

Shree Warana Vibhag Shikshan Mandal's

**WARANA UNIVERSITY,  
WARANANAGAR**

(A State Public University established under Section 3 (6) of MPUA, 2016)

॥ विद्या सर्वस्य भूषणम् ॥



Warana University

Established:2025

**Structure & Syllabus For  
First Year Bachelor in Computer Application (F.Y. BCA)  
Semester- I and II**

**UNDER  
Faculty of Science & Technology**

**(As Per National Education Policy – 2020)  
With Effect from Academic Year 2025-26 Onwards**

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## Preface

The National Education Policy (NEP) 2020 has marked a significant transformation in India's education system, aiming to align higher education with the evolving needs of the 21st century. Warana University is firmly committed to the effective implementation of NEP 2020 in its true spirit, with a strong emphasis on holistic, multidisciplinary, and outcome-based education in accordance with the guidelines of the Government of Maharashtra.

We are pleased to present the First Year BCA Syllabus, thoughtfully designed in alignment with the core philosophy of NEP 2020, effective from the Academic Year 2025–26. This curriculum aims to provide students with a strong foundation in core computing areas such as programming, database management, software development, computer systems, and emerging information technologies, along with skill enhancement and co-curricular activities. The program is structured to develop competent IT professionals with strong technical knowledge, analytical thinking, and the adaptability required to meet dynamic industry and global technological demands.

Special emphasis has been given to experiential learning, where theoretical concepts are reinforced through practical laboratory work, project-based learning, and industry-oriented activities. The syllabus also promotes research, innovation, and entrepreneurship, encouraging students to engage in creative and investigative pursuits from the early stages of their academic journey.

We extend our sincere gratitude to the Chairpersons and members of the various Boards of Studies for their dedicated efforts in designing this forward-looking curriculum.

At Warana University, we believe this syllabus will empower our students with the critical thinking, creativity, and technical proficiency necessary to excel in their professional lives. Warana University looks forward to supporting students in this transformative and enriching academic journey.

## Program Outcomes

1. **Engineering Knowledge** Graduates will possess a strong foundation in engineering fundamentals and apply this knowledge to identify, analyze, and solve complex engineering problems. They will be able to understand and apply principles of mathematics, science, and engineering to a variety of real-world situations.
2. **Problem Analysis and Solution Design** Graduates will be able to critically analyze engineering problems and design effective solutions. Using their skills in problem-solving and analytical thinking, they will develop innovative solutions while considering factors such as feasibility, sustainability, and societal impact.
3. **Design and Development of Solutions** Graduates will be able to design and develop solutions for complex engineering problems by selecting and applying appropriate engineering design principles, tools, and techniques. They will also consider ethical, cultural, and environmental aspects in their designs, contributing to sustainable solutions.
4. **Investigation and Research** Students will be equipped with the skills to conduct in-depth investigations and research into engineering problems, using appropriate research methodologies, experiments, and data analysis. This ability will help them to evaluate solutions, optimize designs, and innovate within their field.
5. **Modern Tool Usage** Graduates will be proficient in using modern engineering tools, technologies, and software relevant to their specialization. They will understand the limitations and appropriate application of these tools in solving engineering problems and designing systems, products, and processes.
6. **The Engineer and Society** Graduates will be aware of the impact of engineering solutions on society, the environment, and public safety. They will be equipped to practice engineering in a socially responsible manner, adhering to professional ethics, and contributing positively to the welfare of society.
7. **Environment and Sustainability** Graduates will understand the importance of sustainability and the need to consider environmental impact when designing solutions. They will be capable of creating engineering solutions that promote environmental sustainability, using renewable resources, and minimizing waste and pollution.
8. **Ethics and Professionalism** Graduates will demonstrate professional ethics in their engineering practices, showing integrity, accountability, and social responsibility. They will follow industry standards, uphold ethical decision-making, and work in a manner that reflects the values of the engineering profession.
9. **Teamwork and Communication** Graduates will have strong interpersonal skills, working effectively in multidisciplinary teams. They will communicate ideas and solutions clearly, both in written and oral forms, and be able to collaborate with peers, colleagues, and stakeholders in a professional manner.
10. **Life-Long Learning** Graduates will have a mindset of continuous improvement and lifelong learning. They will be capable of adapting to new technological advancements, seeking out opportunities for professional development, and staying current with industry trends throughout their careers.
11. **Leadership and Innovation** Graduates will demonstrate leadership qualities, take initiative in projects, and contribute to innovative solutions within their field. They will foster creativity, encourage new ideas, and embrace challenges with an entrepreneurial mindset

