

University of Mumbai

वेबसाईट - mu.ac.in

ईमेल - आयडी - dr.aams@fort.mu.ac.in
aams3@mu.ac.in



विद्याविषयक प्राधिकरणे
सभा आणि सेवा विभाग (ए.ए.एम.एस)
रूम नं. १२८ एम.जी.रोड, फोर्ट,
मुंबई - ४०० ०३२
टेलिफोन नं - ०२२ - ६८३२००३३

(नॅक पुनर्मूल्यांकनाद्वारे ३.६५ (सी.जी.पी.ए.) सह अ++ श्रेणी
विद्यापीठ अनुदान आयोगाद्वारे श्रेणी १ विद्यापीठ दर्जा)

क्र.वि.प्रा.स.से./आयसीडी/२०२५-२६/३७

दिनांक : २७ मे, २०२५

परिपत्रक:-

सर्व प्राचार्य/संचालक, संलग्नित महाविद्यालये/संस्था, विद्यापीठ शैक्षणिक विभागांचे संचालक/ विभाग प्रमुख यांना कळविण्यात येते की, राष्ट्रीय शैक्षणिक धोरण २०२० च्या अमलबजावणीच्या अनुषंगाने शैक्षणिक वर्ष २०२५-२६ पासून पदवी व पदव्युत्तर अभ्यासक्रम विद्यापरिषदेच्या दिनांक २८ मार्च २०२५ व २० मे, २०२५ च्या बैठकीमध्ये मंजूर झालेले सर्व अभ्यासक्रम मुंबई विद्यापीठाच्या www.mu.ac.in या संकेत स्थळावर NEP २०२० या टॅब वर उपलब्ध करण्यात आलेले आहेत.

मुंबई - ४०० ०३२
२७ मे, २०२५


(डॉ. प्रसाद कारंडे)
कुलसचिव

Copy forwarded for information and necessary action to :-	
1	The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Dept)(AEM), dr@eligi.mu.ac.in
2	The Deputy Registrar, Result unit, Vidyanagari drresults@exam.mu.ac.in
3	The Deputy Registrar, Marks and Certificate Unit,. Vidyanagari dr.verification@mu.ac.in
4	The Deputy Registrar, Appointment Unit, Vidyanagari dr.appointment@exam.mu.ac.in
5	The Deputy Registrar, CAP Unit, Vidyanagari cap.exam@mu.ac.in
6	The Deputy Registrar, College Affiliations & Development Department (CAD), deputyregistrar.uni@gmail.com
7	The Deputy Registrar, PRO, Fort, (Publication Section), Pro@mu.ac.in
8	The Deputy Registrar, Executive Authorities Section (EA) eau120@fort.mu.ac.in He is requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to the above circular.
9	The Deputy Registrar, Research Administration & Promotion Cell (RAPC), rapc@mu.ac.in
10	The Deputy Registrar, Academic Appointments & Quality Assurance (AAQA) dy.registrar.tau.fort.mu.ac.in ar.tau@fort.mu.ac.in
11	The Deputy Registrar, College Teachers Approval Unit (CTA), concolsection@gmail.com
12	The Deputy Registrars, Finance & Accounts Section, fort draccounts@fort.mu.ac.in
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14	The Assistant Registrar, Administrative Sub-Campus Thane, thanesubcampus@mu.ac.in
15	The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan, ar.seask@mu.ac.in
16	The Assistant Registrar, Ratnagiri Sub-centre, Ratnagiri, ratnagirisubcentar@gmail.com
17	The Director, Centre for Distance and Online Education (CDOE), Vidyanagari, director@idol.mu.ac.in
18	Director, Innovation, Incubation and Linkages, Dr. Sachin Laddha pinkumanno@gmail.com
19	Director, Department of Lifelong Learning and Extension (DLLE), dlleuniversityofmumbai@gmail.com

Copy for information :-	
1	P.A to Hon'ble Vice-Chancellor, vice-chancellor@mu.ac.in
2	P.A to Pro-Vice-Chancellor pvc@fort.mu.ac.in
3	P.A to Registrar, registrar@fort.mu.ac.in
4	P.A to all Deans of all Faculties
5	P.A to Finance & Account Officers, (F & A.O), camu@accounts.mu.ac.in

To,

1	The Chairman, Board of Deans pvc@fort.mu.ac.in
2	Faculty of Humanities, Offg. Dean 1. Prof.Anil Singh Dranilsingh129@gmail.com Offg. Associate Dean 2. Prof.Manisha Karne mkarne@economics.mu.ac.in 3. Dr.Suchitra Naik Naiksuchitra27@gmail.com
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3	Chairman, Board of Studies,
4	The Director, Board of Examinations and Evaluation, dboee@exam.mu.ac.in
5	The Director, Board of Students Development, dsd@mu.ac.in DSW directr@dsd.mu.ac.in
6	The Director, Department of Information & Communication Technology, director.dict@mu.ac.in

As Per NEP 2020

University of Mumbai



Syllabus for Major Vertical – 1 & 4

Name of the Programme – B.Sc. (Information Technology)		
Faculty of Science and Technology		
Board of Studies in Information Technology		
U.G. Second Year Programme	Exit Degree	U.G. Diploma in Information Technology
Semester	III & IV	
From the Academic Year	2025-26	

University of Mumbai



(As per NEP 2020)

Sr. No.	Heading	Particulars
1	Title of program O: _____	B.Sc. (Information Technology)
2	Exit Degree	U.G. Diploma in Information Technology
3	Scheme of Examination R: _____	NEP 40% Internal 60% External, Semester End Examination Individual Passing in Internal and External Examination
4	Standards of Passing R: _____	40%
5	Credit Structure R. SU-510C R. SU-510D	Attached herewith
6	Semesters	Sem. III & IV
7	Program Academic Level	5.00
8	Pattern	Semester
9	Status	New
10	To be implemented from Academic Year	2025-26

Sd/-

Sign of the BOS
Chairman
Dr. Srivaramangai R
BOS in Information
Technology

Sd/-

Sign of the
Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science &
Technology

Sd/-

Sign of the Offg. Dean
Prof. Shivram S. Garje
Faculty of Science &
Technology

Under Graduate Diploma in Information Technology

Credit Structure (Sem. III & IV)

(B. Sc.)- Major & Minor

	R. SU-510C									
Level	Semester	Major		Minor	OE	VSC, SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC,RP	Cum. Cr. / Sem.	Degree/ Cum. Cr.
		Mandatory	Electives							
5.0	III	8	...	4	2	VSC:2,	AEC:2	FP: 2	22	UG Diploma 88
		Python Programming				APPLIED MATHEM ATICS	CC:2			
		DATA STRUCTURES								
		Operating System								
		Major Practical 3								
		R. SU-510D								
	IV	8	...	4	2	SEC:2	AEC:2	CEP: 2	22	
		Core Java				Comput er Graphics	CC:2			
		Software Engineering				OR Mobile Program ming				
		Computer Networks								
		Major Practical 4								
	Cum Cr.	28		10	12		6+6	8+4+2	8+2+2	
Exit option; Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor										

[Abbreviation - OE – Open Electives, VSC – Vocation Skill Course, SEC – Skill Enhancement Course, (VSEC), AEC – Ability Enhancement Course, VEC – Value Education Course, IKS – Indian Knowledge System, OJT – on Job Training, FP – Field Project, CEP – Continuing Education Program, CC – Co-Curricular, RP – Research Project]

Sem. - III

Vertical – 1 Major

Syllabus

B.Sc. (Information Technology)

(Sem.- III)

Title of Paper: Python Programming

Sr.No.	Heading	Particulars
1	Description the course: Including but not limited to:	Introduction to Programming with Python course is designed to help beginners learn Python, a versatile and beginner-friendly language known for its simplicity and readability. Python is an excellent choice for newcomers to programming due to its clear syntax and broad applications in fields like web development, data analysis, and artificial intelligence. In today's technology-driven world, programming skills are increasingly essential, and Python's popularity has surged due to its ease of use and extensive support community. Python is also a gateway language, allowing learners to transition easily into more advanced topics such as machine learning, data science, and web development. As an interpreted, high-level language, Python is particularly relevant across industries like technology, healthcare, finance, and academia, making Python proficiency a highly sought-after skill. The course focuses on core programming concepts like syntax, data structures, and control flow, ensuring that learners can write efficient and functional code. The course also encourages further learning, serving as a stepping stone for advanced Python courses or specialized areas like machine learning and web development. Python's beginner-friendly nature and expansive libraries make it an enjoyable language to learn, fostering both interest and engagement. By combining theory with hands-on projects, the course aims to spark curiosity and provide learners with tangible results from their efforts. As learners gain proficiency in Python, they will have the tools to tackle more complex programming challenges, making this course an invaluable starting point for anyone interested in programming or pursuing a career in tech. Demand in the Industry: Python's popularity in the industry is soaring. Professionals proficient in Python are in high demand across various sectors, including technology, finance, healthcare, and academia. Completion of this Course opens doors to entry-level positions in software development, quality assurance, data analysis, and scripting.
2	Vertical:	Major
3	Type:	Theory
4	Credits:	2 credits (1 credit = 15 Hours for Theory in a semester, Total 30 hours)
5	Hours Allotted:	30 Hours
6	Marks Allotted:	50

7	Course Objectives (CO): CO 1. Master the core features of Python, including its execution model and a wide range of data types. CO 2. Develop proficiency in control flow by working with conditional statements, loops and other control structures. CO 3. Work efficiently with arrays, strings, and complex data structures, leveraging Python's capabilities for data manipulation. CO 4. Apply functions, modules, and string operations to solve real-world programming problems with flexibility and ease. CO 5. Manage file operations, utilize regular expressions, and handle date and time functions for comprehensive Python programming tasks.				
8	Course Outcomes (OC): OC 1. Demonstrate mastery of Python features to tackle a wide range of programming challenges. OC 2. Utilize control flow statements to ensure accurate and logical program execution. OC 3. Efficiently manipulate arrays, strings, and data structures to enhance data handling and problem-solving. OC 4. Design modular, efficient programs by leveraging functions, modules, and string operations. OC 5. Manage file operations, employ regular expressions, and manipulate date and time data to improve program functionality and performance.				
9	<table border="1"> <tr> <td data-bbox="240 938 1222 2112"> Module 1: Basic Elements of Python Programming: Features of Python, Execution of a Python Program, Python Interpreter, Comments, IDLE, Data types, Dictionary, Sets, Mapping, Basic Elements of Python, Variables, Input Function, Output Statements, Command Line Arguments. Operators, Precedence of Operators, Associativity of Operators Control Statements: The if statement, The if ... else Statement, The if ... elif ... else Statement, Loop Statement- while loop, for loop, Infinite loop, Nested loop, The else suite, break statement, continue statement, pass statement, assert statement, return statement. Arrays: Creating Arrays, Indexing and Slicing of Arrays, Basic Array Operations, Arrays Processing, Mathematical Operations on Array, Aliasing Arrays, Slicing and Indexing in NumPy Arrays, Basic slicing, Advanced Indexing, Dimensions and Attributes of an Array Functions: Function definition and call, Returning Results, Returning Multiple Values from a Function, Built-in Functions, Difference between a Function and a Method, Pass Value by Object Reference, Parameters and Arguments, Recursive Functions, Anonymous or Lambda Functions. Modules in Python. Strings: Creating Strings, Functions of Strings, Working with Strings, Formatting Strings, Finding the Number of Characters and Words, Inserting Substrings into a String. </td><td data-bbox="1222 938 1497 2112">15 Hrs</td></tr> <tr> <td data-bbox="240 2112 1222 2157"></td><td data-bbox="1222 2112 1497 2157"></td></tr> </table>	Module 1: Basic Elements of Python Programming: Features of Python, Execution of a Python Program, Python Interpreter, Comments, IDLE, Data types, Dictionary, Sets, Mapping, Basic Elements of Python, Variables, Input Function, Output Statements, Command Line Arguments. Operators, Precedence of Operators, Associativity of Operators Control Statements: The if statement, The if ... else Statement, The if ... elif ... else Statement, Loop Statement- while loop, for loop, Infinite loop, Nested loop, The else suite, break statement, continue statement, pass statement, assert statement, return statement. Arrays: Creating Arrays, Indexing and Slicing of Arrays, Basic Array Operations, Arrays Processing, Mathematical Operations on Array, Aliasing Arrays, Slicing and Indexing in NumPy Arrays, Basic slicing, Advanced Indexing, Dimensions and Attributes of an Array Functions: Function definition and call, Returning Results, Returning Multiple Values from a Function, Built-in Functions, Difference between a Function and a Method, Pass Value by Object Reference, Parameters and Arguments, Recursive Functions, Anonymous or Lambda Functions. Modules in Python. Strings: Creating Strings, Functions of Strings, Working with Strings, Formatting Strings, Finding the Number of Characters and Words, Inserting Substrings into a String.	15 Hrs		
Module 1: Basic Elements of Python Programming: Features of Python, Execution of a Python Program, Python Interpreter, Comments, IDLE, Data types, Dictionary, Sets, Mapping, Basic Elements of Python, Variables, Input Function, Output Statements, Command Line Arguments. Operators, Precedence of Operators, Associativity of Operators Control Statements: The if statement, The if ... else Statement, The if ... elif ... else Statement, Loop Statement- while loop, for loop, Infinite loop, Nested loop, The else suite, break statement, continue statement, pass statement, assert statement, return statement. Arrays: Creating Arrays, Indexing and Slicing of Arrays, Basic Array Operations, Arrays Processing, Mathematical Operations on Array, Aliasing Arrays, Slicing and Indexing in NumPy Arrays, Basic slicing, Advanced Indexing, Dimensions and Attributes of an Array Functions: Function definition and call, Returning Results, Returning Multiple Values from a Function, Built-in Functions, Difference between a Function and a Method, Pass Value by Object Reference, Parameters and Arguments, Recursive Functions, Anonymous or Lambda Functions. Modules in Python. Strings: Creating Strings, Functions of Strings, Working with Strings, Formatting Strings, Finding the Number of Characters and Words, Inserting Substrings into a String.	15 Hrs				

	Module 2: List: Exploring List, Tuples and Dictionaries: Lists, List Functions and Methods, List Operations, List Slices, Nested Lists, Tuples, Functions in Tuple. Working with Dictionaries: Creating a Dictionary, Operators in Dictionary, Dictionary Methods, Using for Loop with Dictionaries, Operations on Dictionaries Files in Python: Opening and Closing a File, Working with Text Files, , Working with Binary Files, The 'with' statement, Pickle in Python, The seek() and tell() Methods, Random Accessing of Binary Files, Zipping and Unzipping Files, Working with Directories Regular Expressions: Introduction, Sequence Characters in Regular Expressions, Special Characters in Regular Expressions, Using Regular Expression on Files, Retrieving Information from an HTML File Date And Time in Python: Time, Date, Date and Time Now, combining date and times, formatting date and time, Finding and comparing dates, Sorting dates, Knowing the Time taken by a Program, Working with Calendar Module	15 Hrs
10	Books and References: Textbooks 1. Learning Python, Fourth Edition by Mark Lutz Copyright © 2009 Mark Lutz. Published by O'Reilly Media, Inc. 2. Python Basics: A Practical Introduction to Python 3 Revised and Updated 4th Edition David Amos, Dan Bader, Joanna Jablonski, Fletcher Heisler Reference Books 1. Let Us Python, Yashwant. B. Kanetkar, BPB Publication, 2019 2. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018 3. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Class test of 1 of 15 marks Class test of 2 of 15 marks Average of the two: 15 marks Quizzes/ Presentations/ Assignments: 5 marks Total: 20 marks	Format of Question Paper: External Examination (30 Marks)– 1 hr duration
14	Format of Question Paper: (Semester End Examination: 30 Marks. Duration:1 hour) Q1: Attempt any two (out of four) from Module 1 (15 marks) Q2: Attempt any two (out of four) from Module 2 (15 marks) Or Q1: Attempt any three (out of five) from Module 1 (15 marks) Q2: Attempt any three (out of five) from Module 2 (15 marks)	

