SIES COLLEGE OF COMMERCE & ECONOMICS
AUTONOMOUS
UG DEPARTMENT OF INFORMATION TECHNOLOGY

Date of BOS meeting: 5th April 2025

Name of BOS Chairperson: Mrs. Bhavini Deepak Shah

Sr. No.	Heading	Particulars
1	Title of the course	B. Sc. (Information Technology)
2	Eligibility for admission	HSC or Equivalent with Mathematics as Compulsory Subject
3	Minimum percentage	45 %
4	Semesters	I & II
5	Level	UG
6	Pattern	03 years & 06 semesters CBGS
7	To be implemented from	From Academic year 2025-26 in a progressive manner

SIES COLLEGE OF COMMERCE & ECONOMICS (AUTONOMOUS)
(Affiliated to University of Mumbai)
RE-ACCREDITED GRADE "A" BY NAAC

BOARD OF STUDIES
UG DEPARTMENT OF INFORMATION TECHNOLOGY

(WITH EFFECT FROM THE ACADEMIC YEAR 2025-2026)

FYBSc (IT)
Semester I

Semester I			
Course Code	**Course Type**	**Course Title**	**Credits**
BSIT-MJS1-101	Major	Web Programming	3
BSIT-MJPS1-101	Major Practical	Web Programming Lab	1
BSIT-MJS1-102	Major	Imperative Programming	2
BSIT-OES1-103	Open Electives(OE)	Foundation of Human Skills	2
BSIT-OES1-104	Open Electives(OE)	Fundamentals of Marketing I	2
BSIT-OES1-105	Open Electives(OE)	Discrete Mathematics	2
BSIT-OES1-106	Open Electives(OE)	Supply Chain Management	2
BSIT-VSPS1-107	Vocational Skill Courses (VSC)	Discrete Mathematics Lab	2
BSIT-SEPS1-108	Skill Enhancement Courses (SEC)	Imperative Programming Lab	2
BSIT-AECS1-109	Ability Enhancement Courses (AEC)	Communication Skills in English -I	2
BSIT-VECS1-110	Value Education Courses (VEC)	Green Computing	2
BSIT-IKSS1-111	Indian Knowledge System(IKS)	Indian Knowledge System	2
BSIT-CCS1-112	Co-curricular Courses (CC)	CC	2
		Total Credits	22

B. Sc. (Information Technology)		Semester – I	
Course Name: Web Programming		Course Code: BSIT-MJS1-101	
Periods per week (1 Period is 60 minutes)		3	
Credits		3	
		Hours	Marks
Evaluation System	Theory Examination	2	50
	Internal	--	25

Course Objectives:

- The Learner will be able to identify and discover the web programming using basic HTML.
- The Learner will be able to demonstrate and interpret the web page using various HTML tags and validate the data using JavaScript.
- The Learner will be able to illustrate and design the web page by applying event handling concept.
- The Learner will be able to analyse and differentiate between the server-side scripting and client-side scripting using PHP.
- The Learner will be able to evaluate database programming using MySQL.
- The Learner will be able to design and create the web pages using HTML, PHP and MYSQL

Sr. No	Modules/Units	No of Lectures
1.	**HTML5**: Introduction, Why HTML5? Formatting text by using tags, using lists and backgrounds, Creating hyperlinks and anchors. Style sheets, CSS formatting text using style sheets, formatting paragraphs using style sheets. **HTML5 Page layout and navigation**: Creating navigational aids: planning site organization, creating text based navigation bar, creating graphics based navigation bar, creating graphical navigation bar, creating image map, redirecting to another URL, **creating division based layouts:** HTML5 semantic tags, creating divisions, creating HTML5 semantic layout, positioning and formatting divisions. **HTML5 Tables, Forms and Media: Creating tables**: creating simple table, specifying the size of the table, specifying the width of the column, merging table cells, using tables for page layout, **formatting tables**: applying table borders, applying background and foreground fills, changing cell padding, spacing and alignment, **creating user forms:** creating basic form, using check boxes and option buttons, creating lists, additional input types in HTML5, **Incorporating sound and video**: audio and video in HTML5, HTML multimedia basics, embedding video clips, incorporating audio on web page.	15
2.	**Java Script**: Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, **Operators**: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++(Increment), --(Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ?: (Conditional operator), , (Comma operator), delete, new, this, void	15

	Statements: Break, comment, continue, delete, do...while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while, with, **Core JavaScript (Properties and Methods of Each)** : Array, Boolean, Date, Function, Math, Number, Object, String, regExp **Document and its associated objects:** document, Link, Area, Anchor, Image, Applet, Layer **Events and Event Handlers :** General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload	
3.	**XML :** Introduction to XML, Anatomy of an XML document, Creating XML Documents **PHP**: Why PHP and MySQL? Server-side scripting, PHP syntax and variables, comments, types, control structures, branching, looping, termination, functions, passing information with PHP, GET, POST, formatting form variables, superglobal arrays, strings and string functions, arrays, number handling, basic PHP errors/problems **Advanced PHP:** String and Regular Expressions, Sessions, Cookies and HTTP, E-Mail, Introduction of Web Frameworks	15

REFERENCE BOOKS:

1. Web Design The Complete Reference, Thomas Powell, Tata McGraw Hill
2. HTML5 Step by Step, Faithe Wempen, Microsoft Press 2011
3. PHP 5.1 for Beginners, Ivan Bayross Sharanam Shah, SPD 2013
4. PHP Project for Beginners, SharanamShah, Vaishali Shah, SPD 2015
5. PHP 6 and MySQL Bible, Steve Suehring, Tim Converse, Joyce Park, Wiley 2009
6. JavaScript 2.0: The Complete Reference, Thomas Powell and Fritz Schneider, Tata McGraw Hill 2 nd
7. HTML and XHTML The Complete Reference, Thomas Powell, Tata McGrawHill
8. Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly, 3 rd, 2018

B. Sc. (Information Technology)	Semester – I
Course Name: Web Programming Lab	Course Code: BSIT-MJPS1-101
Periods per week (1 Period is 60 minutes)	2
Credits	1

		Hours	Marks
Evaluation System	Practical Examination	--	25

Course Objectives:

- The Learner will be able to identify and discover the web programming using basic HTML.
- The Learner will be able to demonstrate and interpret the web page using various HTML tags and validate the data using JavaScript.
- The Learner will be able to illustrate and design the web page by applying event handling concept.
- The Learner will be able to analyse and differentiate between the server-side scripting and client-side scripting using PHP.
- The Learner will be able to evaluate database programming using MySQL.
- The Learner will be able to design and create the web pages using HTML, PHP and MYSQL

Practical No	Details
1.	**Use of Basic Tags**
a.	Design a web page using different text formatting tags.
b.	Design a web page with links to different pages and allow navigation between web pages.
c.	Design a web page demonstrating all Style sheet types
d.	Design a web page that automatically redirects the user to another page.
2.	**Image maps, Tables, Forms and Media**
a.	Design a web page with Imagemaps.
b.	Design a web page with a form that uses all types of controls.
c.	Design a web page demonstrating different semantics
d.	Design a web page with different tables. Design a webpages using table so that the content appears well placed.
e.	Design a web page embedding with multimedia features.
3.	**Java Script**
a.	Using JavaScript design, a web page that prints factorial/Fibonacci series/any given series.
b.	Design a form and validate all the controls placed on the form using Java Script
c.	Write a JavaScript program to display all the prime numbers between 1 and 100.
d.	Write a JavaScript program to accept a number from the user and display the sum of its digits.
e.	Write a program in JavaScript to accept a sentence from the user and display the number of words in it. (Do not use split () function).
f.	Write a java script program to design simple calculator.
4.	**Control and looping statements and Java Script references**
a.	Design a web page demonstrating different conditional statements.
b.	Design a web page demonstrating different looping statements
c.	Design a web page demonstrating different Core JavaScript references (Array, Boolean, Date,

		Function, Math, Number, Object, String, regExp).
	5.	**Basic PHP I**
	a.	Write a PHP Program to accept a number from the user and print it factorial.
	b.	. Write a PHP program to accept a number from the user and print whether it is prime or not.
	6.	**Basic PHP II**
	a.	Write a PHP code to find the greater of 2 numbers. Accept the no. from the user.
	b.	Write a PHP program to display the following Binary Pyramid: 1 0 1 1 0 1 1 0 1 0
	7.	**String Functions and arrays**
	a.	Write a PHP program to demonstrate different string functions.
	b.	Write a PHP program to create one dimensional array.
	c.	Design a PHP page for authenticating a user
	8.	**Email**
	a.	Write a program to send email with attachment.
	9.	**Sessions and Cookies**
	a.	Write a program to demonstrate use of sessions and cookies.
	b.	Write a PHP program to demonstrate use of filters

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Web Programming
Subjects with 4 credits (3 credit theory + 1 credit practical)

The scheme of examination shall be divided into three parts:
- Internal Assessment - 25 marks
- Semester End Examination - 50 marks
- Practical Assessment - 25 marks

Internal Assessment 25 marks

Description	Marks
Internal test (online/offline)(Objective/Subjective)	20
Assignments/ group discussions/ debates/ quiz/ open book test/ book review/presentation/ viva/ any other	5
Total	**25**

Semester end Examination 50 marks (paper pattern)

Duration : 2 hour Total Marks: 50	
Q.1 10 marks (from Unit 1)	10
Q.2 10 marks (from Unit 2)	10
Q.3 10 marks (from Unit 3)	10
Q.4 20 marks (from all Units)	20
Note: The 10/20 marks full length question may be sub divided into 2/4 questions of 5 marks each	

Semester end Practical Examination 25 marks

Description	Marks
Practical examination	20
Viva and Journal	05
Total	**25**

Passing criteria: Minimum 40% (10 out of 25) in Internal, 40% (20 out of 50) in semester end and 40% (10 out of 25) in practical examination.
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Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – I	
Course Name: Imperative Programming		**Course Code:BSIT-MJS1-102**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	1	30
	Internal	--	20

Course Objectives:

- The Learner will be able to identify various programming language and recognize their use to develop various software and hardware applications.
- The Learner will be able to demonstrate the basic knowledge of programming using arithmetic and conditional operators in program. And also associate it with built in functions.
- The Learner will be able to apply and interpret the condition checking, decision making and looping by using various control structures in C programming.
- The Learner will be able to analyze the concept of an array and categorize different macros by applying them in program.
- The Learner will be able to summarize with the knowledge of pointers, file handling in C programming.
- The Learner will be able to design and write a C program using various concept of C programming learned during the course.

