SIES (Nerul) College of Arts, Science and Commerce (Autonomous)

B.Sc. (COMPUTER SCIENCE)

Sr. No.	Heading	Particulars
1	Title of the course	B. Sc (COMPUTER SCIENCE)
2	Eligibility for admission	HSC or Equivalent with Mathematics and Statistics as one of the subjects or its equivalent.
3	Minimum percentage	40%
4	Semesters	I
5	Level	UG
6	Pattern	04 years & 08 semesters CBGS
7	To be implemented from	From Academic year 2023-24 in a progressive manner

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)
(Affiliated to University of Mumbai)
RE-ACCREDITED GRADE "A" BY NAAC (3rd CYCLE)

BOARD OF STUDIES
SYLLABUS FOR
B.SC (COMPUTER SCIENCE)

(WITH EFFECT FROM THE ACADEMIC YEAR 2023-2024)

OBJECTIVES OF THE PROGRAMME

1. To develop an understanding and knowledge of the basic theory of Computer Science with good foundation on theory, systems, and applications.
2. To foster necessary skills and analytical abilities for developing computer-based solutions of real-life problems.
3. To provide training in emergent computing technologies which lead to innovative solutions for industry and academia.
4. To develop the necessary study skills and knowledge to pursue further post-graduate study in computer science or other related fields.
5. To develop the professional skillset required for a career in an information technology-oriented business or industry.
6. To enable students to work independently and collaboratively, communicate effectively, and become responsible, competent, confident, insightful, and creative users of computing technology.

PROGRAMME OUTCOMES:

1. At the end of the program, students will develop technical, computational, and soft skills required for secure and reliable software and communications networks.
2. Students will develop the ability to design, test and implement sustainable computer-based systems to meet industry requirements.
3. Ability to develop an understanding of professional, ethical, legal, security and social issues as well as responsibilities while developing and using computer software.
4. Ability to pursue higher education or become self-employed by applying the knowledge of computer science to solve real world problems.
5. Ability to develop technical projects addressing the needs of diverse domains.

SIES(Nerul) College of Arts, Science and Commerce (Autonomous)

Department of Computer Science

NEP Credit Structure for 2023 - 24

Semester	Major	Minor	OE (Basket)	VSC, SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC, RP	Cum. Cr./ Sem.
I	Introduction to Python Programming (04 Credits)	Descriptive Statistics (04 Credits)	Business Economics (04 Credits)	VSC- Computer Organization (02 Credits)) SEC- Basics of Web Programming (02 Credits)	AEC-Effective Communication – I (02 Credits) VEC-Environmental studies (02 Credits) IKS- Indian Astronomy (02 Credits)	__	22
Total	4	4	4	4	6		22

SCHEME OF MODULES

Serial No.	Course Code	Credits	Course Name
Semester I			
I	**Major Department Specific Course (DSC)**		
1	U23CS1MJ01	03	Introduction to Python Programming
2	U23CS1MJP01	01	Introduction to Python Programming Practical
II	**Minor Department Specific Course**		
1	U23CS1MI01	03	Descriptive Statistics
2	U23CS1MIP01	01	Descriptive Statistics Practical
III	**Open Electives (OE)/ Generic Electives**		
1	U23CS1E01	04	Business Economics
IV	**VOCATIONAL COURSE (VC) & SKILL ENHANCEMENT COURSE (SEC)**		
1	U23CS1VSCP01	02	Basics of Web Programing
2	U23CS1SEC01	01	Computer Organization
3	U23CS1SECP01	01	Computer Organization Practical
V	**ABILITY ENHANCEMENT COURSE(AEC)/VALUE EDUCATION COURSE (VEC) / INDIAN KNOWLEDGE SYSTEM (IKS)**		
1	U23CS1AEC01	02	Effective Communication - I
2	U23CS1VEC01	02	Environmental studies
3	U23CS1IKS01	02	Indian Astronomy
TOTAL CREDITS		**22**	

<center>**Introduction to Python Programming**</center>

COURSE CODE: U23CS1MJ01   **COURSE CREDIT: 03**

1 credit - 15 lectures
1 lecture is 60 minutes.
Course Objectives:

- To learn how to design and program Python applications and to explore the innards of Python Programming and understand components of Python Program.
- To define the structure and components of a Python program and to learn how to write loops and decision statements in Python.
- To learn about inbuilt input/output operations and compound data types in Python and to learn about functions and strings in Python. And to learn about list, dictionaries, and file handling in Python

Course Outcomes:

- Ability to learn how to store, manipulate and access data in Python and write loops and decision statements in Python.
- Ability to learn how to write functions and pass arguments in Python
- Ability to write OOP based programs using python

Unit	Syllabus	No. of Lectures
1	**Introduction:** The Python Programming Language, History, features, Installing Python, Running Python program, Debugging: Syntax Errors, Runtime Errors, Semantic Errors, Experimental Debugging, Formal and Natural Languages, The Difference Between Brackets, Braces, and Parentheses, **Variables and Expressions:** Values and Types, Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, Order of Operations. **Conditional Statements:** if, if-else, nested if –else **Looping:** for, while, and nested loops **Control statements:** Terminating loops, skipping specific conditions	15
2	**Functions:** Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters Are Local, Stack Diagrams, Fruitful Functions and Void Functions, Why Functions? Importing with from, Return Values, Incremental Development, Composition, Boolean Functions, More Recursion, Leap of Faith, Checking Types **Strings:** A String Is a Sequence, Traversal with a for Loop, String Slices, Strings Are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparison, String Operations.	15
3	**Lists**: Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List, Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods **Tuples and Dictionaries**: Tuples, accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in Tuple Functions Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions, Built-in Dictionary Methods **List Comprehensions & OOPS in Python:** Anonymous Functions, List Comprehensions, Introduction to Object Oriented Programming – Defining Class in Python, Creating Object in Python, Directory Methods in Python, Methods (String, Tuples, Lists, Dictionaries).	15

References:
1. Introduction to Computing and Problem-Solving Using Python by E Balagurusamy, Mc Graw Hill. 2017
2. Programming and Problem solving with Python by Ashok Namdev Kamthane and Amit Ashok Kamthane, Mc Graw Hill. 2020
3. Python Programming by Kiran Gurbani and Ashwin Mehta, Himalaya Publications. 2018

Introduction to Python Programming Practical

COURSE CODE: U23CS1MJP01   **COURSE CREDIT: 01**

1 credit - 2 lectures

1 lecture is 60 minutes.

Sr. No	List of Practical
1	Write the program for the following: a. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old. b. Enter the number from the user and depending on whether the number is even or odd, print out an appropriate message to the user.
2	Write the program for the following: a. Write a program to perform arithmetic operations. b. Write a program that swaps the user defined values.
3	Write the program for the following: a. Write a program to generate the Fibonacci series. b. Write a function that reverses the user defined value.
4	Write the program for the following: a. Write a recursive function to print the factorial for a given number. b. Write a function to check the input value is Armstrong and also write the function for Palindrome.
5	Write the program for the following: a. Write a function that takes a character (i.e., a string of length 1) and returns True if it is a vowel, False otherwise. b. Define a function that computes the length of a given list or string. c. Define a procedure histogram () that takes a list of integers and prints a histogram to the screen. For example, histogram ([4, 9, 7]) should print the following: **** ********* *******
6	Write the program for the following: a. A pangram is a sentence that contains all the letters of the English alphabet at least once, for example: The quick brown fox jumps over the lazy dog. Your task here is to write a function to check a sentence to see if it is a pangram or not. b. Take a list, say for example this one: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] and write a program that prints out all the elements of the list that are less than 5.
7	Write the program for the following: a. Write a program that takes two lists and returns True if they have at least one common member. b. Write a Python program to print a specified list after removing the 0th, 2nd, 4th and 5th elements. c. Write a Python program to clone or copy a list
8	Write the program for the following: a. Write a Python script to sort (ascending and descending) a dictionary by value. b. Write a Python script to concatenate the following dictionaries to create a new one. Sample Dictionary:

	dic1={1:10, 2:20} dic2={3:30, 4:40} dic3={5:50,6:60} Expected Result : {1: 10, 2: 20, 3: 30, 4: 40, 5: 50, 6: 60}
	c. Write a Python program to sum all the items in a dictionary.
9	Write the program for the following: a. Design a class that stores the information of student and display the same. b. Implement the concept of inheritance using python.
10	Write the program for the following: a. Create a class called Numbers, which has a single class attribute called MULTIPLIER, and a constructor which takes the parameters x and y (these should all be numbers). i. Write a method called add which returns the sum of the attributes x and y. ii. Write a class method called multiply, which takes a single number parameter and returns the product of a and MULTIPLIER. iii. Write a static method called subtract, which takes two number parameters, b and c, and returns b - c. iv. Write a method called value which returns a tuple containing the values of x and y. Make this method into a property, and write a setter and a deleter for manipulating the values of x and y.

Descriptive Statistics

COURSE CODE : U23CS1MI01   **COURSE CREDIT: 03**

1 credit - 15 lectures
1 lecture is 60 minutes.
Course Objectives:
- To develop the learner's ability to deal with different types of data and to enable the use of different measures of central tendency and dispersion wherever relevant.
- To make learner aware about the techniques to check the Skewness and Kurtosis of data.
- To make learner enable to find the correlation between different variables and further apply the regression analysis to find the exact relation between them and develop ability to analyze statistical data through R software.

Course Outcomes:
- Ability to organize, manage and present data.
- Ability to analyse Statistical data using measures of central tendency and dispersion.
- Study the relationship between variables using techniques of correlation and regression.

