course of the BCA program, students are exposed to a wide range of subjects that cover various aspects of computer science. These subjects typically include programming languages, data structures, algorithms, computer architecture, operating systems, software engineering, web development, database management systems, computer networks, and information security.</p> <p>Upon successful completion of the BCA program, graduates have a wide range of career opportunities in the IT industry. They can work as software developers, system analysts, database administrators, network administrators, web developers, IT consultants, and other related roles. Graduates may also choose to pursue higher education, such as a Master's degree in computer science or a specialized field within the IT domain.</p> <p>By combining theoretical knowledge, practical skills, and industry exposure, the program equips students with the necessary tools to thrive in the IT industry and contribute to technological advancements.</p>
Programme Specific Outcomes(PSOs)	<p>After completing this programme, Learner will</p> <ol style="list-style-type: none"> 1. Build a strong foundation in computer application, including knowledge of Programming languages, Database,
<i>Action Verbs</i>	

<p><i>demonstrating (Major) discipline-related knowledge acquisition, mastery over cognitive and professional, vocational skills are observed e.g. demonstrate sound understanding of.., analyse, compare, create, design, etc...(minimum 5)</i></p>		Mathematics, Operating system and Networking.
	2.	Understand the ethical and professional responsibilities in the field of computer applications by adhering to professional standards and practices.
	3.	Applying programming knowledge to develop a software application to solve specific problems.
	4.	Analyzing system requirements to design efficient and effective software solutions.
	5.	Evaluate software designs and architectures for efficiency, security and user experience.
	6.	Create a software application to meet the requirements of the Industrial Standards.
Eligibility Criteria for Programme	<p>A candidate for being eligible for admission to the course leading to the degree of Bachelor of Computer Applications (as per revised NEP 2020) must have passed the Higher Secondary School Certificate (Std. XII) examination conducted by the different Divisional Boards of the Maharashtra State Board of Secondary and Higher Secondary Education with 45% marks (40% for candidates belonging to Reserved category) with the following subjects: - (from any stream).</p> <ul style="list-style-type: none"> • English • Any one of the Modern Indian Languages or Modern Foreign Languages or any classical Language or Information Technology/ Any four subjects carrying 100 marks each. <p>OR</p> <ul style="list-style-type: none"> • English • Any one vocational subject carrying 200 marks • Any three subjects carrying 100 marks each. <p>OR</p> <p>Must have passed the Higher Secondary School Certificate (Std. XII) examination with the Minimum Competency based vocational courses (MCVC) conducted by the different Divisional Boards of the Maharashtra State Board of Secondary and Higher Secondary Education.</p> <ul style="list-style-type: none"> • English • Any one of the Modern Indian Languages or Modern Foreign Languages or any classical. • Language or Information Technology • General Foundation Course. • Any one subject carrying 300 marks from among the Minimum Competency based vocational courses prescribed by the Higher Secondary School Certificate examination 	

	<p>from time to time. OR Must have passed an examination of other Board or Body Recognized as equivalent thereto. OR 1. Must have passed any three year Government recognized Diploma programme.</p> <p><u>B.C.A.II Year :</u></p> <ul style="list-style-type: none"> • For a student from our University - should have cleared or has ATKT as admissible in first year in the same subject. • For a student from another University - studied at least 12 credits of major(core) courses in the first year and passed first year without ATKT. • Should have passed three years Govt./ D.T.E. recognized Diploma Course with First Class and without ATKT. <p><u>B.C.A.III Year:</u></p> <ul style="list-style-type: none"> • For a student from our University - should have cleared second year in the same subject or has passed with admissible ATKT. <p>For a student from another university– should have completed at least 28 credits of major (core) courses in the first and second year and passed first and second year without ATKT.</p> <p><u>B.C.A.IV Year:</u></p> <ul style="list-style-type: none"> • For a student from our University /another university-should have completed three years degree in the same discipline.
Intake (For SNTWU Departments and Conducted Colleges)	-

- *External Examination does not always mean Theory paper. It may practical examination, Product submission, projects, etc. checked by external examiners.*
- *Internal evaluation should not be written Theory papers like Unit tests. Internal marks will be acquired through practical, small group or individual Projects, activities, presentations, seminars, workshops, products, assignments, application-based work, reports, etc.*
- Practical may be part of the main courses alongwith theory modules instead of having separate courses of practical work.

Structure with Course Titles**(Options related to our area of study to be provided with "OR" for baskets of different types)**

SN	Courses	Type of Course	Credits	Marks	Int	Ext
Semester I						
1.1	Problem Solving using C	Major(Core)	4 (2T+2P)	100	50	50
1.2	Computer Fundamentals & Operating System	Major(Core)	2	50	0	50
1.3	Digital Marketing	OEC	4	100	50	50
1.4	Web Technology	VSC	2	50	50	0
1.5	Swayam/Chetana/MOOC	SEC	2	50	50	0
1.6	Business Communication	AEC	2	50	0	50
1.7	Vedic Mathematics	IKS	2	50	0	50
1.8	Professional Ethics	VEC	2	50	50	0
1.9	* Co-Curricular Course	CC	2	50	50	0
			22	550	300	250
* Co-Curricular Course (Health & Wellness, Yoga education, sports & fitness, Cultural activities, NSS, NCC and Fine/applied/visual/performing arts)						
Semester II						
2.1	Programming Methodology and C++	Major(Core)	4 (2T+2P)	100	50	50
2.2	Digital Electronics	Major(Core)	2	50	0	50
2.3	Mathematics – I (Discrete Mathematics)	Minor Stream	2	50	0	50
2.4	Intellectual Property Rights	OEC	4	100	50	50
2.5	Introduction to Computer Hardware	VSC	2	50	0	50
2.6	Swayam/Chetana/MOOC	SEC	2	50	50	0
2.7	Technical Writing	AEC	2	50	50	0
2.8	Environmental Studies	VEC	2	50	0	50
2.9	* Co-Curricular Course	CC	2	50	50	0
			22	550	250	300
* Co-Curricular Course (Health & Wellness, Yoga education, sports & fitness, Cultural activities, NSS, NCC and Fine/applied/visual/performing arts)						

Exit with UG Certificate with 10 extra credits (44+10credits)

SN	Courses	Type of Course	Credits	Marks	Int	Ext
	Semester III					
3.1	Java Programming	Major (Core)	4 (2T +2P)	100	50	50
3.2	Computer Organization and Architecture	Major (Core)	4	100	50	50
3.3	Mathematics-II (Numerical & Statistical Methods)	Minor Stream	4	100	50	50
3.4	Computer Graphics	OEC	2	50	0	50
3.5	Database Management System	VSC	2	50	50	0
3.6	Swayam/Chetana/MOOC	AEC	2	50	0	50
3.7	Field projects	FP	2	50	50	0
3.8	NCC/NSS/Sports/Cultural/Community/	CC	2	50	50	0
			22	550	300	250
*3.6 Swayam/Chetana/MOOC subjects should be from Ability Enhancement Course (AEC) category only						
*3.7 Field Project will be internal projects assigned to individual student on major subjects.						
	Semester IV					
4.1	Data Structure and Algorithm	Major(Core)	4 (2T +2P)	100	50	50
4.2	Introduction to Microprocessor	Major(Core)	4 (2T +2P)	100	50	50
4.3	Digital Disaster Management	Minor Stream	4	100	50	50
4.4	Multimedia Computing	OEC	2	50	0	50
4.5	Swayam/Chetana/MOOC	SEC	2	50	0	50
4.6	Modern Indian Language/Foreign Language	AEC	2	50	0	50
4.7	Electronic Waste Management	CEP	2	50	50	0
4.8	NCC/NSS/Sports/Cultural/Community/	CC	2	50	50	0
			22	550	250	300

Exit with UG Diploma with 10 extra credits (44+10 credits)