Title of Paper: DATA STRUCTURES

Sr.No.	Heading	Particulars
1	Description the course: Including but Not limited to:	Data Structures is a fundamental subject that focuses on the organization, storage, and manipulation of data. It provides the tools and techniques to efficiently manage and process data, forming the backbone of algorithms and software development.
2	Vertical:	Major
3	Type:	Theory
4	Credits:	2 credits (1 credit = 15 Hours for Theory in a semester, Total 30 hours)
5	Hours Allotted:	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives (CO): 1. To understand the fundamental concepts of data structures and their applications. 2. To analyze the efficiency of algorithms and operations on data structures. 3. To provide practical exposure to implementing data structures in programming. 4. To understand the properties and applications of arrays, linked lists, stacks, and queues. 5. To translate data structure concepts into working code using a programming language. 6. To apply data structures to solve real-world problems like searching and sorting. 7. To grasp the structure and traversal methods of binary trees and binary search trees.	
8	Course Outcomes (OC): Students will be able to: OC 1. Demonstrate knowledge of core data structures and their operations OC 2. Analyze the time and space complexity of algorithms and choose the most efficient solution for a given problem. OC 3. Translate algorithmic solutions into correctly functioning code using their chosen programming language. OC 4. Implement and traverse binary trees and binary search trees, demonstrating their understanding of these structures.	
9	Module 1:	
	1. Introduction Basic terminology: data, information, data structure, abstract data type (ADT) Classification of data structures: linear, non-linear Algorithm analysis: time complexity, Big O notation 2. Arrays and Linked Lists Array representation and operations (traversal, insertion, deletion, searching) Linked lists: singly linked lists (representation, insertion, deletion, traversal) Comparison of arrays and linked lists, advantages and disadvantages. 3. Stacks and Queues Stack ADT: push, pop, peek operations Array implementation of stacks Applications of stacks: expression evaluation (infix to postfix conversion) Queue ADT: enqueue, dequeue, peek operations Array implementation of queues Applications of queues: basic scheduling scenarios 4. Recursion Concept of recursion, base case, recursive step Examples: factorial, Fibonacci sequence	15 Hrs

	Module 2:	
	1.Trees Binary trees: representation, traversal (inorder, preorder, post order) Binary search trees: insertion, deletion, search Applications of trees: basic hierarchical data representation 2.Hashing Hash functions and hash tables Collision handling: separate chaining Applications of hashing: dictionaries 3. Sorting and Searching Sorting algorithms: bubble sort, insertion sort, selection sort Searching algorithms: linear search, binary search	15 Hrs.
10	Books and References: 1. Data Structures and Algorithms made Easy: Data Structures and Algorithmic Puzzles, Narasimha Karumanchi ,5th Edition 2017 2. A Simplified Approach to Data Structures, Lalit Goyal, Vishal Goyal, Pawan Kumar SPD,1st 2014 3. Problem Solving in Data Structures & Algorithms Using C by Hemant Jain ,1st Edition, BPB Publications, 2018 4. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 4th Edition, MIT Press,2022	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Class test of 1 of 15 marks Class test of 2 of 15 marks Average of the two: 15 marks Quizzes/ Presentations/ Assignments: 5 marks Total: 20 marks	Format of Question Paper: External Examination (30 Marks)– 1 Hr. duration
14	Format of Question Paper: (Semester End Examination: 30 Marks. Duration:1 hour) Q1: Attempt any two (out of four) from Module 1 (15 marks) Q2: Attempt any two (out of four) from Module 2 (15 marks) Or Q1: Attempt any three (out of five) from Module 1 (15 marks) Q2: Attempt any three (out of five) from Module 2 (15 marks)	

Title of Paper: Operating System

Sr.No.	Heading	Particulars
1	Description the course : Including but Not limited to:	Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file systems and protection) Introduce the issues to be considered in the design and development of operating system (memory, file and disk).
2	Vertical :	Major
3	Type :	Theory
4	Credits :	2 credits (1 credit = 15 Hours for Theory in a semester, Total 30 hours)
5	Hours Allotted :	30
6	Marks Allotted:	30
7	Course Objectives(CO): 1. Understand basic knowledge of computer operating system structures and functioning. 3. Understand the process management mechanism 4. CO 3. Ability to apply CPU scheduling algorithms to manage tasks. 5. CO 4. Discuss methods of prevention and recovery from system deadlock 6. CO 5. Understand the implementation of file systems and directories	
8	Course Outcomes (OC): 1. Outline the basic concept of operating systems 2. Analyze the working of operating system 3. Examine the working of various scheduling approaches 4. Apply the concepts of synchronization and deadlock 5. Apply the file access mechanisms	
9	Modules:- Module 1: Operating System Overview: Basics of operating systems: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security. Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues. Process Synchronization: Background, Critical-Section Problem, Peterson's Solution. Synchronization Hardware, Semaphores, Classic Problems of Synchronization.	
	Module 2: Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing. Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock. File System Interface: File Concept, Access Methods, Directory Structure, and File System Structure.	15 Hrs 15 Hrs

10	Books and Reference: 1. Operating Systems – Internals and Design Principles William Stallings, Pearson 9th , 2009 2. Operating System Concepts, Abraham Silberschatz, Wiley, 8th Edition 3. Operating Systems, Godbole and Kahate, Godbole and Kahate, 3rd Edition.	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Class test of 1 of 15 marks Class test of 2 of 15 marks Average of the two: 15 marks Quizzes/ Presentations/ Assignments: 5 marks Total: 20 marks	Format of Question Paper: External Examination (30 Marks)– 1 hr duration
14	Format of Question Paper: (Semester End Examination : 30 Marks. Duration:1 hour) Q1: Attempt any two (out of four) from Module 1 (15 marks) Q2: Attempt any two (out of four) from Module 2 (15 marks) Or Q1: Attempt any three (out of five) from Module 1 (15 marks) Q2: Attempt any three (out of five) from Module 2 (15 marks)	

Title of Paper: Major Practical 3

Sr.No.	Heading	Particulars
1	Description the course: Including but not limited to:	This course offers a comprehensive exploration of advanced Python programming concepts, designed to equip students with the tools to tackle real-world problems efficiently. It covers a range of topics, including text processing with regular expressions to identify patterns and extract meaningful data, as well as file handling techniques for both text and binary files. Students will also gain expertise in manipulating and comparing dates using Python's built-in date and time modules, along with performing calendar-based operations. The course emphasizes performance optimization by teaching students how to measure and improve program execution time. Additionally, students will learn how to extract structured data, such as hyperlinks from HTML files, and apply these techniques in practical scenarios. By the end of the course, students will be adept at solving complex problems, optimizing their Python solutions, and utilizing advanced programming concepts to handle diverse data processing tasks.
2	Vertical:	Major
3	Type:	Practical
4	Credits:	2 credits (30 Hours of Practical work in a semester)
5	Hours Allotted:	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives (CO): 1. Understand fundamental programming concepts in Python, including input/output operations, conditional statements, and loops. 2. Understand and apply array operations, indexing, slicing, and mathematical functions using NumPy. 3. Develop problem-solving skills by using functions, recursive logic, lambda expressions, and modular programming. 4. Use data structures like lists and dictionaries and perform file operations. 5. Work with text processing, file handling, date manipulation, and performance analysis using advanced Python programming concepts 6. To provide hands-on experience in implementing fundamental data structures like arrays, linked lists, stacks, queues, trees, and graphs. 7. To develop skills in algorithm design and analysis for solving computational problems using data structures. 8. To enable students to choose appropriate data structures for different applications and justify their choices. 9. To enhance understanding of dynamic memory allocation and efficient data management techniques. 10. To equip students with the ability to debug and optimize code for data structure operations.	
8	Course Outcomes (OC): . OC 1. Apply Python programming concepts like input/output, conditional statements, and loops, to solve fundamental problems effectively. . OC 2. Demonstrate proficiency in performing basic operations, indexing, slicing, and analyzing attributes of arrays using NumPy. . OC 3. Apply functions, recursion, and lambda expressions to solve computational problems, and implement modular programming for reusable and efficient code design.	

	. OC 4. Implement lists and dictionaries, perform file operations, and use functions to solve real-world problems effectively. . OC 5. Process text, extract information, handle dates, and measure execution time for solving complex real-world problems. . OC 6. Ability to implement and manipulate basic and advanced data structures to solve real-world problems. . OC7 Proficiency in writing efficient algorithms using suitable data structures for operations like searching, sorting, and traversal. . OC8 Capability to analyze the time and space complexity of algorithms for various data structures. . OC9 Enhanced problem-solving skills by applying data structures in different domains such as databases, networks, and operating systems	
9	Module 1 1. Write programs for the following: a. Write 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. Write a program to accept a number from the user and depending on whether the number is even or odd, print out an appropriate message to the user. c. Write a program to accept the SGPI from the user and print corresponding grade based on the following: d. SGPI	

	b. Create a file geometry.py to calculate base areas for shapes square and circle. In another file, write a function pointyShapeVolume(x, y, squareBase) that calculates the volume of a square pyramid if squareBase is True and of a right circular cone if squareBase is False. x is the length of an edge on a square if squareBase is True and the radius of a circle when squareBase is False. y is the height of the object. First use squareBase to distinguish the cases. Use the circleArea and squareArea from the geometry module to calculate the base areas. 7. Write programs 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 script to sort (ascending and descending) a dictionary by value. 8. Write programs for the following: a. Write a program to accept and pass radius to a function that returns area and circumference (using tuple). b. Write a program to perform basic file operations on text files and binary files. c. Write a Python program to read last n lines of a file. 9. Write programs for the following: a. a. Write a program to count the occurrences of a specific word in a file using regular expressions. b. b. Write a program to extract all hyperlinks () from an HTML file. 10. Write programs for the following: a. Write a program that compares two dates (in DD/MM/YYYY format) and prints which one is earlier. b. Write a program to measure program execution time. c. Write a program using the calendar module to print the weekday of the first day of a given month and year.	
	Module 2	30 Hrs
	1. Array Operations: Write a program to implement basic array operations: a. Insert an element at a specific position in an array. b. Delete an element from a specific position in an array. c. Search for an element in an array (linear search). 2. Linked List Manipulation: Write a program to: a. Create a singly linked list. b. Insert a node at the beginning, end, and at a given position in a linked list. c. Delete a node from a given position in a linked list. 3. Stack Application: Write a program to: a. Implement a stack using an array. b. Convert an infix expression to postfix notation using a stack. 4. Queue Application: Write a program to: a. Implement a queue using an array. b. Simulate a simple queuing system (e.g., customer service queue). 5. Binary Search Tree: Write a program to: a. Create a binary search tree. b. Insert nodes into a binary search tree. c. Search for a node in a binary search tree. 6. Tree Traversal: Write a program to: a. Implement pre-order, b. in-order,	

	c. Post-order traversal of a binary tree. 7.Hash Table: Write a program to: a. Implement a hash table with separate chaining for collision handling. b. Store and retrieve data from the hash table. 8.Sorting Algorithms: Write programs to implement and compare the following sorting algorithms: a. Bubble sort b. Insertion sort c. Selection sort 9.Searching Algorithms: Write programs to implement and compare: a. Linear search b. Binary search (on a sorted array) 10.Combined Application a. Design a simple program that uses multiple data structures .	
10	Text Books: 1. Learning Python, Fourth Edition by Mark Lutz Copyright © 2009 Mark Lutz. Published by O'Reilly Media, Inc. 2. Python Basics: A Practical Introduction to Python 3 Revised and Updated 4th Edition David Amos, Dan Bader, Joanna Jablonski, Fletcher Heisler 3. Data Structures and Algorithms made Easy: Data Structures and Algorithmic Puzzles, Narasimha Karumanchi ,5th Edition 2017	
11	Reference Books: 1. Let Us Python, Yashwant. B. Kanetkar, BPB Publication, 2019 2. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018 3. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017 4. A Simplified Approach to Data Structures, Lalit Goyal, Vishal Goyal, Pawan Kumar SPD,1st 2014 5. Problem Solving in Data Structures & Algorithms Using C by Hemant Jain ,1st Edition, BPB Publications, 2018 6. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 4th Edition, MIT Press,2022	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Students are expected to attend each practical and submit the written practical of the previous session. Performing Practical and writeup submission will be continuous internal evaluation. 2.5 marks can be awarded for each practical performance and writeup submission totaling to 50 marks and can be converted to 20 marks.	30 marks practical exam of 2 hours duration
14	Format of Question Paper: Duration 2 hours. Certified copy of Journal is compulsory to appear for the practical examination Practical Slip: Q1. From Module 1 13 marks Q2. From Module 2 12marks Q3. Journal and Viva 05 marks	

Sem. - IV

Vertical – 1 Major

Title of Paper :Core Java

Sr.No.	Heading	Particulars
1	Description the course : Including but Not limited to:	Core Java course focuses on teaching students how to design, develop, and maintain software applications using the Java programming language. The course covers fundamental to advanced concepts of Java, enabling students to understand object-oriented programming (OOP) principles, data structures, algorithms, and real-world application development.
2	Vertical :	Major
3	Type :	Theory
4	Credits :	2 credits (1 credit = 15 Hours for Theory in a semester, Total 30 hours)
5	Hours Allotted :	30 Hr
6	Marks Allotted:	50
7	Course Objectives(CO): CO 1: Understand and Apply Object-Oriented Programming (OOP) Concepts. CO 2: Identify the key components of a class and object in Java, including attributes (fields), methods, and constructors. CO 3: Apply sound software engineering principles in Java by organizing code into classes and methods with proper access control identifiers CO 4: Use tools and techniques like unit testing, as well as IDE debugging tools to find and fix issues within Java programs. CO 5. Effectively use Java's collection framework (e.g., Lists, Sets, Maps) to manage and process groups of related objects. CO 6. Use OOP concepts in designing and building solutions to real-world problems, ensuring the application is modular, maintainable, and reusable.	
8	Course Outcomes (OC): OC1. Understand the basics of Java and its runtime environment. OC2. Be proficient in using Java's data types, control flow statements, and OOP principles such as classes, inheritance, and exception handling. OC3. Creating own classes and objects OC4. Develop mini projects using Class, Interface and exception handling	
9	Modules:- Module 1:	15 Hrs
	Introduction to Java Programming -History of Java and its Evolution,Features of Java (Platform Independence, Object-Oriented),Data Types and Variables,Operators Constants and Literals,Type Casting Decision Making and Loops :If-else Statements,Switch Statement, Loops (For, While, Do-While),Break and Continue Statements Classes and Objects :Array,ArraysString class and String methods, StringBuffer and StringBuilder, Object-Oriented Programming Concepts, Defining Classes and Creating Objects, Instance Variables and Methods, Constructors, this Keyword, super keyword, Types of Classes, Scope Rules, Access Modifier, constants, static members of a class, garbage collection.	