Sr. No	Modules/Units	No of Lectures
1.	**Introduction:** Programming Paradigm, Types of Programming languages, History, features and application. Simple program logic, program development cycle, pseudo code statements and flowchart symbols, programming and user environments. **Fundamentals:** Structure of a program. Compilation and Execution of a Program, Character Set, identifiers and keywords, data types, constants, variables and arrays, declarations, expressions, statements, Variable definition, symbolic constants. **Operators and Expressions:** Arithmetic operators, unary operators, relational and logical operators, assignment operators, assignment operators, the conditional operator, library functions. **Data Input and output:** Single character input and output, entering input data, scanf function, printf function, gets and puts functions.	10
2.	**Conditional Statements and Loops:** Decision Making Within A Program, Conditions, Relational Operators, Logical Connectives, If Statement, If-Else Statement, Loops: While Loop, Do While, For Loop. Nested Loops, Infinite Loops, Switch Statement . **Functions:** Overview, defining a function, accessing a function, passing arguments to	10

	a function, specifying argument data types, function prototypes, recursion, modular programming and functions, standard library of c functions, prototype of a function: parameter list, return type, function call, block structure, passing arguments to a function: call by reference, call by value, Preprocessors	
3.	**Arrays:** Definition, processing, passing arrays to functions, multidimensional arrays, arrays and strings, Pointers **File Handling:** Why files are needed? , File Input/Output, Data Organization, File Operations, Text Files and Binary Files, Working with files, Structures and Unions	10

REFERENCE BOOKS:

1. Programming with C Byron Gottfried,Tata McGRAW-Hill, 2nd edition,1996
2. Programming Logic and Design, Joyce Farell, Cengage Learning, 8th edition, 2014
3. "C" Programming", Brian W. Kernighan and Denis M.Ritchie., PHI, 2nd edition
4. Let us C, Yashwant P.Kanetkar, BPB publication
5. C for beginners, Madhusudan Mothe, X-Team Series, 1st edition, 2008
6. 21st Century C Ben Klemens, OReilly, 1st edition, 2012

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Imperative Programming
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**
- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 10 marks (Attempt any 2 from 4 questions of 5 marks each)	**10**
Q.2 10 marks (Attempt any 2 from 4 questions of 5 marks each)	**10**
Q.3 10 marks (Attempt any 2 from 4 questions of 5 marks each)	**10**
Total	**30**

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – I	
Course Name: Foundation of Human Skills		Course Code: BSIT-OES1-103	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:

- To understand basic concepts, theories and techniques in the field of human behaviour at the individual, group and organizational levels in the changing global scenario.
- To understand how and why people behave in a said manner either as individuals or in groups.
- To understand how behaviour affects individual performance and performance of the organization as a whole.
- To understand how to effectively modify the behaviour for enhanced performance.

Sr. No	Modules/Units	No of Lectures
1.	**Individual Behaviour:** Individual differences, factors affecting individual differences **Ethics:** Importance of ethics, Personal and Professional ethics. **Personality:** Determinants of personality, Personality traits theory, Big five model, Myers Briggs type indicator, Personality traits important for organizational behaviour like authoritarianism, locus of control, Machiavellianism, introversion-extroversion achievement orientation , self– esteem, risk taking, self- monitoring and type A and B personalities	15
2.	**Concept of understanding self and others through Johari window** **Thinking, and perception:** Thinking skills, thinking styles and thinking hat, Emotional Intelligence, **Perception:** features and factors influencing individual perception, Effects of perceptual error in managerial decision making at work place. (Errors such as Halo effect, stereotyping, prejudice, attributional).	15

REFERENCE BOOKS:

- Organisational behaviour, S.Robbins, Prentice Hall
- Organisational behaviour, John W.Newstrom and Keith Davis, Tata McGrawhill
- Organisational behaviour, Fred Luthans, McGrawhill,Newyork
- Organisational behaviour, K.Aswathappa, Himalaya Publishing House
- Essentials of management, Koontz,Harold, Tata McGrawhill

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Foundation of Human Skills
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 15 marks OR 15 marks	**15**
Q.2 15 marks OR 15 marks	**15**
Total	**30**
Note: The 15 marks full length question may be sub divided into 2 questions of 7 and 8 marks each or 2 questions of 10 and 5 marks each	

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – I	
Course Name: Fundamentals of Marketing I		Course Code: BSIT-OES1-104	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:
- To understand basic concepts, theories and techniques in the field of Marketing and its significance in business context.
- To analyse the influence of marketing environment on the overall marketing function.
- To recognize the importance of research in the field of marketing.
- To understand the customer – centric nature of marketing.

Sr. No	Modules/Units	No of Lectures
1.	**Introduction to Marketing** • Definition, features, advantages and scope of marketing • The 4P's and 4C's of marketing • Marketing v/s Selling • Marketing as an activity and function **Concepts of Marketing** • Needs, wants and demands, transactions, transfer and exchanges. • Market, Target audience, Customer, Consumer. • Orientations of a firm: Production concept; Product concept; selling concept and marketing concept, social relationship, Holistic marketing.	15
2.	**Marketing Environment** • **Micro environment:** Management structure; Marketing Channels; Markets in which a firm operates; competitors and stakeholders. • **Macro environment:** Political Factors; Economic Factors; Socio Cultural Factors , Technological Factors (PEST Analysis) **Marketing research** • Meaning, features, Importance of marketing research. • Types of marketing research: Product research; Sales research; consumer/customer research; production research.	15

REFERENCE BOOKS:

- Kotler Philip, Marketing Management, Pearson.
- Stanton, Etzel, Walker, Fundamentals of Marketing, Tata-McGraw Hill.
- Saxena Rajan, Marketing Management, Tata-McGraw Hill.
- Ramaswamy, Namakumari, Marketing Management: Indian Context Global Perspective, Sage Publication.

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Fundamentals of Marketing I
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test / Value Added Course/ Project / Tutorial / Outreach / Internship / Research etc.	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 15 marks OR 15 marks	15
Q.2 15 marks OR 15 marks	15
Total	30
Note: The 15 marks full length question may be sub divided into 2 questions of 7 and 8 marks each or 3 questions of 5 marks each	

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt.
Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – I	
Course Name: Discrete Mathematics		**Course Code: BSIT-OES1-105**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	1	30
	Internal	--	20

Course Objectives:

- To make students learn the basic principles of set, basic set equalities, the basic concepts of relations and functions and the basic concepts of graphs and trees.
- To make students learn to write an argument using logical notation and determine if the argument is valid or invalid.
- To make students learn to make sequence, define functions and relations and use mathematical induction to prove the theorems and formulae
- To make students learn the basics of Graph and Trees and Probability.

Sr. No	Modules/Units	No of Lectures
1.	**Set Theory**: Definitions and the Element Method of Proof, Properties of Sets, Disproofs, Algebraic Proofs, Boolean Algebras. **The Logic of Compound Statements**: Logical Form and Logical Equivalence, Conditional Statements, Valid and Invalid Arguments. **Elementary Number Theory and Methods of Proof**: Introduction to Direct Proofs, Rational Numbers, Divisibility, Division into Cases and the Quotient-Remainder Theorem, Floor and Ceiling.	10
2	**Sequences, Mathematical Induction, and Recursion**: Sequences, Mathematical Induction, , defining sequences recursively, solving recurrence relations by iteration, Second order linear homogenous recurrence relations with constant coefficients. **Functions**: Functions Defined on General Sets, One-to-One and Onto, Inverse Functions, Composition of Functions, Cardinality with Applications to Computability. **Relations**: Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Partial Order Relations, Hasse Diagram.	10
3.	**Graphs and Trees**: Definitions and Basic Properties, Trails, Paths, and Circuits, Matrix Representations of Graphs, Isomorphism's of Graphs, Trees, Rooted Trees, Spanning trees and shortest path **Probability**: Introduction, Axioms of Probability Conditional Probability, Independent Events, Bayes' Theorem	**10**

REFERENCE BOOKS:

1. Discrete Mathematics with Applications, Sussana S. Epp, Cengage Learning, 2018
2. Discrete Mathematics, Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson, Tata Mc Graw Hill, 2007
3. Discrete Mathematics and its Applications, Kenneth H. Rosen, Tata Mc Graw Hill, 2011

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Discrete Mathematics
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Tutorial /Assignment / Open Book Test / Value Added Course/ Project / Presentation / Outreach / Internship / Case Study / Research etc.	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 10 marks (Attempt any 2 from 4 questions of 5 marks each)	**10**
Q.2 10 marks (Attempt any 2 from 4 questions of 5 marks each)	**10**
Q.3 10 marks (Attempt any 2 from 4 questions of 5 marks each)	**10**
Total	**30**

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – I	
Course Name: Supply Chain Management		Course Code: BSIT-OES1-106	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:

- The Learner will be able to introduce process and functions of supply chain management.
- The Learner will be able appreciate the design and network in supply chain management.
- The Learner will be able to understand the role of coordination in supply chain management.

Sr. No	Modules/Units	No of Lectures
1.	**Introduction to Supply Chain Management**- Supply chain – objectives – importance – decision phases – process view – competitive and supply chain strategies – achieving strategic fit – supply chain drivers – obstacles – framework – facilities – inventory – transportation – information – sourcing – pricing. **Designing the Supply Chain Network**- Designing the distribution network – role of distribution – factors influencing distribution – design options – e-business and its impact – distribution networks in practice – network design in the supply chain – role of network – factors affecting the network design decisions – modelling for supply chain. **Planning Demand and Supply-** Role of forecasting – demand forecasting – approaches – role of IT.	15
2.	**Planning and Managing Inventories-** Safety inventory and its appropriate level – impact of supply uncertainty, aggregation and replenishment policies. **Transportation Networks and Sourcing-** Role of transportation – modes and their performance – transportation infrastructure and policies - design options and their trade-offs – Tailored transportation. Sourcing – In-house or Outsource – 3rd and 4th PLs – supplier scoring and assessment. **Coordination in a Supply Chain-** Lack of supply chain coordination and the Bullwhip effect – obstacle to coordination – managerial levels – building partnerships and trust – continuous replenishment and vendor-managed inventories – collaborative planning, forecasting and replenishment.	15

REFERENCE BOOKS:

1. Sunil Chopra and Peter Meindl, SUPPLY CHAIN MANAGEMENT – STRATEGY, PLANNING AND OPERATION, PHI, 4th Edition, 2010.
2. Wisner, Keong Leong and Keah-Choon Tan, PRINCIPLES OF SUPPLY CHAIN MANAGEMENT A BALANCED APPROACH, Thomson Press, 2005..
3. Coyle, Bardi, Longley, THE MANAGEMENT OF BUSINESS LOGISTICS – A SUPPLY CHAIN PERSPECTIVE, Thomson Press, 2006.
4. Jeremy F Shapiro, MODELING THE SUPPLY CHAIN, Thomson duxbury 2002.