SN	Courses	Type of Course	Credits	Marks	Int	Ext
Semester V						
5.1	Python Programming	Major(Core)	4	100	50	50
5.2	Software Engineering	Major(Core)	4	100	50	50
5.3	Python Programming Lab	Major(Core)	2	50	0	50
5.4	Elective – I	Major (Electives)	4	100	50	50
5.5	Introduction to Data Science	Minor Stream	4	100	50	50
5.6	Data Analytics using spreadsheet	VSC	2	50	50	0
5.7	Field Project/Internship	FP/CEP	2	50	50	50
			22	550	300	250
Semester VI						
6.1	Mobile Application Development	Major (Core)	4	100	50	50
6.2	Computer Network	Major(Core)	4	100	50	50
6.3	Mobile Application Development Lab	Major (Core)	2	50	0	50
6.4	Elective – II	Major (Elective)	4	100	50	50
6.5	Artificial Intelligence	Minor Stream	4	100	50	50
6.6	Internship/Apprenticeship	OJT	4	100	50	50
			22	550	250	300

Exit with Degree (3-year)

Elective - I
Dot Net Technology
Cyber Security
PHP Programming

Elective - II
Advanced Python Programming
Advanced Java
Data Visualization

4-Year Degree with Honors

SN	Courses	Type of Course	Credits	Marks	Int	Ext
Semester VII						
7H.1	Data Warehousing and Data Mining	Major(Core)	4	100	50	50
7H.2	System Software	Major(Core)	4	100	50	50
7H.3	Software Testing and Quality Assurance	Major(Core)	4	100	50	50
7H.4	Software Testing and Quality Assurance Lab	Major(Core)	2	50	50	0
7H.5	Elective – III	Major (Elective)	4	100	50	50
7H.6	Research Methodology-I	Minor Stream (RM)	4	100	50	50
			22	550	300	250
Semester VIII						
8H.1	Big Data Analytics	Major(Core)	4	100	50	50
8H.2	Image Processing	Major(Core)	4	100	50	50
8H.3	Theory of Computation	Major(Core)	4	100	50	50
8H.4	Big Data Analytics Lab	Major (Core)	2	50	0	50
8H.5	Elective – IV	Major (Elective)	4	100	50	50
8H.6	Internship/Apprenticeship	OJT	4	100	50	50
			22	550	250	300

Elective – III	Elective - IV
Machine Learning	Cloud Computing
Ethical Hacking	Block Chain Technology
Internet of Things	Compiler Design

4-Year Degree with Research

SN	Courses	Type of Course	Credits	Marks	Int	Ext
Semester VII						
7R.1		Major(Core)	4	100	50	50
7R.2		Major(Core)	4	100	50	50
7R.3		Major(Core)	2	50	0	50
7R.4		Major (Elective)	4	100	50	50
7R.5		Minor Stream (RM)	4	100	50	50
7R.6		Research Project	4	100	100	0
			22	550	300	250
Semester VIII						
8R.1		Major(Core)	4	100	50	50
8R.2		Major(Core)	4	100	50	50
8R.3		Major(Core)	2	50	0	50
8R.4		Major(Elective)	4	100	50	50
8R.5		Research Project	8	200	100	100
			22	550	250	300

Course Syllabus
Semester: I
1.1 Major (Core)

Course Title	PROBLEM SOLVING USING C
Course Credits	2 Credits
Course Outcomes	After Completion of this Course, students will be able
	1. To develop logic which will help them to create programs in C.
	2. To demonstrate an understanding of computer programming language concepts.
	3. To Design and develop computer programs, analyze, and interpret the concept of pointers, declarations, initialization, operations on pointers and their usage.
	4. To learn the basic programming constructs, they can easily switch over to any other language in future.
	5. To Develop applications
Module 1 (Credit 1)	
Learning Outcomes	After learning this module, learners will be able to
	1. Learn steps in problem solving using C
	2. Learn concepts of C language
	3. Understand structure, Keywords, operators, functions of C programming
	4. Learn concept of I/O Function, concept of header files, preprocessor directives.
Content Outline	<p>Introduction to problem solving: Concept: Steps in problem solving - (Define Problem, Analyze Problem, Explore Solution), Problem solving techniques - (Trial & Error, Brain Storming, Divide & Conquer), Algorithms and Flowcharts (Definitions, Characteristics, Advantage & Disadvantages, Symbols, Examples), Pseudo-code (Definition, Conditional statements, Loops), etc.</p> <p>Overview of programming languages: Definition of the program, Concept- Source code, Object code, Compilation, Interpretation, Execution, Input and Output, Debugging etc., Expressions, control structures; subroutines, Storage management; scoping rules; bindings for names, Storage types: Automatic, external, register and static variables</p> <p>Introduction to 'C' Language : History of C Programming , Structures of 'C' , Programming, Simple example, Basic Input/ Output, Function as building blocks. Language Fundamentals : Character set, C Tokens, Keywords, Identifiers, Variables, Constant, Data Types, Comments</p>

	<p>Operators : Types of operators, Precedence and Associativity, Expression. Statement and types of statements, Built in Operators and function., Console based I/O and related built in I/O Function: printf(), scanf(), getch(), getchar(), putchar(),etc; Concept of header files, Preprocessor directives: #include, #define, Conditional statements and Loops</p>
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. gain proficiency in writing C programs to solve various problems.
	2. Learn difference between structure and Union
	3. Handle the operations of the files
	4. learn the syntax and semantics of the C language, including its specific features such as pointers and memory management.
Content Outline	<p>Control structures</p> <ul style="list-style-type: none"> • Decision making structures: If, If-else, Nested If –else, Switch, Loop Control structures • While, Do-while, For, Nested for, while, do-while loop, jumping statements: break, continue, goto, exit. <p>Functions: Definition, Basic types of function, Declaration and definition, Function call, Types of function, Parameter passing, Call by value, Call by reference, Scope of variables, Recursion, String: Declaration, string Functions, String Manipulations</p> <p>Pointers: Introduction to pointers, Pointer notation, Pointer arithmetic, Null Pointer</p> <p>Arrays: Definition, Declaration, Initialization, Bounds checking, One-Dimensional Array, Two-Dimensional Array, Passing array to a function, pointer to Array</p> <p>Structure and Union: Introduction to Structure, Definition, Declaration of Structure Variables, .Dot Operator, Nested Structure, Array of Structure, pointer to structure, Introduction to Union, Difference between Structure and Union</p> <p>File Handling: Concept of File, Definition, File operations (create, open, read, move, write, close), File opening Mode, Closing a file, Input/output operations, Creating and reading a file, Command Line Argument</p>

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Assignments can be given range from simple tasks to complex projects.
2. Evaluate their problem-solving approach, algorithm design, and logic
3. Conducting regular quizzes and tests to assess students' theoretical knowledge of C programming concepts

References:-

1. C: The Complete Reference (Fourth Edition), Herbert Schildt, Tata McGraw-Hill Education Pvt. Ltd., 2000
2. Ramkumar and Agrawal, "Programming in ANSI C", Tata McGraw Hill, 1996.
3. Y.P Kanetkar, "Let Us "C", , Infinity Science Press, 2008

Course Syllabus

Semester: I

1.1 Major (Core)

Course Title	PROBLEM SOLVING USING C Lab
Course Credits	2 Credits
Course Outcomes	After completion of this Course, the students will be able to
	1. Read, understand and trace the execution of programs written in C language.
	2. Write the C code for a given algorithm.
	3. Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
	4. Write programs that perform operations using derived data types.
	5. Implement simple file operations
	6. Read, understand and trace the execution of programs written in C language.
Module 1 (Credit 1)	
Learning Outcomes	After learning this Module, learners will be able to
	1. write simple programs on operators
	2. Implement header files and preprocessor directives
	3. Apply control, iterative, jumping statements
	4. Understand break and continue statement and apply it
Content Outline	Simple Program, Implementation of Operators: Built in Operators and function, Arithmetic, Logical, Relational, bitwise, Precedence and Associativity, composite statements. Unary, binary and ternary operators. Concept of header files, Preprocessor directives: #include, #define. And macros implementations, Implementation of Storage types: Automatic external, register and static variables Console based I/O and related built in I/O function: printf(), scanf(), getch(), getchar(), putchar(); Control Statement: Decision Making Statements, if, Nested if, if-else, Nested if-else, if-else-if, switch, etc. The Conditional Expression; Iterative Statements- The for loop, . The while loop, The do-while loop; Jumping Statements- The goto & label ,The break & continue, The exit() function