## Duration

- The BCA Program is a full-time undergraduate program of 3 years.
- The program is divided into 6 semesters, each consisting of coursework, laboratory sessions, projects, and industry-oriented activities.

## Eligibility

### 1. Educational Qualification:

The candidate shall have passed Higher Secondary Certificate (HSC / Class 12<sup>th</sup>) examination from a recognised board (like Maharashtra State Board, CBSE, ICSE, or equivalent).

The candidate shall have obtained:

- At least 45% aggregate marks in class 12 for Open Category candidates.
- At least 40% aggregate marks in class 12 for candidates belonging to Reserved Categories, EWS, and Persons with Disability (PwD).

### 2. Entrance Examination Requirement:

The candidate shall have obtained a non-zero score in MAH-BCA CET — A state-level common entrance test conducted by the Maharashtra State CET Cell.

## Medium of Instruction

The medium of instruction for the Bachelor in Computer Application (BCA) program shall be English.

## Abbreviations

<b>Acronym</b>	<b>Full Form</b>
ISE	In-Semester Examination
ISE-I	In-Semester Examination-I
ISE-II	In-Semester Examination-II
ESE	End Semester Examination
ISA	In-Semester Assessment (Term Work)
POE	Practical & Oral Examination
L	Lecture
T	Tutorial
P	Practical
CH	Contact Hours
C	Credit
PCC	Program Core Courses
PE	Program Elective
OE	Open Elective
LC	Lab Course
SW	Seminar Work

## Examination & Evaluation Pattern

Evaluation tools used for the evaluation of a student for each course is as follows:

For Theory Courses	In-Semester Examination (ISE) And End Semester Examination (ESE)
For Lab / Tutorial Courses	In-Semester Assessment (ISA) And / Or Practical and Oral Examination (POE)

Refer course structure for specific evaluation tools used for each course.

Theory courses in the BCA programme shall follow one of the following evaluation schemes, as prescribed in the approved curriculum structure:

1. ESE – 60 Marks and ISE – 40 Marks Pattern, or
2. ESE – 30 Marks and ISE – 20 Marks Pattern.

Students, faculty members, and examination authorities shall refer to the detailed curriculum structure for confirmation of the evaluation scheme applicable to each course.

### In-Semester Examination (ISE)

The In-Semester Examination (ISE) will be conducted at the departmental level.

ISE shall be conducted separately for courses having:

- ISE of 40 Marks
- ISE of 20 Marks

#### For Courses Having ISE of 40 Marks:

- There shall be two tests: ISE-I and ISE-II.
- Each test shall be of 40 marks.
- Duration of each test shall be 1 hour 30 minutes.
- ISE-I shall cover Unit I.
- ISE-II shall cover Unit II.
- Final ISE marks shall be calculated as the average of ISE-I and ISE-II.
- Minimum passing marks: 40% (i.e., 16 marks out of 40).

#### For Courses Having ISE of 20 Marks:

- There shall be two tests: ISE-I and ISE-II.
- Each test shall be of 20 marks.
- Duration of each test shall be 1 hour.

- ISE-I shall cover Unit I.
- ISE-II shall cover Unit II.
- Final ISE marks shall be calculated as the average of ISE-I and ISE-II.
- Minimum passing marks: 40% (i.e., 8 marks out of 20).

▪ **Minimum Passing Criteria**

Students must score a minimum of 40% marks in the ISE. If a student fails to secure the minimum required marks, he/she must appear for a Make-up Examination.