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Supply Chain Management
<u>Subjects with 2 credits Theory</u>

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test / Value Added Course/ Project / Tutorial / Outreach / Internship / Research etc.	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 15 marks	**15**
Q.2 15 marks	**15**
Total	**30**
Note: The 15 marks full length question may be sub divided into 2 questions of 7 and 8 marks each or 3 questions of 5 marks each	

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt.
Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – I	
Course Name: Discrete Mathematics Lab		**Course Code: BSIT-VSCPS1-107**	
Periods per week (1 Period is 60 minutes)		**4**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Practical Examination**	**--**	**50**

Course Objectives:
- To make students learn the main features of SCILAB program development environment.
- To make students learn to implement simple mathematical functions in SCILAB.
- Learners will be able to navigate Excel's interface, including ribbons, toolbars, and file operations, to efficiently manage and organize data.
- To make students learn the fundamental functions of Excel for performing calculations and data analysis.

List of SCILAB Practical: Write the programs for the following	
1.	**Operations and Properties Sets**
a.	Union, Intersection, Difference, and Complement operations on sets.
b.	Cardinality
2.	**Mathematical Reasoning with Sets**
a.	Inclusion Exclusion Principle
b.	Power Sets
c.	Mathematical Induction
3.	**Logical Equivalence and Boolean Algebra**
a.	Verify De Morgan's Theorems
b.	logical identities
4.	**Divisibility and Quotient-Remainder Theorem**
a.	Check divisibility
b.	Verify and compute quotient-remainder for given numbers.
5.	**Functions and Algorithms**
a.	Recursively Defined Functions
b.	Polynomial Evaluation
c.	Greatest Common Divisor
6.	**Plotting**
a.	2d graph of one variable function
b.	3d graph of function
7.	**Graph Theory**

a.	Paths and Connectivity
b.	Minimum Spanning Tree
c.	Isomorphism
8.	**Directed and Undirected Graphs**
a.	Adjacency Matrix
b.	Incident Matrix
9.	**Probability and Bayes' Theorem**
a.	probability of independent events
b.	apply Bayes' theorem
10.	**Algebraic Systems**
a.	Properties of Operations
b.	Roots of Polynomials

List of EXCEL Practical: Write the programs for the following	
1.	**Exploring Excel Interface and Essential Operations:** Understand the Excel interface, including ribbons, toolbars, and basic file operations.
2.	**Efficient Data Entry and Formatting Techniques:** Learn to enter data accurately and apply formatting to enhance presentation quality
3.	**Performing Calculations with Basic Excel Formulas:** Master fundamental functions like SUM, AVERAGE, MIN, MAX, COUNT, COUNTA, COUNTIF, COUNTIFS and Basics mathematical functions.
4.	**Text Manipulation with String Functions in Excel:** Combine and extract text using functions like CONCATENATE, LEFT, RIGHT, MID, UPPER, LOWER, PROPER and TRIM.
5.	**Organizing Data through Sorting and Filtering:** Manage and arrange data systematically using sorting and filtering techniques.
6.	**Highlighting Key Data with Conditional Formatting:** Apply conditional formatting to visually distinguish important data points.
7.	**Visualizing Information with Basic Charts and Graphs:** Create bar charts and graphs to effectively display student marks and statistics.
8.	**Validating Data for Accuracy and Integrity:** Implement data validation techniques to ensure correct data entry and restrict invalid inputs.
9.	**Dynamic Data Summarization with Pivot Tables:** Use pivot tables to summarize and analyse data dynamically.
10.	**Statistical Data Analysis with Basic Functions:** Perform statistical analysis using functions like MEAN, MEDIAN, and MODE for data interpretation

Recommended Books:

- **Scilab: A Practical Introduction to Programming and Problem Solving" by Tejas Sheth.**
- **Introduction to Scilab: For Engineers and Scientists" by Sandeep Nagar.**
- **Scilab from Theory to Practice - I. Fundamentals" by Philippe Roux and Damien Davin.**
- **Excel 2019 All-in-One for Dummies" by Greg Harvey.**
- **Microsoft Excel 365 Bible" by Michael Alexander and Dick Kusleika.**
- **Excel: Quick Start Guide from Beginner to Expert" by William Fischer.**

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Discrete Mathematics Lab
<u>**Subjects with 2 credits practical**</u>

The scheme of examination shall be:
- Practical Assessment   50 marks

    Semester end Practical Examination   50 marks

Description	Marks
Practical examination	40
Viva	05
Journal	05
Total	**50**

Passing criteria: Minimum 40% (20 out of 50) in practical examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – I	
Course Name: Imperative Programming Lab		Course Code: BSIT-SECPS1-108	
Periods per week (1 Period is 60 minutes)		4	
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	--	50

Course Objectives:

- The Learner will be able to identify various programming language and recognize their use to develop various software and hardware applications.
- The Learner will be able to demonstrate the basic knowledge of programming using arithmetic and conditional operators in program. And also associate it with built in functions.
- The Learner will be able to apply and interpret the condition checking, decision making and looping by using various control structures in C programming.
- The Learner will be able to analyse the concept of an array and categorize different macros by applying them in program.
- The Learner will be able to summarize with the knowledge of pointers, file handling in C programming.
- The Learner will be able to design and write a C program using various concept of C programming learned during the course.
- Students will be able to write programs in C using graphics software.
- To make students learn screen coordinates and their pixels values using screen axis and design different shapes on screen using real world object coordinates.

Imperative Programming

List of Practicals:	
1.	**Basic Programs:**
a.	Write a program to display the message HELLO WORLD.
b.	Write a program to declare some variables of type int, float and double. Assign some values to these variables and display these values.
c.	Write a program to find the addition, subtraction, multiplication and division of two numbers.
2.	**Programs on variables:**
a.	Write a program to swap two numbers without using third variable.
b.	Write a program to find the area of rectangle, square and circle.
c.	Write a program to find the volume of a cube, sphere, and cylinder.
3.	**Conditional statements and loops(basic)**
a.	Write a program to enter a number from the user and display the month name. If number >13 then display invalid input using switch case.
b.	Write a program to check whether the number is even or odd.
c.	Write a program to check whether the number is positive, negative or zero.

d.	Write a program to find the factorial of a number.
e.	Write a program to check whether the entered number is prime or not.
f.	Write a program to find the largest of three numbers.
4.	**Conditional statements and loops(advanced)**
a.	Write a program to find the sum of squares of digits of a number.
b.	Write a program to reverse the digits of an integer.
c.	Write a program to find the sum of numbers from 1 to 100.
d.	Write a programs to print the Fibonacci series.
e.	Write a program to find the reverse of a number.
f.	Write a program to find whether a given number is palindrome or not.
g.	Write a program that solve the quadratic equation $$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
h.	Write a program to check whether the entered number is Armstrong or not.
i.	Write a program to count the digit in a number
5.	**Programs on patterns:**
a.	Programs on different patterns.
6.	Functions:
a.	Programs on Functions.
7.	**Recursive functions**
a.	Write a program to find the factorial of a number using recursive function.
b.	Write a program to find the sum of natural number using recursive function.
8.	**Arrays**
a.	Write a program to find the largest value that is stored in the array.
b.	Write a program using pointers to compute the sum of all elements stored in an array.
c.	Write a program to arrange the 'n' numbers stored in the array in ascending and descending order.
d.	Write a program that performs addition and subtraction of matrices.
e.	Write a program that performs multiplication of matrices.
9.	**Pointers**
a.	Write a program to demonstrate the use of pointers.
b.	Write a program to perform addition and subtraction of two pointer variables.
10.	**Structures and Unions**
a.	Programs on structures.
b.	Programs on unions.
11.	**File Handling in C**
a.	C program to read name and marks of n number of students and store them in a file.

b.	Write to a binary file using fwrite()
c.	Read from a binary file using fread()

Computer Graphics & Animation

List of Practical	
1.	**Solve the following:**
a.	Study and enlist the basic functions used for graphics in C / C++ / Python language. Give an example for each of them.
b.	Draw a co-ordinate axis at the center of the screen.
2.	**Solve the following:**
a.	Divide your screen into four region, draw circle, rectangle, ellipse and half ellipse in each region with appropriate message.
b.	Draw a simple hut on the screen.
3	**Draw the following basic shapes in the center of the screen:**
	i. Circle ii. Rectangle iii. Square iv. Concentric Circles v. Ellipse vi. Line
4.	**Solve the following:**
a.	Develop the program for DDA Line drawing algorithm.
b.	Develop the program for Bresenham"s Line drawing algorithm.
5.	**Solve the following:**
a.	Develop the program for the mid-point circle drawing algorithm.
b.	Develop the program for the mid-point ellipse drawing algorithm.
6.	**Solve the following:**
a.	Write a program to implement 2D scaling.
b.	Write a program to perform 2D translation
7.	**Solve the following:**
a.	Perform 2D Rotation on a given object.
b.	Program to create a house like figure and perform the following operations. i. Scaling about the origin followed by translation. ii. Scaling with reference to an arbitrary point. iii. Reflect about the line y = mx + c.
8.	**Solve the following:**
a.	Write a program to implement Cohen-Sutherland clipping.
b.	Write a program to implement Liang - Barsky Line Clipping Algorithm
9.	**Solve the following:**
a.	Write a program to fill a circle using Flood Fill Algorithm.
b.	Write a program to fill a circle using Boundary Fill Algorithm.
10.	**Solve the following:**
a.	Develop a simple text screen saver using graphics functions.
b.	Perform smiling face animation using graphic functions.

c.	Draw the moving car on the screen.
11.	**Solve the following:**
a.	Implementation of curve generation using Interpolation methods.
b.	Implementation of Curve generation using B-spline and Bezier curves.
c.	Implementation of any one of back face removal algorithm (such that depth buffer algorithm, Painter's algorithm, Warnock's algorithm, Scan line algorithm)

REFERENCE BOOKS:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Computer Graphics - Principles and Practice	J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes	Pearson Education	Second Edition	
2.	Steve Marschner, Peter Shirley	Fundamentals of Computer Graphics	CRC press	Fourth Edition	2016
3.	Computer Graphics	Hearn, Baker	Pearson Education	Second	
4.	Principles of Interactive Computer Graphics	William M. Newman and Robert F. Sproull	Tata McGraw Hill	Second	

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Imperative Programming Lab
Subjects with 2 credits practical

The scheme of examination shall be:
- Practical Assessment   50 marks

      Semester end Practical Examination   50 marks

Description	Marks
Practical examination	40
Viva	05
Journal	05
Total	**50**

Passing criteria: Minimum 40% (20 out of 50) in practical examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt.
Under unforeseen circumstances or challenging situations, all examinations will be conducted through
online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – I	
Course Name: Communication Skills in English - I		Course Code: BSIT-AECS1-109	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:

- To develop awareness of the complexity of the communication process.
- To develop effective listening skills in students so as to enable them to comprehend instructions and become critical listeners.
- To develop effective oral skills so as to enable students to speak confidently interpersonally as well as in large groups.
- To develop effective reading and writing skills so as enable students to read and write in a clear, concise, persuasive and audience centred manner.
- To develop ability to communicate effectively with the help of electronic media.