Module 2 (Credit 1)	
Learning Outcomes	After learning this Module, learners will be able to
	5. Implement the Functions in the program
	6. Understand declaration and initialization of pointers 7. Passing of array to a function
	8. understand defining and declarations of structure variable in the program
Content Outline	Implementation of Functions: Defining and accessing, passing arguments, Function prototypes, function calling mechanism, call by value, call by reference, recursive function; String Manipulations Pointer Declaration and Initialization of Pointer variables, pointer Arithmetic, Pointers and Character Strings Implementation of 1-D and multi dimension Array, One-Dimensional Array, Two-Dimensional Array, Passing array to a function, pointer to Array. Programs Using Structure and Union : Defining and Declaring Structure Variables, .Dot Operator, Nested Structure, Array of Structure, pointer to structure, Examples of Union. Programs using I/O Operations File Handling: File Operations (Create, open, read, move, write, close) Input/output operations on file Character by –(fgetc, fputc), Reading and writing files

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Assignments can be given range from simple tasks to complex projects.
2. Evaluate their problem-solving approach, algorithm design, and logic
3. Conducting regular quizzes and tests to assess students' theoretical knowledge of C programming concepts

References:-

Text Book:

1. **C – programming E.Balagurusamy, Tata McGray Hill, 1990**

Reference Books:

1. C: The Complete Reference (Fourth Edition), Herbert Schildt, Tata McGraw-Hill Education Pvt. Ltd., 2000
2. Ramkumar and Agrawal, “Programming in ANSI C”, Tata McGraw Hill, 1996.
3. Y.P Kanetkar, “Let Us “C” , , Infinity Science Press, 2008

Course Syllabus

Semester: I

1.2 Major (Core)

Course Title	Computer Fundamentals and Operating System
Course Credits	2 Credits
Course Outcomes	After completion of this Course, the students will be able to
	1) Understand the fundamental components and architecture of a computer system.
	2) Identify and describe the functions and features of various input and output devices.
	3) Explain the concepts of computer memory and storage systems.
	4) Gain knowledge of different operating systems and their features.
	5) Understand the fundamentals of file management in an operating system.
	6) Comprehend the concepts of process management and multitasking.
	7) Develop problem-solving and troubleshooting skills related to computer systems and operating systems.
Module 1 (1 Credit)	
Learning Outcomes	After learning this module, learners will be able to
	1) gain knowledge of the basic features, systems and generations of the computers
	2) Demonstrate a solid understanding of computer system components and their functions.
	3) Identify and explain the features and capabilities of various input and output devices.
	4) Describe the hierarchy of computer memory and differentiate between primary and secondary storage.
	5) Demonstrate a solid understanding of computer system components and their functions.
Content Outline	Introduction to Computer Systems: Components and architecture of a computer system. Input Devices: Keyboard, mouse, scanners, and other input devices. Output Devices: Monitors, printers, speakers, and other output devices. Computer Memory: Primary and secondary memory, RAM, ROM, and cache memory. Storage Systems: Hard drives, solid-state drives, optical drives, and other storage devices. Operating Systems: Functions and features of an operating system. Types of Operating Systems: Windows, macOS, Linux, and mobile operating systems.

	File Management: File systems, directories, file operations, and file attributes. File Organization: Sequential, indexed, and direct file organization.
Module 2 (1 Credit)	
Learning Outcomes	After learning this module, learners will be able to
	1) Understand the concept of a process in an operating system and the basics of process management.
	2) Explain memory management techniques, including virtual memory and paging.
	3) Apply problem-solving and troubleshooting skills to diagnose and resolve computer system and operating system issues.
Content Outline	Process Management: Processes, process scheduling, and multitasking. CPU Scheduling Algorithms: FCFS, SJF, Round Robin, and priority scheduling. Memory Management: Types of memory, segmentation, and paging. Virtual Memory: Concepts, advantages, and paging algorithms. Operating System Installation and Configuration. Troubleshooting: Identifying and resolving common computer and operating system issues.

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. conduct regular quizzes to assess students' understanding of fundamental concepts in computer fundamentals and operating systems
2. Assign research papers or presentations on specific topics related to computer fundamentals and operating systems.
3. Organize group discussions or debates on current trends, challenges, or ethical issues related to computer fundamentals and operating systems.
4. Assign tasks where students need to analyze and compare different operating systems. Ask them to evaluate the strengths, weaknesses, and key features of popular operating systems such as Windows, macOS, Linux, or mobile operating systems

References:-

Text Books:

1. P. K. Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications, Sixth Edition
2. Silberschatz, Galvin, Gagne" Operating System Principles" John Wiley & Sons, 7th Edition

Reference Books:

1. Dr. Madhulika Jain, "Information Technology Concept", BPB Publication 2nd Edition.
2. Andrew Tanenbaum, Modern Operating Systems, Prentice Hall.
3. William Stallings, Operating Systems, Prentice Hall.
4. Harvey M. Deitel, An introduction to operating systems. Addison-Wesley.
5. Andrew Tanenbaum& Albert Woodhull, Operating Systems: Design and Implementation. Prentice-Hall.
6. Naresh Chauhan, Principles of Operating Systems, Oxford Press
7. Achyut S. Godbole, Atul Kahate, Operating Systems, Tata McGraw Hill
8. Abraham Silberschatz, Peter Galvin, Greg Gagne, Operating System Concepts, Wiley,8thEdition

Course Syllabus Semester: I

1.3 OEC

Course Title	Digital Marketing
Course Credits	4 Credits
Course Outcomes	After completion of this Course, the students will be able
	1. Understand the principles and foundations of digital marketing.
	2. Develop proficiency in using digital channels and tools for marketing purposes.
	3. Gain knowledge of key concepts and techniques in business analytics.
	4. Learn to apply data analysis to optimize marketing strategies and campaigns.
	5. Understand the importance of customer insights and segmentation in digital marketing.
	6. Learn to measure and evaluate digital marketing performance using analytics tools.
Module 1 (Credit 1)	
Learning Outcomes	After learning this module, learners will be able to
	1. Gain a comprehensive understanding of the principles, concepts, and techniques of digital marketing, including the use of various digital channels and tools.
	2. Familiarizing the students with techniques of SEO.
	3.
Content Outline	<p>Basics of Websites & Digital Marketing: -</p> <ul style="list-style-type: none"> • Fundamental of Digital Marketing: Concept, Scope, Areas to Explore • Building Websites on Weebly, WordPress & Blogger • Designing: Canva Tool for Image Editing and Photoshop Graphics <p>SEO - On Page Optimization: - Broken links, Backlinks, W3 Errors, Keyword research & optimization Heading Tag Optimization: Reporting, Suggestion and Implementing Backlinks, Titles & Meta Descriptions, Website Content Optimization Meta & Title Tags Adjustment, XLM Site Map Setup, Robot.txt Validation Google Analytics and Webmaster Tool Setup SERP - rankings on google, Plugins Installation and Monitoring Heading Tag Optimization: Reporting, Suggestion and Implementing Duplicate Content Reporting Duplicate Content Rewording/ re writing using seo target keywords Plugins & Internal Linking, Permalinks Optimization: Reporting, Suggestion and Implementing</p>