	Inheritance: Its types, Superclass and Subclass, Final classes and methods Polymorphism: Compile-time and Runtime Polymorphism	
	Module 2:	
	Interfaces: Defining and Implementing Interfaces, Abstract Classes and Methods, Multiple Interface Implementation Packages: Introduction to predefined packages, User Defined Packages, Access specifier, Java Built-in packages Exception handling- Try, Catch, and Finally Blocks, Throw and Throws Keywords Introduction to Threads: Creating and Running Threads, Thread Lifecycle	15 Hrs
10	Books and References: 1. Java: The Complete Reference Herbert Schildt MC-Graw HILL 12th EDITION 2022 2. Core Java, Volume I: Fundamentals Hortsman Pearson 9th 2013 3. Core Java, Volume II: Advanced Features Gary Cornell and Hortsman Pearson 8th 2008	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Class test of 1 of 15 marks Class test of 2 of 15 marks Average of the two: 15 marks Quizzes/ Presentations/ Assignments: 5 marks Total: 20 marks	Format of Question Paper: External Examination (30 Marks)– 1 hr duration
14	Format of Question Paper: (Semester End Examination: 30 Marks. Duration: 1 hour) Q1: Attempt any two (out of four) from Module 1 (15 marks) Q2: Attempt any two (out of four) from Module 2 (15 marks) Or Q1: Attempt any three (out of five) from Module 1 (15 marks) Q2: Attempt any three (out of five) from Module 2 (15 marks)	

Title of Paper: Software Engineering

Sr.No	Heading	Particulars
1	Description the course: Including but Not limited to:	This course provides an in-depth understanding of Scrum, an Agile framework for developing, delivering, and sustaining complex products. Students will learn the principles and practices of Scrum, including roles (Scrum Master, Product Owner, Development Team), events (Sprint, Scrum Meetings), and artifacts (Product Backlog, Sprint Backlog, Increment). The course emphasizes hands-on exercises, real-world scenarios, and collaborative activities to master iterative development and enhance team productivity. By the end, learners will be equipped to implement Scrum in software engineering projects effectively and drive organizational agility.
2	Vertical :	Major
3	Type :	Theory
4	Credits :	2 credits (1 credit = 15 Hours for Theory in a semester, Total 30 hours)
5	Hours Allotted :	30
6	Marks Allotted:	50
7	Course Objectives (CO): CO1: Understand the core principles of Agile and the Scrum framework. CO2: Explore the high-level Scrum process and its key components. CO3: Develop skills in managing the Product Backlog effectively. CO4: Learn techniques for Sprint planning, execution, and tracking. CO5: Gain insights into Scrum-based project, quality, and risk management. CO6: Master the art of writing clear and actionable user stories.	
8	Course Outcomes (OC): OC1: Demonstrate a comprehensive understanding of Agile concepts and Scrum practices. OC2: Apply Scrum processes to effectively manage software development life cycles. OC3: Create and prioritize user stories for efficient Product Backlog management. OC4: Utilize metrics to evaluate and enhance Sprint performance and team productivity. OC5: Implement strategies for cost, customer, and risk management in Scrum projects. OC6: Formulate effective Sprint retrospectives to drive continuous improvement.	
9	Module 1:	
	Software and Software Engineering, Process Models, Introduction to Agile Concepts, All about Scrum, Scrum Process: High-Level View. Product Backlog Management, Sprint Planning, Writing Effective User Stories, Sprint Execution and Tracking, Sprint Review, Sprint Retrospectives	15 Hrs
	Module 2:	
	Measurements and Metrics in Scrum, Software Development Life Cycle and Waterfall Model, Project Management in Scrum and Waterfall, Quality Management in Scrum, Customer Management in Scrum, Risk Management in Scrum, Cost Management in Scrum.	15 Hrs

10	Books and References: 1. "Agile Scrum", Rama Bedarkar, Wiley, 1st, 2020 2. "Mastering Professional Scrum: A Practitioner's Guide to Overcoming Challenges and Maximizing the Benefits of Agility" by Stephanie Ockerman and Simon Reindl, Addison-Wesley Professional, 1st edition (2019). 3. "Scrum: A Pocket Guide" by Gunther Verheyen, Van Haren Publishing, 2nd edition (2019). 4. "Software in 30 Days" by Ken Schwaber and Jeff Sutherland, Wiley, 1st edition (2012). 5. "Scrum Insights for Practitioners: The Scrum Guide Companion" by Hiren Doshi, PracticeAgile Solutions, 1st edition (2016). 6. "A Scrum Book: The Spirit of the Game" by Jeff Sutherland and James O. Coplien, Pragmatic Bookshelf, 1st edition (2019). 7. "The Scrum Fieldbook: A Master Class on Accelerating Performance, Getting Results, and Defining the Future" by J.J. Sutherland, Random House Business, 1st edition (2019).	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Class test of 1 of 15 marks Class test of 2 of 15 marks Average of the two: 15 marks Quizzes/ Presentations/ Assignments: 5 marks Total: 20 marks	Format of Question Paper: External Examination (30 Marks)– 1 hr duration
14	Format of Question Paper: (Semester End Examination: 30 Marks. Duration:1 hour) Q1: Attempt any two (out of four) from Module 1 (15 marks) Q2: Attempt any two (out of four) from Module 2 (15 marks) Or Q1: Attempt any three (out of five) from Module 1 (15 marks) Q2: Attempt any three (out of five) from Module 2 (15 marks)	

Title of Paper: Computer Networks

Sr.No.	Heading	Particulars
1	Description the course : Including but Not limited to:	A course on Computer Networks typically focuses on the fundamental principles, technologies, and protocols that enable communication and data exchange between devices in various network environments.
2	Vertical :	Major
3	Type :	Theory
4	Credits :	2 credits (1 credit = 15 Hours for Theory in a semester, Total 30 hours)
5	Hours Allotted :	30
6	Marks Allotted:	50
7	Course Objectives(CO): 1. To understand the basic concepts in OSI Model,distinguishing Factors in TCP/IP ,IP addressing Schemes 2. Understand How the communication happens across the network 3. Understanding of various Routing protocol and their implementation	
8	Course Outcomes (OC): CO 1.Understanding the Transport layer protocols and their utilities CO 2.Various application layer protocols and their implementation CO3:Mailing Services and web services implementation	
9	Modules:- Module 1: 1. Introduction: OSI Model, TCP/IP Protocol Suite, IPV 4 Addresses and Protocol and IPV6 Addresses and Protocol 2. Address Resolution Protocol (ARP), Internet Control 3. Message Protocol Version 4 (ICMPv4), Mobile IP, 4. Unicast Routing Protocols (RIP, OSPF and BGP)	
	Module 2: 8. User Datagram Protocol (UDP), Transmission Control Protocol (TCP) 9. Host Configuration: DHCP, Domain Name System (DNS) 10. Remote Login: TELNET and SSH, File Transfer: FTP and TFTP ; World Wide Web and HTTP, 11. Electronic Mail: SMTP, POP, IMAP and MIME	
10	Books and References: TCP/IP Protocol Suite, Behrouz A. Forouzan, 4th Edition, Tata McGrawHill (Chapter 2, 5, 7, 26, 27, Chapter 8, 9, 10, 11, Chapter 14,15, Chapter 16, 18, 19, Chapter 20, 21, 22, Chapter 23, 25)	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Class test of 1 of 15 marks Class test of 2 of 15 marks Average of the two: 15 marks Quizzes/ Presentations/ Assignments: 5 marks Total: 20 marks	Format of Question Paper: External Examination (30 Marks)– 1 hr duration

14

Format of Question Paper: (Semester End Examination : 30 Marks. Duration:1 hour)

Q1: Attempt any two (out of four) from Module 1 (15 marks)

Q2: Attempt any two (out of four) from Module 2 (15 marks)

Or

Q1: Attempt any three (out of five) from Module 1 (15 marks)

Q2: Attempt any three (out of five) from Module 2 (15 marks)

Title of Paper: Major Practical 4

Sr.No.	Heading	Particulars
1	Description the course : Including but Not limited to:	Computer Networking Practical course focuses on providing hands-on experience with various networking concepts and techniques. Students typically practice configuring, troubleshooting, and testing network protocols and hardware in real-world scenarios. The practical component of this course emphasizes network setup, monitoring, and management skillsWireless Networks and Mobile Communications A Java Programming Practical course typically provides hands-on experience in writing, debugging, and executing Java programs. The goal is to help students become proficient in Java programming and apply theoretical concepts to solve real-world problems. The practical sessions in this course usually focus on programming skills and the application of Java principles in various scenario
2	Vertical :	Major
3	Type :	Practical
4	Credits :	2 credits (30 Hours of Practical work in a semester)
5	Hours Allotted :	30
6	Marks Allotted:	50 Marks
7	Course Objectives(CO): 1. Understand core Java programming concepts, including data types, control structures, and object-oriented programming principles. 2. Develop the ability to implement inheritance, polymorphism, interfaces, and abstract classes effectively. 3. Gain hands-on experience with exception handling, multithreading, and dynamic initialization. 4. Learn to apply Java programming to solve real-world problems, such as matrix operations and finding areas/volumes. 5. Enhance debugging and problem-solving skills using Java's rich standard libraries and features. 6. Basic foundation of LAN 7. various command line utilities to be tested 8. Practical implementation of IP Subnetting 9. Testing of various Routing Protocols	
8	Course Outcomes (OC): CO 1. Write efficient Java programs to perform arithmetic operations, manage control flow, and manipulate strings. CO 2. Demonstrate knowledge of object-oriented concepts by implementing inheritance, polymorphism, and interfaces. CO 3. Apply exception handling mechanisms to create robust Java applications. CO 4.1Implement multithreading and explore dynamic initialization for advanced Java programming.	

	CO 5. Solve computational problems, such as matrix operations and factorial calculation, using packages and Java constructs. CO 6. Implementation of utility protocols CO 7 Understanding Basic Security features CO 8 Network Traffic and Packet Analysis CO 9 Basic Understanding of Wireless Network	
9	Module 1 1. Write a program a. in Java to demonstrate Boolean value. b. Print a string 10 times using a for loop. c. Write a program in Java to evaluate $a+b*c\%d$. 2. Write a program a. in Java to find the biggest element among three numbers using if else. b. Write a program in Java to find the biggest element among three numbers using the ternary operator. c. Write a program in Java to check the grade of marks using a switch case. 3. Write a program a. in Java to demonstrate dynamic initialization. b. Write a program in Java to create a class and access all data members and methods using the object and compute the area and perimeter of a circle. c. Write a program in Java to access member variables using the constructor. 4. Write a program a. in Java to multiply two matrices. b. Write a program in Java to calculate the area of a rectangle using single inheritance. c. Write a program in Java to demonstrate multilevel inheritance. 5. Write a program a. in Java to demonstrate hierarchical inheritance. b. Write a program in Java to find the area and perimeter of a circle using an abstract class. c. Write a program in Java to show that a private member of a class cannot be inherited. 6. Write a program a. in Java to find the volume of a box using this keyword. b. Write a program in Java to find the average of three numbers using the method overloading c. Write a program in Java to find average of three numbers using method overriding. d. Create a class figure. Create two subclasses rectangle and triangle. Find the area of a rectangle and half the area of the rectangle using the reference of the figure. 7. Write a program a. Create an interface area. Find the area of a circle. b. Write a program in Java to find the sum and average of three numbers using the super keyword. 12. Write a program	30 Hrs

	a. in Java to find the volume of a box using constructor overloading. b. Write a program in Java to demonstrate exception handling in case of variable/constant divided by zero. 13. Write a program in Java a. to implement multiple inheritance using the interface. b. Write a program in Java to check if a given string is palindrome or not. 14. Write a program in Java a. for sorting a given list of strings in ascending order. b. Write a program in Java to find the factorial of a number using the package. 15. Write a program in a. Java to import the package. b. Write a program in Java to implement thread. c. Write program to implement Flow, Grid and Border Layout using swing. d. Write program to demonstrate following events Action Mouse Key	
	Module 2	30 Hrs
	1. Configuring LAN setup a. Planning and Setting IP networks b. Configuring subnet c. Using, linux-terminal or Windows-cmd, execute following networking commands and note the output: ping, traceroute, netstat, arp, ipconfig, Getmac, hostname, NSLookUp, pathping, SystemInfo 2. IPv4 Addressing and Subnetting a. Given an IP address and network mask, determine other information about the IP address such as: a. Network address • Network broadcast address • Total b. number of host bits • Number of hosts b. Given an IP address and network mask, determine other information about the IP address such as: c. The subnet address of this subnet • d. The broadcast address of this subnet • e. The range of host addresses for this subnet • f. The maximum number of subnets for this subnet mask • g. The number of hosts for each subnet • h. The number of subnet bits •The number of this subnet 3. Configure Static IP routing using . 4. Configure IP routing using RIP. 5. Configuring Simple and multi-area OSPF 6. Configuring BGP protocol (Multi-Autonomous) 7. Configuring server and client. a. Configure DHCP b. Configure DNS c. Configure HTTP d. Configure Telnet e. Configure FTP 8. Configure basic security features for networks 9. Using Wireshark, network analyzer, set the filter for ICMP, TCP, HTTP, UDP, FTP and perform respective protocol transactions to show/prove that the	

	network analyzer is working 10.create a wireless network of multiple PCs using appropriate access point. 11.IPV6 Addressing Basics	
10 & 11	Text Books& References Books :	
	1. Java: The Complete Reference Herbert Schildt MC-Graw HILL 12th EDITION 2022 2. Core Java, Volume I: Fundamentals Hortsman Pearson 9th 2013 3. Core Java, Volume II: Advanced Features Gary Cornell and Hortsman Pearson 8th 2008 4. Cisco CCNA 200-301 Official Cert Guide	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Students are expected to attend each practical and submit the written practical of the previous session. Performing Practical and writeup submission will be continuous internal evaluation. 2.5 marks can be awarded for each practical performance and writeup submission totaling to 50 marks and can be converted to 20 marks.	30 marks practical exam of 2 hours duration
14	Format of Question Paper: Duration 2 hours. Certified copy of Journal is compulsory to appear for the practical examination Practical Slip: Q1. From Module 1 13 marks Q2. From Module 2 12marks Q3. Journal and Viva 05 marks	

Vertical - 4

VSC

Syllabus

B. Sc. (Information Technology)

(Sem.- III)

Title of Paper APPLIED MATHEMATICS

Sr.No.	Heading	Particulars
1	Description the course : Including but Not limited to:	This course is designed for developing competency of the students in the applications of various mathematical concepts. It is equipped with Complex numbers, Laplace transform, Inverse Laplace transform, Differential equations of first order with first degree and higher degree. This course introduces basic concepts of Algebra and prepares students to study further courses in linear and abstract algebra.
2	Vertical :	Vocational Skill Course
3	Type :	Theory
4	Credits :	2 credits (1 credit = 15 Hours for Theory in a semester, Total 30 hours)
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives(CO): CO1: Ability to interpret the mathematical results in physical or practical terms for complex numbers. CO2: Know and to understand various types of methods to solve Laplace transform. CO3: Apply the knowledge of Laplace Transforms to solve the problems. CO4: Know and to understand various types of methods to solve differential equation. CO5: Apply the knowledge of differential equations to solve the problems. CO6: Inculcate the habit of Mathematical Thinking through Indeterminate forms.	
8	Course Outcomes (OC): OC 1. Familiar with the various forms and operations of a complex number. OC 2: Find the Laplace transform of a function of using definition. OC 3: Find the Inverse Laplace transform of a function of using definition. OC 4: Solve Differential equations of first degree and first order. OC 5: Solve Differential equations of first degree and higher order.	
9	Modules:- Module 1: 1.1 Complex Numbers: Complex number, Equality of complex numbers, Graphical representation of complex number (Argand's Diagram), Polar form of complex numbers. Polar form of $x+iy$ for different signs of x,y , Exponential form of complex numbers, Mathematical operation with complex numbers and their representation on Argand's Diagram, Circular functions of complex angles, Definition of hyperbolic function. Relations between circular and hyperbolic functions, Inverse hyperbolic functions. 1.2 The Laplace Transform: Introduction. Definition of the Laplace Transform, Table of Elementary Laplace Transforms. Theorems on Important Properties of	
		15 Hrs

	Laplace Transformation, First Shifting Theorem, Second Shifting Theorem, Convolution Theorem, Laplace Transform of Derivatives. 1.3 Inverse Laplace Transform: Shifting Theorem, Partial fractions Methods, Use of Convolution Theorem, Solution of Ordinary Linear Differential Equations with Constant Coefficients, Laplace Transformation of Special Function, Periodic Functions, Heaviside Unit Step Function, Dirac-delta Function (Unit Impulse Function).	
	Module 2:	
	2.1 Equation of the first order and of the first degree: Separation of variables, Equations homogeneous in x and y, Non-homogeneous linear equations, Exact differential Equation, Integrating Factor, Linear Equation and equation reducible to this form, Method of substitution. 2.2 Differential equation of the first order of a degree higher than the first: Introduction, Solvable for p (or the method of factors), Solve for y, Solve for x, Clairaut's form of the equation, Method of Substitution. 2.3 Linear Differential Equations with Constant Coefficients: Introduction, The Differential Operator, Linear Differential Equation $f(D) y = 0$, Different cases depending on the nature of the root of the equation $f(D) = 0$, Linear differential equation $f(D) y = X$, The complimentary Function, The inverse operator $1/f(D)$ and the symbolic expression for the particular integral,	15 Hrs
10	Books and References: 1. A text book of Applied Mathematics Vol I, P. N. Wartikar and J. N. Wartikar, Pune Vidyathi Griha, 7 th , 1995 2. A text book of Applied Mathematics Vol II, P. N. Wartikar and J. N. Wartikar, Pune Vidyathi Griha, 7 th , 1995 3. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publications.	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Class test of 1 of 15 marks Class test of 2 of 15 marks Average of the two: 15 marks Quizzes/ Presentations/ Assignments: 5 marks Total: 20 marks	Format of Question Paper: External Examination (30 Marks)– 1 hr duration
14	Format of Question Paper: (Semester End Examination : 30 Marks. Duration:1 hour) Q1: Attempt any two (out of four) from Module 1 (15 marks) Q2: Attempt any two (out of four) from Module 2 (15 marks) Or Q1: Attempt any three (out of five) from Module 1 (15 marks) Q2: Attempt any three (out of five) from Module 2 (15 marks)	