Module No	Modules/Units	No of Lectures
1.	**Understanding Communication** • Nature and Scope of Communication 1.1.Definition ,Process of Communication, Features/Characteristics, Functions, and Benefits of Business Communication • The 7Cs of Communication • Communication Network/Channels • Non-verbal Communication Barriers to Communication	8
2.	**Reading, Listening and Presentation Skills** • Effective Reading, Importance and Benefits of Reading, Mechanics of Reading/Reading Speed . • Effective Listening, Types of Listening, Principles and Barriers to Effective Listening Planning and organising a presentation., Preparing and Delivering a Presentation.	10
3.	**Writing Skills** • Letter and Email Writing, Layout and Format, Principles of Effective Letter and Email Writing, Types of Letters/Emails. Application (Job/Course of Study) , Request for Recommendation and Testimonials Career Building; Resume/Biodata, Statement of Purpose	12

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SCHEME OF EXAMINATION FOR: Communication Skills in English - I
<u>Subjects with 2 credits Theory</u>

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Class Assignments/ Presentations/ MOOCs	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q1. Answer any 3 out of 5 (Short Notes)	15
Q.2 Letter writing (2 out of 3)	10
Q.3 Comprehension Passage	05
Total	**30**

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – I	
Course Name: Green Computing		**Course Code: BSIT-VECS1-110**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	1	30
	Internal	--	20

Course Objectives:

- Learners will be able to identify how to our daily lifestyle creates bad impact on environment.
- Learners will be able to interpret initiatives taken by various countries to reduce and recycle e-waste.
- Learners will be able to relate the impact of e-waste on environment and human health.
- Learners will be able to select various methods to reduce power usage, save paper etc.
- Learners will be able to evaluate the green methods implemented in business.
- Learners will be able to plan and develop ideas for e-waste management.

Module No	Modules/Units	No of Lectures
1.	**Overview and Issues:** Problems: Toxins, Power Consumption, Equipment Disposal, Company"s Carbon Footprint: Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power. **Initiatives and Standards**: Global Initiatives: United Nations, Basel Action Network, Basel Convention, North America: The United States, Canada, Australia, Europe, WEEE Directive, RoHS, National Adoption, Asia: Japan, China, Korea.	10
2.	**Minimizing Power Usage:** Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data De- Duplication, Virtualization, Management, Bigger Drives, Involving the Utility Company, LowPower Computers, PCs, Linux, Components, Servers, Computer Settings, Storage, Monitors, Power Supplies, Wireless Devices, Software. **Cooling:** Cooling Costs, Power Cost, Causes of Cost, Calculating Cooling Needs, Reducing Cooling Costs, Economizers, On-Demand Cooling, HP"s Solution, Optimizing Airflow, Hot Aisle/Cold Aisle, Raised Floors, Cable Management, Vapour Seal, Prevent Recirculation of Equipment Exhaust, Supply Air Directly to Heat Sources, Fans, Humidity, Adding Cooling, Fluid Considerations, System Design, Datacentre Design, Centralized Control, Design for Your Needs, Put Everything Together.	10

3.	**Changing the Way of Work:** Old Behaviours, starting at the Top, Process Reengineering with Green in Mind, Analysing the Global Impact of Local Actions, Steps: Water, Recycling, Energy, Pollutants, Teleworkers and Outsourcing, Telecommuting, Outsourcing, how to Outsource. **Technology Businesses** : Dell, Recycling Programs, Datacenter, Green Initiatives, Customer Interaction, Hewlett-Packard, History, Recycling Programs, Business Operations, Product Innovations, Rackspace, Embracing a New Idea, Green IT Up, Supply Chain	10

REFERENCE BOOKS:

1. Green IT, Toby Velte, Anthony Velte,Robert Elsenpeter, McGraw Hill.

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Green Computing
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Q.2 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Q.3 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Total	30

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

B. Sc. (Information Technology)			Semester – I	
Course Name: Indian Knowledge System			**Course Code: BSIT-IKSS1-111**	
Periods per week (1 Period is 60 minutes)			**2**	
Credits			**2**	
			Hours	**Marks**
Evaluation System		**Theory Examination**	1	30
		Internal	--	20

Course Objectives:

- The course is intended to provide undergraduates with a fundamental guide to the history, science, culture and philosophy of India.
- To give a basic understanding of Indian Knowledge System.

Module No	Modules/Units	No of Lectures
1.	**Introduction to Indian Knowledge system –** (a) Introduction • Why study IKS? • IKS and Indian philosophy – Introduction to Sankhya, Original and new Sankhya, Vaisheshika, Nyaya and difference between Nyaya and Vaisheshika with reference to ancient Indian texts. (b) Introduction to Indian management thoughts and practices • Management and Indian ethos • Work values and ethics from Bharatheeya Sanskriti • Personality development – Development of integrated personality based on Indian Ethos • Leadership with reference to Indian Ethos, Indian Epics, Bhagavad Gita and other scriptures	10

2.	**Glimpse of Bharatvarsha**
	
	(a) Sacred Geography: Mountains & Rivers
	• Sacred mountains with specific reference to Narsimha Konda, Surya Pahar, Mandar Hill, Chandrakanth Parbat, Palithana, Amarnath, Hemkunt, Girnar Hill, Mount Kailash, Tirumalai Hills, Sabarimala Hills.
	• Rivers with respect to Ganga, Yamuna, Brahmagupta, Narmada, Saraswati, Godavari, Kaveri
	(a) Food & Diet: Distinctive features of regional cuisines
	   • North, South, East, West cuisine
	   • Dietary guidelines of Ayurveda/ Naturopathy- Satvik, Rajasik, Tamasik.
	   • Vath, Pith, Kapha
		10

3.	**Arts and Science** Schools of music and dance: important features of Carnatic and Hindustani Classical Music, vocal/instruments used – Some famous artists Indian school of classical and folk dances representing east, west, north and south. India's contribution to medicine, surgery and mathematics. • India's contribution to medicine • Ayurveda – Charaka- The pioneer of Clinical Medicine - contribution, Sushruta- The Father of Surgery – contribution • Contribution of India in Science and Mathematics (metallurgy/ astronomy/architecture)	10

REFERENCE BOOKS:

1. An Introduction to Indian Knowledge Systems: Concepts and Applications, B Mahadevan, V R Bhat, and Nagendra Pavana R N; 2022 (Prentice Hall of India).
2. Indian Knowledge Systems: Vol I and II, Kapil Kapoor and A K Singh; 2005 (D.K. PrintWorld Ltd).
3. The Beautiful Tree: Indigenous India Education in the Eighteenth Century, Dharampal,Biblia Impex, New Delhi, 1983. Reprinted by Keerthi Publishing House Pvt Ltd., Coimbatore, 1995.

4. „Knowledge traditions and practices of India‟, Kapil Kapoor, Michel Danino, CBSE,India.
5. Dr. Subhash Kak, Computation in Ancient India, Mount, Meru Publishing (2016)
6. Dharampal, Indian Science and Technology in the Eighteenth Century, Academy ofGandhian Studies, Hyderabad, 1971, republic. Other India Bookstore, Goa, 2000
7. Robert Kanigel, The Man Who Knew Infinity: A Life of the Genius Ramanujan, Abacus,London, 1999
8. Alok Kumar, Sciences of the Ancient Hindus: Unlocking Nature in the Pursuit ofSalvation, CreateSpace Independent Publishing, 2014
9. The Positive Sciences of the Ancient Hindus; BrijendraNath Seal; 4th Edition; 2016
10. Fine Arts & Technical Sciences in Ancient India with special reference to Someśvara‟sMānasollāsa; Dr. Shiv Shekhar Mishra, Krishnadas Academy, Varanasi 1982
11. Mints and Minting in India; Upendra Thakur; Chowkhanba Publication; 1972
12. Economic Sutras by Prof. Satish Y. Deodhar, IIMA Books series
13. Coomaraswamy, Ananda K. 2002. Early Indian Architecture: Cities and City-Gates,Munshiram Manoharlal Publishers.
14. Vatasyayan, Kapila. 1997. The Square and the Circle of the Indian Arts, AbhinavPublication.
15. Hardy, Adam. 2015. Theory and Practices of Temple Architecture in Medieval India:Bhoja‟s Samrangansutradhar and The Bhojpur Line Drawings, Dev Publishers & Distributors.
16. B. Datta and A. N. Singh, History of Hindu Mathematics, 2 Parts, Lahore 1935, 1938; Reprint, Asia Publishing House, Bombay 1962; Reprint, Bharatiya Kala Prakashan, Delhi2004.
17. C. N. Srinivas Iyengar, History of Indian Mathematics, The World Press, Calcutta 1967.
18. S. Balachandra Rao, Indian Mathematics and Astronomy: Some Landmarks, 3rd Ed.Bhavan's Gandhi Centre, Bangalore 2004.
19. G. G. Emch, M. D. Srinivas and R. Sridharan, Eds., Contributions to the History ofMathematics in India, Hindustan Book Agency, Delhi, 2005.