Unit	Syllabus	No. of Lectures
1	**Data Types and Data Presentation**: Data types: Attribute, Variable, Discrete and Continuous variable, Univariate and Bivariate distribution. Types of Characteristics, Different types of scales: nominal, ordinal, interval and ratio. **Data presentation**: Frequency distribution, Histogram, Ogive curves. **Introduction to R**: Data input, Arithmetic Operators, Vector Operations, Matrix Operations, Data Frames, Built-in Functions. Frequency Distribution, Grouped Frequency Distribution, Diagrams and Graphs, Summary statistics for raw data and grouped frequency distribution. Measures of Central tendency: Concept of average/central tendency, characteristics of good measure of central tendency. Arithmetic Mean (A.M.), Median, Mode - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits, and demerits. **Combined arithmetic:** mean. Partition Values: Quartiles, Deciles and Percentiles - examples for ungrouped and grouped data	15
2	**Measures dispersion**: Concept of dispersion, Absolute and Relative measure of dispersion, characteristics of good measure of dispersion. Range, Semi-interquartile range, Quartile deviation, Standard deviation - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits and demerits. Combined standard deviation, Variance. Coefficient of range, Coefficient of quartile deviation and Coefficient of variation (C.V.) **Moments**: Concept of Moments, Raw moments, Central moments, Relation between raw and central moments. **Measures of Skewness and Kurtosis**: Concept of Skewness and Kurtosis, measures based on moments, quartiles.	15
3	**Correlation**: Concept of correlation, Types and interpretation, Measure of Correlation: Scatter diagram and interpretation; Karl Pearson's coefficient of correlation (r): Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, properties; Spearman's rank correlation coefficient: Definition, examples of with and without repetition. Concept of Multiple correlation. **Regression**: Concept of dependent (response) and independent (predictor) variables, concept of regression, Types and prediction, difference between correlation and regression, Relation between correlation and regression. Linear Regression - Definition, examples using least square method and regression coefficient, coefficient of determination, properties. Concept of Multiple regression and Logistic regression.	15

References:
1. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.
2. Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi

Additional References:
1. Sarma, K. V. S. (2001). Statistics Made it Simple: Do it yourself on PC. Prentice Hall of India, New Delhi.
2. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.
3. Purohit, S. G., Gore S. D., Deshmukh S. R. (2008). Statistics Using R, Narosa Publishing House, New Delhi.
4. Schaum's Outline Of Theory And Problems Of Beginning Statistics, Larry J. Stephens, Schaum's Outline Series McGraw-Hill. 2009

Descriptive Statistics Practical

COURSE CODE: U23CS1MIP01   **COURSE CREDIT: 01**

1 credit - 2 lectures

1 lecture is 60 minutes.

Sr. No.	List of Practical
	Problem solving and implementation using R Studio
1	**Basics of R-** a. Data input, Arithmetic Operators b. Vector Operations, Matrix Operations c. Data Frames, Built-in Functions d. Frequency Distribution, Grouped Frequency Distribution e. Diagrams and Graphs
2	**Frequency distribution and data presentation-** a. Frequency Distribution (Univariate data/ Bivariate data) b. Diagrams c. Graphs
3	**Measures of Central Tendency-** a. Arithmetic Mean b. Median c. Mode d. Partition Values
4	**Measures dispersion-** a. Range and Coefficient of range b. Quartile deviation and Coefficient of quartile deviation c. Standard deviation, Variance and Coefficient of variation (C.V.)
5	**Moments-** a. Raw moments b. Central moments
6	**Measures of Skewness -** a. Karl Pearson's measure of Skewness b. Bowley's measure of Skewness c. Moment coefficient of Skewness
7	**Measures of Kurtosis-** a. Moment coefficient of Kurtosis (Absolute measure) b. Moment coefficient of Kurtosis (Relative measure)
8	**Correlation-** a. Karl Pearson's correlation coefficient b. Spearman's Rank correlation

9	**Regression-** a. Method of least squares b. Using regression coefficients c. Properties of regression lines & regression coefficients
10	**Summary Statistics using R-** a. Summary statistics for raw data b. Summary statistics for grouped frequency distribution c. Simple Correlation & Regression using R

Basics of Web Programming

COURSE CODE: U23CS1VSCP01   **COURSE CREDIT: 01**

2 credits - 60 lectures
1 lecture is 60 minutes.

Course Objectives:
- To know the use of HTML, CSS, JavaScript in designing Web pages.

Course Outcomes:
- Ability to design and develop Web Pages using HTM, CSS and JavaScript.

Sr. No	List of Practical
1	Design a webpage that makes use of a. Document Structure Tags b. Various Text Formatting Tags c. List Tags d. Image and Image Maps
2	Design a webpage that makes use of a. Table tags b. Form Tags (forms with various form elements) c. Navigation across multiple pages d. Embedded Multimedia elements
3	Create an HTML page using tags to accomplish the following: a. A paragraph containing text "All that glitters is not gold". Bold face and italicize this text b. Create equation: $$x = 1/3(y1^2 + z1^2)$$ c. Put a background image to a page and demonstrate all attributes of background image d. Create unordered list of 5 fruits and ordered list of 3 flowers
4	Create the following table using HTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary *(table below)*
5	Use HTML5 for performing following tasks: a. Draw a square using HTML5 SVG , fill the square with green color and make 6px brown stroke width b. Write the following mathematical expression by using HTML5 MathML : $d=x^2-y^2$ c. Redirecting current page to another page after 5 seconds using HTML5 meta tag
6	Demonstrate the following HTML5 Semantic tags- <article>, <aside>, <details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>, <section> for a webpage that gives information about travel experience

Table for practical 4:

Department	Sem1	SubjectA
		SubjectB
		SubjectC
	Sem2	SubjectE
		SubjectF
		SubjectG
	Sem3	SubjectH
		SubjectI
		SubjectJ

7	Design a webpage that make use of Cascading Style Sheets with a. CSS properties to change the background of a Page. b. CSS properties to change Fonts and Text Styles c. CSS properties for positioning an element
8	Using CSS a. Create a class called income, and make it a background color of #0ff. b. Create a class called expenses, and make it a background color of #f0f. c. Create a class called profit, and make it a background color of #f00. d. Throughout the document, any text that mentions income, expenses, or profit, attach the appropriate class to that piece of text. e. Further create following line of text in the same document: The current price is 50₹ and new price is 40₹
9	Using CSS a. Change the tag li to have the following properties: □ A display status of inline □ A medium, double-lined, black border □ No list style type b. Add the following properties to the style for li: □ Margin of 5px □ Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left
10	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.
11	a. Write a JavaScript program to accept a number from the user and display the sum of its digits. b. 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). c. Write a java script program to design simple calculator.
12	Using JavaScript a. Design a web page demonstrating different conditional statements. b. Design a web page demonstrating different looping statements.
13	Design a web page demonstrating different Core JavaScript references (Array, Boolean, Date, Function, Math, Number, Object, String, regExp).

14	Write JavaScript code for
	a. Finding Palindrome numbers
	b. Calculating reverse of a number
	c. Displaying the following pattern
	       *
	     * *
	   * * *
	d. Displaying the following pattern
	    *
	   **
	  ****
	 ******

15	Write JavaScript code for Validating the various Form Elements
16	Write JavaScript code for a. Demonstrating different JavaScript Objects such as Window, Navigator, History, Location, Document, b. Storing and Retrieving Cookies

Computer Organization

COURSE CODE: U23CS1SEC01   **COURSE CREDIT: 01**
1 credit -15 lectures
1 lecture is 60 minutes.

Course Objectives:
- To understand the structure and operation of modern processors and their instruction sets.

Course Outcomes:
- To understand basics of digital electronics needed for computers and how data is transferred between the processor and I/O devices.

Unit	Syllabus	No. of Lectures
1	**Computer Abstractions and Technology:** Basic structure and operation of a computer, functional units and their interaction. Representation of numbers and characters. **Logic circuits and functions:** Combinational circuits and functions: Basic logic gates and functions, truth tables; logic circuits and functions. Minimization with Karnaugh maps. Synthesis of logic functions with and-or-not gates, Nand gates, nor gates. Fan-in and fan-out requirements; tristate buffers. Half adder, full adder, ripple carry adder. (Flip flops) Gated S-R and D latches, edge-triggered D latch. Shift registers and registers. Decoders, multiplexers. **Sequential circuits and functions:** State diagram and state table; finite state machines and their synthesis. **Instruction set architectures:** Memory organization, addressing and operations; word size, big-endian and little-endian arrangements. Instruction sets. **Basic Processor Unit:** Main components of a processor: registers and register files, ALU, control unit, instruction fetch unit, interfaces to instruction and data memories	15

References:
1. Carl Hamacher et al., Computer Organization and Embedded Systems, 6 ed.,   McGraw-Hill 2012

Additional References:

1. Patterson and Hennessy, Computer Organization and Design, Morgan Kaufmann, ARM Edition, 2011
2. R P Jain, Modern Digital Electronics, Tata McGraw Hill Education Pvt. Ltd. , 4th Edition, 2010

Computer Organization Practical

COURSE CODE: U23CS1SECP01   **COURSE CREDIT: 01**

1 credit - 2 lectures

1 lecture is 60 minutes.

Sr. No,	List of Practical
1	Study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR, and EX-NOR).
2	Simplify given Boolean expression and realize it.
3	Design and verify a half/full adder
4	Design and verify half/full subtractor
5	Design a 4-bit magnitude comparator using combinational circuits.
6	Design and verify the operation of flip-flops using logic gates.
7	Verify the operation of a counter.
8	Verify the operation of a 4-bit shift register
9	Using SPIM, write and test an adding machine program that repeatedly reads in integers and adds them into a running sum. The program should stop when it gets an input that is 0, printing out the sum at that point.
10	Using SPIM, write and test a program that reads in a positive integer using the SPIM system calls. If the integer is not positive, the program should terminate with the message "Invalid Entry"; otherwise the program should print out the names of the digits of the integers, delimited by exactly one space. For example, if the user entered "528," the output would be "Five Two Eight."

Practical No. 1 to 8 can be performed using any open-source simulator (like Logisim)
(Download it from https://sourceforge.net/projects/circuit/)
Practical No. 9 and 10 are required to be done using SPIM. SPIM is a self-contained simulator that will run MIPS R2000/R3000 assembly language programs.
Latest version is available at https://sourceforge.net/projects/spimsimulator/

Indian Astronomy

COURSE CODE: U23CS1IKS01   **COURSE CREDIT: 02**

1 credit - 15 Hours

1 lecture is 60 minutes.

Course Objectives:
- To develop an awareness among learners about the Indian Astronomy.
- To make learners proficient in the concept, technicalities and computational procedures developed by Indian mathematician and astronomers.

Course Outcomes:
- To understands basics of Indian Astronomy.
- To Understand Coordinate Systems, Rasi & Nakshatra systems.