SEC

Syllabus

B. Sc. (Information Technology)

(Sem.- IV)

Title of Paper: Computer Graphics

Sr.No	Heading	Particulars
1	Description the course : Including but Not limited to:	Computer Graphics Practical is a hands-on course designed to introduce students to the foundational principles of computer graphics, including 2D transformations, graphical modelling, and basic animations. The course focuses on applying mathematical concepts like translation, rotation, scaling, and shearing to create and manipulate graphical objects. Students will learn to use programming tools such as Python (Matplotlib, Pygame, OpenCV) or C/C++ libraries to implement these concepts. Through practical assignments, they will develop the skills to create simple 2D animations, simulate real-world objects, and design graphical scenes. The course bridges the gap between theoretical concepts and real-world applications, fostering creativity and problem-solving in visual computing.
2	Vertical :	Skill Enhancement Course
3	Type :	Practical
4	Credits :	2 credits (30 Hours of Practical work in a semester)
5	Hours Allotted :	30
6	Marks Allotted:	50 Marks
7	Course Objectives(CO):	CO1: Introduce foundational concepts of 2D transformations, geometric modelling, and rendering techniques in computer graphics. CO2: Develop skills to apply 2D transformations (translation, rotation, scaling, shearing, reflection) and basic animations. CO3: Enable students to simulate real-world objects and create simple animations. CO4: Equip students to understand graphics pipelines, coordinate systems, and basic rendering principles. CO5: Foster creativity and logical thinking by implementing graphical scenes and animations.
8	Course Outcomes (OC):	OC1: Understand and apply 2D transformation matrices to graphical objects. OC2: Implement simple graphics primitives and manipulate them using transformations. OC3: Create basic 2D animations (e.g., bouncing ball, rotating shapes). OC4: Understand and utilize color models, coordinate systems, and graphical libraries. OC5: Develop basic graphical applications using lightweight tools and programming languages.

9	Module 1	30 Hrs
	Module 1: Basic Setup and 2D Graphics Fundamentals 1. Installing Required Software • Objective: Install and configure Python, Matplotlib, OpenCV, or Pygame for computer graphics. • Task: Verify the installation and create a "Hello, Graphics!" window. 2. Drawing Basic Shapes • Objective: Draw lines, circles, rectangles, and polygons using graphical primitives. • Tool: Python with Matplotlib or OpenCV. 3. Line Drawing Algorithms • Objective: Implement the DDA (Digital Differential Analyzer) algorithm. • Tool: Python or C++. 4. Bresenham's Line Drawing Algorithm • Objective: Implement Bresenham's line drawing algorithm. • Tool: Python or C++. 5. Circle Drawing Algorithms • Objective: Implement the Midpoint Circle algorithm. • Tool: Python or C++. 6. Polygon Filling • Objective: Implement the boundary-fill and flood-fill algorithms. • Tool: Python or C++. 7. Translation Transformation • Objective: Shift a 2D object using translation matrices. • Tool: Python with Matplotlib. 8. Rotation Transformation • Objective: Rotate a 2D object about a fixed point or origin. • Tool: Python with Matplotlib. 9. Scaling Transformation • Objective: Scale a 2D object up or down using scaling matrices. • Tool: Python with Matplotlib. 10. Reflection Transformation • Objective: Reflect a 2D object across x-axis, y-axis, and diagonal. • Tool: Python with Matplotlib. 11. Shearing Transformation • Objective: Apply x-axis and y-axis shearing to a 2D object. • Tool: Python with Matplotlib. 12. Composite Transformations • Objective: Combine translation, rotation, and scaling on a 2D object. • Tool: Python with Matplotlib. 13. Clipping Algorithms • Objective: Implement the Cohen-Sutherland line clipping algorithm.	

	- Tool: Python or C++. 14. Window-to-Viewport Transformation - Objective: Map a 2D object from a window to a viewport. - Tool: Python or C++. 15. Basic Interactive Graphics - Objective: Create a simple interactive graphics program (e.g., moving a rectangle with arrow keys). - Tool: Python with Pygame.	
	Module 2	30 Hrs
	1. Simple Animation - Objective: Animate a moving ball across the screen. - Tool: Python with Pygame. 2. Bouncing Ball Animation - Objective: Create a bouncing ball with collision detection. - Tool: Python with Pygame. 3. Rotating Object Animation - Objective: Animate a rotating triangle or square. - Tool: Python with Pygame or Matplotlib. 4. Scaling Animation - Objective: Create an animation showing pulsating objects (grow/shrink). - Tool: Python with Matplotlib. 5. Multiple Object Animation - Objective: Animate multiple objects moving independently. - Tool: Python with Pygame. 6. Color Models - Objective: Experiment with RGB and HSI color models. - Tool: Python with OpenCV. 7. Bezier Curves - Objective: Draw and animate a Bezier curve. - Tool: Python with Matplotlib. 8. 2D Game Development Basics - Objective: Create a simple 2D game (e.g., a ball avoiding obstacles). - Tool: Python with Pygame. 9. Scene Creation - Objective: Design a basic 2D scene (e.g., a house, tree, and sun). - Tool: Python with Matplotlib. 10. Parallax Scrolling Animation - Objective: Implement parallax scrolling for a background in 2D graphics. - Tool: Python with Pygame. 11. Path Animation - Objective: Animate an object moving along a predefined path.	

	• Tool: Python with Matplotlib. 12. Collision Detection • Objective: Implement collision detection between 2D objects. • Tool: Python with Pygame. 13. Interactive Graphics with Mouse Input • Objective: Create an interactive program where shapes follow mouse clicks. • Tool: Python with Pygame. 14. Text Rendering • Objective: Render and animate text in a 2D graphical environment. • Tool: Python with Pygame. 15. Final Project • Objective: Combine multiple concepts to create a complete animated 2D scene. • Example: A car moving on a road with a rising sun and trees. Tool: Python with Matplotlib or Pygame	
10 & 11	Reference and Text Books: 1. Python Graphics: A Reference for Creating 2D and 3D Images, Bernard Korites, Apress, 2nd Edition 2023. 2. Computer Graphics from Scratch: A programmer's Introduction to 3D Rendering, Gabriel Gambetta, no starch press, 2021 3. 2D Computer Graphics: Modern C++ and Standard Library, Hakan Blomqvist, 2023	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Students are expected to attend each practical and submit the written practical of the previous session. Performing Practical and writeup submission will be continuous internal evaluation. 2.5 marks can be awarded for each practical performance and writeup submission totaling to 50 marks and can be converted to 20 marks.	30 marks practical exam of 2 hours duration
14	Format of Question Paper: Duration 2 hours. Certified copy of Journal is compulsory to appear for the practical examination Practical Slip: Q1. From Module 1 13 marks Q2. From Module 2 12marks Q3. Journal and Viva 05 marks	

Syllabus

B. Sc. (Information Technology)

(Sem.- IV)

Title of Paper Mobile Programming

Sr.No	Heading	Particulars
1	Description the course : Including but Not limited to:	This course introduces the fundamentals of Flutter and Dart for building cross-platform mobile applications. Students will learn to create responsive user interfaces, manage app state, handle user inputs, and implement navigation and animations. The course also covers integrating APIs, working with databases, and deploying functional mobile apps for Android and iOS.
2	Vertical :	Skill Enhancement Course
3	Type :	Practical
4	Credits :	2 credits (30 Hours of Practical work in a semester)
5	Hours Allotted :	30
6	Marks Allotted:	50 Marks
7	Course Objectives(CO): CO1: Understand the fundamentals of Flutter and Dart programming for mobile app development. CO2: Learn how to set up the Flutter SDK and development environment. CO3: Develop skills to create basic Flutter applications using widgets like Text, Row, and Column. CO4: Explore the use of StatelessWidget and StatefulWidget for managing app states. CO5: Master the implementation of responsive UIs using MediaQuery and layouts. CO6: Gain knowledge of form creation, input handling, and validation in Flutter apps. CO7: Learn to navigate between screens and implement app navigation features like drawers. CO8: Understand how to use Flutter animations, including AnimatedContainer and FadeTransition. CO9: Explore database integration with APIs using packages like http and FutureBuilder. CO10: Build apps with themes, user interactions (e.g., taps and long presses), and custom styling.	

8	Course Outcomes (OC): OC1: Demonstrate the ability to configure Flutter and build a functional development environment. OC2: Create and run basic Flutter apps with appropriate UI components. OC3: Develop responsive and adaptive UIs for multiple screen sizes. OC4: Implement interactive features like counters, sliders, and switches in Flutter apps. OC5: Design and validate user input forms using TextFormField. OC6: Develop navigation flows between screens and integrate drawers for better usability. OC7: Create animations for smooth transitions and enhanced user experiences. OC8: Build applications that fetch and display data from public APIs asynchronously. OC9: Apply effective state management strategies to handle app states efficiently. OC10: Demonstrate the ability to debug, test, and optimize Flutter apps for deployment.	
9	Module 1	30 Hrs
	1. Install Flutter SDK on your computer and run the flutter doctor command to check your setup. 2. Create a "Hello, World!" Flutter application and run it on an emulator. 3. Modify the app's title and primary color in the MaterialApp widget. 4. Create a StatelessWidget that displays a greeting message. 5. Write a Dart program to calculate the sum of two numbers entered by the user. 6. Implement a Dart program that uses if-else statements to determine if a number is odd or even. 7. Demonstrate the use of a switch-case statement in Dart. 8. Write a program to print a multiplication table using a for loop. 9. Create a Flutter app with a Text widget that displays your name. 10. Build an app with a Column widget to arrange multiple Text widgets vertically. 11. Use a Row widget to arrange three buttons horizontally. 12. Create a Flutter app using Scaffold with an AppBar, Body, and a FloatingActionButton. 13. Create a simple counter app using StatefulWidget to increment and display a number. 14. Implement a TextField widget to accept user input and display it using a Text widget. 15. Design a Flutter app with a Container widget and customize its padding, margin, and color. Use the Stack widget to overlay a Text widget on an Image.	
	Module 2	30 Hrs
	1. Build a responsive UI using MediaQuery to adapt to different screen sizes. 2. Create a Flutter form with TextFormField widgets to accept a username and password. 3. Implement form validation to ensure the fields are not empty. 4. Add navigation between two screens in Flutter using the Navigator class.	

	5. Create a Drawer widget for app navigation with three menu options. 6. Display a list of items in a ListView widget. 7. Use the GridView widget to display a grid of images. 8. Add a GestureDetector to detect taps and display a message in the console. 9. Implement a LongPress event to change the color of a container. 10. Create a basic animation using the AnimatedContainer widget. 11. Implement a FadeTransition to animate the opacity of a widget. 12. Use a Slider widget to select a value between 0 and 100 and display the value. 13. Create a Switch widget to toggle between two themes (light and dark). 14. Use the http package to fetch and display data from a public API. Create a FutureBuilder widget to display data asynchronously.	
10 & 11	Reference and Text Books: 1. Mastering Flutter: A Beginner's Guide, by Sufyan bin Uzayr, CRC Press, 1st, 2023 2. Flutter for Beginners, by Alessandro Biessek, Packt Publishing, 1st edition (2019). 3. Flutter Cookbook, by Simone Alessandria, Packt Publishing, 2nd Edition, 2023 4. Beginning App Development with Flutter, by Rap Payne, Apress, 1st edition (2019). 5. Flutter Apprentice, by Michael Katz, Kevin David Moore, and Vincent Ngo, Kodeco, 1st edition (2021). 6. Flutter Complete Reference 2.0, by Alberto Miola, Independently published, 2nd edition (2023). 7. Flutter in Action, by Eric Windmill, Manning Publications, 1st edition (2020). 8. Programming Flutter, by Carmine Zaccagnino, O'Reilly Media, 1st edition (2020).	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: Students are expected to attend each practical and submit the written practical of the previous session. Performing Practical and writeup submission will be continuous internal evaluation. 2.5 marks can be awarded for each practical performance and writeup submission totaling to 50 marks and can be converted to 20 marks.	30 marks practical exam of 2 hours duration
14	Format of Question Paper: Duration 2 hours. Certified copy of Journal is compulsory to appear for the practical examination Practical Slip: Q1. From Module 1 13 marks	

	Q2. From Module 2 12marks
	Q3. Journal and Viva 05 marks

QUESTION PAPER PATTERN (External and Internal)

Internal Continuous Assessment: 40%	Semester End Examination: 60%
Continuous Evaluation through: Class test of 1 of 15 marks Class test of 2 of 15 marks Average of the two: 15 marks Quizzes/ Presentations/ Assignments: 5 marks Total: 20 marks	Format of Question Paper: External Examination (30 Marks)– 1 hr duration
Format of Question Paper: (Semester End Examination: 30 Marks. Duration:1 hour) Q1: Attempt any two (out of four) from Module 1 (15 marks) Q2: Attempt any two (out of four) from Module 2 (15 marks) Or Q1: Attempt any three (out of five) from Module 1 (15 marks) Q2: Attempt any three (out of five) from Module 2 (15 marks)	

Practical Examination

Internal Continuous Assessment: 40%	Semester End Examination: 60%
Continuous Evaluation through: Students are expected to attend each practical and submit the written practical of the previous session. Performing Practical and writeup submission will be continuous internal evaluation. 2.5 marks can be awarded for each practical performance and writeup submission totaling to 50 marks and can be converted to 20 marks.	30 marks practical exam of 2 hours duration
Format of Question Paper: Duration 2 hours. Certified copy of Journal is compulsory to appear for the practical examination Practical Slip: Q1. From Module 1 13 marks Q2. From Module 2 12marks Q3. Journal and Viva 05 marks	

Letter Grades and Grade Points:

Semester GPA/ Programme CGPA Semester/ Programme	% of Marks	Alpha-Sign/ Letter Grade Result	Grading Point
9.00 - 10.00	90.0 - 100	O (Outstanding)	10
8.00 - < 9.00	80.0 - < 90.0	A+ (Excellent)	9
7.00 - < 8.00	70.0 - < 80.0	A (Very Good)	8
6.00 - < 7.00	60.0 - < 70.0	B+ (Good)	7
5.50 - < 6.00	55.0 - < 60.0	B (Above Average)	6
5.00 - < 5.50	50.0 - < 55.0	C (Average)	5
4.00 - < 5.00	40.0 - < 50.0	P (Pass)	4
Below 4.00	Below 40.0	F (Fail)	0
Ab (Absent)	-	Ab (Absent)	0

Sd/-
Sign of the BOS
Chairman
Dr. Srivaramangai R
BOS in Information
Technology

Sd/-
Sign of the
Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science &
Technology

Sd/-
Sign of the Offg. Dean
Prof. Shivram S. Garje
Faculty of Science &
Technology

As Per NEP 2020

University of Mumbai



Syllabus for Minor Vertical 2

Faculty of Commerce & Management

Board of Studies in Bachelor of Management Studies

Second Year Programme in Minor B. Com (Management Studies)

Semester	III & IV	
Title of Paper	Sem.	Total Credits 4
I) Industry & Service Management (II) (Strategic Financial Management)	III	4
Title of Paper		Credits
I) Industry & Service Management (III) (Project & Customer Relationship Management)	IV	4
From the Academic Year		2025-26