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Indian Knowledge System
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Assignment / Project and Viva voce/Case studies/ Outreach programs /Certificate courses.	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 10 marks (Attempt any 2 from 4 questions of 5 marks each)	**10**
Q.2 10 marks (Attempt any 2 from 4 questions of 5 marks each)	**10**
Q.3 10 marks (Attempt any 2 from 4 questions of 5 marks each)	**10**
Total	**30**

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

B. Sc. (Information Technology)	Semester – I
Course Name: Co-curricular Courses	Course Code: BSIT-CCS1-112
Periods per week (1 Period is 60 minutes)	2
Credits	2
Evaluation System **Marks**	50

Course Objectives

1) To enable learners to recognize the value of co-curricular activities in promoting holistic personal and professional development.
2) To help learners understand the role of arts, culture, wellness, sports, and community participation in achieving balanced growth.
3) To develop organizational, communication, and leadership skills through involvement in various college and intercollegiate activities.
4) To encourage learners to reflect on their strengths, interests, and social responsibilities through diverse co-curricular engagements.
5) To guide learners in assessing their contributions toward community development, sustainability, and collaborative initiatives.
6) To equip learners with the ability to design, plan, and implement events or projects that enhance creativity, teamwork, and leadership.

Nature of the Course: Non-classroom experiential course integrating learning beyond academics through arts, sports, wellness, community service, entrepreneurship, environmental and cultural engagement.

Duration: Minimum 30 hours to be completed under CC as per NEP 2020 guidelines

COURSE IMPLEMENTATION AND INSTRUCTIONS
1. Duration & Credits
- Total duration: Minimum 30 hours (Odd/Even Semester).
- On completion, students earn 2 credits under the Co-Curricular Course component.

2. Activity Options (Choose any one or combination to complete 30 hours):
- **Cultural & Literary Skills:** Cultural Club, Marathi Vangmay Mandal, Speakers' Forum and Magazine Committee.
- **Sports & Fitness:** Gymkhana, Yoga, Physical Education.
- **Social Outreach & Community Service:** NSS, DLLE, Rotaract, NGO collaborations.
- **Entrepreneurship & Career Orientation:** Entrepreneurship Cell, Finance Club, Commerce Forum.
- **Environmental & Sustainability Practices:** Green Club, Value Lab, Eco Activities.
- **Research and Innovation:** Research Cell, Tech Clubs.
- **Life Skills & Safety:** Self-Defence, Disaster Management, Value Education.

3. Methods of Completion

Any combination of the following modes summing up to 30 hours:
- Attending events (college/intercollegiate).
- Participating or presenting in events.
- Organising events as a core committee member.

4. Evaluation and Documentation
- Students must maintain a CC Log Sheet recording hours and activities, duly verified by the respective coordinator.
- Evaluation based on participation, initiative, teamwork, reflection, and discipline.

5. Certification
- Certified completion of 30 hours (by event head/committee) will qualify the learner for **2 credits**.

FYBSc (IT)
Semester II

Semester II			
Course Code	**Course Type**	**Course Title**	**Credits**
BSIT-MJS2-101	Major	Digital Electronics	3
BSIT-MJPS2-101	Major Practical	Digital Electronics Lab	1
BSIT-MJS2-102	Major	Object Oriented Programming	2
BSIT-MNS2-103	Minor	Principles of Operating Systems	2
BSIT-OES2-104	Open Electives(OE)	Human Resource Management	2
BSIT-OES2-105	Open Electives(OE)	Fundamentals of Marketing II	2
BSIT-OES2-106	Open Electives(OE)	Numerical and Statistical Methods	2
BSIT-OES2-107	Open Electives(OE)	Enterprise Resource Planning	2
BSIT-VSPS2-108	Vocational Skill Courses (VSC)	Numerical and Statistical Methods Lab	2
BSIT-SEPS2-109	Skill Enhancement Courses (SEC)	Object Oriented Programming Lab	2
BSIT-AECS2-110	Ability Enhancement Courses (AEC)	Communication Skills in English -II	2
BSIT-VECS2-111	Value Education Courses (VEC)	Environment Sustainability in IT	2
BSIT-CCS2-112	Co-curricular Courses (CC)	CC	2
		Total Credits	22

B. Sc. (Information Technology)		Semester – II	
Course Name: Digital Electronics		**Course Code: BSIT-MJS2-101**	
Periods per week (1 Period is 60 minutes)		3	
Credits		3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	2	50
	Internal	--	25

Course Objectives:

- The learner will be able to identify various number systems and its arithmetic operations.
- The learner will be able to summarize the basics of digital logic and its application in digital electronics circuits.
- The learner will be able to apply the concept of counters, shift registers and digital logic families.
- The learner will be able to analyse various combinational logic circuits and sequential circuits.
- The learner will be able to summarize various logic circuits.
- The learner will be able to design various combinational logic circuits and sequential circuits.

Module No	Modules/Units	No of Lectures
1.	**Number System:** Analog System, digital system, numbering system, binary number system, octal number system, hexadecimal number system, conversion from one number system to another **Binary Arithmetic:** Binary addition, Binary subtraction, Negative number representation, Subtraction using 1"s complement and 2"s complement, Binary multiplication and division, Arithmetic in octal number system, Arithmetic in hexadecimal number system	15
2.	**Logic gates and Logic Circuits:** Basic and Universal Gates, Implementation of other gates using universal gates **Boolean algebra and minimization:** Introduction, Basic Theorems of Boolean Algebra, Boolean Functions and their Representation, Gate-Level Minimization, Deriving Boolean expression from given circuit (Simplification of Boolean Function), Karnaugh Map 2/3/4 varriables K-Maps. QuineMcCluskey Method.	15

3.	**Combinational logic Circuit:** Introduction, Analysis and Design Procedure for Combinational Logic Circuits, Types ofCombinational Circuit. **Sequential Circuits: Flip-Flop:** Introduction, Terminologies used, S-R flip-flop, D flip-fop, JK flip- flop, Race-around condition, Master – slave JK flip-flop, T flip-flop, Applicationof flip-flops. **Introduction to counters and registers**	15

REFERENCE BOOKS:

1. Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley, 200796
2. Digital Logic Design , Sonali Singh , BPB publications, 1 st 2015
3. Fundamentals of Digital Electronics and Logic Design, Subir Kumar Sarkar, AsishKumar De, Souvil Sarkar Pan Stanford Publishing, 1 st 2014.
4. Digital Principles and Applications, Donald P Leach Albert Malvino Goutam SahaTMH, 8 th 2015

B. Sc. (Information Technology)		Semester – II	
Course Name: Digital Electronics Lab		Course Code: BSIT-MJPS2-101	
Periods per week (1 Period is 60 minutes)		2	
Credits		1	
		Hours	Marks
Evaluation System	Practical Examination	--	25

Course Objectives:

- The learner will be able to identify various number systems and its arithmetic operations.
- The learner will be able to summarize the basics of digital logic and its application in digital electronics circuits.
- The learner will be able to apply the concept of counters, shift registers and digital logicfamilies.
- The learner will be able to analyse various combinational logic circuits and sequentialcircuits.
- The learner will be able to summarize various logic circuits.
- The learner will be able to design various combinational logic circuits and sequentialcircuits.

List of Practicals:	
1.	**Study of basic gates and Universal gates**
a.	To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates
b.	To study IC 7400, 7402, 7404, 7408, 7432, 7486, 74266
c.	To implement and verify NAND and NOR as Universal gates
2.	**Study of Boolean expressions**
a.	To verify De Morgan''s laws
b.	Implement the given expression using a minimum number of gates.
c.	Implement the given expression using a minimum number of ICs.
3.	**Design of Combinational Circuits using K-maps**
a.	Design and implement combinational circuits for the given problem/problemsusing minimization techniques of K-maps.
4.	**Design and implement code converters**
a.	Design the circuit and implement Binary to gray code converter
b.	Design the circuit and implement Gray to Binary code converter
c.	Design the circuit and implement Binary to BCD code converter
d.	Design the circuit and implement Binary to XS-3 code converter
5.	**Implement Adder and Subtractor circuits**
a.	Design the circuit and implement Half Adder and Full Adder
b.	Design the circuit and implement BCD Adder, XS-3 Adder , Binary Subtractor
6.	**Design and implement Arithmetic circuits**
a.	Design and implement 2-by-2 bit multiplier

7.	**Implement Encoders and Decoders**
a.	Design and implement 8: 3 encoder
b.	Design and implement 3:8 decoder
8.	**Multiplexers and Demultiplexers**
a.	Design and Implement 4:1 multiplexer
b.	Design and Implement 1:4 demultiplexer
c.	Study IC 74151 8: 1 multiplexer and implement the expression
d.	Study IC 74138 3: 8 decoder and implement the expression
9.	**Study of Flipflops and Counters**
a.	Study of IC"s 7473, 7474, and 7476
b.	Design a 3-bit ripple/ synchronous counter using IC 7473 and required gates

SCHEME OF EXAMINATION FOR: Digital Electronics
Subjects with 4 credits (3 credit theory + 1 credit practical)

The scheme of examination shall be divided into three parts:
- Internal Assessment - 25 marks
- Semester End Examination - 50 marks
- Practical Assessment - 25 marks

Internal Assessment 25 marks

Description	Marks
Internal test (online/offline)(Objective/Subjective)	20
Assignments/ group discussions/ debates/ quiz/ open book test/ book review/presentation/ viva/ any other	5
Total	**25**

Semester end Examination 50 marks (paper pattern)

Duration : 2 hour Total Marks: 50	
Q.1 10 marks (from Unit 1)	10
Q.2 10 marks (from Unit 2)	10
Q.3 10 marks (from Unit 3)	10
Q.4 20 marks (from all Units)	20
Note: The 10/20 marks full length question may be sub divided into 2/4 questions of 5 marks each	

Semester end Practical Examination 25 marks

Description	Marks
Practical examination	20
Viva and Journal	05
Total	**25**

Passing criteria: Minimum 40% (10 out of 25) in Internal, 40% (20 out of 50) in semester end and 40% (10 out of 25) in practical examination.