The Make-up Examination will be conducted in the same semester for:

- Students who fail to secure minimum passing marks.
- Students who were absent due to valid reasons such as medical issues, natural calamities, or participation in NSS, NCC, or similar activities (subject to verification of absence and recommendation from the Head of Department).

▪ **Special Provision**

If a failed student appears for three tests (including the Make-up test) and scores more than 16 marks (for ISE-40 Marks) or more than 8 marks (for ISE-20 Marks) when calculating the average of the best two out of the three tests, the student will be awarded the minimum passing marks of 16 (for ISE-40 Marks) or 8 (for ISE-20 Marks) only.

For students absent with valid reasons:

- If absent in one test, the average of the attempted test and the Make-up test will be considered.
- If absent in two tests, the decision will be taken after reviewing the reasons and based on the recommendation of the Head of Department.

**End Semester Examination (ESE):**

The End Semester Examination shall be conducted centrally by the University.

ISE shall be conducted separately for courses having:

- ISE of 40 Marks
- ISE of 20 Marks

**For Courses Having ESE of 60 Marks:**

- The examination shall be conducted for 60 marks.
- Duration shall be 2 hours.
- The question paper shall cover the entire syllabus.
- Minimum passing marks: 40% (i.e., 24 marks out of 60).
- Unit-I or Unit-II will carry 20% weightage each.
- Unit-III and Unit-IV will carry 30% weightage each.

– Nature of Question Paper for 60 Marks

Q. No.		Marks	BL	CO
<b>1</b>	<b>Attempt the following.</b>	<b>24</b>		
	<b>a</b> Unit -1		II	1
	<b>b</b> Unit -1		III	2
	<b>c</b> Unit -2		IV	1
	<b>d</b> Unit -2		I	1
<b>2</b>	<b>Attempt any Three of the following.</b>	<b>18</b>		
	<b>a</b> Unit -3		VI	2
	<b>b</b> Unit -3		II	3
	<b>c</b> Unit -3		IV	3
	<b>d</b> Unit -3		II	3
<b>3</b>	<b>Attempt any Three of the following.</b>	<b>18</b>		
	<b>a</b> Unit -4		IV	4
	<b>b</b> Unit -4		III	4
	<b>c</b> Unit -4		III	4
	<b>d</b> Unit -4		III	4

**For Courses Having ESE of 30 Marks:**

- The examination shall be conducted for 30 marks.
- Duration shall be 1 hour.
- The question paper shall cover the entire syllabus.
- Minimum passing marks: 40% (i.e., 12 marks out of 30).
- Marks allotted for each Unit are indicated in Nature of Question Paper.
- Nature of Question Paper for 30 Marks

Q. No.		Marks	BL	CO
<b>1</b>	<b>Attempt the following.</b>	<b>10</b>		
	<b>a</b> Unit -1		II	1
	<b>b</b> Unit -2		III	2
<b>2</b>	<b>Attempt any Two of the following.</b>	<b>10</b>		
	<b>a</b> Unit -3		VI	2
	<b>b</b> Unit -3		II	3
	<b>c</b> Unit -3		IV	3
<b>3</b>	<b>Attempt any Two of the following.</b>	<b>10</b>		
	<b>a</b> Unit -4		IV	4

	<b>b</b>	<b>Unit -4</b>		III	4
	<b>c</b>	<b>Unit -4</b>		III	4

▪ **Backlog Examination**

Students who fail in the End Semester Examination (ESE) of either the odd or even semester within an academic year will be allowed to appear for the Backlog Examination, which will be conducted along with the regular ESE of the respective semester.

▪ **Re-Examination of ESE**

A Re-Examination (Make-up Examination) for all courses (UG and PG), including both theory and laboratory courses, will be conducted once a year before the commencement of the odd semester of the next academic year.

- A one-grade penalty will be applied to students appearing for the Make-up/Re-Examination.
- However, no grade penalty will be applied if a student secures a ‘P’ grade in the Make-up/Re-Examination.
- Grace marks will not be awarded for the Make-up/Re-Examination.
- Exception: Grace marks may be considered if the student is appearing for the ESE for the first time.