Sem. - III

Syllabus

B.Com. Management Studies

(Sem.- III))

Title of Paper: STRATEGIC FINANCIAL MANAGEMENT

Sr. No.	Heading	Particulars
1	Description the course: Including but not limited to:	This course focuses on planning, implementation & control of financial services. This is a critical discipline that integrates financial decision making with long term business strategies to achieve sustainable growth & maximize shareholders value. The course focuses is on strategic application of financial management principles to help organizations combat with the growing complexities of business world. The course is designed to provide students with comprehensive understanding of how financial decisions can improve corporate performance.
2	Vertical:	Minor
3	Type:	Theory
4	Credit:	4 credits
5	Hours Allotted:	60 Hours
6	Marks Allotted:	100 Marks
7	Course Objectives: 1. To equip the learner with basic understanding of application of various dividend decision models and to throw a light on the concept XBRL. 2. To acquaint management learners in preparation of capital budgeting and role of capital rationing in management decision making process. 3. To provide the learner with basic understanding of strategic financing decision and working capital 4. To create basic understanding on risk management, International financial markets and taxation	
8	Course Outcomes: 1. Learners get depth knowledge on various types and models of dividend policy adopted in firm while declaring dividend to shareholders. 2. Learners will have better awareness and understanding of capital budgeting and role of capital rationing. 3. Learners will have a basic understanding on of strategic financing decision and working capital. 4. The learner will have create a basic understanding on risk management, International financial markets and taxation	

Module 1: Foundations of Strategic Financial Management

1. Introduction to Strategic Financial Management: Meaning, scope, and objectives of SFM, Role of SFM in corporate strategy, Financial goals and strategy.
2. Shareholder value maximization and stakeholder interests, Strategic vs. operational finance, Emerging role of the finance manager.
3. Financial Planning and Strategy Formulation, Strategic planning process and financial implications, Financial modelling and forecasting,
4. Types of financial plans, Linking financial strategy with business strategy, Valuation Principles, Business valuation concepts and methods

Module 2: Capital Budgeting & Capital Rationing

1. Concept – Need & Importance of Capital budgeting, Steps in Capital Investment Decisions
2. Techniques & process of Capital Budgeting, Risk analysis in Capital Budgeting.
3. Concept of Decision Tree Analysis, Decision Tree Applications, Evaluation of lease vs. buy decisions, Types of leases and their financial implications
4. Meaning, Significance-Types – Methods of Capital Rationing, Practical Problems

Module 3: Strategic Financing Decisions

1. Theories of capital structure, Factors determining capital structure, Cost of capital, Leverage analysis, EBIT-EPS analysis
2. Theories of dividend policy, Factors influencing dividend decisions, Types of dividend policies, Share buybacks.
3. Types of shares, Equity financing, types of Debt financing, Hybrid financing instruments, International financing options
4. Strategic importance of working capital, Managing key components, Working capital financing strategies

Module 4: Strategic Financial Risk Management

1. Types of financial risks, Risk identification, measurement, and evaluation, International financial risk management
2. International financial markets and institutions, Foreign direct investment decisions, Management of exchange rate risk, International taxation.
3. Principles of corporate governance, Role of finance in corporate governance, Ethical issues in financial management.
4. Impact of technology on financial strategies, Digital transformation in finance, Emerging financial instruments and markets, Financial and non-financial performance metrics.

10	Text Books: 1) IM Pandey, Financial Management, Vikas Publication. 2) Ravi Kishor, Financial Management, Taxman's	
11	Reference Books: 1. Khan & Jain, Financial Management, MC Graw Hill 2. Van Horne & John Wachowiz, Fundamentals of Financial Management. 3. Dr.S.P.Gupta, Financial Management, Sahitya Bhawan Publication 4. Prasanna Chandra, Strategic Financial Management, MC Graw Hill. 5. Ravi M, Kishore, Strategic Financial Management, Taxman's.	
12	Internal Continuous Assessment: 40%	External, Semester End Examination 60% Individual Passing in Internal and External Examination
13	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

Paper Pattern 4 Credits (Total 100 Marks)

Internal = 40 Marks
External = 60 Marks

Internal Paper Pattern (40 Marks)

1. Case Study writing OR Assignment	} any two (10 Marks each)	20 Marks
2. Quiz OR Group discussion OR Role Playing		
3. Project Presentation OR Research Paper		
4. Class Test - (Mandatory) with Objective questions		20 Marks
Total		40 Marks

External Paper Pattern (60 Marks)

External Paper Pattern (60 Marks)

Write any **FOUR** questions from the following

Q1. Answer the following	15 marks
A	
B	
Q2. Answer the following	15 Marks
A	
B	
Q3. Answer the following	15 Marks
A	
B	
Q4. Answer the following	15 marks
A	
B	
Q5. Answer the following	15 Marks
A	
B	
Q6. Answer the following	15 Marks
A	
B	

Sem. - IV

Syllabus
B.Com. Management Studies
(Sem.- IV)

Title of Paper: Project & Customer Relationship Management

Sr. No.	Heading	Particulars
1	Description the course: Including but not limited to:	Project & Customer Relationship Management (CRM) integrates strategies for managing project lifecycles with those for nurturing customer interactions. It ensures that projects deliver value while fostering strong, lasting client relationships. This approach emphasizes clear communication, expectation management, and proactive problem-solving throughout the project. Aligning project goals with customer needs enhances satisfaction and promotes future collaboration. Effective Project & CRM utilizes tools and techniques to track progress, manage resources, and maintain consistent customer engagement. Ultimately, it aims to optimize project outcomes and maximize customer lifetime value.
2	Vertical :	Minor
3	Type :	Theory
4	Credit:	4 credits
5	Hours Allotted :	60 Hours
6	Marks Allotted:	100 Marks
7	Course Objectives: 1. To analyze the interrelationship between project management principles and Customer Relationship Management (CRM) practices. 2. To investigate the role of established CRM strategies in fostering strong customer relationships and contributing to project success. 3. To identify effective project management for successful CRM project implementation. 4. To evaluate advanced e-CRM strategies and establish metrics for measuring CRM project success.	
8	Course Outcomes: The students will be able to; 1. Articulate the fundamental relationship between project management and CRM. 2. Comprehend the application of CRM strategies in achieving project success through enhanced customer relationships. 3. Describe the process of CRM project implementation, including associated challenges and the incorporation of customer feedback. 4. Evaluate advanced e-CRM strategies and apply project optimization techniques.	

Module 1: Foundations of Project Management and CRM

1. Concepts of Project Management, Features and Need for project management, Principles of Project Management, Project Life Cycle and Methodologies
2. Concept of Customer Relationship Management, Core principles, importance, and the evolution of CRM, Types of CRM
3. Relation in Project Management and CRM, Role of Project Manager, Role of Consultants in Project Management and CRM
4. Customer-Centric Project Management, effect of project decisions on customer data, The role of projects in implementing CRM strategies.

Module 2: CRM Strategies for Project Success

1. Customer Needs Analysis, Techniques for gathering and understanding customer requirements in projects, Stakeholder Management,
2. Sales force automation, Customer service and support, customer data management
3. Emerging CRM technologies, Effective communication strategies for managing customer expectations and project planning.
4. Building Strong Customer Relationships, Techniques for fostering trust, managing conflict, and enhancing customer loyalty throughout the project.

Module 3: Project Management for CRM Implementation

1. Defining CRM project goals and objectives, Developing a CRM implementation plan, Resource allocation and budgeting.
2. Managing CRM project timelines and deliverables, tracking project progress and performance, Addressing project challenges and risks.
3. Customer feedback and expectations during project execution, Change management within CRM project implementation,
4. Identifying and mitigating risks associated with CRM implementation, Proper communication with customers during project phases

Module 4: Advanced CRM Strategies and Project Optimization

1. E-CRM: Concept -Features of e-CRM-Benefits of e-CRM - Social Networking and CRM -Mobile CRM- CRM v/s Digital Marketing -CRM in service industry in India
2. Customer segmentation and targeting, Customer lifetime value analysis, Data mining and predictive analytics, Using analytical CRM data to optimize future projects,
3. Enhancing customer satisfaction and loyalty, Personalized customer interactions, Using CRM data to improve Customer experience (CX)

	4. Measuring CRM project success and ROI, Lessons learned and best practices, Measuring CRM project success, Future trends in CRM and project management.	
10	Text Books: 1. Project Management: A Life Cycle Approach by R.K. Khurana - Published by Vikas Publishing House. 2. Jagdish N.Sheth, Atul Parvatiyar & G.Shainesh, "Customer Relationship Management", Emerging Concepts, Tools and Application", 2010, TMH.	
11	Reference Books: 1. Project Management: A Professional Approach by K. Nagarajan - Published by Pearson 2. Fundamentals of Project Management by Joseph Heagney - Published by PMI 3. Project Management: Concepts, Techniques and Tools by Aditi Jaiswal and Alok Gakhar - Published by Prentice-Hall India 4. Project Management: The Indian Context by Prasanna Chandra and K.S. Rajasekaran - Published by McGraw-Hill Education 5. Project Management: A Systems Approach to Planning, Scheduling, and Controlling by Raghavan Srinivasan - Published by McGraw-Hill Education 6. Dilip Soman & Sara N-Marandi," Managing Customer Value" 1st edition, 2014, Cambridge. 7. Alok Kumar Rai, "Customer Relationship Management: Concepts and Cases", 2008, PHI. 8. Ken Burnett, the Handbook of Key "Customer Relationship Management", 2010, Pearson Education. 9. Mukesh Chaturvedi, Abinav Chaturvedi, "Customer Relationship Management- An Indian Perspective", 2010 Excel Books, 2nd edition	
12	Internal Continuous Assessment: 40%	External, Semester End Examination 60% Individual Passing in Internal and External Examination
13	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 4)	

Paper Pattern 4 Credits (Total 100 Marks)

Internal = 40 Marks
External = 60 Marks

Internal Paper Pattern (40 Marks)

1. Case Study writing OR Assignment	}	any two (10 Marks each)	20 Marks
2. Quiz OR Group discussion OR Role Playing			
3. Project Presentation OR Research Paper			
4. Class Test - (Mandatory) with Objective questions			20 Marks
Total			40 Marks

External Paper Pattern (60 Marks)

External Paper Pattern (60 Marks)

Write any **FOUR** questions from the following

Q1. Answer the following	15 marks
A	
B	
Q2. Answer the following	15 Marks
A	
B	
Q3. Answer the following	15 Marks
A	
B	
Q4. Answer the following	15 marks
A	
B	
Q5. Answer the following	15 Marks
A	
B	
Q6. Answer the following	15 Marks
A	
B	

Sd/-

Sign of the BOS
Chairman
Dr. Kanchan Fulmali
Board of Studies in
BMS

Sd/-

Sign of the
Offg. Associate Dean
Prin. Kishori Bhagat
Faculty of Commerce
& Management

Sd/-

Sign of the
Offg. Associate Dean
Prof. Kavita Laghate
Faculty of
Commerce &
Management

Sd/-

Sign of the
Offg. Dean
Prin. Ravindra
Bambardekar
Faculty of
Commerce &
Management

AC –
Item No. –

As Per NEP 2020

University of Mumbai



Syllabus for Basket of VES	
Board of Studies in Value Education	
UG First Year Programme	
Semester	II
Title of Paper	Credits 2
I) Environmental Management & Sustainable Development -II	
From the Academic Year	2024-25

**Name of the Course: Environmental Management
& Sustainable Development -II**

Sr. No.	Heading	Particulars
1	Description the course : Including but Not limited to :	This introductory course explores the interconnectedness of our environment and the challenges it faces. Designed for students from all faculties, it equips you with a foundational understanding of: - Ecosystems and biodiversity: Explore the intricate web of life on Earth and the importance of species diversity. - Human impact: Analyse how human activities affect natural resources, climate, and pollution. - Sustainability: Discover principles for living in harmony with the environment and meeting our needs without compromising future generations. Regardless of major, environmental awareness is crucial. This course empowers learner to: - Become an informed citizen: Make responsible choices and advocate for environmental protection. - Understand complex environmental issues: Gain a holistic view of challenges like climate change and pollution. Explore solutions and career paths: Discover potential careers in environmental management, conservation, or sustainable development.
2	Vertical :	Open Elective
3	Type :	Theory / Practical
4	Credit:	2 credits / (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives: 1. To create and disseminate knowledge to the students about environmental problems at local, regional and global scale. 2. To introduce about ecosystems, biodiversity and to make aware for the need of	

	conservation. 3. To sensitize students towards environmental concerns, issues, and impacts of human population. 4. To prepare students for successful career in environmental departments, research institutes, industries, consultancy, and NGOs, etc.
8	Course Outcomes: 1. Use principles of Environmental Science for explaining sustainable development and its related ethical concerns 2. Display scientific perspective for issues confronting our present day environment. 3. Analyze the national and global environmental issues relating air, water, soil, and land use, biodiversity, and pollution. 4. Explain the Role of an individual in relation to human population and environmental pollution. 5. Recognize the importance of collective efforts for environmental sustainability as reflected in various treaties, conventions and laws
9	Modules:- Unit I: Environmental Pollution and Health (8 lectures) Understanding pollution: Production processes and generation of wastes; Assimilative capacity of the environment; Definition of pollution; Point sources and non-point sources of pollution. Air pollution: Sources of air pollution; Primary and secondary pollutants; Criteria pollutants- carbon monoxide, lead, nitrogen oxides, ground-level ozone, particulate matter and Sulphur dioxide; Other important air pollutants- Volatile Organic compounds (VOCs), Peroxyacetyl Nitrate (PAN), Polycyclic aromatic hydrocarbons (PAHs) and Persistent organic pollutants (POPs); Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards. Water pollution: Sources of water pollution; River, lake and marine pollution, groundwater pollution; water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life. Soil pollution and solid waste: Soil pollutants and their sources; Solid and hazardous waste; Impact on human health. Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health. Thermal and Radioactive pollution: Sources and impact on human health and ecosystems. Unit II: Environmental Management (7 lectures) Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control. Environmental management system: ISO 14001 Life cycle analysis; Cost-benefit analysis Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme. Introduction to Millennium Development Goals, Sustainable Development Goals, & Mission Life.

	Unit III: Environmental Treaties and Conventions (8 lectures)
	1) Major International Environmental Agreements: Stockholm Conference on Human Environment, 1972, Ramsar Convention on Wetlands, 1971, Montreal Protocol, 1987, Basel Convention (1989), Earth Summit at Rio de Janeiro, 1992, Kyoto Protocol, 1997, Earth Summit at Johannesburg, 2002. 2) Major Indian Environmental Legislations: The Wild Life (Protection) Act, 1972; The Water (Prevention and Control of Pollution) Act, 1974; The Forest (Conservation) Act, 1980; The Air (Prevention and Control of Pollution) Act, 1981; The Environment (Protection) Act, 1986; The Biological Diversity Act, 2002
	Unit IV: Case Studies and Field Survey (7 lectures)
	The students are expected to be engaged in some of the following or similar identified activities: • Discussion on one national and one international case study related to the environment and sustainable development. • Field visits to identify local/regional environmental issues, make observations including data collection and prepare a brief report. • One student one tree initiative. • Documentation of campus biodiversity. • Campus environmental management activities such as solid waste disposal, water management, and sewage treatment.
10	Text Books 1. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI). 2. Central Pollution Control Board Web page for various pollution standards. https://cpcb.nic.in/standards/ 3. Masters, G. M., & Ela, W. P. (2008). Introduction to environmental engineering and science (No. 60457). Englewood Cliffs, NJ: Prentice Hall. 4. Jørgensen, Sven Marques, Erik João Carlos and Nielsen, Søren Nors (2016) Integrated Environmental Management, A transdisciplinary Approach. CRC Press. 5. Barrow, C. J. (1999). Environmental management: Principles and practice. Routledge. 6. Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press. 7. Richard A. Marcantonio, Marc Lane (2022). Environmental Management: Concepts and Practical Skills. Cambridge University Press. 8. UNEP (2007) Multilateral Environmental Agreement Negotiator's Handbook, University of Joensuu, ISBN 978-952-458-992-5 9. Ministry of Environment, Forest and Climate Change (2019) A Handbook on International Environment Conventions & Programmes. https://moef.gov.in/wp-content/uploads/2020/02/convention-V-16-CURVE-web.pdf 10. Ministry of Environment, Forest and Climate Change (2019) A Handbook on International Environment Conventions & Programmes. https://moef.gov.in/wp-content/uploads/2020/02/convention-V-16-CURVE-web.pdf 11. India Code – Digital repository of all Central and State Acts: https://www.indiacode.nic.in/ 12. University Grants Commission, D.O.No.F. 14-5/2015(CPP-II) dated 2nd August 2019.