Module 2 (Credit 2)	
Learning Outcomes	After learning this module, learners will be able to
	1) Understand the metrics and importance for a website through Google Analytics
	2) Learn and demonstrate strategies for effective campaign Understand the various metrics important for SEM campaign
Module 3 (Credit 3)	
Learning Outcomes	After learning this module, learners will be able to
	1) Learn data-driven marketing decisions by applying business analytics techniques and interpreting data insights to optimize marketing strategies and campaigns.
Content Outline	<p>Social Media Optimization: -</p> <p>FACEBOOK: Custom Graphics and Setting Profile with about/ hours and other information of business: For your Social Media Account: Facebook business page</p> <p>Google business profile & Page: with custom graphics and setting up profile with proper information</p> <p>Twitter business profile & Page: with custom graphics and setting up profile with proper information</p> <p>Pinterest: making account, creating 5 boards, entering board description with keyword rich descriptions, pinning 5 images to begin with, so 1 each in each board</p> <p>Instagram: creating account and updating profile you tube optimization, creating account/ channel if you don't have one, optimize the channel description and other work as per you tube channel checklist</p> <p>Linked in profile creation, optimization linking the above: 36,38,39,40,41,42,43: with your website/ webpage if not done already</p> <p>Social Media Content Creation and Posting: 5 Social Media Platform: 2 posts for each platform and 1 Image Post and 1 interesting post found related to the business you are in on web and shared on your page each day. Along with: Commenting, Follows, Likes, Shares</p> <p>Paid Advertising: Email Marketing, FB Marketing & Google AdWords Facebook Marketing: Ad Plan, Ad Setup with Banner Images, Monitoring & Reporting (1 Ad: Website Conversion, Apps Installation, Promote Page Etc.) Google AdWords: Search Ads Type: Keyword Research, 1 Campaign, 2 Ad groups, 5 Ads. Display Ads: 2 Banner Graphics keyword Research, 1 Ad Group, 2 Ads.</p> <p>Email Marketing: Content Writing as per Offers, services & Discounts,</p>

	Custom Template Building, HTML Conversion, Use of Emailing Software: Account Creation, Creating Customer List, Sending Emails
Module 4 (Credit 4)	
Learning Outcomes	After learning this module, learners will be able to
	1) Develop the ability to measure and evaluate the performance of digital marketing campaigns using appropriate metrics and analytics tools.
	<p>YouTube Optimization</p> <p>Pinterest Posting, pinning, re pinning</p> <p>Analytics: Google Analytics, Installing Google Analytics, How to Study Google Analytics, Interpreting Bars & Figures, How Google Analytics can Help SEO, Advanced Reporting, Webmaster Central, Bing/Yahoo, Open Site Explorer, Website Analysis using various SEO Tools available.</p> <p>Reporting and Monitoring: - SEO REPORT/plan Initial website ranking and evaluation report Analytics report and webmaster report AdWords Report, Fb Insight Marketing Media Audit Report SERP Report Competitor Analysis Report (Media Audit Report)</p>

Course Syllabus

Semester: I

1.4 VSC

Course Title	Web Technology
Course Credits	2 Credits
Course Outcomes	After completion of this Course, the students will be able to
	1) Understand the fundamental concepts and components of web technology, including the World Wide Web, HTTP protocol, web browsers, and web servers.
	2) Develop proficiency in HTML and CSS to create structured and visually appealing web pages.
	3) Apply JavaScript to enhance interactivity and create dynamic functionality on web pages.
	4) Implement server-side scripting languages to develop dynamic web applications.
	5) Integrate web applications with databases for data storage and retrieval.
Module 1 (1 Credit)	
Learning Outcomes	After learning this module, learners will be able to
	1) Demonstrate a deep understanding of web technology concepts, protocols, and standards.
	2) Create well-structured and visually appealing web pages using HTML and CSS.
	3) Develop interactive and dynamic web pages using JavaScript and DOM manipulation.
	4) Design and implement server-side scripts to handle user requests and generate dynamic web content.
	5) Demonstrate a deep understanding of web technology concepts, protocols, and standards.
Content Outline	Introduction to Web Technology: World Wide Web, HTTP protocol, web browsers, and web servers. HTML Basics: Document structure, tags, elements, and attributes. Cascading Style Sheets (CSS): Styling web pages, selectors, properties, and positioning. Responsive Web Design: Creating web pages that adapt to different screen sizes. JavaScript Fundamentals: Variables, data types, operators, control structures, and functions. Document Object Model (DOM): Manipulating web page elements using JavaScript.

Module 2 (2 Credit)	
Learning Outcomes	After learning this module, learners will be able to
	1) Integrate databases with web applications for efficient data storage and retrieval.
	2) Apply secure coding practices and implement security measures to protect web applications from common vulnerabilities.
	3) Effectively use web development frameworks and tools to streamline the web development process.
	4) Integrate databases with web applications for efficient data storage and retrieval.
Content Outline	<p>Client-Side Scripting: Event handling, form validation, and dynamic content generation using JavaScript.</p> <p>Introduction to Web Development Frameworks (e.g., React, Angular, Vue.js)</p> <p>Server-Side Scripting: Introduction to server-side scripting languages (e.g., PHP, Python, Ruby).</p> <p>Dynamic Web Pages: Generating dynamic content based on user input and server-side processing.</p> <p>Database Connectivity: Introduction to databases, SQL queries, and database integration with web applications.</p>

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. students can be asked to create a web page using HTML and CSS, implement a JavaScript function to perform a specific task, or develop a simple interactive web form.
2. Assign group projects where students work together to develop a web application
3. Ask students to present their web development projects or specific concepts they have learned.
4. Provide students with case studies that present real-world scenarios or challenges in web programming

References:-

1. **Web Programming, Guy W. Lecky Thompson, 2009, Cengage Learning**

Reference Books:

1. Web Design The complete Reference, Thomas Powell, Tata McGrawHill
2. HTML and XHTML The complete Reference, Thomas Powell, Tata McGrawHill
3. JavaScript 2.0 : The Complete Reference, Second Edition by Thomas Powell and Fritz Schneider
4. PHP : The Complete Reference By Steven Holzner, Tata McGrawHill

Course Syllabus Semester: I
1.5. SEC (Swayam/Chetana/MOOC)

Course Syllabus Semester: I

1.6. AEC

Course Title	Business Communication
Course Credits	2
Course Outcomes	Students will be able to draft effective business correspondence with brevity and clarity. Enhance critical thinking by designing and developing clean and lucid writing skills
Module 1 (Credit 1)	Fundamentals of Business Communication
Learning Outcomes	Students will be able to 1. Demonstrate the fundamental concepts of interpersonal and professional communication. 2. Learn how to use grammar rules and vocabulary in real-life contexts, enhancing their language proficiency
Content Outline	1) Basics of Communication, Process of Communication, Components of Communication, Factors of Communication, Barriers to Communication – Physical, Psychological, Semantics, Organizational and Interpersonal Barriers; How to overcome Barriers. Verbal (Written & Oral), Non-verbal - Non-Verbal Communication -Personal appearance; Facial Expression, Movement, Posture, Gesture, Eye Contact. 2) Parts of speech, Verb, Tenses: Form and use, Articles and Prepositions, Transformations of sentences, Common Errors. 3) Root words (Etymology), Meaning of Words in Context, Synonyms & Antonyms, Collocations, Prefixes & Suffixes, Standard Abbreviations.
Module 2 (Credit 1)	Grammar in context and Vocabulary Building and Kinesics – Voice Dynamics
Learning Outcomes	Students will be able to 1. Produce a variety of business communication materials and technical documents that meet professional standards 2. Interpret and utilize kinesics effectively, as well as develop vocal techniques to convey meaning
Content Outline	4) Business Report Writing, Parts of a Formal Letter and Formats Parts/Elements of a Formal Letter - Letter heads, and/or Sender's Address, Dateline, Inside Address, Reference. 5) Basics of Email 6) Types of Letters in Both Formal Letter Format and Emails Claim & Adjustment Letters, Request/Permission Letters Emails- Format

	<p>of Emails, Features of Effective Emails, Language and style of Emails.</p> <p>7) Sales Letter, Circular Letter</p> <p>8) Kinesics: Definitions; importance; Features of Body Language; Voice Modulation: Quality, Pitch; Rhythm; intonation; Pronunciation; Articulation; stress & accent; Linguistic features of voice control: Vowel & Consonant Sounds.</p>
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Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. – Assignment on Job Application and CV
2. – Business emails (To be sent by students to the teacher as mentioned in syllabus)
3. – Report writing on any given topic.