Unit	Syllabus	No. of Lectures
1.	**Introduction**: Ancient Indian Astronomy, The Vedic Period, Siddhanta, Aryabhata, Astronomers after Aryabhata, Contents of Siddhantaas, Continuity in Astronomical Tradition Celestial Sphere: Introduction, Diurnal Motion of Celestial Bodies, Motion of Celestial Bodies Relative to Stars, Celestial Horizon, Meridian, Pole Star and Directions, Zodiac and Constellations, Equator and Poles (Visuvad vṛtta and Dhruva), Latitude of a Place and Altitude of Pole Star, Ecliptic and the Equinoxes	15
2	**Co-ordinate Systems**: Introduction, Celestial Longitude and Latitude (Ecliptic System), Right Ascension and Declination (Equatorial System), Azimuth and Altitude (Horizontal System), Hour Angle and Declination (Meridian System), Phenomenon of Precession of Equinoxes, Ancient Indian References to the Precession, Effects of Precession on Celestial Longitude Tropical (Sayana) and Sidereal (Nirayana) Longitudes **Rasi and Naksatra Systems**: Zodiac and Rasis, Nakṣatra System **Time in Indian Astronomy**: Introduction, Civil Day and Sidereal Day, Solar Year and Civil Calendar, Solar Month and Lunar Month, Luni-Solar Year (or Lunar Year), Adhikamāsa and Ksayamāsa, Yuga System. Indian Eras, Time on a Microcosmic Scale	15

Reference:

1. Indian Astronomy: An Introduction by S Balachandra Rao, University Press 2000
2. Mathematics in Ancient and Medieval India by A K Bag, Orientilia Delhi. 1979

Environmental Studies

COURSE CODE: U23CS1VEC01   **COURSE CREDIT: 02**

1 credit - 15 lectures

1 lecture is 60 minutes.

Course Objectives:
- Understand key concepts of environmental studies. ecosystems and natural resources.
- Understand the role of communities in environmental management, use computing effectively by applying concepts of green computing.

Course Outcomes:
- To understand environmental policies and practices.
- To develop ethical values towards the environment conservation

Unit	Syllabus	No. of lectures
01	**Introduction** The Multidisciplinary Nature of Environmental Studies, Components of the Environment, Scope and Importance of Environmental Studies, Concept of Sustainability and Sustainable Development. **Ecosystems and Natural Resources** Overview of Ecosystems, Structure and Function of Ecosystems, Energy Flow in Ecosystem, Food Chain, Food Web and Ecological Succession, Case Studies of Ecosystems, Degradation of Ecosystems, Renewable and Non-Renewable Resources, Deforestation, Role of an Individual in the Conservation of Natural Resources.	15
02	**Human Communities and the Environment** Human Population and Growth, Carbon Footprint, Resettlement and Rehabilitation of Project-Affected Persons, Disaster Management, Environmental Movements, Environmental Ethics, Environmental Communication and Public Awareness, Visit to Local Area to Document Environmental Assets. **Green Computing** Overview of Green Computing, Green Computing Efforts, Going Paperless, Power Measurement and Power Reduction, Electronic Waste, Recycling of Electronic Waste, Green Supply Chain, Certifications for Green Computing	15

References:
1. Bharucha Erach, "Textbook of Environmental Studies for Undergraduate Courses", Universities Press 2005

Additional References

1. Hawkins R.E., "Encyclopedia of Indian Natural History", Bombay Natural History Society, Bombay 1986
2. Kaushik A., "Perspectives in Environmental Studies", New Age International Publication, New Delhi 2006
2. Jadhav, H &Bhosale, "Environmental Protection and Laws", Himalaya Pub. House, Delhi 2015

SCHEME OF THEORY EXAMINATION

I. MAJOR AND MINOR

The scheme of examination shall be divided into two parts:
- **Internal assessment 40% i.e. 40 marks**
- **Semester end examination 60% i.e. 60 marks**

(A) Internal Assessment 40 marks

Description	Marks
Internal test of 20 marks Q.1 Multiple choice Questions / True or False - 10 Marks Q.2 Attempt 2 questions out of 3 questions (5 marks each)- 10 Marks	20
One Project and Viva voce / Presentation / Case studies / Assignments Poster Making / Quiz / Role Play / Subject Specific Activities	15
Attendance and Class behavior	05
Total	40

(B) Semester end examination 60 marks

PAPER PATTERN

Duration: 2 hours			
Total Marks: 60			
All Questions are Compulsory			
Question	**Based on**	**Options**	**Marks**
Q. 1	Unit 1	A OR B / A OR B	15
Q. 2	Unit 2	A OR B / A OR B	15
Q. 3	Unit 3	A OR B / A OR B	15
Q. 4	Unit 1,2,3	A OR B / A OR B	15
Total			60

Note:
1. Q.1, 2, 3 and 4 may be divided into sub questions with internal choice if required.

- **Passing criteria: Minimum 40% in Internal (16 out of 40) and 40% (24 out of 60) in semester end examination.**

II. VOCATIONAL COURSE (VSC) & SKILL ENHANCEMENT COURSE (SEC)

The scheme of examination shall be divided into two parts:

▪ **Internal assessment 40% i.e. 20 marks**
▪ **Semester end examination 60% i.e. 30 marks**

(A) Internal Assessment 20 marks

Description	Marks
Internal test Q.1 Multiple choice Questions/True or False - 5 Marks Q.2. Attempt 1 question out of 3 questions- 5 Marks	10
Assignments / Presentation / Poster / Subject Specific Activities	5
Attendance and Class behavior	5
Total	20

B) Semester end examination 30 marks

PAPER PATTERN

Duration: 1 hours	
Total Marks: 30	
Description	**Marks**
Q.1 10 marks OR 10 marks	10
Q.2 10 marks OR 10 marks	10
Q.3 10 marks OR 10 marks	10
Total	30
Note: 1. Q.1, 2, 3 may be divided into sub questions if required. 2. Q.3 May include theory (short notes) /Case Study in one of the options.	

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

III. ABILITY ENHANCEMENT COURSE(AEC) / VALUE EDUCATION COURSE (VEC) / INDIAN KNOWLEDGE SYSTEM (IKS)

The scheme of examination shall be divided into two parts:
- **Internal assessment 40% i.e. 20 marks**
- **Semester end examination 60% i.e. 30 marks**

Question Paper Pattern

(A) Internal Assessment: Total 20 Marks

Description	Marks
Internal Test Q.1 Multiple choice Questions/True or False - 5 Marks Q.2. Attempt 1 question out of 3 questions- 5 Marks	10 Marks
Assignment/Presentation/Group Discussion/Role Play/Mock Interviews / Subject Specific Activities	05 Marks
Attendance	05 Marks

(B) Theory Exam, Total Marks: 30 Marks

Description	Marks
A) Descriptive Question OR B) Short Notes 2 out of 3 (5 Marks each) From Unit 1	10 Marks
A) Descriptive Question OR B) Short Notes 2 out of 3 (5 Marks each) From Unit 2	10 Marks
A) Descriptive Question OR B) Short Notes 2 out of 3 (5 Marks each) From Unit 1,2	10 Marks

SCHEME OF PRACTICAL EXAMINATION

The scheme of Practical examination shall be
- Practical assessment carries 50 Marks : 40 marks + 05 marks (journal)+ 05 marks(viva)
- Minimum 75 % practical are required to be completed and written in the journal.

(Certified Journal is compulsory for appearing at the time of Practical Exam)

(A) Practical Assessment 50 marks

Description	Marks
Two questions of practical (20 marks each)	40
Journal	5
Viva	5
Total	50

Passing criteria: Minimum 40% in Practical (20 out of 50)

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)
Syllabus for Approval

B.SC (COMPUTER SCIENCE)

Sr. No.	Heading	Particulars
1	Title of the Programme	B.Sc. (Computer Science)
2	Eligibility for admission	HSC or Equivalent with Mathematics and Statistics as one of the subjects or its equivalent
3	Minimum Percentage for admission	45%
4	Semesters	II
5	Level	UG
6	Pattern	04 years & 08 semesters CBGS
7	To be implemented from	From Academic year 2023-24 in a progressive manner

Date: 22nd December, 2023.

Signature:

Dr. Koel Roychoudhury   **Dr. Sheeja Ravi**
AC Chairperson   **Head of the Department**

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)
(Affiliated to University of Mumbai)
RE-ACCREDITED GRADE "A" BY NAAC (3rd CYCLE)

BOARD OF STUDIES
SYLLABUS FOR
B.SC (COMPUTER SCIENCE)

(WITH EFFECT FROM THE ACADEMIC YEAR 2023-2024)

OBJECTIVES OF THE PROGRAMME

1. To develop an understanding and knowledge of the basic theory of Computer Science with good foundation on theory, systems, and applications.

2. To foster necessary skills and analytical abilities for developing computer-based solutions of real-life problems.

3. To provide training in emergent computing technologies which lead to innovative solutions for industry and academia.

4. To develop the necessary study skills and knowledge to pursue further post-graduate study in computer science or other related fields.

5. To develop the professional skill set required for a career in an information technology-oriented business or industry.

6. To enable students to work independently and collaboratively, communicate effectively, and become responsible, competent, confident, insightful, and creative users of computing technology.

PROGRAMME OUTCOMES:

1. At the end of the program, students will develop technical, computational, and soft skills required for secure and reliable software and communications networks.

2. Students will develop the ability to design, test and implement sustainable computer-based systems to meet industry requirements.

3. Ability to develop an understanding of professional, ethical, legal, security and social issues as well as responsibilities while developing and using computer software.

4. Ability to pursue higher education or become self-employed by applying the knowledge of computer science to solve real world problems.