▪ **Eligibility Criteria for ESE**

To be eligible for the End Semester Examination (ESE), a student must:

- Secure at least 40% marks in ISE and ISA of the concerned course.
- Fulfil the attendance requirements as per the norms of Warana University, Warananagar.

If a student does not meet these requirement, he/she will not be eligible to appear for ESE.

**In Semester Assessment (ISA):**

ISA for laboratory courses will be conducted as a continuous assessment throughout the semester. The assessment will be based on the following:

1. Performance in laboratory work.
2. Submission of experiments in the form of a properly maintained journal or report.
3. Timely completion of assigned experiments.
4. Attendance in laboratory sessions.
5. Understanding of the experiments conducted, evaluated through methods such as quizzes, oral examinations, case studies, field work, surveys, open-book tests, model preparation, programming, projects, or any other criteria specified by the course teacher.

## **Practical Oral Examination (POE):**

POE for laboratory courses will be conducted immediately after the end of the semester. The duration of the practical examination will be as specified in the curriculum structure. The POE will be conducted jointly by an Internal Examiner and an External Examiner.

The examination may be conducted in any one of the following ways:

### **1. Oral Examination Only**

Both the Internal and External Examiners will ask questions based on the practical content of the course to assess the student's practical knowledge.

### **2. Practical Examination Only**

Students will be required to perform a given experiment, complete a workshop task, prepare a drawing, or develop a computer program, as applicable. In this case, the student's performance will be evaluated by the External Examiner only.

### **3. Practical and Oral Examination**

Students will first perform a given practical task. This will be followed by an oral examination (viva voce) based on the practical content of the course. The student's performance will be evaluated jointly by both the Internal and External Examiners.

## Grading System

The University follows a **10-Point Grading System** to evaluate student performance.

▪ **Conversion of Marks into Grades**

In every semester, the marks you get in each subject (out of 100) are converted into **grade points** as per the table below. You need at least **40% marks** to pass a subject.

Marks Obtained (Out of 100)	Grade Point	Letter Grade	Meaning
Absent	0	AB	Absent
0 – 39	0	F	Fail
40 – 44	4	P	Pass
45 – 49	5	C	Average
50 – 59	6	B	Above Average
60 – 69	7	B+	Good
70 – 79	8	A	Very Good
80 – 89	9	A+	Excellent
90 – 100	10	O	Outstanding

**Note:**

1. If decimal marks are 0.5 or more, they will be rounded off to the next higher number. (Example: 59.5 will become 60)
2. For courses of 50 marks or 200 marks, marks will be converted proportionally to 100 marks before assigning grade points.

▪ **Calculation of Semester Grade Point Average (SGPA)**

SGPA is calculated at the end of each semester. It shows your average performance in one semester.

$$SGPA = \frac{\sum(\text{Credit} \times \text{Grade Point}) \text{ for each course of a Semester}}{\sum(\text{Credits}) \text{ for a Semester}}$$

▪ **Calculation of Cumulative Grade Point Average (CGPA)**

CGPA is calculated after completing multiple semesters. CGPA reflects the overall academic performance of the student in the program.

$$CGPA = \frac{\sum(\text{Total Credits of a Semester} \times \text{SGPA of Respective Semester}) \text{ of all semesters}}{\sum(\text{Course Credits}) \text{ of all Semesters}}$$

**Note:** The SGPA & CGPA shall be rounded off to 2 decimal points.

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar**  
**First Year Bachelor in Computer Application**  
**Curriculum Structure and Evaluation Scheme Semester – I**