References:-

- 1) Urmila Rai, S M Rai, "Business Communications", Himalaya Publishing House, 2004
- 2) Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi
- 3) Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi

Course Syllabus
Semester: 1
1.7 IKS

Course Title	Vedic Mathematics
Course Credits	2 Credits
Course Outcomes	Understand Ancient Vedic Maths techniques
	Learn Faster Calculation Methods
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able 1. To understand difference between general maths and vedic maths 2. To Learn Rapid Addition of single, double, triple digits
Content Outline	<ul style="list-style-type: none"> • Introduction of Vedic Maths • Benefits of Vedic Maths • Difference between general Maths and Vedic Maths • Mental Maths Addition • Rapid Addition- Single to Double-Digit • Rapid Addition- Double to Double-Digit • Rapid Addition- Triple to Triple-Digit • Left to Right Addition
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able 1. To solve problems on multiplications 2. To understand different Multiplication tricks
Content Outline	<ul style="list-style-type: none"> • Multiplication with Double Digit to Single Digit numbers • Multiplication by Multiples of 10 • Traditional Multiplication • Multiplication with Tricks

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Assign regular problem sets that cover various topics of addition and multiplication

References /Text Books :-

Mental Calculation by Bharati Krishna Tirtha
Vedic Mathematics by Bharti Krishna Tirtha

Course Syllabus Semester: I

1.8 VEC

Course Title	Professional Ethics
Course Credits	2 Credits
Course Outcomes	After completion of this course, students will be able to
	1. Understand the fundamental concepts and significance of professional ethics.
	2. Apply ethical theories and frameworks to analyze and resolve ethical dilemmas in professional contexts.
	3. Evaluate and critique codes of ethics and professional standards in different fields.
	4. Recognize and address ethical issues and challenges in the workplace.
	5. Demonstrate ethical decision-making skills through the analysis of case studies and real-world scenarios.
	6. Develop an understanding of the ethical implications of emerging technologies.
	7. Demonstrate awareness of the importance of diversity, inclusion, and social responsibility in professional settings.
	8. Apply ethical principles in professional relationships and communication.
	9. Reflect on personal and professional values and their alignment with ethical standards.
	10. Demonstrate ethical leadership skills and the ability to promote ethical conduct in organizations.
Module 1 (1 Credit)	
Learning Outcomes	After learning this module, learners will be able to
	1. Analyze and evaluate ethical theories and apply them to professional contexts.
	2. Demonstrate an understanding of ethical codes and standards relevant to their field of study.
	3. Analyze and evaluate ethical theories and apply them to professional contexts.
Content Outline	Introduction to Professional Ethics: Definition and significance of professional ethics, Ethical decision-making frameworks and models, Relationship between ethics and professionalism. Ethical Theories: Overview of major ethical theories (e.g., consequentialism, deontology, virtue ethics), Application of ethical theories to professional contexts, Critiques and comparisons of different ethical theories. Codes of Ethics and Professional Standards: Exploration of codes of ethics in various professions (e.g., engineering, medicine, law, computing),

	Analysis of professional standards and their role in guiding ethical conduct, Case studies on ethical dilemmas and violations in different professions.
Module 2 (1 Credit)	
Learning Outcomes	After learning this module, learners will be able
	1. Identify ethical dilemmas and challenges in the workplace and develop strategies to address them.
	2. Apply ethical decision-making frameworks to analyze and resolve complex ethical problems.
	3. Engage in critical thinking and ethical reasoning to assess the consequences of actions and decisions.
	4. Identify ethical dilemmas and challenges in the workplace and develop strategies to address them.
	5. Apply ethical decision-making frameworks to analyze and resolve complex ethical problems.
Content Outline	<p>Ethical Issues in the Workplace: Workplace ethics and organizational culture, Conflict of interest, whistleblowing, and confidentiality, Ethical considerations in decision-making, communication, and relationships within organizations.</p> <p>Technology and Ethics: Ethical implications of emerging technologies (e.g., artificial intelligence, biotechnology, data analytics, Privacy, security, and data ethics in the digital age, Responsible and sustainable use of technology.</p> <p>Professional Responsibility and Leadership: Professional accountability and responsibility, Ethical leadership and its impact on organizations, Addressing ethical challenges in professional roles and responsibilities.</p>

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

- 1) Provide students with real-life ethical case studies from various professional fields.
- 2) Assign students to research and present on specific ethical dilemmas that professionals commonly encounter in their fields.
- 3) Organize group discussions or debates on contemporary ethical issues related to different professional fields.
- 4) Assign students to work in groups and develop an ethical leadership project aimed at promoting ethical conduct in a specific context, such as a workplace, community organization, or educational institution.

References:-

- 1) "Ethics in Information Technology" by George Reynolds
- 2) "Applied Professional Ethics: A Developmental Approach for Use with Ethical Codes" by Leo J. Krynski and S. G. Jennings
- 3) "Professional Ethics and Human Values" by Jayshree Suresh and Sudhir S. Choudhary

Course Syllabus Semester: I

1.9 CC

Course Syllabus

Semester: II

2.1 Major (Core)

Course Title	Programming Methodology and C++
Course Credits	2
Course Outcomes	1. Describe the object-oriented programming approach in connection with C++
	2. Apply the concepts of object-oriented programming
	3. Analyze a problem and construct a C++ program that solves it
	4. Illustrate the process of file input output using C++
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	5. Understand Programming Concepts which will help them to develop a solid understanding of fundamental programming concepts such as variables, data types, control structures (loops and conditionals), functions, arrays, and objects.
	6. Apply Object -oriented programming concepts such as objects, classes and define the Functions and Variables.
Content Outline	<p>Evolution of OOP: Advantages and disadvantages of OOP over its predecessor paradigms, Characteristics of Object Oriented Programming: Abstraction, Encapsulation, Data hiding, Inheritance, Polymorphism, Code Extensibility and Reusability, User defined Data Types.</p> <p>C++Program Structure, Simple Input/ Output Program, Program Comments, Identifiers, Literals, String, Character, Integer, Floating Point, Constants, Keywords, Data Types, Operators in C++, Control Structures in C++.</p> <p>Object and Classes: Core object concepts, Encapsulation, Abstraction, Polymorphism, Classes, Messages Association, Interfaces, Implementation of class in C++, C++ Objects as physical object, C++ object as data types constructor Object as function arguments.</p> <p>Functions and Variables: Functions: Declaration and Definition, Variables: Definition Declaration, and Scope, Dynamic Creation and Derived Data, Arrays and Strings in C++.</p>

Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand the concepts of constructors, inheritance and its types and polymorphism
	2. Handle Files input output in C++ and work on class template
Content Outline	<p>Inheritance: Concept of Inheritance, Derived class and base class, Types of Inheritance, Functions and Friend Functions.</p> <p>Constructors: Multiple Constructors and Initialization, Using Destructors to Destroy Instances.</p> <p>Polymorphism: Syntax for Operator overloading, overloading of unary and binary operators.</p> <p>File input and output: Reading a File, Managing I/O Streams, opening a File – Different Methods, Checking for Failure with File Commands</p> <p>Class templates: Implementing a class template, implementing class template member functions, Using a class template, Function templates</p>

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. assignments can include tasks such as implementing algorithms, solving programming problems, creating object-oriented programs
2. Assign small-scale projects that require students to apply their programming knowledge to solve real-world problems eg:- a calculator application, or a student grade management system using C++.
3. Utilize online coding platforms or coding competitions to assess students' programming skills and problem-solving abilities.