B. Sc. (Information Technology)		Semester – II	
Course Name: Object Oriented Programming		**Course Code: BSIT-MJS2-102**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**1**	**30**
	Internal	**--**	**20**

Course Objectives:

- The learner will be able to define basic concepts of object-oriented programming.
- The learner will be able to explain the concepts of classes, objects, constructors & destruction with their uses and distinguish between object-oriented & procedural oriented programming.
- The learner will be able to demonstrate the concepts of polymorphism & virtual functions.
- The learner will be able to explain program development using inheritance and handling of exceptions in the program.
- The learner will be able to summarize concepts of templates, working with files & debugging.
- The learner will be able to write programs using object-oriented methodology.

Sr. No	Modules/Units	No. of Lectures
1.	**Object Oriented Methodology:** Introduction, Advantages and Disadvantages of Procedure Oriented Languages, what is Object Oriented? What is Object Oriented Development? Benefits and Application of OOPS. **Principles of OOPS:** Basic Concepts of OOPS: Objects, Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing **Classes and Objects:** Simple classes (Class specification, class members accessing), The Main function, Function prototyping, Defining member functions, passing object as an argument, Returning object from functions, friend classes, Pointer to object, Array of pointer to object.	10
2.	**Constructors and Destructors:** Introduction, Default Constructor, Parameterized Constructor and examples, Constructor Overloading, Destructors **Polymorphism:** Concept of function overloading, overloaded operators, overloading unary and binary operators. **Virtual Functions:** Introduction and need, Pure Virtual Functions, Static Functions, this Pointer, abstract classes.	10

3.	**Program development using Inheritance:** Introduction, understanding inheritance, Advantages provided by inheritance, choosing the access specifier, Derived class declaration, derived class constructors, class hierarchies, multiple inheritance, multilevel inheritance, containership, hybrid inheritance. **Exception Handling:** Introduction, Exception Handling Mechanism, Concept of throw & catch with example **Templates:** Introduction, Function Template and examples, Class Template and examples. **Working with Files:** Introduction, File Operations, Various File Modes, File Pointer and their Manipulation	10

REFERENCE BOOKS:

1. C++ for DUMMIES , Stephen Randy Davis , Wiley Publishing, Inc.

2. Object Oriented Programming with C++, E. Balagurusamy , Tata McGraw Hill

3. Object Oriented Analysis and Design, Object Oriented Analysis and Design, Timothy BuddTMH

4. Mastering C++ , K R Venugopal, Rajkumar Buyya, T Ravishankar, Tata McGraw Hill

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SCHEME OF EXAMINATION FOR: Object Oriented Programming
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Q.2 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Q.3 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Total	30

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

B. Sc. (Information Technology)		Semester – II	
Course Name: Principles of Operating Systems		**Course Code: BSIT-MNS2-103**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**1**	**30**
	Internal	**--**	**20**

Course Objectives:

- The learner will be able to describe the structure of OS and basic architectural components involved in OS design.
- The learner will be able to explain the mechanisms used by operating systems to manage processes and threads as well as diverse memory management techniques.
- The learner will be able to demonstrate the concepts of file handling and I/O operations.
- The learner will be able to analyze deadlocks, its causes, and practical solutions.
- The learner will be able to compare and differentiate between the concepts of multiprocessor, multicomputer & distributed system and would understand various concepts of security.
- The learner will be able to rewrite various scheduling algorithm for scheduling processes & threads.

Sr. No	Modules/Units	No of Lectures
1.	**Introduction:** What is an operating system? History of operating system, computer hardware, different operating systems, operating system concepts, system calls, operating system structure. **Processes and Threads:** Processes, threads, interprocess communication, IPC problems. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms	10
2.	**Deadlocks:** Resources, introduction to deadlocks, the ostrich algorithm, deadlock detection and recovery, deadlock avoidance, deadlock prevention, issues. **Memory Management:** No memory abstraction, memory abstraction: address spaces, virtual memory, page replacement algorithms, segmentation.	10
3.	**Mass-Storage Structure:** Overview, Disk Structure. **File Systems:** Files, directories, file system implementation, Files system management and optimization. **Multiple Processor Systems:** Multiprocessors, Multicomputers, distributed systems.	10

REFERENCE BOOKS:

1.Operating System Concepts ,Abraham Silberschatz, Peter Galvin, Greg Gagne, , Wiley, 2021.

2. Operating Systems , Achyut S. Godbole, AtulKahate, Tata McGraw Hill, 2017.

3. Operating Systems – Internals and Design Principles Willaim Stallings Pearson 8th 2009.

4. Principles of Operating Systems, Naresh Chauhan, Oxford Press, 2014

5. Modern Operating Systems ,Andrew S Tanenbaum, Herbert Bos, 4e Fourth Edition,

Pearson Education, 2016

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SCHEME OF EXAMINATION FOR: Principles of Operating Systems
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:

- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Q.2 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Q.3 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Total	30

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

B. Sc. (Information Technology)		Semester – II	
Course Name: Human Resource Management		Course Code: BSIT-OES2-104	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

COURSE OBJECTIVES :

- Students should grasp fundamental concepts, theories, and principles related to HRM, including workforce planning, recruitment.

- Learn how HRM aligns with organizational goals and strategies, emphasizing the role of HR professionals in contributing to the achievement of business objectives.

- Develop skills in HR metrics and analytics to measure HRM effectiveness, track key performance indicators (KPIs), and make data-driven decisions to improve organizational performance.

Sr. No.	Modules	Number of lectures
1.	**Unit – 1 Introduction to Human Resource Management** Human Resource Management - Definition - Objectives - Functions - Scope - Importance - HRM in India - Evolution of HRM - Computer Application in Human Resource Management - Quality of a good Human Resource Managers - Human Resource Planning - Job Analysis, Job description and Job Specification.	15
2.	**Unit – 2 Manpower Planning and Selection** Recruitment and Selection - Sources of Recruitment - Selection Process - Test Types - Interview Types - Career Planning - VS Manpower Planning and succession Planning - Career Planning - Process - Career Development - Placement and Induction.	15
	Total Lectures	30

Reference Materials :

1. Human Resource Management - Dr. C.B. Gupta - Sultan and Sons.

2. Personnel & Human Resource Management - P. Subba Rao - Himalaya Publishing House.

3. Human Resource and Personnel Management - K. Aswathappa - Tata Mc Graw Hill Publishing Co. Ltd.

4. Personnel Management & Human Resources - C.S. Venkata Rathnam & B.K. Srivastava. TMPL.

5. Dynamics of Industrial Relations - Dr. C.B. Memoria, Dr. Satish Memoria &S.V. Gankar - Himalaya Publishing House.

6. Performance Appraisal, Theory and Practice - AIMA - Vikas management Series, New Delhi - 1986.

7. Human Resource Management: Pattanayak pH 1.2002

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SCHEME OF EXAMINATION FOR: Human Resource Management
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:

- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test / Value Added Course/ Project / Tutorial / Outreach / Internship / Research etc.	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 15 marks	15
Q.2 15 marks	15
Total	30
Note: The 15 marks full length question may be sub divided into 2 questions of 7 and 8 marks each or 3 questions of 5 marks each	

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – II	
Course Name: Fundamentals of Marketing II		Course Code: BSIT-OES2-105	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

COURSE OBJECTIVES :

- To understand in detail the elements of marketing mix
- To analyse steps product planning and reasons for product failures.
- To understand pricing and distribution strategies and factors affecting pricing and channel selection.
- To recognize various promotional tools that can be used to effective promote offerings.
- To apply segmentation, targeting, positioning and differentiation strategies.

Sr. No.	Modules	Number of lectures
1.	**Marketing Mix** • Meaning –elements of Marketing Mix. • Product-product mix-product line lifecycle-product planning – New product development failure of new product-levels of product. • Pricing – objectives- factors influencing pricing policy and Pricing strategy. • Physical distribution – meaning – factor affecting channel selection-types of marketing channels • Promotion – meaning and significance of promotion. Promotion tools (brief)	15
2.	**Segmentation, Targeting, Positioning Differentiation and Trends In Marketing** • Segmentation – meaning , importance , basis • Targeting – meaning , types • Positioning – meaning – strategies • Differentiation – meaning – strategies • New trends in marketing – Emarketing , Internet marketing and Social Media Marketing, trends in digital marketing • Social marketing/ Relationship marketing	15
	Total Lectures	30

REFERENCES

- Kotler Philip, Marketing Management, Pearson.
- Stanton, Etzel, Walker, Fundamentals of Marketing, Tata-McGraw Hill.
- Saxena Rajan, Marketing Management, Tata-McGraw Hill.
- Ramaswamy, Namakumari, Marketing Management: Indian Context Global Perspective, Sage Publication

SCHEME OF EXAMINATION FOR: Fundamentals of Marketing II
<u>**Subjects with 2 credits Theory**</u>

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test / Value Added Course/ Project / Tutorial / Outreach / Internship / Research etc.	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 15 marks	**15**
Q.2 15 marks	**15**
Total	**30**
Note: The 15 marks full length question may be sub divided into 2 questions of 7 and 8 marks each or 3 questions of 5 marks each	

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – II	
Course Name: Numerical and Statistical Methods		Course Code: BSIT-OES2-106	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:

- To make the students analyze the errors obtained in the numerical solution of problems.
- To help students to learn the use of appropriate numerical method to determine approximate solution of algebraic and transcendental equations, system of linear equations, ordinary differential equation and integration.
- To make students learn standard probability distributions and their applications and basics of Linear Regression

Sr. No	Modules/Units	No of Lectures
1.	**Approximations and Round-Off Errors**: Significant Figures, Accuracy and Precision, Error Definitions, Round-Off Errors . **Solutions of Algebraic and Transcendental Equations**: The Bisection Method, The Newton-Raphson Method, The Regula-falsi Method, The Secant Method. **Interpolation**: Forward Difference, Backward Difference, Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation.	10
2. .	**Solution of simultaneous algebraic equations (linear) using iterative methods**: Gauss-Jordan Method, Gauss-Seidel Method. **Numerical differentiation and Integration**: Numerical differentiation, Numerical integration using Trapezoidal Rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules. **Numerical solution of 1st and 2nd order differential equations**: Taylor series, Euler's Method, Modified Euler's Method, Runge-Kutta Method for 1st and 2nd Order Differential Equations.	10
3.	**Random Variables**: Discrete and Continuous random variables, Probability density function, Probability distribution of random variables, Expected value, Variance, Standard Deviation. **Standard Distributions**: Discrete distributions: Bernoulli, Binomial, Poisson, properties and their applications Continuous distributions: Exponential, Normal distribution , properties and its	10

applications. **Linear Regression**: Linear Regression, Polynomial Regression, Multiple Linear Regression, Introduction -General Linear Least Squares and Nonlinear regression.		
Total		30

REFERENCE BOOKS:

1. Introductory Methods of Numerical Analysis, S. S. Shastri, PHI, 2012
2. Numerical Methods for Engineers, Steven C. Chapra, Raymond P. Canale, Tata MCGraw Hill, 2010
3. Fundamentals of Mathematical Statistics, S. C. Gupta, V. K. Kapoor, Sultan Chand & Sons, 2002
4. Numerical Analysis, Richard L. Burden, J. Douglas Faires, Cengage Learning, 2011

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Numerical and Statistical Methods
<u>Subjects with 2 credits Theory</u>

The scheme of examination shall be divided into two parts:

- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Q.2 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Q.3 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Total	30

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC

B. Sc. (Information Technology)		Semester – II	
Course Name: Enterprise Resource Planning		**Course Code: BSIT-OES2-107**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	1	30
	Internal	--	20

Course Objectives:

- The Learner will be able to understand on how to evaluate ERP & focus on role of ERP in organization
- The Learner will be able to study the steps and activities in the ERP life cycle
- The Learner will be able to develop a process driven thinking towards business processes
- The Learner will be able to analyse the strategic options for ERP identification and adoption.
- The Learner will be able to design the ERP implementation strategies.
- The Learner will be able to understand the need of Business Systems and Processes through strategic analysis of ERP systems.