12	Internal Continuous Assessment: 40%	Semester End Examination : 60%
13	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, Field Visits, Case Studies, assignments, One Student one tree initiative etc. (at least 4)	
14	Format of Question Paper: for the final examination For OE: External - 30 Marks (2 Credits) Internal - 20 Marks Question Paper Format for 30 Marks Format of Question Paper: 30 Marks per paper Semester End Theory Examination: 1. Duration - These examinations shall be of one hour and 30 minutes duration. 2. Theory question paper pattern: There shall be 04 questions each of 10 marks out of which students will attempt ANY THREE	

Signature:
Prof. Kavita Laghate
Chairman of Board of Studies in Value Education

AC-20/05/2025

Item No.- 5.45 (N)

Sem-IV 5(a)

As Per NEP 2020

University of Mumbai



Syllabus for Basket of AEC	
Board of Studies in English	
UG First Year B.sc Programme	
Semester	IV
Title of Paper	Credits
Introduction to Communication Skills in English II	2
From the Academic Year	2025-2026

Sr. No.	Heading	Particulars
1	Description of the course: Including but Not limited to:	Introduction to Communication Skills in English II Effective academic communication skills are essential for success in scholarly pursuits. In the academic realm, proficiency extends beyond verbal articulation to encompass precise and coherent written expression. Students are not only required to engage in thoughtful discussions and articulate complex ideas verbally but must also demonstrate their understanding through well-crafted written assignments, and presentations. Academic communication involves the mastery of scholarly conventions, such as adherence to academic writing styles, and the ability to engage in dialogue with peers and scholars. It encompasses the skillful navigation of academic discourse, fostering an environment where ideas are shared, challenged, and refined. Developing strong academic communication skills empower individuals to contribute meaningfully to intellectual conversations, enriching both their academic journey and the broader scholarly community. This course with its 30:20 pattern will also help in accomplishing this goal. The course is aimed at honing their cognitive, analytical, linguistic and creative skills. It is hoped that by the end of the academic year, the learners will have developed confidence in using the English language both for oral and written communication as well as develop interest in enhancing these skills later on.
2	Vertical:	AEC (Ability Enhancement Course)
3	Type:	Theory
4	Credit:	2 credits (1credit=15Hours for Theory in a semester)
5	Hours Allotted:	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives:	1. To cultivate a comprehensive understanding of English Usage in Communication 2. To enhance reading proficiency with a diverse range of written texts with different genres and styles of written communication. 3. To help learners with better comprehension of a variety of oral texts by inculcating listening skills through practical exercises. 4. To train learners in group discussion and interview skills 5. To provide practical experience in formal and creative writing.

8 Course Outcomes:

At the end of the course the learner is able to:

- Demonstrate an understanding of English Usage in Communication
- Exhibit the ability to Read a variety of written text using subskills such as analyzing and interpreting text.
- Show competence in comprehending a variety of oral texts.
- Actively participate in group discussion, and research and prepare for the interview effectively
- Display advanced formal (email writing, report writing) and creative writing skills.

9 Modules: -

Module1:(15 Lectures)

A) English Usage in Communication

- Appropriacy in the Use of English
- Distinction between American English and British English
- Indianism and Indian English
- Elevator Pitch
- Modes and Types of Interview

B) Enhancing Reading Competencies:

- Augmenting active vocabulary
- Understanding relations between parts of a text
- Understanding concepts and arguments,
- Developing skills in analysis and interpretation
- Rewriting a passage from a defined perspective
- Reading critically (presenting a reasoned argument that evaluates and analyses what you have read)

A variety of passages of 200-250 words may be taken such as extracts from academic texts literary texts, magazines, newspapers, reports, documents. The passages should have complex text type, function and lexis. The learners may be encouraged to gather meaning contextually or by referring to offline and online sources such as dictionary, thesaurus, and encyclopedia.

C) Listening Skills

- Predicting content and guessing meaning
- Making inferences from the audio-visual text
- Listening for opinion/argument/counter-arguments etc.

	• Taking notes A variety of relevant audio/visual texts as samples may be drawn from various sources. Listening skills in English should be developed through various activities along with the practice done while teaching in the class.
	Module2: (15 Lectures)
	A. Group Discussion • Formal and informal discussion • Elements of group discussion • Using appropriate language: Initiating, seeking and giving opinions, suggesting, responding to a suggestion, agreeing, disagreeing, interrupting, requesting, clarifying, summing up • Types of discussion: Giving and sharing opinions of a given topic, making decisions, problem solving (case study) B. Interview Skills • Attending an Interview (Job/Entrance): Researching the organization, reviewing career-profile and your bio-data, preparing for standard questions, Responding to questions • Analyzing Interviews Students can be tested on forming actual interview frameworks including questions. Teachers must form the groups and conduct actual interviews involving full strength of students. C. Writing Skills: • Emails: applying for admission, accepting and joining (academic institution), Cancelling admission, registering a complaint • Report Writing: Activity/Event report, Academic Report • Creative Writing: Personal Essay, Memoir, Short Speech on the given occasion/ event, Story writing
10	Text Books: N.A.
11	References: • Bellare, Nirmala. <i>Reading & Study Strategies</i>. Books. 1 and 2. Oxford University Press, 1997, 1998 • Bellare, Nirmala. <i>Easy Steps to Summary Writing and Note-Making</i>. Amazon Kindle Edition, 2020 • Comfort, Jeremy, et al. <i>Speaking Effectively: Developing Speaking Skills for Business English</i>. Cambridge University Press, 1994.

- Das, Bikram K., et. al. *An Introduction to Professional English and Soft Skills*. Cambridge University Press India Pvt. Ltd., 2010
- Das, Yadjnaseni & R. Saha (eds.) *English for Careers*. Pearson Education India, 2012.
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- Doff, Adrian and Christopher Jones. *Language in Use* (Intermediate and Upper Intermediate). CUP, 2004.
- Glendinning, Eric H. and Beverley Holmstrom. Second edition. *Study Reading: A Course in Reading Skills for Academic Purposes*. CUP, 2004
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- Labade, Sachin, Katre Deepa et al. *Communication Skills in English*. Orient Blackswan, Pvt Ltd, 2021.
- Lewis, N. *How to Read Better & Faster*. New Delhi, Goyal Publishers & Distributors Pvt. Ltd, 2006.
- McCarthy, Michael and Felicity O'Dell. *English Vocabulary in Use*. Cambridge: Cambridge University Press, 2001.
- Mohan, RC Sharma Krishna. *Business Correspondence and Report Writing*. Third edition. Tata McGraw-Hill Education, 2002.
- Murphy, Raymond, et al. *Grammar in use: Intermediate*. Cambridge University Press, 2000
- Raman, Meenakshi, and Singh, Prakash. *Business Communication*. India, Oxford University Press, 2006.
- Richards, Jack C., and Chuck Sandy. *Passages Level 2 Student's Book*. Cambridge University Press, 2014.
- Sadanand, Kamlesh & S. Punitha. *Spoken English: A Foundation Course*. (Part 1 & 2). Orient Blackswan. 2009.
- Sasikumar, V., et al. *A Course in Listening & Speaking I*. 2005. Cambridge University Press India Pvt. Ltd. (under the Foundation Books Imprint), 2010
- Savage, Alice, et al *Effective Academic Writing*. Oxford: OUP, 2005
- Sethi, J. *Standard English and Indian usage: Vocabulary and grammar*. PHI Learning Pvt. Ltd., 2011.
- Taylor, Grant. *English Conversation Practice*. 1967. Tata McGraw-Hill, 2013
- Turton, Nigel D. *A B C of Common Grammatical Errors*. 1995. Macmillan India Ltd., 1996
- Vas, Gratian. *English Grammar for Everyone*. Mumbai, Shree Book Centre, 2015
- Watson, T. *Reading Comprehension Skills and Strategies: Level 6*. Saddleback Educational Publishing, 2002

Web link Resources:

1. A rendezvous with Simi Garewal: Ratan Tata:

<https://www.youtube.com/watch?v=ozetTgOHu78&t=510s> Here Ratan Tata discusses his personal life, his expectations, his experience as a CEO of Tata and sons.

2. A rendezvous with Simi Garewal: Kiran Bedi: <https://youtu.be/vX2NyKvEAXQ> In this video, Kiran Bedi shares her daring adventures, her field, her passion for career with Simi Garewal.

3. In Conversation: Rajiv Mehrotra with J.R.D.Tata: <https://youtu.be/68otfg601HI> J. R. D. Tata discloses his dream of India, his experiences with Pandit Nehru, Mahatma Gandhi, Sardar Patel and his contribution to modern India.

4. The Tharoor Guide To Indian English: <https://youtu.be/NsyI9LIXbFM> Shashi Tharoor talks of new words like “defenstrate”, “brinjol”; talks about Indian English, ethnicity and so on.

5. Dr. A.P.J Abdul Kalam on Discovery, invention and innovation: <https://youtu.be/9CKCfiX3u00> Dr. Kalam addresses IIT Delhi students.

6. Malala Yousafzai’s speech on the occasion of her Nobel Peace Prize (2014) on education: <https://youtu.be/c2DHZlkUI6s>

7. Kailash Satyarthi’s speech on the occasion of Nobel Peace Prize(2014) on the innocence of children; he gives voice to voiceless in his speech: https://youtu.be/wt0LSCEuc_M

8. Speech by Mr. Ratan Tata: <https://youtu.be/m7-tKX7aZXM>

9. “I Have a Dream” speech by Martin Luther King Jr. HD (subtitled) <https://www.youtube.com/watch?v=vP4iY1TtS3s> “I Have a Dream” is a public speech that was delivered by American civil rights activist Martin Luther King Jr. during the March on Washington for Jobs and Freedom on August 28, 1963, in which he called for civil and economic rights and an end to racism in the United States.

10. Speech by Emma Watson on Gender Equality : <https://youtu.be/nIwU-9ZTTJc> 11. Imaginative science video: Could humans live in underwater cities?

<https://youtu.be/GUGtU7li1yk>

12. A conversation about household appliances: <https://youtu.be/rAPl0fSborU> 13. Video on psychology: Why do we dream? <https://youtu.be/2W85Dwxx218>

14. Video on space: Solar system 101: <https://youtu.be/libKVRa01L8>

15. Video on evolution: How Apocalypses paved the way for Humans <https://youtu.be/libKVRa01L8> 16. Video on biology: Why Bats Aren't as Scary as You Think https://youtu.be/D6e_qh3YRPs

17. Video on social media: What is a social media influencer? <https://youtu.be/39A3og7enz8>

18. Tips on communication (TED Talk): The Secrets of Learning a New Language https://youtu.be/o_XVt5rdpFY

	19. Expressing opinions: If Cinderella Were a Guy: https://youtu.be/p4OyCNctKXg 20. Telling stories without words: Partly Cloudy https://youtu.be/ix13P9NqBjo 21. Telling stories without words: Tree of Unity https://youtu.be/sAo41Gyl6hY 17 22. Bonding over the Radio: A special storytelling series by the much loved author Ruskin Bond: akashvaniair https://youtu.be/oxf60BIR2Q4 https://youtu.be/ISX7rUOJOms https://youtu.be/rrC_s0XPXKI https://youtu.be/FUML3q1ncF0 https://youtu.be/3by_ninqRzg 23. Video on the English language: Where did English come from? https://youtu.be/YEaSxhcns7Y 24. Video on biology: The science of skin colour: https://youtu.be/r4c2NT4naQ 25. Video on advertising: The Science of Persuasion https://youtu.be/cFdCzN7RYbw 26. "The Happy Prince" Oscar Wilde Michael Mills Classic Animated Short 1974 https://www.youtube.com/watch?v=q3RZh1yaqxM Learners may be encouraged to watch animated stories such as this one and questions asked later on.	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%
13	Continuous Evaluation through: - Performance in activities on Module 2 A & B during lectures: (10 marks) The class may be divided into batches to participate in Group Discussion and mock interview by creating formal schedule for the same before the semester End Examination. - Participation in classes during lectures: (05 marks) (Learners' response during the teaching and the tasks involving Listening skills (Module 1 C) will be assessed) - Overall attendance in lectures (05 marks) (Percentage of learners' attendance in class to be considered)	
14	Format of Question Paper: for the final examination Q.1. Short Notes on Module 1 A (2 out of 4) 10 Marks Q.2. Unseen Passage (200-250 words) (Module 1 B) 10 Marks Q. 3 Writing Skills on Module 2 C – Writing an email or a Report or Creative Writing 10 Marks	

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Prof. Dr. Anil Singh
Faculty of
Humanities

AC – 20/05/2025

Item No. 8.47 (N) Sem III/IV 1(c)

As Per NEP 2020

University of Mumbai



Syllabus for CC

Ad- hoc Board of Studies in N.C.C./N.S.S./Sports Co-Curricular

UG First Year Programme - Co-Curricular Course

Semester	III & IV	
Title of Paper	Sem	Credits
Indian Theatre: Classical Roots and Contemporary Expressions	III	2
Integrated Theatre Production: Stage Craft, Costume, Music and Technology	IV	2
From the Academic Year		2025-26

Semester III As per NEP 2020

Indian Theatre: Classical Roots and Contemporary Expressions

Syllabus for Two Credits Programme

With effect from Academic Year 2025-2026

Aims and Objectives

- To understand the historical evolution of Indian theatre from Vedic to modern times.
- To analyze the core principles of Bharata's *Natyashastra* and their relevance in contemporary theatre.
- To examine major classical playwrights and evaluate the narrative and thematic aspects of their works.
- To explore and differentiate various streams of modern Indian theatre including commercial, experimental, and children's theatre.
- To develop a critical perspective on the sociopolitical role of street and one-act plays.
- To appreciate the interdisciplinary nature of performing arts by connecting theory with practical examples.

Learning Outcomes

The course will enable the learner to

- Describe the historical and cultural development of Indian theatre across different time periods.
- Interpret and apply the aesthetic principles from *Natyashastra* (such as Rasa and Abhinaya) in the analysis of theatrical performances.
- Critically evaluate classical Indian plays for their structure, themes, character development, and historical significance.
- Compare and contrast different forms of modern Indian theatre and assess their audience impact and staging methods.
- Demonstrate understanding of street theatre and one-act plays by creating outlines or performing excerpts reflecting real-world issues.
- Reflect on the role of performing arts in cultural preservation, education, and community engagement.

Modules at Glance

Semester III

Module No.	Unit	Content	No. of Hours
1	I	Indian Theatre: Historical Roots	07
	II	Bharata's <i>Natyashastra</i> and Theatrical Principles	08
2	III	Classical Playwrights and Dramatic Texts	07
	IV	Streams and Forms of Modern Indian Theatre	08
Total No. of Hours			30

Module No.	Unit	Content
1	I	Indian Theatre: Historical Roots - History of Indian Drama, Origins: Historical development: From Vedic rituals to Sanskrit drama, medieval folk forms, colonial influences, and post-independence trends. - Major periods: Ancient (Natyashastra era), Medieval (Bhakti and folk traditions), Modern (colonial and post-independence)
	II	Bharata's <i>Natyashastra</i> and Theatrical Principles - In-depth analysis of <i>Natyashastra</i>, the foundational treatise on Indian dramaturgy - Key concepts: - Natyagriha (Ancient theatre architecture) - Rasa Theory – the aesthetic experience and emotional flavors - Bhava, Abhinaya, and their relevance in classical performance - Influence of <i>Natyashastra</i> on later theatrical tradition
2	III	Classical Playwrights and Dramatic Texts - Critical study of major classical dramatists and their works: Kalidasa – <i>Abhijnanasakuntalam</i>, <i>Malavikagnimitram</i> Bhasa, Sudraka, Bhavabhuti – Key themes and innovations. - Analysis of plot structure, character portrayal, and cultural context in classical play.
	IV	Streams and Forms of Modern Indian Theatre Commercial Theatre: Characteristics, audience engagement, and production values Experimental Theatre: Alternative spaces, innovative storytelling, and non-linear narratives Amateur Theatre: Community participation, regional theatre groups, and resourceful staging Children's Theatre: Educational objectives, interactive methods, and imagination-centered content One-Act Plays: Structure, brevity, and intensity of narrative Street Theatre (Nukkad Natak): Origin, purpose, and

		socio-political engagement
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Scheme of Evaluation

The Scheme of Examination shall be of 50 marks. It will be divided into Internal Evaluation (20 marks) and Semester End Examination (30 Marks).