References/Text Books:-

1. E. Balguruswamy, 'Object Oriented Programming with C++', Tata McGraw – Hill Education, 2008
2. K.R Venugopal 'Mastering C++', Tata McGraw-Hill Education, 1997
3. B.Stroustrup 'C++ Programming Language' (3rd Edition). Addison Wesley, 1997
4. B.chandraNarosa 'A Treatise On Object Oriented programming using C++'- Publications, 1998
5. Herbert Schildt, "The Complete Reference CN", Tata McGraw-Hili, 2001

Course Syllabus

Semester: II

2.1 Major (Core)

Course Title	Programming Methodology using C++ LAB
Course Credits	2 Credits
Course Outcomes	Students will be able to:
	1) Create simple programs using classes and objects in C++.
	2) Implement Object Oriented Programming Concepts in C++.
	3) Develop applications using stream I/O and file I/O.
	4) Implement simple graphical user interfaces
	5) Implement Object Oriented Programs using templates and exceptional handling
Module 1 (Credit 1)	
Learning Outcomes	After learning this Module, Learners will be able to
	7. Learn simple programs using classes and objects in C++
	8. Implement Object Oriented Programming Concepts in C++
Content Outline	<p>1. Simple Programs on fundamental Data Types and I/O operators, Derived data types, Symbolic constants, variables and Reference variables</p> <p>Operators and decision control structures: Programs to implement if statements, Switch statements, Loop statements:</p> <ul style="list-style-type: none">• Write a C++ program to display entered number is even or odd.• Write a C++ program to display entered number is prime or not• Write a C++ program to display factorial entered number.• Write a C++ program accept an integer between 1 to 12 and display name of the month of respective number.• Write a C++ program to display pattern (number/symbol).• Write a C++ program which explains the use of a scope resolution operator• Write a C++ program which explains the use of a manipulators operator <p>Functions in C++:</p> <ul style="list-style-type: none">• Write a C++ program which explains the feature of an inline function.• Write a C++ program which explains the concept of default arguments.• Write a C++ program for function overloading.• Write a C++ program to swap two numbers using concept of call by value.• Write a C++ program to swap two numbers using concept of call by address.• Write a C++ program to swap two numbers using concept of

	<p>call by reference.</p> <p>Advanced Language Constructs:</p> <ul style="list-style-type: none"> • Write a program in C++ which explains the concept of Linear array • Write a program in C++ which explains the concept of multidimensional array • Write a program in C++ which manipulate the array elements using pointer <p>Object and Classes :</p> <ul style="list-style-type: none"> • Write a C++ program for a simple class implementation. • Write a C++ program for a nesting of member function. (One function calls another Function). • Write a C++ program for arrays within a class. (How to use a array in a class). • Write a C++ program for static class member. (Class member should be a static variable) • Write a C++ program which shows use of static member function. • Write a C++ program which explain concept of array of object. <p>Friend Function:</p> <ul style="list-style-type: none"> • Write a C++ program for a friend function. • Write a C++ program for a function friendly to two classes.
Module 2 (Credit 1)	
Learning Outcomes	<p>After learning this Module, Learners will be able to</p> <ol style="list-style-type: none"> 1. Learn simple programs using Inheritance, Constructors and operator overloading 2. Reading and creating text files using C++ programs.
Content Outline	<p>Inheritance:</p> <ul style="list-style-type: none"> • Write a C++ program for single level inheritance. • Write a C++ program for multilevel inheritance • Write a C++ program for multiple inheritance • Write a C++ program hierarchical inheritance • Write a C++ program for hybrid inheritance • Write a C++ program using virtual base class <p>Constructor and Destructor:</p> <ul style="list-style-type: none"> • Write a C++ program for default constructors. • Write a C++ program for parameterized constructors. • Write a C++ program of copy constructors. • Write a C++ program which explains the concept of constructor overloading • Write a C++ program of implementation of destructors <p>Polymorphism: Write C++ programs which explain the concept of Operator</p>

	<p>Overloading (Unary, Binary, Using friend functions etc.)</p> <p>Files and streams:</p> <ul style="list-style-type: none"> • Write a C++ program of working with single file. (Creates a file with constructor Function). • Write a C++ program of working with multiple files (creates a file with open () function). • Write a C++ program of reading from two files simultaneously. • Write a C++ program of input output operations on characters (uses put () and get () function). <p>Class templates: Implementations of Class template, Class template with multiple parameters, Function template.</p>
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Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Encourage students to review and provide feedback on each other's code.
2. Ask students to document their code by providing clear comments, writing technical documentation, or creating project reports
3. Assign small-scale projects that require students to apply their programming knowledge to solve real-world problems.
4. Assign small coding tasks that cover various programming concepts and techniques

References/Textbooks:-

1. E. Balguruswamy, 'Object Oriented Programming with C++', Tata McGraw – Hill Education, 2008
2. K.R Venugopal 'Mastering C++', Tata McGraw-Hill Education, 1997
3. B.Stroustrup 'C++ Programming Language' (3rd Edition). Addison Wesley, 1997
4. B.chandraNarosa 'A Treatise On Object Oriented programming using C++'- Publications, 1998
5. Herbert Schildt, "The Complete Reference C++", Tata McGraw-Hill, 2001

Course Syllabus

Semester: II

2.2 Major (Core)

Course Title	Digital Electronics
Course Credits	2 Credits
Course Outcomes	To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
	Understand the digital signal, positive and negative logic, Boolean algebra, logic gates, logical variables, the truth table, number systems, codes, and their conversion from to others.
Module 1 (Credit 1)	
Learning Outcomes	After learning this Module, learners will be able to
	1. Understand number systems and codes of digital systems, including the basic building blocks such as logic gates, combinational and sequential circuits.
	2. develop the skills to design and implement digital systems. They will learn to analyze specifications, create truth tables, design logic circuits, simulate them, and validate their functionality
Content Outline	1) Number Systems and Codes: Review of Binary, Octal and Hexadecimal Number Systems – Conversion methods- complements- signed and unsigned Binary numbers. Binary codes: Weighted and non-Weighted codes – ASCII – Error detecting and Error correcting codes- hamming codes. 2) Computer Arithmetic: Integer Representation, Integer Arithmetic, Floating Point Representation, Floating Point Arithmetic, Sources of Errors, Propagated Errors. 3) Digital Logic Circuits: Introduction to digital signals, Logic Gates, Universal gates, Implementation of Universal gates using basic gates. Conversion of Universal gates into Basic Gates, Exclusive gates Truth table, De-Morgan's Theorem: Statement and Proof.
Module 2 (Credit 1)	
Learning Outcomes	Students will be able to
	1. Manipulate Boolean expressions, simplify logic functions, and implement logic circuits using Boolean algebra.
	2. Understand different types of logic gates (AND, OR, NOT, etc.) and heir behavior and truth tables.

Content Outline	<p>4) Boolean Algebra: Boolean Laws, Simplification of Boolean expression using Laws, Min terms (SOP) Max terms (POS), Standard/Canonical SOP and POS forms, K-map (2,3 and 4 variables) Don't care conditions.</p> <p>5) Truth tables: Simplification of Boolean expression using Truth Tables</p>
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Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Assign small-scale circuit design projects that require students to apply their knowledge of digital electronics
2. Conduct hands-on lab experiments where students can work with actual electronic components and test digital circuits.
3. Provide simulation software or tools that allow students to simulate and analyze digital circuits.