5. Ability to develop technical projects addressing the needs of diverse domains.

SIES(Nerul) College of Arts, Science and Commerce (Autonomous)

Department of Computer Science

NEP Credit Structure for 2023 - 24

Semester	Major	Minor	OE (Basket) Any Two	VSC, SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC, RP	Cum. Cr./ Sem.
II	Design and Analysis of Algorithm (4 credits) Basics of Data Structure (2 Credits)	Probability Theory and Distribution (02 Credits)	Money Inflation& Monetary Policy Introduction to Entrepreneurship Supply Chain Management Film Appreciation (02+02=04 Credits)	VSC- Advanced Python Programing (2 credits) SEC- Object- Oriented Analysis and Design (02 Credits)	AEC- Effective Communication –II (02 Credits) VEC- Sustainability Development with Green IT (02 Credits)	CC (02- Credits)	22
Total	**6**	**2**	**4**	**4**	**4**	**2**	**22**

SCHEME OF MODULES

Serial No.	Course Code	Credits	Course Name
	Semester II		
I	**Major Department Specific Course (DSC)**		
1	U23CS2MJ102	03	Design and Analysis of Algorithm
2	U23CS2MJP102	01	Practical of Design and Analysis of Algorithm
3	U23CS2MJ202	01	Basics of Data Structures
3	U23CS2MJP202	01	Practical of Basics of Data Structure
II	**Minor Department Specific Course**		
1	U23CS2MI01	01	Probability Theory and Distribution
1	U23CS2MIP01	01	Practical of Probability Theory and Distribution
III	**Open Electives (OE)/ Generic Electives (Any Two)**		
1	U23BE2E01 U23AF2E01 U23COM2E01 U23MMC2E01	02 + 02	Money Inflation & Monetary Policy Introduction to Entrepreneurship Supply Chain Management Film Appreciation
IV	**VOCATIONAL COURSE (VC) & SKILL ENHANCEMENT COURSE (SEC)**		
1	U23CS2VSC01	01	Advanced Python Programming
2	U23CS2VSCP01	01	Practical of Advanced Python Programming
3	U23CS2SEC01	01	Object-Oriented Analysis and Design
4	U23CS2SECP01	01	Practical of Object-Oriented Analysis and Design
V	**ABILITY ENHANCEMENT COURSE(AEC)/VALUE EDUCATION COURSE(VEC) / INDIAN KNOWLEDGE SYSTEM (IKS)**		
1	U23CS2AEC01	02	Effective Communication - II
2	U23CS2VEC01	02	Sustainability Development with Green IT
3	U23CS2CC01	02	NSS, SPORTS, DLLE (Select any one)
TOTAL CREDITS		**22**	

Design & Analysis of Algorithms

COURSE CODE: U23CS2MJ102   **COURSE CREDIT: 03**

1 credit - 15 lectures
1 lecture is 60 minutes.

Course Objectives:

- To make students understand the basic principles of algorithm design and the theoretical background of the basic data structures
- To familiarize the students with fundamental problem-solving strategies like searching, sorting, selection, recursion and help them to evaluate efficiencies of various algorithms.
- To teach students the important algorithm design paradigms and how they can be used to solve various real world problems.

Course Outcomes:

- Students should be able to understand and evaluate efficiency of the programs that they write based on performance of the algorithms used.
- Students should be able to appreciate the use of various data structures as per need
- To select, decide and apply appropriate design principle by understanding the requirements of any real life problems

Unit	Syllabus	No of Lectures
1	**Introduction to algorithms** - What is algorithm, analysis of algorithm, Types of complexity, Running time analysis, How to Compare Algorithms, Rate of Growth, Types of Analysis, Asymptotic Notation, Big-O Notation, Omega-Ω Notation, Theta-Θ Notation, Asymptotic Analysis, Performance characteristics of algorithms, Estimating running time / number of steps of executions on paper, Idea of Computability **Algorithm Design Techniques -** Introduction to various types of classifications/design criteria and design techniques.	15
2	**Greedy Technique -** Concept, Advantages & Disadvantages, Applications, Implementation using problems like - file merging problem **Divide-n-Conquer -** Concept, Advantages & Disadvantages, Applications, Implementation using problems like - merge sort, Strassen's Matrix Multiplication **Dynamic Programming** - Concept, Advantages & Disadvantages, Applications, Implementation using problems like - Fibonacci series, Factorial of a number, Longest Common subsequence **Backtracking Programming -** Concept, Advantages & Disadvantages, Applications, Implementation using problems like N-Queen Problem	15
3	**Recursion** - What is recursion, Recursion vs Iteration, recursion applications like Factorial of a number, Fibonacci series & their comparative analysis with respect to iterative version, Tower of Hanoi problem **Basic Sorting Techniques** - Bubble, Selection and Insertion Sort & their comparative analysis **Searching Techniques** - Linear Search and its types, Binary Search and their comparative analysis **Selection Techniques** - Selection by Sorting, Partition-based Selection Algorithm,	15

References:
1. "Data Structure and Algorithm Using Python", Rance D. Necaise, Wiley India Edition, 2016.
2. "Data Structures and Algorithms Made Easy", NarasimhaKarumanchi, CareerMonk Publications, 2016.
3. "Introduction to Algorithms", Thomas H. Cormen, 3rd Edition, PHI.

Design & Analysis of Algorithms Practical

COURSE CODE: U23CS2MJP102   **COURSE CREDIT: 01**
1 credit - 2 lectures
1 lecture is 60 minutes.

Sr. No	List of Practical
1	Programs on 1-d arrays like - sum of elements of array, searching an element in array, finding minimum and maximum element in array, count the number of even and odd numbers in array. For all such programs, also find the time complexity, compare if there are multiple methods
2	Programs on 2-d arrays like row-sum, column-sum, sum of diagonal elements, addition of two matrices , multiplication of two matrices. For all such programs, also find the time complexity, compare if there are multiple methods
3	Program to implement various types of classifications.
4	Program to implement file merging, coin change problems using Greedy Algorithm and to understand time complexity
5	Programs to select the Nth Max/Min element in a list by using various algorithms. Compare the efficiency of algorithms.
6	Programs to find a pattern in a given string - general way and brute force technique. Compare the efficiency of algorithms.
7	Program to implement merge sort, Straseen‴s Matrix Multiplication using D-n-C Algorithm and to understand time complexity.
8	Program to implement fibonacci series, Longest Common Subsequence using dynamic programming and to understand time complexity. Compare it with the general recursive algorithm
9	Program to implement N-Queen Problem, Binary String generation using Backtracking Strategy and to understand time complexity.
10	Programs on recursion like factorial, fibonacci, tower of hanoi. Compare algorithms to find factorial/fibonacci using iterative and recursive approaches
11	Program to perform linear search and binary search on list of elements. Compare the algorithms by calculating time required in milliseconds using readymade libraries
12	Programs to sort elements of list by using various algorithms like bubble, selection sort, and insertion sort. Compare the efficiency of algorithms.

Basics of Data Structure

COURSE CODE: U23CS2MJ202   **COURSE CREDIT: 01**

1 credit - 15 lectures
1 lecture is 60 minutes
Course Objectives:

*   The purpose of the course is to familiarize the prospective learners with data structures that are fundamentally important.

Course Outcome:

*   Create different types of data structures.

Unit	Syllabus	No of lectures
01	**Introduction to Data Structures** - What is data structure, types, Introduction to Array(1-d & 2-d), Stack and List data structures, operations on these data structures, advantages disadvantages and applications of these data structures like solving linear equations, Polynomial Representation, Infix-to-Postfix conversion **Graphs**: Graphs and Graph Models; Graph terminologies and Special types of graphs; Definition and elementary results; Representing graphs, Linked representation of a graph; Graph Isomorphism; Connectivity in graphs – path, trail, walk; Euler and Hamilton paths; Planar graphs, Graph colouring and chromatic number. **Trees**: Definition, Tree terminologies and elementary results; Linked representation of binary trees; Ordered rooted tree, Binary trees, Complete and extended binary trees, Expression trees, Binary Search tree, Algorithms for searching and inserting in binary search trees, Algorithms for deleting in a binary search tree; Traversing binary trees.	15

Text Books:
1. Introduction to Algorithm, Thomas H Cormen, PHI
2. Data Structures & Algorithms Made Easy, Narasimha Karumanchi, 2021
3. Data Structures Seymour Lipschutz, Schaum's out lines, McGraw- Hill Inc. 2017

References:
1. Fundamentals of Computer Algorithms, Sartaj Sahni and Sanguthevar Rajasekaran Ellis Horowitz, Universities Press, 2018
2. Data Structures and Algorithms in Python, Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, Wiley, 2016

Basics of Data Structures Practical

COURSE CODE: U23CS2MJP202   **COURSE CREDIT: 01**
1 credit - 2 lectures
1 lecture is 60 minutes.

Sr. No	List of Practical
1	Write a program to implement basic array operations like insertion, deletion, and searching.
2	Write a program to Create a singly linked list with operations like insertion, deletion, and traversal.
3	Write a program to Create a doubly linked list with operations like insertion, deletion, and traversal.
4	Write a program to Implement stack using arrays and linked lists, with operations like push, pop.
5	Write a program to Implement queue using arrays and linked lists, with operations like enqueue, and dequeue.
6	Write a program to implement Binary Tree with insertion, deletion, traversal operations
7	Write a program to implement Graph with traversal operations
8	Write a program for creating, traversing (inorder, preorder, postorder), and searching in a binary tree
9	Write a program to for creating, traversing (inorder, preorder, postorder), and searching in a binary tree
10	Write a program to convert infix expression to postfix expression

Probability Theory and Distribution

COURSE CODE: U23CS2MI102   **COURSE CREDIT: 01**

1 credit - 15 lectures
1 lecture is 60 minutes
Course Objective:

- To make learner aware about basic probability axioms and rules and its application.
- To understand the concept of conditional probability and Independence of events.
- To make learner familiar with discrete and continuous random variables as well as standard discrete and continuous distributions.

Course Outcome:

- Calculate probability, conditional probability and independence.
- Apply the given discrete and continuous distributions whenever necessary.

Sr. No.	Syllabus	No of Lectures
01	**Probability:** Random experiment, sample space, events types and operationsof events, Probability definition: classical, axiomatic, Elementary Theorems of probability (without proof). Conditional probability, Bayes theorem (without proof), independence, Examples on Probability. **Random variables** (Discrete and Continuous) - Probability mass function,Probability density function and cumulative distribution function of discrete and continuous random variable, Properties of cumulative distribution function. **Mathematical Expectations and Variance**: Mathematical Expectations of a function, Variance and S.D of a random variable, properties. **Probability Distribution** - Binomial, Poisson, Normal - definition, properties, uses, and illustrations - Chebyshev's inequality and Central Limit Theorem.	15

REFERENCES:

Textbooks:
1. Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi
2. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.