Sr. No	Modules/Units	No of Lectures
1.	**Introduction to Enterprise Resource Planning** : Information System and Its Components, Value Chain Framework, Organizational Functional Units, Evolution of ERP Systems, Role of ERP in Organization, Three-Tier Architecture of ERP system **ERP Implementation Lifecycle :** Project Preparation, Initial Costing, Requirement Engineering, ERP Solution Selection, Technical Planning, Change Management and Training Plan, Implementation and Deployment Planning, Configuration, Custom Coding, Final Preparation, Go-live **ERP and Related Technologies** : Business Processing Reengineering(BPR), Data Warehousing, Data Mining, On-line Analytical Processing(OLAP), Supply Chain Management (SCM), Customer Relationship Management(CRM), Electronic Data Interchange (EDI)	15
2.	**ERP Manufacturing Perspective** : MRP - Material Requirement Planning, BOM - Bill Of Material, MRP - Manufacturing Resource Planning, DRP - Distributed Requirement Planning, PDM - Product Data Management **ERP Modules :** Finance, Plant Maintenance, Quality Management, Materials Management **Benefits of ERP** : Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality, Costs, Improved Information Acc **Introduction to ERP tools** : OpenERP JDEdwards-EnterpriseOne Microsoft	15

	Dynamics-CRM Module SAP	

REFERENCE BOOKS:

1. Enterprise Resource Planning - Alexis Leon, Tata McGraw Hill
2. Enterprise Resource Planning – Diversified by Alexis Leon, TMH.
3. Enterprise Resource Planning - Ravi Shankar & S. Jaiswal ,Galgotia.
4. Enterprise Resource Planning : Concepts and Practices by Vinod Kumar Garg, N. K. Venkitakrishnan
5. ERP a Managerial Perspective by S Sadagopan
6. Guide to Planning ERP Application, AnnettaClewwto and Dane Franklin, McGRaw-Hill, 1997
7. The SAP R/3 Handbook, Jose Antonio, McGraw – Hill
8. E-Business Network Resource planning using SAP R/3 Baan and Peoplesoft : A Practical Roadmap For Success By Dr. Ravi Kalakota

SCHEME OF EXAMINATION FOR: Enterprise Resource Planning
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:

- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test / Value Added Course/ Project / Tutorial / Outreach / Internship / Research etc.	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q.1 15 marks	15
Q.2 15 marks	15
Total	30
Note: The 15 marks full length question may be sub divided into 2 questions of 7 and 8 marks each or 3 questions of 5 marks each	

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – II	
Course Name: Numerical and Statistical Methods Lab		Course Code: BSIT-VSCPS2-108	
Periods per week (1 Period is 60 minutes)		4	
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	--	50

Course Objectives:
- To make students learn the applications of SCILAB program development environment
- Learners will be able to write programs for various numerical and statistical methods.
- Learners will be able to apply logical and lookup functions in Excel to efficiently retrieve and analyze data.
- Learners will be able to create dynamic and combo charts to effectively visualize and compare data in Excel.

List of Practical: Write the programs for the following using SCILAB	
1.	**Solution of Algebraic and Transcendental Equations**
a.	Program to solve algebraic and transcendental equation by bisection method.
b.	Program to solve algebraic and transcendental equation by false position method.
c.	Program to solve algebraic and transcendental equation by Secant method.
d.	Program to solve algebraic and transcendental equation by Newton Raphson method.
2.	**Interpolation**
a.	Program for Newton's forward interpolation.
b.	Program for Newton's backward interpolation.
c.	Program for Lagrange's interpolation.
3.	**Solving Linear System of Equations by Iterative Methods**
a.	Program for solving linear system of equations using Gauss Jordan method.
b.	Program for solving linear system of equations using Gauss Seidel method.
4.	**Numerical Integration**
a.	Program for numerical integration using Trapezoidal rule.
b.	Program for numerical integration using Simpson's $1/3^{rd}$ rule.
c.	Program for numerical integration using Simpson's $3/8^{th}$ rule.
5.	**Numerical Differentiation**
a.	Programing to obtain derivatives numerically.
6.	**Solution of Differential Equation by using Euler's method.**
a.	Program to solve differential equation using Euler's method.
b.	Program to solve differential equation using modified Euler's method.

7.	Solution of Differential Equation by Runge-Kutta method.
a.	Program to solve differential equation using Runge-Kutta 2nd order.
b.	Program to solve differential equation using Runge-Kutta 4th order methods.
8.	Regression
a.	Program for linear regression.
b.	Program for polynomial regression.
9.	Random Variables
a.	Expected Value
b.	Variance
c.	Standard Deviation
10.	Random Variables with Distributions
a.	Program to generate random variables.
b.	Program for uniform distribution.
c.	Program for Bernoulli distribution

List of Practical: Write the programs for the following using EXCEL	
1.	**Applying Logical and Lookup Functions in Excel:** Use IF, VLOOKUP, and HLOOKUP functions to analyse and retrieve specific data efficiently.
2.	**Combining Conditions with Logical Functions (AND, OR, NOT):** Apply logical functions to evaluate multiple conditions simultaneously.
3.	**Automating Repetitive Tasks Using Macros:** Record and execute macros to automate common data entry and formatting tasks.
4.	**Building Interactive Dashboards for Data Visualization:** Combine charts, slicers, and interactive elements to create insightful Excel dashboards.
5.	**Predicting Outcomes with What-If Analysis Tools:** Utilize Goal Seek and Scenario Manager to predict results by changing input variables
6.	**Creating Dynamic and Combo Charts for Data Comparison:** Use advanced charting techniques to create multi-dimensional and dynamic data presentations.
7.	**Consolidating Data from Multiple Sources:** Merge and summarize data from multiple sheets to generate combined reports.
8.	**Managing Large Datasets with Excel as a Database:** Organize, filter, and analyse large datasets by creating structured tables in Excel.
9.	**Cleaning and Preparing Raw Data for Analysis:** Implement data cleaning techniques, including removing duplicates and standardizing formats.
10.	**Importing and Exporting Data for Comprehensive Reporting:** Import data from external sources (like CSV) and export formatted reports as PDFs.

Recommended Books:

- **"Scilab: A Practical Introduction to Programming and Problem Solving" by Tejas Sheth.**
- **"Introduction to Scilab: For Engineers and Scientists" by Sandeep Nagar.**
- **"Scilab from Theory to Practice - I. Fundamentals" by Philippe Roux and Damien Davin.**
- **"Excel 2019 All-in-One for Dummies" by Greg Harvey.**
- **"Microsoft Excel 365 Bible" by Michael Alexander and Dick Kusleika.**
- **"Excel: Quick Start Guide from Beginner to Expert" by William Fischer.**

ROPOSED SCHEME OF EXAMINATION FOR: Numerical and Statistical Methods Lab
Subjects with 2 credits practical

The scheme of examination shall be:
- Practical Assessment   50 marks
    Semester end Practical Examination   50 marks

Description	Marks
Practical examination	40
Viva	05
Journal	05
Total	**50**

Passing criteria: Minimum 40% (20 out of 50) in practical examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – II	
Course Name: Object Oriented Programming Lab		Course Code: BSIT-SECPS2-109	
Periods per week (1 Period is 60 minutes)		4	
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	--	50

Course Objectives:

- The learner will be able to define basic concepts of object-oriented programming.
- The learner will be able to explain the concepts of classes, objects, constructors & destruction with their uses and distinguish between object-oriented & procedural oriented programming.
- The learner will be able to demonstrate the concepts of data conversions, polymorphism & virtual functions.
- The learner will be able to explain program development using inheritance and handling of exceptions in the program.
- The learner will be able to summarize concepts of templates, working with files & debugging.
- The learner will be able to write programs using object-oriented methodology.
- To make students learn different DOS and Linux commands using command line interface and shell.
- To make students understand different utilities provided by Windows and Linux operating system

Object Oriented Programming

List of Practical:	
1.	**Classes and methods**
a.	Design an employee class for reading and displaying the employee information, the getInfo() and displayInfo() methods will be used repectively. Where getInfo() will beprivate method
b.	Design the class student containing getData() and displayData() as two of its methodswhich will be used for reading and displaying the student information respectively.Where getData() will be private method.
c.	Design the class Demo which will contain the following methods: readNo(), factorial() for calculating the factorial of a number, reverseNo() will reverse the given number, isPalindrome() will check the given number is palindrome, isArmstrong() which will calculate the given number is armStrong or not.Where readNo() will be private method.
d.	Write a program to demonstrate function definition outside class and accessing classmembers in function definition.
2.	**Using friend functions.**
a.	Write a friend function for adding the two complex numbers, using a single class
b.	Write a friend function for adding the two different distances and display its sum, using two classes.
c.	Write a friend function for adding the two matrix from two different classes and display its sum.
3.	**Constructors and method overloading**
a.	Design a class Complex for adding the two complex numbers and also show the use of constructor.