References/Text Books:-

1. R P Jain, "Modern Digital Electronics", Tata McGraw-Hill Education, 2003
2. N.G. Palan. "Logic Circuit" Technova Publication, 1998

Course Syllabus

Semester: II

2.3 Minor Stream

Course Title	Mathematics – I (Discrete Mathematics)
Course Credits	2
Course Outcomes	Learners will be able to
	Understand the theory and techniques of Sets, Relations and Functions and also use mathematical reasoning techniques including Binomial Theorem, Induction
	Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems.
Module 1 (Credit 1)	Properties of Integers, Sets, Relation, Functions, Binomial Theorem and Mathematical Induction
Learning Outcomes	After learning the module, learners will be able to
	9. Solve GCD, LCM and theorems and problems
	10. Solve sums of Set Theories, Relation and Function
	11. Solve basic problems based on Binomial Theorem and Mathematical Induction
Content Outline	<p>1) Properties of Integers: Definition of GCD, LCM, Theorems Euclidean algorithm and problems</p> <p>2) Set Theory: Definition of Sets, Subsets, Cardinality of Sets, Types of sets: Equal Sets, Universal Sets, Finite and Infinite Sets, proper set, power sets, Operations on Sets: Union, Intersection, Complement of Sets, set difference, Cartesian Product, Venn Diagrams, and Algebra of sets</p> <p>3) Relations: Definitions of Relation, Reflexive Relation, Symmetric Relation, Transitive relation, Equivalence Relation Recurrence Relation: Definitions and problems</p> <p>4) Functions: Define Function, Injective Functions, Surjective Functions, Bijective Functions, Composite Function, Inverse of a Function, Domain and Range</p> <p>5) Binomial Theorem and Mathematics Induction: Binomial Theorem: Statement and basic problems and Mathematical Induction: Principles and basic problems</p>

Module 2 (Credit 1)	Permutation and Combination, Matrices and Determinants
Learning Outcomes	After learning the module, learners will be able to
	3. Solve Problems of permutations and Combinations
	4. Solve basic Matrices and Determinants problems
Content Outline	<p>6) Permutations and Combinations: Permutation: Definition, Basic Permutation, Permutation with Repetition and Circular Permutation and basic problems Combination: Definition and basic problems</p> <p>7) Matrices and Determinants: Matrices: Definition, Operations on Matrices, Square Matrix and its Inverse, Solution of Equations using Matrices Determinants: Properties of Determinants, Solution of equations using Determinants</p>

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

Assign regular problem sets that cover various topics in Discrete Mathematics. Include a mix of theoretical and applied problems to assess students' understanding of concepts such as logic, set theory, combinatorics, graph theory, and mathematical reasoning

References:-

1. Kolman, Busby and Ross, "Discrete mathematical Structures and graph theory"
2. Alan Doerr, K. Levasseur, "Applied discrete structure for computer science", Galgotia publications, 1988
3. Trembley & Manohar, "Discrete mathematical Structures with application to computer science", McGraw Hill, 1987.
4. Swapan Kumar Chakraborty, Bikash Kanti Sarkar, Discrete Mathematics, Oxford Higher Education, 2011
5. C. L. Liu, D. P. Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, Tata Mcgraw-Hill, 3 rd Edition, 2008.S.

Course Syllabus Semester: II
2.4 OEC

Course Title	Intellectual Property Rights
Course Credits	4 Credits
Course Outcomes	After going through the course, learners will be able to
	1. Learn how to protect their creative work using Intellectual Property Rights.
	2. Identify the use of Intellectual Property.
	3. Develop an ability to use Intellectual property to protect their work.
	4. Understand the registration process of Copyright, Patent and Trademark.
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	12. Demonstrate knowledge and understanding of the justifications and rationales for protecting intellectual property
Content Outline	Basic Principles and Acquisition of Intellectual Property Rights: Philosophical Aspects of Intellectual Property Laws, Basic Principles of Patent Law, Patent Application procedure, drafting of a Patent Specification, Understanding Copyright Law, Basic Principles of Trade Mark, Basic Principles of Design Rights, International Background of Intellectual Property.
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	5. Demonstrate knowledge and understanding of different countries IPR acts.
Content Outline	Information Technology Related Intellectual Property Rights: Computer Software and Intellectual Property- Objective, Copyright Protection, Reproducing, Defences, Patent Protection. Database and Data Protection- Objective, Need for Protection, UK Data Protection Act, 1998, US Safe Harbor Principle, Enforcement. Protection of Semi-conductor Chips- Objectives, Justification of protection, Criteria, Subject matter of Protection, WIPO Treaty, TRIPs, SCPA. Domain Name Protection- Objectives, domain name and Intellectual Property, Registration of domain names, disputes under Intellectual Property Rights, Jurisdictional Issues, and International Perspective.
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to

	1. Understand different patents and copy rights information
	2. Outline the process of patenting and development
	3. Explain the procedure of trademark development
Content Outline	<p>Patents (Ownership and Enforcement): Patents: Objectives, Rights, Assignments, Defenses in case of Infringement.</p> <p>Copyright (Ownership and Enforcement): Copyright: Objectives, Rights, Transfer of Copyright, work of employment Infringement, Defenses for infringement.</p> <p>Trademark (Ownership and Enforcement): Trademarks: Objectives, Rights, Protection of goodwill, Infringement, Passing off, Defenses. Designs: Objectives, Rights, Assignments, Infringements, Defenses of Design Infringement.</p>
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Discover the new development in ITR
	2. Explain the new technology and basics of Cyber laws and learn case studies
Content Outline	<p>Enforcement of Intellectual Property Rights: Civil Remedies, Criminal Remedies, Border Security measures. Practical Aspects of Licensing: Benefits, Determinative factors, important clauses, licensing clauses.</p> <p>Cyber Law: Basic Concepts of Technology and Law: Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence Law of Digital Contracts: The Essence of Digital Contracts, The System of Digital Signatures, The Role and Function of Certifying Authorities, The Science of Cryptography.</p> <p>Case studies: Case studies related to different cyber crimes and punishment can be given.</p>

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Assignments can be given range from simple tasks to complex projects.
2. Different case studies will be solved.

Text Books: Cyber law by Vivek Sood

Reference Books:

1. Licensing Art & Design by Caryn R. Leland, Allworth Press
2. A Professional's Guide to Licensing and Royalty Agreements by Caryn R. Leland Allworth Press IT 2000 Bill
3. How To Register Your Own Copyright by Marx Warda, Sphinx Publishing
4. Web sites: online information, handou

Course Syllabus Semester: II
2.5 VSC

Course Title	Introduction to Computer Hardware
Course Credits	2
Course Outcomes	Students will be able to
	1. Identify the hardware components of Computer
	2. Understand the Computer Memory and Network in detail
	3. assemble / setup and upgrade personal computer systems; diagnose and isolate faulty components; optimize system performance and install / connect peripherals.
Module 1 (Credit 1)	
Learning Outcomes	After learning this Module, learners will be able to
	3. Understand detailed hardware and software components and diagnostic methods
	4. Understand Computer Memory and Network and its types, advantages and disadvantages.
Content Outline	<p>6) Fundamentals of Computer Hardware: What is Computer Hardware and Hardware Upgrade?, Computer Hardware Parts(Components), Hardware vs Software, Hardware Virtualization, Hardware as a service, Computer Hardware Problems and Diagnostic Methods</p> <p>7) Computer Memory: Definition, Characteristics of Main Memory, how does Computer Memory work, Types of Computer Memory, Register Memory, Cache Memory, Primary and Secondary Memory and its types, RAM, ROM and Memory units</p> <p>8) Computer Network: Basics of Network, LAN, MAN and WAN along with advantages and disadvantages.</p>
Module 2 (Credit 1)	
Learning Outcomes	Students will be able to
	3. Assemble and troubleshoot their personal computer
Content Outline	<p>9) PC Assembling and Troubleshooting:</p> <p>Assembling:</p> <ol style="list-style-type: none"> How to build a computer: Choosing the right components, Safety Measures, Steps to build a computer Types of Computer Cables and its advantages Types of Processors Working of Printers and Scanners and its types Microcomputers and Motherboards and its types and selection of right motherboard Drivers role and types <p>Troubleshooting: Diagnose and troubleshooting of microcomputer/computer system hardware & software and other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failed boot before the OS is loaded, Different approaches to installing and supporting I/O devices, Managing Faulty Components.</p>

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Hand-on Training can be given for assembling the computer
2. Different charts can be prepared as an assignment on the topics of Computer Hardware Parts, Memory, Network

References/Text Books:-

1. Introduction to PC Hardware and Troubleshooting, Mike Meyers, McGraw Hill Education
2. Modern Computer Hardware Course, Manhar Lotia, BPB Publication
3. PC Hardware: The Complete Reference by Craig Zacker and John Rourke, McGraw Hill Education