Additional References:
1. Mood, A. M. and Graybill, F. A. and Boes D.C. (1974). Introduction to the Theory of Statistics, Ed. 3, McGraw Hill Book Company.
2. Hoel P. G. (1971). Introduction to Mathematical Statistics, John Wiley and Sons, New York.
3. Hogg, R.V. and Craig R.G. (1989). Introduction to Mathematical Statistics, Ed. MacMillan Publishing Co., New York.
4. Walpole R. E., Myers R. H. and Myers S. L. (1985), Probability and Statistics for Engineers andScientists
5. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.

Probability Theory and Distribution Practical

COURSE CODE: U23CS2MIP102   **COURSE CREDIT: 01**

1 credit - 15 lectures
1 lecture is 60 minutes

SNO	List of Practical's
1	Implement examples based on Probability definition: classical, axiomatic
2	Implement examples based on elementary Theorems of probability
3	Implement examples based on Conditional probability
4	Implement examples based on „Bayes" theorem
5	Implement examples based on independence
6	Implement examples based on Probability distribution of discrete random variable.
7	Implement examples based on Probability mass function
8	Implement examples based on Probability distribution of continuous random variable.
9	Implement examples based on Probability density function
10	Implement examples on Mean of discrete and continuous Probability distribution
11	Implement examples on standard deviation and variance of discrete and continuous probability distribution
12	Implement examples on calculation of probability, mean and variance based on Binomial distribution
13	Implement examples on calculation of probability based on Normal distribution, Poisson distribution

OPEN ELECTIVES
Introduction to Entrepreneurship

COURSE CODE : U23AF2E01   **COURSE CREDIT: 02**
1 credit - 15 lectures
1 lecture is 60 minutes
Course Objectives:
- Entrepreneurship is one of the major focus areas of the discipline of Management. This course introduces Entrepreneurship to budding managers.
- To develop entrepreneurs & to prepare students to take the responsibility of the full line of management function of a company.

Course Outcome: After completion of this course students will be able to:-
- To identify the importance of Entrepreneurship
- To identify the mechanisms available to evaluate and analyze the external environment which affects entrepreneurship .
- The learners will be able to understand venture capital, its sources and problems faced during raising funds.

Sr. No	Syllabus	No. of lectures
1	**Foundations of Entrepreneurship Development**: Concept and Need of Entrepreneurship Development Definition of Entrepreneur, Entrepreneurship, Importance and significance of growth of entrepreneurial activities Characteristics and qualities of entrepreneur • Theories of Entrepreneurship: Innovation Theory by Schumpeter & Imitating Theory of High Achievement by McClelland X-Efficiency Theory by Leibenstein Theory of Profit by Knight Theory of Social change by Everett Hagen • External Influences on Entrepreneurship Development: Socio-Cultural, Political, Economical, Personal. Role of Entrepreneurial culture in Entrepreneurship Development.	10
2	**Entrepreneur Project Development** Innovation, Invention, Creativity, Business Idea, Opportunities through change. • Idea generation– Sources-Development of product /idea, • Environmental scanning and SWOT analysis • Creating Entrepreneurial Venture-Entrepreneurship Development Cycle •	10
3	**Venture Development** Steps involved in starting of Venture • Institutional support to an Entrepreneur • Venture funding, requirements of Capital (Fixed and working) Sources of finance, problem of Venture set-up and prospects	10

References:
1. Dynamics of Entrepreneurial Development Management - Vasant Desai, Himalaya Publishing House.
 2. Entrepreneurial Development - S.S. Khanna
3. Entrepreneurship & Small Business Management - CL Bansal, Haranand Publication
 4. Entrepreneurial Development in India - Sami Uddin, Mittal Publication
 5. Entrepreneur Vs Entrepreneurship- Human Diagno

FILM APPRECIATION

COURSE CODE: U23MMC2E01   **COURSE CREDIT: 02**

1 credit - 15 lectures
1 lecture is 60 minutes
Course Objectives:
●   To introduce students to the basic concepts of cinema.
●   To help students identify different genres and aspects of films.
●   To help students understand technical aspects regarding making of films.

Unit	Details	Lectures
I	Introduction to Film as an Art Form, History of films, Evolution of Cinema - Silent Era to Talkies, Golden Age of Hollywood, Commercial films, History and evolution of the Indian film industry, Silent era, golden era of Bollywood.	10
II	Basic Elements of Film - Shot, Scene, Sequence, and Frame Composition. Understanding Film Genres - Comedy, Drama, Action, and Documentary. Cinematography - Camera Angles, Movement, and Lighting. Sound Design and Music in Film. Editing Techniques and Their Impact on Storytelling.	10
III	Themes and Symbolism in Film. Stages in filmmaking: pre production, production and post production. , Impact of Technological Advances on Film. Cultural influence of films. Introduction to regional cinema; Marathi, Bengali, Tamil, Malyali, Telugu, Kannada.	10

References:
- Bordwell, D., & Thompson, K. (2016). Film Art: An Introduction. McGraw Hill
- Giannetti, L. . Understanding Movies. Pearson; 13th edition (26 June 2013)
- Nowell-Smith, G. (Ed.). The Oxford History of World Cinema. Oxford University Press.
- Sharff, S. (1982). The Elements of Cinema.
- Ganti, T. (2004). Bollywood: A Guidebook to Popular Hindi Cinema. Psychology Press, 2004
- Rajadhyaksha, A., & Willemen, P. (2022). A Short History of Indian Cinema. Routledge.

LOGISTIC AND SUPPLY CHAIN MANAGMENT

COURSE CODE: U23COM2E01   **COURSE CREDIT: 02**

1 credit - 15 lectures
1 lecture is 60 minutes
Course Objectives:
1. To provide students with a basic understanding of concepts of logistics and supply chain management.
2. To introduce students to the key activities performed by the logistics function.
3. To understand global trends in logistics and supply chain management

Course Outcome:
After studying the course, students will be able to:
1. Understand the concepts of logistics and supply chain management.
2. Familiarize the students with logistic functions.
3. Identify the global trends in logistics and supply chain management.

Sr. No	Syllabus	No. of lectures
01	**Module 1: Overview of Logistics and Supply Chain Management** a) Introduction to Logistics Management • Meaning, Basic Concepts of Logistics- Logistical Performance Cycle, Inbound Logistics, In process Logistics, Outbound Logistics, Logistical Competency, Integrated Logistics, Reverse Logistics and Green Logistics • Objectives of Logistics, Importance of Logistics, Scope of Logistics, Logistical Functions/Logistic Mix, Changing Logistics Environment b) Introduction to Supply Chain Management • Meaning, Objectives, Functions, Participants of Supply Chain, Role of Logistics in Supply Chain, Comparison between Logistics and Supply Chain Management, Channel Management and Channel Integration c) Customer Service: Key Element of Logistics • Meaning of Customer Service, Objectives, Elements, Levels of customer service, Rights of Customers	15
02	**Module 2: Recent Trends in Logistics and Supply Chain Management** a) Elements of Logistics Mix: Transportation- Introduction, Factors Influencing Transportation Decisions, Modes of Transportation- Railways, Roadways, Airways, Waterways, Ropeways, Pipeline, Transportation Infrastructure Warehousing: Introduction, Factors affecting Warehousing. Materials Handling: Equipment's used for Materials Handling, Factors affecting Materials Handling Equipment's, Packaging: Objectives of Packaging, Types of Packaging Material b) Information Technology in Logistics: Introduction, Objectives, Role of Information Technology in Logistics and Supply Chain Management, Information Technology Infrastructure, Logistics in the Global Environment: Managing the Global Supply Chain, Impact of Globalization on Logistics and Supply Chain Management, Global Logistics Trends, Global Issues and Challenges in Logistics and Supply Chain Management	15

Reference Books:
1. David Simchi Levi, Philip Kaminshy, Edith Simchi Levi, Designing & Managing the Supply Chain - Concepts, Strategies and Case Studies Logistics
2. Donald Waters, An Introduction to Supply Chain
3. Martin Christopher, Logistics & Supply Chain Management - Strategies for Reducing Cost & Improving Services
4. Donald J. Bowersox & David J Closs, Logistical Management-The Integrated Supply Chain Process, McGraw Hill Education
5. Ronald H Ballou & Samir K Srivastava, Business Logistics/ Supply Chain Management-Pearson
6. Donald J Bowersox, David J Closs & M Bixby Cooper, Supply Chain Logistics Management- The McGraw Hill Companies.

Money, Inflation and Monetary Policy

COURSE CODE: U23BE2E01   **COURSE CREDIT: 02**
1 credit - 15 lectures
1 lecture is 60 minutes

Course Objectives:
- To familiarize students with the basic concepts of money, money supply and inflation.
- To orient students with the role of Central Bank and Monetary Policy in the economy.

Course Outcomes:
- Learners will be able to discuss the basic concepts of money, money supply and inflation.
- Learners will be able to recognize the role of Central Bank and interpret the working of the Monetary Policy in the economy.

Sr. No	Syllabus	No. of lectures
01	**MODULE I: Money and Inflation** Money: Concept, Functions of money, Evolution of money. Money Supply: Determination, Measurement, Value of money & Purchasing power. Inflation: Meaning, Types- Single-digit, double-digit, Headline inflation, Core inflation, Retail inflation. Causes- Demand-pull and Cost-push inflation, Effects of inflation in the economy Related case studies.	15
02	**MODULE II: Central Banking and Monetary Policy** Central Bank: Meaning, Central Banking in India-Role and Functions of RBI- Banker to the Government, Bankers' Bank, Custodian of Foreign Exchange Reserves, Regulator of Financial System and Controller of Credit. Monetary Policy- Meaning, Objectives, Instruments of Monetary Policy- Quantitative and Qualitative- Mechanism and Effectiveness, related case studies. Monetary Policy and Inflation Targeting. Related case studies.	15

References:
1. Ackley.G (1976), Macro Economic Theory and Policy, Macmillan Publishing Co. New York
2. Ahuja. H.L., Modern Economics — S.Chand Company Ltd. New Delhi.
3. Blanchard Olivier (2000), Macro Economics, Englewood Elitt, Prentice Hall
4. Dornbush , Rudiger, Fisher Stanley and Startz, Richards Macroeconomics, Nineth edition 2004 Tata-Mac Graw Hill, New Delhi.
5. Dwivedi, D.N. (2001), Macro Economics: Theory and Policy, Tata-Mac Graw Hill, New Delhi.
6. Gregory .N. Mankiw, Macroeconomics, Fifth Edition (2002) New York:Worth Publishers
7. Jhingan, M.L., Principles of Economics — Vrinda Publications (P) Ltd.
8. Shapiro, E (1996), Macro-Economic Analysis , Galgotia Publication, New Delhi.
9. Vaish .M.C. (2010) Macro Economic Theory 14th edition, Vikas Publishing House(P)Ltd

Advanced Python Programming

COURSE CODE: U23CS2VSC01   **COURSE CREDIT: 01**

1 credit - 15 lectures
1 lecture - 60 minutes
Course Objectives:
- To know about use of regular expression and to design GUI Programs also to learn about reading, writing and implementing other operation on files in Python and to implement database interaction using Python.