Sr. No.	Category	Course Category	Course Code	Course Title	Teaching and Credit Scheme					Examination and Evaluation Scheme			
					L	T	P	C	CH	Component	Marks	Min. for Passing	
1	Programme Course	PCC	2502UBCAP CC101	Mathematics Foundations to Computer Science - I	3	-	-	3	3	ESE	60	24	40
			2502UBCAP CC101T	Mathematics Foundations to Computer Science – I Tutorial	-	1	-	1	1	ISA	25	10	
			2502UBCAP CC102	Problem Solving Techniques using C	4	-	-	4	4	ESE	60	24	40
										ISE	40	16	
			2502UBCAP CC103	Computer Architecture	4	-	-	4	4	ESE	60	24	40
										ISE	40	16	
			2502UBCAP CC104	English Communication Skill and Lab	3	-	-	3	3	ESE	60	24	40
							ISE	40	16				
			2502UBCA PCC105	Indian Vision for Human Society	2	-	-	2	2	ESE	30	12	20
										ISE	20	08	
			2502UBCA PCC106	Environmental Science and sustainability	2	-	-	2	2	ESE	30	12	20
										ISE	20	08	
2	Laboratory Course	LC	2502UBCA PCC102P	Problem Solving Techniques using C – Lab	-	-	4	2	4	POE	50	20	20
			2502UBCA PCC104P	English Communication Skill Lab	-	-	2	1	2	POE	25	10	10
					<b>18</b>	<b>01</b>	<b>06</b>	<b>22</b>	<b>25</b>	<b>--</b>	<b>600</b>	<b>240</b>	<b>240</b>

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar**  
**First Year Bachelor in Computer Application**  
**Curriculum Structure and Evaluation Scheme Semester – II**

Sr. No.	Category	Course Category	Course Code	Course Title	Teaching and Credit Scheme					Examination and Evaluation Scheme			
					L	T	P	C	CH	Component	Marks	Min. for Passing	
1	Programme Course	PCC	2502UBCAPC C201	Mathematics Foundations to Computer Science - II	3	-	-	3	3	ESE	60	24	40
										ISE	40	16	
			2502UBCAPC C201T	Mathematics Foundations to Computer Science – II Tutorial	-	1	-	1	1	ISA	25	10	10
			2502UBCAPC C202	Data Structures - I	3	-	-	3	3	ESE	60	24	40
										ISE	40	16	
			2502UBCAPC C203	Operating Systems	4	-	-	4	4	ESE	60	24	40
										ISE	40	16	
2502UBCAPC C204	Object Oriented Programming using CPP	4	-	-	4	4	ESE	60	24	40			
							ISE	40	16				
2502UBCAPC C205	Indian Constitution	2	-	-	2	2	ESE	30	12	20			
							ISE	20	08				
2	Laboratory Course	LC	2502UBCAPC C202P	Data Structures – I -Lab	-	-	2	1	2	POE	50	20	20
			2502UBCAPC C204P	Object Oriented Programming using CPP-Lab	-	-	4	2	4	POE	25	10	10
			2502UBCAPC C206P	HTML-Lab	-	-	2	1	2	POE	50	20	20
					<b>16</b>	<b>01</b>	<b>08</b>	<b>21</b>	<b>25</b>	<b>--</b>	<b>600</b>	<b>240</b>	<b>240</b>

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC101 Course Name: Mathematics Foundations to  
Computer Science - I**

<b>Teaching Scheme</b>	<b>Credit</b>	<b>Evaluation Scheme</b>
<b>Lectures: 03 Hours/Week</b>	<b>03</b>	<b>ISE: 40 Marks ESE: 60 Marks</b>

**Prerequisites, if any:** Basic mathematical knowledge from higher secondary level. Familiarity with algebraic operations and logical reasoning.

**Course Objectives:** The objective of the course is to

1. To develop a strong foundation in mathematical logic, set theory, and matrix algebra.
2. To understand fundamental structures like graphs and apply them to computer science problems.
3. To enhance logical reasoning and problem-solving abilities.
4. To apply discrete mathematical techniques to model and analyze computational systems.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Understand and apply fundamental concepts of sets, logic, matrices, and graph theory.
<b>CO2</b>	Perform set operations, construct logical arguments, and use truth tables effectively.
<b>CO3</b>	Carry out matrix algebra and compute matrix inverses using transformations.
<b>CO4</b>	Analyze graph structures and represent those using adjacency and incidence matrices.