	b.	Design a class Geometry containing the methods area() and volume() and also overload the area() function .
	c.	Design a class StaticDemo to show the implementation of static variable and static function.
4.		**Operator Overloading**
	a.	Overload the operator unary(-) for demonstrating operator overloading.
	b.	Overload the operator + for adding the timings of two clocks, And also pass objects as an argument.
	c.	Overload the + for concatenating the two strings. For e.g "Py" + "thon" = Python
5.		**Inheritance**
	a.	Design a class for single level inheritance using public and private type derivation.
	b.	Design a class for multiple inheritance.
	c.	Implement the hierarchical inheritance.
6.		**Virtual functions and abstract classes**
	a.	Implement the concept of method overriding.
	b.	Show the use of virtual function
	c.	Show the implementation of abstract class.
7.		**String handling**
	a.	String operations for string length , string concatenation
	b.	String operations for string reverse, string comparison,
	c.	Console formatting functions.
8.		**Exception handling**
	a.	Show the implementation of exception handling
	b.	Show the implementation for exception handling for strings
	c.	Show the implementation of exception handling for using the pointers.
9.		**File handling**
	a.	Design a class FileDemo open a file in read mode and display the total number of words and lines in the file.
	b.	Design a class to handle multiple files and file operations
	c.	Design a editor for appending and editing the files
10.		**Templates**
	a.	Show the implementation of template class library for swap function.
	b.	Design the template class library for sorting ascending to descending and vice versa

Operating Systems

	List of Practical
1.	Installation of virtual machine software.
2.	Installation of Linux operating system (RedHat / Ubuntu) on virtual machine.
3	Installation of Windows operating system on virtial machine.
4.	**Linux commands: Working with Directories:**
a.	pwd, cd, absolute and relative paths, ls, mkdir, rmdir,
b.	file, touch, rm, cp. mv, rename, head, tail, cat, tac, more, less, strings, chmod
5.	**Linux commands: Working with files**
a.	ps, top, kill, pkill, bg, fg
b.	grep, locate, find, locate
c.	date, cal, uptime, w, whoami, finger, uname, man, df, du, free, whereis, which
d.	Compression: tar, gzip
6.	**Windows (DOS) Commands – 1**
a.	Date, time, prompt, md, cd, rd, path
b.	Chkdsk, copy, xcopy, format, fidsk, cls, defrag, del, move.
7.	**Windows (DOS) Commands – 2**
a.	Diskcomp, diskcopy, diskpart, doskey, echo
b.	Edit, fc, find, rename, set, type, ver
8.	**Working with Windows Desktop and utilities**
a.	Notepad
b.	Wordpad
c.	Paint
d.	Taskbar
e.	Adjusting display resolution
f.	Using the browsers
g.	Configuring simple networking
h.	Creating users and shares
9.	**Working with Linux Desktop and utilities**
a.	The vi editor
b.	Graphics
c.	Terminal
d.	Adjusting display resolution
e.	Using the browsers
f.	Configuring simple networking
g.	Creating users and shares
10.	Installing utility software on Linux and Windows

SCHEME OF EXAMINATION FOR: Object Oriented Programming Lab
Subjects with 2 credits practical

The scheme of examination shall be:
- Practical Assessment   50 marks
      Semester end Practical Examination   50 marks

Description	Marks
Practical examination	40
Viva	05
Journal	05
Total	**50**

Passing criteria: Minimum 40% (20 out of 50) in practical examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – II	
Course Name: Communication Skills in English - II		**Course Code: BSIT-AECS2-110**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**1**	**30**
	Internal	**--**	**20**

Course Objectives:

- To develop awareness of the complexity of the communication process.
- To develop effective listening skills in students so as to enable them to comprehendinstructions and become critical listeners.
- To develop effective oral skills so as to enable students to speak confidently interpersonallyas well as in large groups.
- To develop effective reading and writing skills so as enable students to read and write in aclear, concise, persuasive and audience centred manner.
- To develop ability to communicate effectively with the help of electronic media.

Module No	Modules/Units	No of Lectures
1	Group Discussions & Interviews with Soft skills	10
2	Technical Writing: Reports, Proposals & Instructions	12
3	Summary & Paragraph Writing	8

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SCHEME OF EXAMINATION FOR: Communication Skills in English - II
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**

- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Class Assignments/ Presentations/ MOOCs/ Practical sessions	10
Total	20

Semester end Examination 30 marks (paper pattern)

Description	Marks
Q1. Answer any 3 out of 5 (Short Notes)	15
Q.2 Technical writing (2 out of 3)	10
Q.3 Paragraph writing / Summarisation	05
Total	**30**

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – II
Course Name: Environment Sustainability in IT		Course Code: BSIT-VECS2-111
Periods per week (1 Period is 60 minutes)		2
Credits		2
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:
- Learners will be able to identify how to our daily lifestyle creates bad impact on environment.
- Learners will be able to interpret initiatives taken by various countries to reduce and recycle e-waste.
- Learners will be able to relate the impact of e-waste on environment and human health.
- Learners will be able to select various methods to reduce power usage, save paper etc.
- Learners will be able to evaluate the green methods implemented in business.
- Learners will be able to plan and develop ideas for e-waste management.

Module No	Modules/Units	No of Lectures
1	**Going Paperless:** Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include, Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI), Nuts and Bolts, Value Added Networks, Advantages, Obstacles. **Recycling:** Problems, China, Africa, Materials, Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, frombeginning to end, Life, Cost, Green Design, Recycling Companies, Finding the Best One, Checklist, Certifications, Hard Drive Recycling, Consequences, cleaning a Hard Drive, Pros and cons of each method, CDs and DVDs, good and bad about CD and DVDs disposal, Change the mind-set, David vs. America Online	10

2	**Hardware Considerations**: Certification Programs, EPEAT, RoHS, Energy Star, Computers, Monitors, Printers, Scanners, All-in-Ones, Thin Clients, Servers, Blade Servers, Consolidation, Products, Hardware Considerations, Planned Obsolescence, Packaging, Toxins, Other Factors, Remote Desktop, Using Remote Desktop, Establishing a Connection, In Practice **Greening Your Information Systems:** Initial Improvement Calculations, Selecting Metrics, Tracking Progress, Change Business Processes, Customer Interaction, Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling.		10
3	**Staying Green:** Organizational Check-ups, Chief Green Officer, Evolution, Sell the CEO, SMART Goals, Equipment Check-ups, Gather Data, Tracking the data, Baseline Data, Benchmarking, Analyse Data, Conduct Audits, Certifications, Benefits, Realities, Helpful Organizations. **Other Organizations:** University of Wisconsin–River Falls, University Center, Power and Water, Community Development, Wal-Mart, Partners, Experimental Stores, Products, Waste Reduction		10

REFERENCE BOOKS:
1. Green IT , Toby Velte, Anthony Velte, Robert Elsenpeter , McGraw Hill .

UG DEPARTMENT OF INFORMATION TECHNOLOGY

SCHEME OF EXAMINATION FOR: Environment Sustainability in IT
Subjects with 2 credits Theory

The scheme of examination shall be divided into two parts:
- **Internal assessment - 20 marks**
- **Semester end examination - 30 marks**

Internal Assessment 20 marks

Description	Marks
Objective type test (for 10 marks – online/offline)	10
Any one of the following Presentation / Assignment / Online course / Case Study / Open Book Test	10
Total	20

Semester end Examination 30 marks (proposed paper pattern)

Description	Marks
Q.1 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Q.2 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Q.3 10 marks (Attempt any 2 from 4 questions of 5 marks each)	10
Total	30

Passing criteria: Minimum 40% (8 out of 20) in Internal, 40% (12 out of 30) in semester end examination.

Note: The syllabus and Evaluation pattern may change as per the directives by UOM/UGC/Govt. Under unforeseen circumstances or challenging situations, all examinations will be conducted through online mode or as directed by State Govt. and UGC.

B. Sc. (Information Technology)		Semester – II
Course Name: Co-curricular Courses		Course Code: BSIT-CCS2-112
Periods per week (1 Period is 60 minutes)		2
Credits		2
Evaluation System	Marks	50

Course Objectives

1) To enable learners to recognize the value of co-curricular activities in promoting holistic personal and professional development.
2) To help learners understand the role of arts, culture, wellness, sports, and community participation in achieving balanced growth.
3) To develop organizational, communication, and leadership skills through involvement in various college and intercollegiate activities.
4) To encourage learners to reflect on their strengths, interests, and social responsibilities through diverse co-curricular engagements.
5) To guide learners in assessing their contributions toward community development, sustainability, and collaborative initiatives.
6) To equip learners with the ability to design, plan, and implement events or projects that enhance creativity, teamwork, and leadership.

Nature of the Course: Non-classroom experiential course integrating learning beyond academics through arts, sports, wellness, community service, entrepreneurship, environmental and cultural engagement.

Duration: Minimum 30 hours to be completed under CC as per NEP 2020 guidelines
COURSE IMPLEMENTATION AND INSTRUCTIONS
1. Duration & Credits
- Total duration: Minimum 30 hours (Odd/Even Semester).
- On completion, students earn 2 credits under the Co-Curricular Course component.

2. Activity Options (Choose any one or combination to complete 30 hours):
- **Cultural & Literary Skills:** Cultural Club, Marathi Vangmay Mandal, Speakers' Forum and Magazine Committee.
- **Sports & Fitness:** Gymkhana, Yoga, Physical Education.
- **Social Outreach & Community Service:** NSS, DLLE, Rotaract, NGO collaborations.
- **Entrepreneurship & Career Orientation:** Entrepreneurship Cell, Finance Club, Commerce Forum.
- **Environmental & Sustainability Practices:** Green Club, Value Lab, Eco Activities.
- **Research and Innovation:** Research Cell, Tech Clubs.
- **Life Skills & Safety:** Self-Defence, Disaster Management, Value Education.

3. Methods of Completion
Any combination of the following modes summing up to 30 hours:
- Attending events (college/intercollegiate).
- Participating or presenting in events.
- Organising events as a core committee member.

4. Evaluation and Documentation
- Students must maintain a CC Log Sheet recording hours and activities, duly verified by the respective coordinator.
- Evaluation based on participation, initiative, teamwork, reflection, and discipline.

5. Certification
- Certified completion of 30 hours (by event head/committee) will qualify the learner for **2 credits**.