Course Outcomes:
- Ability to implement regular expression and designing GUI in Python as well as ability to work with files and perform operations on it using Python and knowledge of working with databases.

Sr. No	Syllabus	No. of lectures
01	Regular expressions: What is a regular expression? sequence characters in regular expressions, quantifiers in regular expressions, special characters in regular expressions, using regular expression on files, retrieving information from an html file. Graphical user interface: Creating a GUI in python, Widget classes, Working with Fonts and Colours, working with Frames, Layout manager, Event handling Working with files: Files, opening and closing a file, working with text files containing strings, knowing whether a file exists or not, working with binary files, the "with" statement, the seek() and tell() methods, random accessing of binary files, zipping and unzipping files, working with directories, running other programs from python program Database in python: Using SQL with python, retrieving rows from a table, inserting rows into a table, deleting rows from a table, updating rows in a table, creating database tables through python, Exception handling in databases.	15

Textbooks:
1. Paul Gries , Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 3rd Edition, 2018
2. Programming through Python, M. T Savaliya, R. K. Maurya, G M Magar, Revised Edition, Sybgen Learning India, 2020

Additional References:
1. Advanced Python Programming, Dr. Gabriele Lanaro, Quan Nguyen, SakisKasampalis, Packt Publishing, 2019
2. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018
3. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018

Advanced Python Programming Practical
COURSE CODE: U23CS2VSCP01   **COURSE CREDIT: 01**
1 credit - 2 lectures
1 lecture - 60 minutes

Sr. No.	List of Practical's
1	Write a Python program to demonstrate use of regular expression To display last four characters. To display the substring starting from index 4 and ending at index 8. To check whether string has alphanumeric characters or not.
2	Write a Python program for following To trim the last five characters from the string. To trim the first four characters from the string. To display the starting index for the substring "wa".
3	Write a Python program for following To change the case of the given string To check if the string is in title case To replace all the occurrences of letter 'a' in the string with '*'
4	Write a GUI Program in Python to design application that demonstrates Different fonts and colors
5	Write a GUI Program in Python to design application that demonstrates Different Layout Managers
6	Write a GUI Program in Python to design application that demonstrates Event Handling
7	Write a program to Python program to read entire text file.
8	Write a program to Python program to append text to a file and display the text.
9	Write a program to Python program to read last n lines of a file.
10	Write a Python Program to work with databases in Python to perform operations such as a. Connecting to database b. Creating and dropping tables.
11	Write a Python Program to Insert and update into tables.
12	Write a Python Program to create a table to store the student roll no., student name, class, phone number and insert records into the table.

Object-Oriented Analysis and Design

COURSE CODE: U23CS2SEC01   **COURSE CREDIT: 02**

1 credit - 15 lectures
1 lecture is 60 minutes
Course Objectives:

- Understand the importance of OOP approach over procedural language.

Course Outcomes:

- Ability to implement the concepts of OOPS like encapsulation, inheritance, and polymorphism.

Sr. No.	Syllabus	No. of lectures
01	Introduction to Programming Concepts: Object oriented programming paradigm, basic concepts of object oriented programming, benefits of object oriented programming Classes, Abstraction & Encapsulation: Classes and objects, Dot Operator, data members, member functions, passing data to functions, scope and visibility of variables in function. Constructors and Destructors: Default constructor, parameterized constructor, copy constructor, private constructor, destructors. Polymorphism - Binding-static binding & overloading, constructor overloading function overloading, operator overloading, overloading unary and binary operators. Inheritance: Defining base class and its derived class, access specifies, types of inheritance-single, multiple, hierarchical, multilevel, hybrid inheritance. Run time Polymorphism - Dynamic Binding, Function overriding, virtual function, pure virtual function, virtual base class, abstract class.	15

Textbooks:

1. Object Oriented Programming with C++, Balagurusamy E., 8th Edition, McGraw Hill Education India.
2. UML & C++: A Practical Guide to Object Oriented Development, Lee/Tepfenhart, Pearson Education, 2nd Edition2015

Additional References:

1. Mastering C++ by Venugopal, Publisher: McGraw-Hill Education, 2017
2. Let Us C++ by KanetkarYashwant, Publisher: BPB Publications, 2020
3. Object Oriented Analysis and Design by Timothy Budd TMH, 2001

Practical of Object-Oriented Analysis and Design

COURSE CODE: U23CS2SECP01   **COURSE CREDIT: 01**

1 credit - 30 lectures
1 lecture is 60 minutes
2 lecture per week

Sr. No	Syllabus
1	Program to demonstrate use of data members & member functions.
2	Programs based on branching and looping statements using classes
3	Program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
4	Programs to demonstrate various types of constructors and destructors.
5	Programs to demonstrate use of public, protected & private scope specifies.
6	Programs to demonstrate single level inheritance
7	Programs to demonstrate multilevel inheritance
8	Programs to demonstrate multiple inheritance.
9	Programs to demonstrate hierarchical inheritance
10	Programs to demonstrate inheritance and derived class constructors
11	Programs to demonstrate function overloading
12	Programs to demonstrate function overriding

Effective Communication Skills-2

COURSE CODE: U23COM2AEC01   **COURSE CREDIT: 02**

1 credit - 15 lectures
1 lecture is 60 minutes

Course Objectives:
1. To develop effective interpersonal skills among learners for corporate employability.
2. To develop effective business letter writing skills among students applicable in corporate world.
3. To develop professional skills among learners for better personality development.

Course Outcomes:
1. Learner will be able to apply interpersonal skills for better employability.
2. Learner will be able to utilize effective business letter writing skills required in corporate world.
3. Learner will be able to use specified oral and written skills for the professional development.

Sr. No	Syllabus	No. of lectures
01	Module-1.Group Communication Interview Skills: Preparing for Interview, Types of Interviews, Group Discussion: Nature and Ingredients, Process and Preparation, Corporate Meetings: Theory, Group Dynamics, Process of Conducting Meeting, Notice, Agenda and Minutes of Meeting, Conference: Types, Organization, Advanced Methods of conducting conferences	10
02	Module-2.Business Correspondence -2 Trade Letters: Inquiry Letter, Complaint Letter, Adjustment Letter, Sales Letter, RTI and Consumer Grievance Letter ,Report Writing: Types of Report, Format of Report, Investigative Report, Feasibility Report	10
03	Module-3. Language and Writing Skills Presentation Skills: Principles of Effective Presentation, Effective use of OHP, Use of PPT, Summarization: Identification of main points and sub points, Presenting in cohesive manner, Paraphrasing and summarizing,	10

Reference Books:

1. A Handbook of Commercial Correspondence by Ashley, A, Oxford University Press, 1992.
2. Basic Business Communication: Skills for Empowering the Internet Generation by Raymond Lesikar and Marie Flatley,9th Edition, Tata McGraw Hill, New Delhi,2002.
3. Business Communication by D Chaturvedi and Mukesh Chaturvedi, Third Edition, Pearson Publications Ltd,2013.
4. Business Communication by Meenakshi Raman and Prakash Singh ,Oxford University Press,2007.
5. Business Communication Strategies by Monippally, Matthukutty, M,Tata McGraw Hill New Delhi,2001.
6. Effective Business Communication by Herta Murphy, Herbert Hildebrandt,,Jane Thomas,Mc Graw Hill Education,2009.
7. Effective Communication by Balan K.R. and Rayadu C.S., Beacon Publication, New Delhi, 1996.
8. Effective Technical Communication by M.Ashraf, Rizvi,Mc Graw Hill Publications,2006.

Sustainability Development with Green IT

 COURSE CODE: U23CS2VEC01   **COURSE CREDIT: 02**

1 credit - 15 lectures
1 lecture is 60 minutes
Course Objectives:
- Know about Green IT Fundamentals: Business, IT, and the Environment
- Green IT Strategies and Significance of Green IT Strategies
- Green Enterprise Architecture and Green Information Systems

Learning Outcomes:
- After successful completion of this course, students would be able to
- Explain drivers and dimensions of change for Green Technology
- Appreciate Virtualization; smart meters and optimization in achieving green IT
- Gain knowledge about green assets, green processes, and green enterprise architecture

Unit	Syllabus	No. Of lectures
01	Green IT Overview: Introduction, Environmental Concerns and Sustainable Development, Environmental Impacts of IT, Green I , Holistic Approach to Greening IT, Greening IT, Applying IT for Enhancing Environmental Sustainability,Green IT Standards and Eco-Labelling of IT , Enterprise Green IT Strategy, Green Washing, Green IT: Burden or Opportunity? Green Devices and Hardware: Introduction , Life Cycle of a Device or Hardware, Reuse, Recycle and Dispose Green Software: Introduction , Processor Power States, Energy-Saving Software Techniques, Evaluating and Measuring Software Impact to Platform Power Sustainable Software Development: Introduction, Current Practices, Sustainable Software, Software Sustainability Attributes, Software Sustainability Metrics, Sustainable Software Methodology, Defining Actions	15
02	Green Data Centers: Data Centers and Associated Energy Challenges, Data Centre IT Infrastructure, Data Centre Facility Infrastructure: Implications for Energy Efficiency, IT Infrastructure Management, Green Data Centre Metrics Green Data Storage: Introduction, Storage Media Power Characteristics, Energy Management Techniques for Hard Disks, System-Level Energy Management Green Networks and Communications: Introduction, Objectives of Green Network Protocols, Green Network Protocols and Standards Enterprise Green IT Strategy: Introduction, Approaching Green IT Strategies, Business Drivers of Green IT Strategy, Business Dimensions for Green IT Transformation.	15

Textbooks:
1. Green IT Strategies and Applications Using Environmental Intelligence, BhuvanUnhelkar, CRC Press, 2016
2. Green Information and Communication Systems for a Sustainable Future, Rajshree Srivastava, Sandeep Kautish, Rajeev Tiwari. CRC Press, 2020

Additional References:
1. Emerging Green Technologies, Matthew N. O. Sadiku, Taylor and Francis (CRC Press), 2022
2. Sustainability Awareness and Green Information Technologies, TomayessIssa, Springer, 2021
3. Environmental Sustainability Role of Green Technologies, P. Thangavel, and G. Sridevi, Springer, 2016

Co –Curricular Course in Cultural Activities

Course Code: U23NSS2CC01   **Course Type: Co-curricular**   **Credits: 2**

Course Objectives:

The syllabus is aimed to achieve the following objectives:

1. To train students in skills to plan, manage and implement various types of events and to enable them to effectively undertake any activity in the real world.
2. To develop a sense of discipline and commitment as an educated individual towards the society.
3. To develop social values respecting differences among individuals, respecting diverse value and cultures.