Semester III (50 Marks - 2 Credits)

Internal Evaluation (20 Marks)

Sr. No.	Particulars	Marks
1	Presentation OR Project OR Assignment	15
2	Participation in Workshop / Conference / Seminar (as decided by the Teacher) OR Participation in Online Workshop / Conference / Seminar (as decided by the Teacher) OR Field Visit OR Attendance	5

Semester End Examination (30 Marks)

Question No.	Particulars	Marks
1	Objective Type Questions (All Units)	06
2	Descriptive Question(s) on Unit I The Question may be divided into sub questions: Attempt any 2 out of 4 (Each of 3 Marks)	06
3	Descriptive Question(s) on Unit II The Question may be divided into sub questions: Attempt any 2 out of 4 (Each of 3 Marks)	06
4	Descriptive Question(s) on Unit III The Question may be divided into sub questions: Attempt any 2 out of 4 (Each of 3 Marks)	06
5	Descriptive Question(s) on Unit IV The Question may be divided into sub questions: Attempt any 2 out of 4 (Each of 3 Marks)	06
Total		30

Reference Books

- Ankur, D. R. (2021). *Doosare Natyashastra ki Khoj (in Hindi)*. Vani Prakashan. ISBN: 978-9350004302.
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- Gargi, B. (1991). *Indian theatre*. National Book Trust.
- Ghosh, M. (Trans.). (1951). *The Natyashastra of Bharatamuni (Vol. I & II)*. Asiatic Society of Bengal.
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- Karnad, G. (1995). *Three modern Indian plays: Tughlaq, Hayavadana, Nagamandala*. Oxford University Press.
- Mason, D. (Ed.). (2006). *Performance traditions in India*. Oxford University Press.
- Mathur, J. C. (2006). *Paramparasheel natya (in Hindi)*. National School of Drama. ISBN-13: 9788181970756.
- Macdonell, A. A. (1900). *A history of Sanskrit literature*. D. Appleton and Company.
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- Shukla, B. (2009). *Natyashastra (in Hindi)*. Chaukhamba Sanskrit Sansthan. ISBN: 978-81-208-2248-1.
- Sircar, B. (2009). *Three plays: Evam Indrajit, Pagla Ghoda, and Bhoma*. Oxford University Press.
- Solomon, R. H. (2004). *New directions in Indian theatre*. Seagull Books.
- Tendulkar, V. (2004). *Collected plays in translation (Vol. 1)*. Oxford University Press.
- Tanvir, H. (2007). *Charandas Chor and other plays*. Seagull Books.
- Vatsyayan, K. (1980). *Traditional Indian theatre: Multiple streams*. National Book Trust.
- Vatsyayan, K. (1996). *Indian poetics and Natyashastra*. [Publisher not listed].
- Varadpande, M. L. (1987). *A history of Indian theatre (Vols. 1–3)*. Abhinav Publications.
- Wales, H. W. (2010). *Bharat ka pracheen natak: Vishwa sahitya aur theatre ke liye mulyon ka adhyayan (in Hindi)*. Motilal Banarsidass Publishing House. ISBN: 978-8120824522.
- Wilson, E., & Alvin, G. (2001). *Theatre: The lively art (6th ed.)*. McGraw-Hill.

Semester IV

As per NEP 2020

Integrated Theatre Production: Stage Craft, Costume, Music and Technology

Syllabus for Two Credits Programme

With effect from Academic Year 2025-2026

Aims and Objectives

- Theorize the semiotic and emotional functions of lighting and costume design within various theatrical traditions.
- Critically examine the historical evolution and theoretical paradigms of lighting and costume design in stagecraft.
- Explore the interplay between visual design elements and narrative dramaturgy in theatrical performance.
- Understand technical terminologies and design documentation processes from a theoretical perspective.
- Discuss the role of modern technologies (e.g., DMX, lighting consoles) and their theoretical implications on visual design aesthetics.
- Evaluate costume design strategies in relation to character psychology, period accuracy, and genre conventions.

Learning Outcomes

The course will enable the learner to

- **Define and describe** key theoretical concepts related to lighting and costume design in theatre.
- **Interpret** the narrative and symbolic meanings conveyed through visual design elements in performance.
- **Analyze** lighting and costume designs using appropriate theoretical and historical frameworks.
- **Discuss** the interrelationship between text, character, and design from a theoretical standpoint.
- **Compare and contrast** design practices across different theatrical genres and periods.
- **Evaluate** how technological advancements have influenced theoretical approaches to stage design.

Modules at Glance Semester IV

Module No.	Unit	Content	No. of Hours
1	I	Stage Lighting Design and Documentation	07
	II	Principles and Practice of Costume Design	08
2	III	Background Music and Sound Design	07
	IV	Technological Tools in Theatre Production	08
Total No. of Hours			30

Module No.	Unit	Content
1	I	Stage Lighting Design and Documentation • Introduction to lighting as a narrative and emotional tool in theatre • Preparation and documentation: ○ Lighting layout plan ○ Ground plan ○ Cue sheet making • Study of light placement, intensity, color, and timing • Introduction to modern lighting technology: ○ Use of computerized and automated lighting systems (DMX, consoles, software) • Integration of lighting with sound and stage movement.
	II	Principles and Practice of Costume Design • Elements and principles of costume design: texture, silhouette, line, color, proportion • Costume construction techniques: fabric selection, stitching, pattern-making • Embellishment and ornamentation: embroidery, painting, appliqué • Costumes for theatrical styles: • Realistic/Representational theatre: historically and culturally accurate costume design • Stylized/Presentational theatre: symbolic, abstract, and thematic design approaches
2	III	Background Music and Sound Design • Objectives and importance of background music in theatre production. • Methods of using sound: • Live performance effects vs. recorded effects • Synchronizing sound with cues, lighting, and performance • Introduction to musical instruments used in theatre:

		• String instruments (e.g., sitar, violin) • Wind instruments (e.g., flute, shehnai) • Percussion instruments (e.g., tabla, drums) • Music cue sheets: structure, timing, and application in live performance.
	IV	Technological Tools in Theatre Production • Overview of sound equipment: microphones, mixers, speakers • Integration of computers and software in sound and music production • Use of digital platforms in cueing, editing, and managing technical aspects of performance • Case studies/examples from contemporary and traditional performances integrating modern technology.

Scheme of Evaluation

The Scheme of Examination shall be of 50 marks. It will be divided into Internal Evaluation (20 marks) and Semester End Examination (30 Marks).

Semester IV (50 Marks - 2 Credits)

Internal Evaluation (20 Marks)

Sr. No.	Particulars	Marks
1	Presentation OR Project OR Assignment	15
2	Participation in Workshop / Conference / Seminar (as decided by the Teacher) OR Participation in Online Workshop / Conference / Seminar (as decided by the Teacher) OR Field Visit OR Attendance	5

Semester End Examination (30 Marks)

Question No.	Particulars	Marks
1	Objective Type Questions (All Units)	06
2	Descriptive Question(s) on Unit I The Question may be divided into sub questions: Attempt any 2 out of 4 (Each of 3 Marks)	06
3	Descriptive Question(s) on Unit II The Question may be divided into sub questions: Attempt any 2 out of 4 (Each of 3 Marks)	06
4	Descriptive Question(s) on Unit III The Question may be divided into sub questions: Attempt any 2 out of 4 (Each of 3 Marks)	06
5	Descriptive Question(s) on Unit IV The Question may be divided into sub questions: Attempt any 2 out of 4 (Each of 3 Marks)	06
Total		30

Reference Books

- Angeloglou, M. (1970). *A history of make-up*.
- Malvil, H. (n.d.). *Magic of makeup for stage*.
- Strenkovsky, S. (1937). *The art of make-up*. Frederick Muller.
- Pilbrow, R. (2008). *Stage lighting design: The art, the craft, the life*. Quite Specific Media Group.
- Dasgupta, G. N. (1986). *Guide to stage lighting*. Annapurna Dasgupta.
- Corry, P. (1958). *Lighting the stage*. Pitman.
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Sd/-

**Sign of the BOS
Chairman
Dr. Sunil Patil
Ad-hoc Board of
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Co-Curricular**

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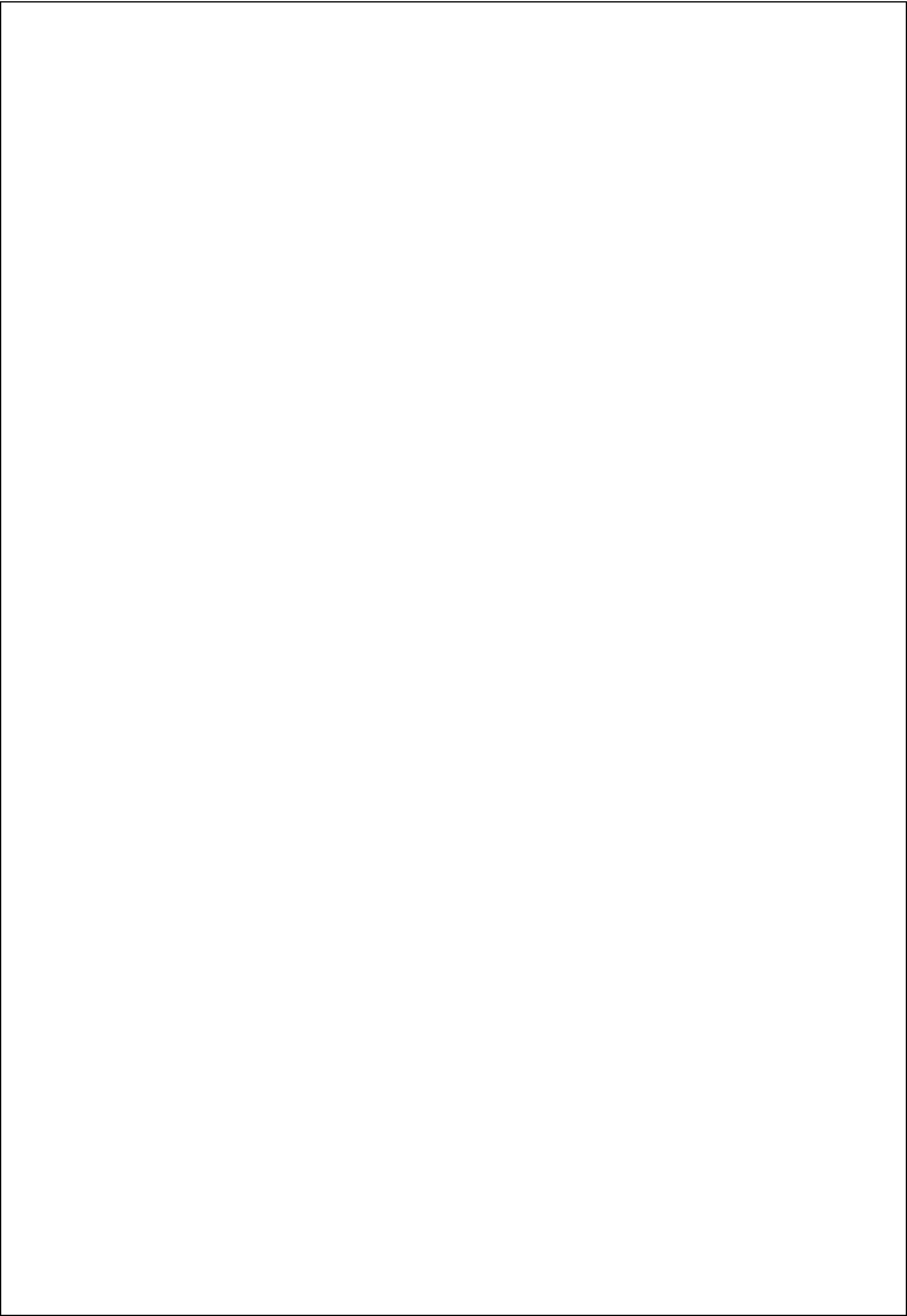
**Sign of the
Offg. Associate Dean
Dr. C.A.Chakradeo
Faculty of
Interdisciplinary
Studies**

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**Sign of the
Offg. Associate Dean
Dr. Kunal Ingle Faculty
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Prof. A. K. Singh
Faculty of
Interdisciplinary
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As Per NEP 2020

University of Mumbai



Syllabus for CC

Ad- hoc Board of Studies in N.C.C./N.S.S./Sports Co-Curricular

UG First Year Programme – National Service Course

Semester	III & IV	
Title of Paper	Sem	Credits
Study of Indian Social Reformers	III	2
Youth and Disaster Management	IV	2
From the Academic Year		2025-26

UNIVERSITY OF MUMBAI

Semester III

(w.e.f. June, 2025)

Sub: - NSS- Study of Indian Social Reformers

Credits: 02

Lectures: 30

Marks:50

Unit	SEMESTER 3	No. of	No. of
Number	Title of the Unit	Lecture	Credits
1	History of Social work in India	15	1
	Social Reformers: Definition, concept and Nature		
	History of Indian Social Reformers		
	Characteristics Indian Social Reformers - Pre-Post Independence		
	Skills for NSS volunteers:		
	Soft Skills for NSS Volunteers – Communication skills, Public speaking skills, Body Language, Content writing, Resume writing.		
	Life Skills – problem solving, Empathy, coping with emotions, self- Awareness and inter personal skills.		
2	Contributions of Social Reformers	15	1
	• Mahatma Gandhi		
	• Swami Vivekanand		
	• Sant Gadge Baba		
	• Mahatma Jyotiba Phule		
	• Rajshri Shahu Maharaj		
	• Baba Amte		
	• RajaRam Mohan Roy		

References –

- 1) Fadake G. D., (Sampadak) – Mahatma FuleSamagraWangmaya.
- 2) Salunkhe P.B., (Sampadak) – Mahatma FuleGouravGranth.
- 3) NarkeHari,(Sampadak) -Mahatma Fule :ShodhachyaNavyaWata.
- 4) Bhosale S. S., (Sampadak) –KrantiSukte: RajarshiChhatrapatiShahu
- 5) PawarJaysingrao, (Sampadak) –RajarshiShahuSmarakGranth
- 6) Dr. BabasahebAmbedkarlekhanaaniBhashanekhand 18, Bhag –1,2,3.
- 7) ToksalePrajecta -VyavysaikSamajkarya

- 8) Dr. V.C. Dande : National Service Scheme Review
- 9) Joshi V.N.-BhartiyTatvdnyanachabruhadItihas, Khand10
- 10) YadiIndumati -BharatratnaShendgeDipak (Anuwad) -MadarTeressa.
- 11) Marathi Vishwakosh, Khanda12.
- 12) Bhagat R.T. - Swami VivekanandTeAcharyaVinoba.
- 13) ShethPurushottam, KhambeteJayashri, Mane ShailajaRashtriyaSevaYojna
- 14) MishrAnupam - AajBhikharehaiTalab(Hindi)
- 15) ThotePurushottam–SamajkaryachiMultatve
- 16) Bhide G.L.,MaharashtratilSamajSudharanechaItihaas

UNIVERSITY OF MUMBAI

Semester IV

(w.e.f. June, 2025)

Sub: - NSS- Youth and Disaster Management

Credits: 02

Lectures: 30

Marks:50

Unit Number	SEMESTER 4 Title of the Unit	No. of Lecture	No. of Credits
1	Youth and Disaster Management-	10	
	Meaning and Types of Disasters – Natural and Man-Made disasters, preparedness, Disaster Risk reduction: Preparedness, Mitigation, Response, Relief, Rehabilitation, Reconstruction.		
2	Project:	20	
	• Project work is mandatory for all the students in IV semester.		
	• They can carry out project work under the supervision of the teacher in-charge of NSS and at the end of the semester a project report shall be presented and viva voce shall be conducted.		
	• The Project work can be carried out independently or in a group.		
	The project work shall be community based and selected preferably from the adopted villages/ slums/ neighborhoods.		
	Project Submission and Presentation VIVA-VOCE		

Note:

1. Above Paper will be exempted if the learner is involved in NSS as Volunteer and Successfully completes 60 hours in each Semester.
2. If learner as a NSS Volunteer attends any Camps at National/State/University/District/ College Special Camp will be exempted from either **Sem II OR Sem IV** Paper provided they produce Certificate of Participation or Attendance in Camp certified by the Programme Officer.