**Course Syllabus Semester: II
2.6 (Swayam/Chetana/MOOC)**

Course Syllabus

Semester: II

2.7 AEC

Course Title	Technical Writing
Course Credits	2 Credits
Course Outcomes	CO1: Understand the process of Technical Writing CO2: Understand Various User Guides CO3: Aware about the concepts of Translation and Localization CO4: Aware about the Working environment required for technical writing CO5: Writing Project Proposal, Software Project Documentation and Report writing
Module 1 (Credit 1)	
Learning Outcomes	Student will be able to 1. Learn Meaning of Technical Communication, its need and importance. 2. Learn process of Technical writing 3. Learn various user guides
Content Outline	1. Technical Communication <ul style="list-style-type: none">• Definition of Technical Communication• Need for Technical Communication• Importance of Technical Communication• Attributes of Technical Communication• Role of Technical Author• Process of Technical Writing• Technical Publications• User guides• Administering guides• Deployment guides• Installation guides• Implementation guides• Troubleshooting guides
Module 2 (Credit 1)	
Learning Outcomes	Student will be able to 1. Learn Objectives , components of Technical leaflets 2. Learn Technical Processes and Procedures

Content Outline

1. Technical Leaflets
 - Objectives
 - Components of Technical Leaflets
 - Preparing Technical Leaflets

2. Technical Specifications & Descriptions
 - Requirement Specifications
 - Functional Specifications
 - Design Specifications
 - Test Specifications
 - Writing Technical Descriptions
 - Writing Processes and Procedures

Assignments :

1. To prepare Technical leaflets
2. To prepare various user guides

References /Text Books :

1. Technical Writing – Process and Product by Sharon T. Gerson & Steven M. Gerson, Pearson Education Inc.
2. Technical Writing and Profession by Thomas N. Huckin & Leslie A. Olsen, Macmillan
3. Writing and Life by Don Knefel, CBS College Publishing
4. Business Correspondence and Report Writing by R.C. Sharma & Krishna Mohan 3rd Edition Tata McGraw-Hill
5. Beginner’s Guide to Technical Writing by John Evans
6. Thirty Minutes before presentation by Patrick Forsyth, Kogan Page India Pvt Ltd.
7. Writing and Analyzing effective Computer System Documentation by Ann Stuart , University of Evansville, Indiana
8. How to write a Computer Manual -A Handbook of Software Documentation by Jonathan Price, The Benjamin-Cummings Publishing Company, California
9. Technical Documentation by A. J. Marlow, NCC Blackwell
10. The Elements of Style by William Strunk Jr.
11. Technical Writing for Dummies by Sheryl Lindsell-Roberts
12. Technical Communication, 9th edition by Mike Markel
13. The Insider’s Guide to Technical Writing by Krista Van Laan
14. Technical Writer Career Guide by ClickHelp
15. Microsoft Manual of Style

Course Syllabus Semester: II

2.8 VEC

Course Title	Environmental Science
Course Credits	2
Course Outcomes	Learners will be able to learn
	1) Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
	2) Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
	3) Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
	4) Understand the practical applicability of the Right to Information Act, 2005
	5) Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
Module 1 (Credit 1)	
Learning Outcomes	After learning the Module, learners will be able to
	1) develop awareness of various environmental issues and challenges facing our planet, such as air and water pollution, deforestation, loss of biodiversity, climate change, waste management, and resource depletion.
	2) understand the key environmental concepts, including biodiversity, ecosystems, natural resources, pollution, climate change, sustainability, and human-environment interactions.
Content Outline	<p>The Multidisciplinary nature of Environmental Studies Definition, scope and importance, Need for public awareness.</p> <p>Natural Resources Renewable and non-renewable resources, Natural resources and associated problems.</p> <ol style="list-style-type: none"> a) Forest Resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and groundwater, floods, drought, conflicts over water, Dams: benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, waterlogging, and salinity. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. f) Land resources: Land as a resource, land degradation, man-induced landslides, soil erosion and desertification.

	Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.
Module 2 (Credit 1)	
Learning Outcomes	After learning the Module, learners will be able to
	1) recognize the importance of ecosystem services provided by natural environments, such as clean air and water, food production, climate regulation, and cultural and recreational value
	2) understand the roles of government, NGOs, and international agreements in addressing environmental challenges and promoting sustainable development.
Content Outline	<p>Ecosystem Concept of an ecosystem, Structure and function of an ecosystem, Energy flow in the ecosystem, Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem: Forest ecosystem Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)</p> <p>Environmental Pollution Definition, Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear Hazards.</p> <p>Solid waste Management: Causes, effects and control measures of urban and industrial wastes– biodegradable and non - biodegradable wastes. Role of an individual in prevention of pollution</p> <p>Right to Information Act: Introduction, Right to information and obligations of public authorities, central information commission, state information commission and their duties, powers and functions of information commissions, appeals and penalties, Miscellaneous.</p>

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Assign research projects on various environmental topics. Students can choose a specific issue or aspect of the environment and conduct in-depth research, analyze data, and present their findings.
2. Assign case studies that involve analyzing real-world environmental scenarios Or problems. Students can examine environmental issues related to pollution, deforestation, climate change, waste management, or conservation efforts.
6. Organize field visits to environmental sites such as nature reserves, forests, coastal areas, or waste management facilities.
7. Conduct debates on environmental topics where students present and defend different perspectives.

References:-

Text Book:

1. P. Sharma 2013.Environmental Studies. University Science Press, New Delhi.

Reference Books:

1. Rajagopalan, R. 2018 Environmental Studies- From Crisis To Cure ,Oxford University Press, NewDelhi.
2. Agarwal, K.C. 2001 Environmental Biology, Nidipubl. Ltd. Bikaner.
3. Bharucha Erach,Textbook onEnvironmentalStudies, UGC,NewDelhi
4. BoruaP.K., J.N. Sarma and others, A Textbook on Environmental Studies, Banlata, Dibrugarh
5. BrunnerR.C., 1989 Hazardous Waste Incineration, McGrawHillInc. 480p.
6. Clark R.S., Marine Pollution, Clarendon Press Oxford(TB).
7. Cunningham, W.P. Cooper, T.H. Gorhani,E &Hepworth, M.T. 2001, Environmental Encyclopedia,Jacio Publ. House, Mumbai, 1196p.
8. JoshiP.C. andNamitaJoshi, AText book ofEcologyand Environment, HimalayaPublishing
9. KaushikAnubhaandC.P.Kaushik ,Perspective in EnvironmentalStudies, New Age International
10. The Right to Information Act, 2005 ,SudhirNaib, Oxford University Press; 2011 edition

Course Syllabus Semester: II

2.9 Co-Curricular Course

Evaluation and Grades

* Lab Components are practical oriented and no theory examinations will be conducted.

Practical examinations will be conducted and evaluated by Internal and External Examiners.

• Int. Exam: C.A.: Internal examination and continuous assessment involves two internal test + Assignments/ Presentation/ Oral/ Viva/Group Discussion etc

Terms Used:

Tu.: Tutorial

Pr.: Practical

C.A.: Continuous Assessment

Tw.: Term Work

Cr.: Credits

Int.: Internal

Ext.: External

NEP Structure and Credit Score

The undergraduate degree under NEP will be a multi-disciplinary program of four-year duration with multiple exit and entry options.

Description	Certificate Type	Minimum Credits Required
The successful completion of 2 semesters	Certificate	?
The successful completion of 4 semesters	Diploma	?
The successful completion of 6 semesters	Degree	?
The successful completion of 8 semesters	Honours	?

CGPA & Grades

Semester GPA / Program CGPA	Alpha-Sign / Letter Grade	Semester/Program % of Marks	Results / Class Description
9.00 – 10.00	O (Outstanding)	90.0 – 100	Outstanding
8.00 – < 09.00	A+ (Excellent)	80.0 – < 90.0	First Class Exemplary
7.00 – < 08.00	A (Very Good)	70.0 – < 80.0	First Class Distinction
6.00 – < 07.00	B+ (Good)	60.0 – < 70.0	First Class
5.50 – < 06.00	B (Above Average)	55.0 – < 60.0	High Second Class
5.00 – < 05.50	C (Average)	50.0 – < 55.0	Second Class
4.00 – < 05.00	P (Pass)	40.0 – < 50.0	Pass Class
Below 04.00	F (Fail)	Below 40.00	Fail / Reappear
Absent	Ab	Absent	