Learning Outcome:

The learners will be able to:

1. Learner will be able to solve problems utilizing various concepts, solutions etc.
2. Learner will be able to understand the power of expressions listening to others, public speaking.
3. Learner will be able to take initiatives and responsibilities, influencing others in working for a good purpose, taking accountability.

Unit No.	Topic	No. of Lectures required
Unit I	Theory 1. Event Communication & Presentation Skills. 2. Special Events, Research & Planning 3. Advance Event Accounting & Costing 4. Event Marketing, Advertising & PR 5. Event Production & Logistics	05
Unit II	Training 1. Event Communication & Presentation Skills. 2. Special Events, Research & Planning 3. Advance Event Accounting & Costing 4. Event Marketing, Advertising & PR 5. Event Production & Logistics	05
Unit III	Department level Cultural activities/Performances	15
Unit IV	Report Writing and Operations and Marketing	05
	TOTAL (HOURS)	30

	Semester – I
Course Name: CC in Cultural Activities	Course Code: U23CA2CC01
Course Type	Co-curricular
Focuses on	Skill Development
Caters to	Local
Total Lectures per week (1 Period is 60 minutes)	1
Credits	2

References:

1. S.N. Maheshwari, Cost Accounting
2. B.M. Lal, Cost Accounting
3. Senge, Peter : The Learning Organization
4. Successful Event Management By Anton Shone & Bryn Parry
5. Event management, a professional approach By Ashutosh Chaturvedi

Co –Curricular Course in DLLE

Course Code: U23NSS2CC01 **Course Type: Co-curricular** **Credits: 2**

Course Objectives:

The syllabus is aimed to achieve the following objectives:

CO 1: To promote unexplored career opportunities and a knowledge-based society to the unreached.

CO 2: To enhance students' skills in terms of employment.

CO 3: To enhance skills for students to face life challenges, develop business at a small scale, and earn a source of income.

CO 4: To promote a humanitarian approach amongst the learners and provide their service in the society

CO 5: A learner would become aware of the importance of responsibilities towards community engagement and get actively involved in the upliftment of society with selfless contribution

CO 6: The purpose of this course is to have students create a community project as a means of synthesizing, integrating, and applying the foundational and concentrated curriculum working in small groups and coordinating one with other agencies.

CO 7: To introduce the multidisciplinary approach to environmental education and its importance to the young generation and enable students to create resource materials to promote an environmentally conservative approach in society.

CO 8: To educate students about environmental awareness and sensitivity and encourage collaboration with the community to repair human-made damage and preserve the environment for future generations.

CO 9: The participants will be actively involved in creating awareness about the Fundamental Rights and Duties of every citizen.

CO10: The participants will create visual aids to propagate and promote civic sense in all parts of society and express what they have learned through street plays and rallies.

CO11: To spread awareness and educate consumers about their rights before and after purchase.

CO12: To understand the level of knowledge regarding the Consumer Protection Act in society..

Learning Outcome:

The learners will be able to:

CO 1: It will enable students to connect and understand the social realities and work for social welfare

CO 2: It would help students to enhance leadership skills and apply them in their careers. CO 3: Students will be more aware of the practicality of real life and can face challenges in a better way

CO 4: Students will be equipped with basic knowledge about environmental education and sustainability.

CO 5: The students will be able to apply the knowledge for employment in the future.

CO 6: Students will be able to connect to the unreached section of society and help them.

Name of the Project	Syllabus and Project-based activity	No. of Lectures Required
Vocational Career-Oriented Projects		
1. Career Project CP.	• Different career paths • Developing communication skills • Building a CV • Enhancing skills for interview • Developing profiles on online job portals Students are expected to select a career path and interview in their respective fields and organize charts showing different aspects related to careers. • Students are expected to prepare a booklet/pamphlet on careers and prepare a report	30
2. Anna Poorna Yojana [APY]	• Anna Poorna Yojana (APY) – meaning and importance, problems and prospects in setting up of business. • Computation of Cost and preparation of Cost sheet. • Preparation of Basic Income/ profit and loss statement. • Business model - B to B and B to C • Project activities - Food preparation and selling through stalls, street play, Selling items at the community level, celebrating festivals with NGO, Awareness of food waste management.	30
Community Oriented Projects		
1. Population Education	• Understanding community-related issues around the region and developing a sensitive approach towards society • Engage in community partnership practices and provide leadership in promoting changes to improve community well-being, Community engagement, and leadership • Students are expected to engage in different activities based on the project in the form of Street play, Seminar, Poster competition, Essay writing, Creative Writing competition, Elocution Discussion, act plays Composing songs, Powada, Rally, Exhibition, Video, Short film presentation, Waste collection drive, Environment awareness campaign	30
2. Environment Education EC	• Understanding the basic environmental issues in society and the importance of Environmental Education. • Environmental Awareness program with solutions by with concept of Sustainable Development Goals Project activities: Students are expected to conduct community-level awareness programs by distributing pamphlets, conducting street plays, and participating in various drives like Tree plantation, cleanliness drive, waste	30

	recycling drive energy, water conservation	
3. Citizenship Education Project(CEP).	• Constitution of India: Preamble, Article 51A Fundamental Rights and Duties of every citizen. Educational Institutions as agents for community development. • Preparation of Guidelines for Civic sense in public places and displaying them through posters, placards, and charts. • Project Activities: Street play, Civic Sense Rally, Essay writing, Case Study, Oath taking, Poster Making, Slogan writing.	30
4. Consumer Guidance (CG)	• Significance of consumer guidance. • Different consumer rights. • Details on Consumer Protection Act. • Role of Government in Consumer Protection. Consumer protection councils and redressal mechanisms. • Students need to work in groups of five to eight to organize the program by inviting resource persons and arranging field visits	30

ALLOCATION OF HOURS FOR PARTICIPATION IN EXTENSION WORK

SR NO	EXTENSION ACTIVITIES	TOTAL HOURS
1	Training	10
2	College/ Community level activities	20
TOTAL		**30**

National Service Scheme (NSS) Studies Paper-I

Course Code: U23NSS2CC01   **Course Type: Co-curricular**   **Credits: 2**

Course Objectives:

The syllabus is aimed to achieve the following objectives:

1. To understand the Working, Framework and Contribution of NSS.
2. To Concept of Social Justice and its Importance
3. To understand themselves in relation to their community.
4. To identify the needs and problems of the community and involve them in problem solving.
5. To develop among themselves a sense of social and civic responsibility.
6. To utilize their knowledge in finding practical solutions to individual and community problems.

Learning Outcome:

The learners will be able to:

1. To understand Structural framework of NSS from National Level to College Level
2. Define Social Justice and how it helps the community
3. Enabling the students to contribute towards development of Community
4. Get involved in community betterment and active problem solving
5. Better Sense of social and civic responsibility. Have a better sense of Reduce, Recycle and Reuse
6. Collaborate and Work towards Solving Individua and Community Problems.

Unit No.	Topic	No. of Lectures required
I	Introduction to National Service Scheme (NSS) Formation and development of NSS in India Structural framework of NSS from National Level to College Level Objectives of NSS Symbol and Moto of NSS and its meaning Basic Social Issues in India (Family System, Division of labour, Cast System in India, Gender Issues, Regional Imbalance)	5
II	Introduction to Social justice Social Justice – the Concept and its features, Contribution for Social Justice – Mahatma Jyotiba Phule, Dr. Babasaheb Ambedkar, Shahu Maharaj, Chhatrapati Shivaji Maharaj, Savitribai Phule.	5
III	Suggested Projects: Environment awareness – Waste management & segregation, Reduce, Reuse & Recycle, Organic waste management by composting (maintenance of compost project) Volunteering at study centers managed by Stree Mukti Sanghatana	20
	Total Lectures	**30**

	Semester – I
Course Name: National Service Scheme (NSS)	Course Code:
Course Type	Co-curricular
Focuses on	Skill Development
Caters to	Local, National, Global
Total Lectures per week (1 Period is 60 minutes)	2 (TBD)
Credits	2

References:
1.   National Service Scheme Manual (Revised) Government of India, Ministry of Youth Affairs and Sports, New Delhi
2.   National Service Scheme Manual University of Mumbai
3.   National Service Scheme Manual for NSS District Coordinators National Service Scheme Cell, Dept. of Higher and Technical Education, Mantralaya
4.   Rashtriya Seva Yojana Sankalpana Prof. Dr. Sankey Chakane, Dr. Pramod Diamond Publication, Pune
5.   Annual Report of National Service Scheme (NSS) Dept. of Higher and Technical Education Mantralaya. Dept. of Higher and Technical Education Mantralaya.
6.   Training Programme on National Programme scheme, TISS.
7.   Orientation Courses for N.S.S. Programme officers, TISS.
8.   Social Problems in India, Ram Ahuja.
9.   National Service Scheme in India : A Case Study of Karnataka, M. B. Dishad, Trust Publications, 2001
10.   http://www.thebetterindia.com/140/national-service-scheme-nss/
11.   http://en.wikipedia.org/wiki/national-service-scheme
12.   http://nss.nic.in/adminstruct
13.   http://nss.nic.in/propexpan
14.   http://nss.nic.in
15.   http://socialworkness.org/about.html

Co –Curricular Course in Sports

Course Code: U23PE2CC01   **Course Type: Co-curricular**   **Credits: 2**

Objectives of the course
1) To gain understanding of the learner's preferred game and sport.
2) To master various physical fitness routines for daily use in order to maintain a healthy lifestyle.
3) To determine one's degree of physical fitness by calculating a fitness index.
4) To comprehend diverse ways of physical training.
5) To encourage the student to participate in sports/games for general personality development.