**Evaluation Pattern
Internal Assessment**

Assessment Criteria	Marks
Assignment / Project / Quiz/Presentations	10
Attendance, Class and Activity Participation	10
Total	20

**External Assessment
Question Paper Pattern**

Time: 1:00 Hours

Total Marks: 30

Introduction:-1. All questions are compulsory.

2. Figure to the Right indicates full marks.

3. Draw neat labeled drawings wherever necessary.

Q.1) Rewrite the following by choosing the correct options given below
(with four alternatives) 6 Objectives question of 1 mark each

06 marks.

- | | | | |
|-------|----|----|----|
| 1. a) | b) | c) | d) |
| 2. a) | b) | c) | d) |

Q.2) Short Notes . (Any Two out of Four)

06marks

- 1.
- 2.
- 3.
- 4.

Q.3) Answer the following questions (Any Three out of Five)

18 marks

- 1.
- 2.
- 3.
- 4.
- 5.

.....

NSS Project Report Format

(For Projects in Adopted Area / Village)

➤ **Cover Page**

- Name of the Institution
- Title of the Project (e.g., "Cleanliness Drive in XYZ Village")
- Name(s) of Student Volunteer(s)
- Name of Programme Officer
- Duration of the Project
- Date of Submission

➤ **Certificate**

- Issued by the Programme Officer/NSS Coordinator certifying the successful completion of the project.

➤ **Acknowledgment**

- Brief section to thank authorities, community members, NSS coordinators, peers, etc.

➤ **Index**

- A table listing all sections with corresponding page numbers.

1. Introduction
2. Profile of the Adopted Area / Village
3. Objectives of the Project
4. Planning and Preparation
5. Implementation of Activities
6. Outcomes and Impact
7. Challenges Faced
8. Feedback
9. Conclusion and Suggestions

➤ **Annexures**

- Photographs (with captions)
- Survey forms or questionnaires used
- Newspaper clippings (if any)
- Charts, posters, or flyers prepared

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**Sign of the BOS
Chairman
Dr. Sunil Patil
Ad-hoc Board of
Studies in
N.C.C./N.S.S./Sports
Co-Curricular**

Sd/-

**Sign of the
Offg. Associate Dean
Dr. C.A.Chakradeo
Faculty of
Interdisciplinary
Studies**

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**Sign of the
Offg. Associate Dean
Dr. Kunal Ingle Faculty
of Interdisciplinary
Studies**

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**Sign of the
Offg. Dean
Prof. A. K. Singh
Faculty of
Interdisciplinary
Studies**

AC – 20/05/2025

Item No. – 8.47 (N) Sem III& IV 1(b)

As Per NEP 2020

University of Mumbai



Syllabus for CC

Ad- hoc Board of Studies in N.C.C./N.S.S./Sports Co-Curricular

UG First Year Programme – CC- Sports

Semester	III & IV	
Title of Paper	Sem	Credits
Introduction to Sports Training & Tests and Measurement	III	2
Advanced Sports Training and Performance Evaluation	IV	2
From the Academic Year		2025-26

Course (Optional): Introduction to Sports, Physical Literacy, Health & Fitness and Yog

CBCS (Choice Based Credit System)

Second Year- Semester III

Course Structure

Semester	Paper	Title of Paper	No of lecture (Theory)	Internal Evaluation (IE)	End Semester Evaluation	Total Marks	Credits
Third	CC	Introduction to Sports Training & Tests and Measurement	30	20	30	50	02
Total	-	-	30	20	30	50	02

UNIVERSITY OF MUMBAI

Semester III

(w.e.f. June, 2025)

Sub:- Introduction to Sports Training & Tests and Measurement

Preamble:

Sports play a vital role in fostering physical fitness, mental resilience, and holistic well-being. Understanding the intricacies of sports training and the science of test and measurement is essential for optimizing athletic performance and personal growth. Sports training encompasses systematic methods to enhance physical capabilities, skill development, and strategic planning, while test and measurement provide the tools to evaluate fitness levels, track progress, and refine training protocols. Together, these disciplines empower individuals to achieve their full potential, making them indispensable components of modern sports science and athletic excellence.

Aims and Objectives

Sports Training

- To understand the foundation and principles of sports training.
- To study various training methods and their applications.
- To explore the process of designing personalized and professional training plans.
- To analyze the role of training in achieving peak performance.

Tests and Measurement in Sports

- To understand the significance of test and measurement in sports.
- To learn about various types of tests and their applications.
- To comprehend the criteria for good testing and measurement methods.
- To explore the use of test and measurement data for performance analysis and improvement.

Learning Outcomes

Sports Training

The course will enable the learner to:

- Understand and apply the principles of sports training.
- Identify and differentiate between various training methods.
- Develop effective exercise plans and training schedules.
- Evaluate the impact of training on performance enhancement.

Tests and Measurement in Sports

The course will enable the learner to:

- Identify and explain the importance of test and measurement in sports.
- Apply various skill, fitness, and psychological tests.
- Evaluate test results to assess fitness and performance levels.
- Utilize test data to design targeted training and rehabilitation programs

UNIVERSITY OF MUMBAI

Semester – III

(w.e.f. June, 2025)

Sub:- Introduction to Sports Training & Tests and Measurement

Credits: 02

Lectures: 30

Marks:50

Module No.	Unit No	Title of the Unit	No. of Lectures	No. of Credits
1	I	<i>Introduction to Sports Training</i> Meaning, Definition, and Components/Elements of Sports Training • Meaning • Definition • Components/Elements	2	1
	II	Principles of Sport Training • FITT Principle (Frequency, Intensity, Time, Type) • Specificity • Progression • Overload • Reversibility • Tedium	5	
	III	Types of Training Methods • Interval Training • Fartlek Training • Continuous Training • Weight Training • Circuit Training • Plyometric Training • Flexibility Training	5	
	IV	Basic Guidelines for Designing Exercise Plans and Training Schedules • Current Health Status • Medical History • Level of Fitness • Training Load • Periodisation • Holistic/Integrated Approach • Person-Centred Approach • Training Intensity	3	
		Total	15	1

Sub:- Introduction to Sports Training & Tests and Measurement

Credits: 02

Lectures: 30

Marks:50

Module No.	Unit No	Title of the Unit	No. of Lectures	No. of Credits
2		<i>Test and Measurement in Sports</i>		
	I	Meaning and Importance of Test and Measurement in Sports • Meaning & Importance	1	1
	II	Criteria of a Good Test • Validity • Reliability • Objectivity • Feasibility	2	
	III	Types of Tests Skill Tests • Wall Volley Test • Basketball Free Throw Test • Badminton Short Serve Test Fitness Tests • Cooper's 12-Minute Run/Walk Test • Sit and Reach Flexibility Test • Push-Up Test Psychological Tests • Sport Motivation Scale (SMS) • Competitive State Anxiety Inventory (CSAI-2) • Mental Toughness Questionnaire (MTQ)	6	
	IV	Methods of Measurement • Anthropometric Measurements • Motor Fitness Measurements • Physiological Measurements	3	
	V	Applications of Test and Measurement in Sports Talent Identification • Performance Analysis • Designing Training Programs • Injury Prevention and Rehabilitation	3	
		Total	15	1

Scheme of Evaluation -

The Scheme of Examination shall be of 50 marks. It will be divided into Internal Evaluation

(20 marks) and Semester End Examination (30 Marks).

Semester III (50 Marks - 2 Credits)**Internal Evaluation (20 Marks)**

Sr. No.	Particulars	Marks
1	Presentation OR Project OR Assignment	15
2	Participation in Workshop / Conference / Seminar / Fitness or Sports Activity (as decided by the Sports Incharge) OR Participation in Online Workshop / Conference / Seminar / Fitness or Sports related course (as decided by the Sports Incharge) OR Field Visit / Sports Events OR Attendance of Sports Practice Sessions	5

Semester End Examination (30 Marks)

Question No.	Particulars	Marks
1 to 30	Objective Type Questions (All Units) Each question will carry one mark	30
Total		30

References –

1. "Science and Practice of Strength Training" - Vladimir M. Zatsiorsky and William J. Kraemer
2. "Essentials of Strength Training and Conditioning" - National Strength and Conditioning Association (NSCA)
3. "Principles and Practice of Resistance Training" - Michael H. Stone, Meg Stone, and William A. Sands
4. "Periodization Training for Sports" - Tudor O. Bompa and Carlo A. Buzzichelli
5. "High-Performance Training for Sports" - David Joyce and Daniel Lewindon
6. "Tests and Measurements in Sports and Physical Education" - Dr. A.K. Uppal and Dr. G.P. Gautam
7. "Measurement by the Physical Educator: Why and How" - David K. Miller and Harold M. Barrow
8. "Kinanthropometry and Exercise Physiology Laboratory Manual" - Roger Eston and Thomas Reilly
9. "Evaluation of Human Work" - John R. Wilson and NIGEL CORLETT
10. "Advanced Fitness Assessment and Exercise Prescription" - Vivian H. Heyward and Ann L. Gibson

**UNIVERSITY OF MUMBAI
SYLABUS FOR (NEP-2020)**

CO-CURRICULAR COURSE IN SPORTS

Introduction to Sports, Physical Literacy, Health and Fitness and Yog

SEMESTER IV

(Syllabus to be implemented from, June 2025 onwards)

Course (Optional): Introduction to Sports, Physical Literacy, Health & Fitness and Yog**CBCS (Choice Based Credit System)
Second Year- Semester IV
Course Structure**

Semester	Paper	Title of Paper	No of lecture (Theory)	Internal Evaluation (IE)	End Semester Evaluation	Total Marks	Credits
Fourth	CC	Advanced Sports Training and Performance Evaluation	30	20	30	50	02
Total	-	-	30	20	30	50	02

University of Mumbai

Semester IV

(w.e.f. June, 2025)

Sub:- Advanced Sports Training and Performance Evaluation

Preamble:

In an era where fitness and sports are pivotal to the holistic development of individuals, an understanding of sports training and performance evaluation is essential. This course bridges the gap between theoretical knowledge and its practical application in sports and fitness domains. Students will gain hands-on experience in training methodologies, measurement techniques, and assessment strategies to excel in their chosen field of sports and fitness.

Objectives of the Course:

- To impart practical skills in sports training and evaluation techniques.
- To encourage participation in various sports and fitness activities.
- To develop a scientific approach to training and performance assessment.
- To enhance organizational and leadership skills through event planning and volunteering.
- To foster a deeper understanding of training intensity, recovery, and testing protocols.

Program Outcomes:

By the end of the program, students will:

- Gain practical knowledge of sports training principles and methods.
- Develop the ability to conduct, evaluate, and interpret various fitness and skill-based tests.
- Learn to design and implement personalized and professional training programs.
- Acquire experience in organizing and volunteering in sports and fitness events.
- Understand the role of psychological, fitness, and skill tests in enhancing performance.

UNIVERSITY OF MUMBAI**Semester – IV****(w.e.f. June, 2025)****Sub:- Advanced Sports Training and Performance Evaluation****Credits: 02****Practical Lectures: 60****Marks:50**

Module No.	Unit No	Title of the Unit	No. of Practical hours	No. of Credits
1	I	Advanced Sports Training		
	I	Fundamentals of Sports Training • Warm-ups and cool-downs	10	
	II	• Fitness training (strength, endurance, flexibility) • Group activities and game practice	15	
	III	Training Methods Practical Sessions • Interval and circuit training sessions (Time, Type) • Plyometric and weight training demonstrations • Fartlek & Continuous training sessions • Flexibility training session Basic Guidelines for Designing Exercise Plans and Training Schedules (Practically to be done by the students on peer groups formed by the Sports Incharge) • Current Health Status • Medical History • Level of Fitness • Training Load • Periodisation • Holistic/Integrated Approach • Person-Centred Approach • Training Intensity	5	1
		Total	30	1

UNIVERSITY OF MUMBAI**Semester – IV****(w.e.f. June, 2025)****Sub:- Advanced Sports Training and Performance Evaluation****Credits: 02****Practical Lectures: 60****Marks:50**

Module No.	Unit No	Title of the Unit	No. of Practical hours	No. of Credits
1	I	Performance Evaluation in Sports	10	
		Practical sessions of Fitness & Skill testing (To be conducted by Coach/Fitness Instructor/Sports In charge/Any other P.E. Expert appointed by the College)		
	II	• Practical demonstrations of fitness tests (e.g., Cooper's test, 12-minute run, flexibility tests) • Basic skill tests/modified skills tests for popular sports in the college campus.	15	
	III	Practical sessions of Fitness & Skill testing • Practical Testing Sessions • Skill-based tests: Dribbling, agility, passing (e.g., basketball, football) • Fitness tests: Speed, strength, and endurance measurements • Psychological Tests - Conducting motivation and stress assessments • Conduct of the above mentioned tests by students on the peer groups formed by Sports Incharge/ Sports Director of the college / Students Sport coordinator • Testing of the students must be held under the observation of Coach/ Fitness Instructor/ Sports In charge/Any other P.E. Expert appointed by the College Evaluation of the tests • Date analysis and reporting • Interpretation of test results • Writing of practical reports • Conclusion and recommendation	5	1
		Total	30	1

Scheme of Evaluation -

The Scheme of Examination shall be of 50 marks. It will be divided into Internal Evaluation (20 marks) and Semester End Examination (30 Marks).

Semester IV (50 Marks - 2 Credits) Internal Evaluation (20 Marks)

Sr. No.	Particulars	Marks
1	Conduct of the practical test and demonstration	15
2	Attendance of all practical sessions conducted for Sports Training and performance evaluation/ Sports practice training session conducted by the college	5

Semester End Examination (30 Marks)

Evaluation type	Particulars	Marks
VIVA	Viva on Advanced Sports training & testing methods and evaluation protocols	20
Submission of report	Submission of psychological or fitness testing reports	10
Total		30*

***Note - OR**

- Participation in Sports Competitions Conducted by University of Mumbai Sports Department
(Students who have represented Mumbai University or College at Intercollegiate / Inter Zonal / West Zone Inter University / All Indi Inter University/ International tournament)
- Students who have represented in the above mentioned competitions should be exempted from VIVA & submission of report and should be evaluated on the basis of his/ her performance in the above mentioned competitions.

References -

1. Singh, Hardayal. *Science of Sports Training*. DVS Publication.
2. Bompa, Tudor. *Periodization: Theory and Methodology of Training*. Human Kinetics.
3. Sharma, J. P. *Principles of Sports Training*. Friends Publications.
4. Matveyev, L. P. *Fundamentals of Sports Training*. Progress Publishers.
5. Cooper, Kenneth H. *The Aerobics Program for Total Well-Being*. Bantam Books.
6. Clarke, Harrison. *Application of Measurement to Health and Physical Education*. Prentice Hall.
7. Fox, Edward L., and Donald K. Mathews. *The Physiological Basis of Physical Education and Athletics*. Saunders College Publishing.
8. Barrow, Harold M., and McGee, Rosemary. *A Practical Approach to Measurement in Physical Education*. Lea & Febiger.
9. Shephard, Roy J. *Fitness and Health*. Human Kinetics.
10. Verma, J. P. *A Textbook on Sports Statistics and Measurement*. Sports Publications.

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