COURSE OUTCOMES:
1) After completing the course, the learner will be able to: Understand the fundamental concepts of Physical Education, health, and total well-being.
2) Recognise the significance of physical activity in maintaining a healthy lifestyle.
3) Discover the benefits of physical activity on various bodily systems and the most basic method of maintaining and enhancing health.
4) Encourage students to participate in physical activities, sports, or games.
5) Make people aware of the relevance of sports and physical education in their daily lives for physical and mental well-being.

SR.NO.	COURSE CONTENT	HOURS
1	**Physical Education** Introduction of Physical Education History of Physical Education - Vedic period - Indus Valley civilization - Rome, Greece Foundation of Physical Education Principles of Physical Education	05
2	**Health** Physical fitness Components of HRPF Components of SRPF Factors affecting fitness and wellness	10
3	**Indigenous games in India** Kabaddi Kho kho Tug of war One leg hops step jump Seven stones (Any 2 games only)	15
	Total no. of hours	**30**

SCHEME OF THEORY and PRACTICALS EXAMINATION

I. MAJOR - (4 credit)

The scheme of examination shall be divided into two parts:
- **Internal assessment 40% i.e. 40 marks**
- **Semester end examination 60% i.e. 60 marks**

(A) Internal Assessment 40 marks

Description	Marks
Internal test of 20 marks Q.1 Multiple choice Questions / True or False - 10 Marks Q.2 Attempt 2 questions out of 3 questions (5 marks each)- 10 Marks	20
One Project and Viva voce / Presentation / Case studies / Assignments Poster Making / Quiz / Role Play / Subject Specific Activities	15
Attendance and Class behavior	05
Total	40

(B) Semester end examination 60 marks PAPER PATTERN

Duration: 2 hours			
Total Marks: 60			
All Questions are Compulsory			
Question	**Based on**	**Options**	**Marks**
Q. 1	Unit 1	A or B and P or Q	15
Q. 2	Unit 2	A or B and P or Q	15
Q. 3	Unit 3	A or B and P or Q	15
Q. 4	Unit 1,2,3	A or B and P or Q	15
Total			60

Note:
Q.1, 2, 3 and 4 may be divided into sub questions with internal choice if required.

- Passing criteria: Minimum 40% in Internal (16 out of 40) and 40% (24 out of 60) in semester end examination.

II. MINOR - (2 credit)

The scheme of examination shall be divided into two parts:

- **Practical assessment 40% i.e. 20 marks**
- **Semester end examination 60% i.e. 30 marks**

(A) Practical Assessment 20 marks

Description	Marks
One question of 10 marks practical	10
Journal	5
Viva	5
Total	20

(B) Semester end examination 30 marks PAPER PATTERN

Duration: 1 hours	
Total Marks: 30	
Description	**Marks**
Q.1 10 marks OR 10 marks	10
Q.2 10 marks OR 10 marks	10
Q.3 10 marks OR 10 marks	10
Total	30
Note: 1. Q.1, 2, 3 may be divided into sub questions if required. 2. Q.3 May include theory (short notes) /Case Study in one of the options.	

- **Passing criteria: Minimum 40% in Internal (08 out of 20) and 40% (12 out of 30) in semester end examination.**

III. VOCATIONAL COURSE (VSC) & SKILL ENHANCEMENT COURSE (SEC)

The scheme of examination shall be divided into two parts:

- **Practical assessment 40% i.e. 20 marks**
- **Semester end examination 60% i.e. 30 marks**

(A) Practical Assessment 20 marks

Description	Marks
One question of 10 marks practical	10
Journal	5
Viva	5
Total	20

(B) Semester end examination 30 marks PAPER PATTERN

Duration: 1 hours	
Total Marks: 30	
Description	**Marks**
Q.1 10 marks OR 10 marks	10
Q.2 10 marks OR 10 marks	10
Q.3 10 marks OR 10 marks	10
Total	30
Note: 3. Q.1, 2, 3 may be divided into sub questions if required. 4. Q.3 May include theory (short notes) /Case Study in one of the options.	

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

IV. ABILITY ENHANCEMENT COURSE(AEC) / VALUE EDUCATIONCOURSE (VEC)

The scheme of examination shall be divided into two parts:
- **Internal assessment 40% i.e. 20 marks**
- **Semester end examination 60% i.e. 30 marks**

Question Paper Pattern

(A) Internal Assessment: Total 20 Marks

Description	Marks
Internal Test Q.1 Multiple choice Questions/True or False - 5 Marks Q.2. Attempt 1 question out of 3 questions- 5 Marks	10 Marks
Assignment/Presentation/Group Discussion/Role Play/Mock Interviews / Subject Specific Activities	05 Marks
Attendance	05 Marks

(B) Theory Exam, Total Marks: 30 Marks

Description	Marks
Descriptive Question OR Short Notes 2 out of 3 (5 Marks each) From Unit 1	10 Marks
Descriptive Question OR Short Notes 2 out of 3 (5 Marks each) From Unit 2	10 Marks
Descriptive Question OR Short Notes 2 out of 3 (5 Marks each) From Unit 1,2	10 Marks

V. CO-CURRICULAR COURSES
CC in Cultural Activities

- **The scheme of Examination shall be divided as follows.**
- **Continuous Evaluation Pattern**

Description	Marks
30 hours activity related work such as • Attending lectures/ training sessions • Seminars, Conference	10 10
Maintenance of work records and presentation of activity report	10
Test/ Discussion/ Presentations /Viva-voce by faculty in charge	10
Total	**50**

CC in DLLE

- **Evaluation of 50 marks:**
- **Continuous evaluation pattern.**

Evaluation Criteria	Marks
Participation in social activity	10
Field visit/ community visit and report	10
Essay/ assignment /poster and report	10
Test/discussion/presentation and viva	10
Attendance in seminar /workshop & Training session	10
Total	**50**

CC in NSS

- **The scheme of Examination shall be divided as follows.**
- **Continuous Evaluation Pattern**

Description	Marks
30 hours activity related work such as • Attending lectures/ training sessions • Field work • Maintenance of work record	30
Project Report	10
Viva-voce by faculty in charge and attendance	10
Total	**50**

CC in Sports

- **The scheme of Examination shall be divided as follows.**
- **Continuous Evaluation Pattern (50 Marks):**

1. 30 Hours of Practice (25 Marks) Sports training/practice/coaching sessions on a regular basis (choose any game/sport).

(If a learner participates in training/practice/coaching sessions/camps organised by other organisations or clubs of sports and games, the proof of attendance and participation presented by a learner may be considered for evaluation.)

2. Participation in the organisation of sporting events, workshops, seminars, and so on - 5 hours (15 marks)

3. Participation/performance in sports events at the State, National, International, University, and Intercollegiate levels. 5 hours approx. (10 marks)

SCHEME OF PRACTICAL EXAMINATION (4 credit)

The scheme of Practical examination shall be
● Practical assessment carries 50 Marks : 40 marks +
05 marks (journal)+ 05 marks(viva)
● Minimum 75 % practical are required to be completed
and written in the journal. (Certified Journal is compulsory
for appearing at the time of Practical Exam)

(A) Practical Assessment 50 marks

Description	Marks
Two questions of practical (20 marks each)	40
Journal	5
Viva	5
Total	50

• **Passing criteria: Minimum 40% in Practical (20 out of 50)**

SCHEME OF PRACTICAL EXAMINATION (2 credit)

The scheme of Practical examination shall be
• Practical assessment carries 20 Marks : 10 marks + 05 marks (journal)+ 05marks(viva)
• Minimum 75 % practical are required to be completed and written in the journal.(Certified Journal is compulsory for appearing at the time of Practical Exam)

(A) Practical Assessment 10 marks

Description	Marks
One question of 10 marks practical	10
Journal	5
Viva	5
Total	20

SCHEME OF EXAMINATION
EFFECTIVE COMMUNICATION

The scheme of examination shall be divided into two parts:
- Internal assessment 40% i.e. 20 marks
- Semester end examination 60% i.e. 30 marks

(A) Internal Assessment 20 marks

Description	Marks
Internal tests of 10 marks each Q.1 Multiple choice Questions - 05 Marks Q.2. Attempt 01 questions out of 3 questions (5 marks each)- 05 Marks	10
Role Plays /Group Discussion/Mock Interviews/Presentation/Case studies/Assignments	5
Attendance and Class behavior	5
Total	20

B) Semester end examination 30 marks

Question no.1	A) Descriptive Question OR B) Short Notes -2 out of 3 (5 Marks each) Module no.1	10 Marks
Question no.2	A) Descriptive Question OR B) Short Notes-2 out of 3 (5 Marks each) Module no.2	10 Marks
Question no.3	A) Descriptive Question OR B) Short Notes-2 out of 3 (5 Marks each) Module no.3	10 Marks

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

The scheme of examination shall be divided into two parts:
- Internal assessment 40% i.e.20 marks
- Semester end examination 60% i.e.30 marks

(A) **Internal Assessment 20 marks**

Description	Marks
Internal test of 10 marks Q.1. Attempt 2 questions out of 4 questions (5 marks each)- 10 Marks	10
One Project and Viva voce/Presentation/Case studies/Assignments	10
Total	20

(B) Semester end examination 30 marks

Duration : 1 hour	
Total Marks: 30	
Q.1 Attempt Q1 a) or b)- 10 marks Attempt Q2 a) or b)- 10 marks Attempt Q3 a) or b)- 10 marks	10 10 10
Total	30