**Course Description:** This course provides a foundation in discrete mathematics concepts essential for computer science. It introduces sets, logic, matrices, and graph theory to enhance students' analytical and reasoning skills. The course emphasizes mathematical structures, logical arguments, and their applications in computing, algorithm analysis, and problem-solving.

**Course Content**

<b>Unit-1</b>	<b>Sets</b>	<b>15</b>
Meaning of a set, Methods of describing of a set, Tabular form, Set builder form, Types of a set, Finite set, Infinite set, Empty set, Subset, Universal set, Equal sets, Disjoint sets, Complementary set, Operation on Sets, Union of sets, Intersection of sets, Difference of sets, De Morgan's Laws (without proof), Venn diagram, Cartesian product of two sets, Idempotent laws, Identity laws, Commutative Laws, Associative laws, Distributive laws, Inverse laws, Domination Laws, Absorption laws, Involution laws, Duality, Examples based on above.		
<b>Unit-2</b>	<b>Logic</b>	<b>15</b>
Introduction., Meaning of Statement (Proposition)., Simple and compound statements, Truth values of a statement, Law of excluded middle, Logical Operations: Negation, Conjunction, Disjunction, Implication, Double Implication, Equivalence of Logical statements, Truth Tables and construction of truth tables, Converse, Inverse and Contra positive, Statement forms: Tautology, Contradiction, Contingency, Duality, Laws of logic: Idempotent laws, Commutative laws, Associative laws, Identity laws, Involution laws, Distributive laws, Complement laws, DeMorgan's laws, Argument:		

Valid and Invalid arguments, Examples based on above.		
<b>Unit-3</b>	<b>Matrices</b>	<b>15</b>
<p>Meaning of a matrix, Order of matrix, Types of matrices, Row matrix, Column matrix, Null matrix, Unit matrix, Square Matrix, Diagonal matrix, Scalar matrix, Symmetric matrix, Skew -symmetric matrix, Transpose of a matrix, Definition of Determinants of order 2nd &amp; 3rd and their expansions, Singular and Non-Singular Matrices, Algebra of Matrices, Equality of matrices, Scalar Multiplication of matrix, Addition of matrices, Subtraction of matrices, Multiplication of matrices, Elementary Row &amp; Column Transformations, Inverse of Matrix (Using Elementary Transformations), Examples based on above.</p>		
<b>Unit-4</b>	<b>Graph Theory</b>	<b>15</b>
<p>Introduction to Graph, Kinds of Graph : Simple, Multi and Pseudo Graph, Digraph, Weighted Graph, Degree of Vertex, Isolated Vertex, Path, Cycle, A-Cycle, Types of Graph: Complete, Regular, Bi-Partite, Complete Bi-partite, Isomorphism of Graph, Matrix Representation of Graph: Adjacency and Incidence Matrix, Operation on Graph: Union, Intersection, Complement, Product of Graphs, Fusion of Graphs, Examples based on above.</p>		
<b>Learning Resources:</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. Satinder Bal Gupta, Discrete Mathematics &amp; Structures, University Science Press.</li> <li>2. Yashavant Kanetkar, Let Us C, BPB Publications.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. Shantinakaran, Matrices, S. Chand &amp; Co., New Delhi.</li> <li>2. Schaum Series, Discrete Mathematics.</li> </ol>		
<b>e-Books</b>		
<ol style="list-style-type: none"> <li>1. Applied Discrete Structures – Alan Doerr &amp; Kenneth Levasseur (Free PDF) <a href="https://discrete.openmathbooks.org/dmoi3/dmoi.html">https://discrete.openmathbooks.org/dmoi3/dmoi.html</a></li> <li>2. Schaum’s Outline of Discrete Mathematics – Seymour Lipschutz (PDF) <a href="https://archive.org/details/schaumsoutlineof0000lips">https://archive.org/details/schaumsoutlineof0000lips</a></li> </ol>		
<b>MOOC / NPTEL/YouTube Links</b>		
<ol style="list-style-type: none"> <li>1. Neso Academy – Discrete Mathematics Playlist <a href="https://www.youtube.com/playlist?list=PLBlnK6fEyqRgLLlzdgiTUKULKJPYc0A4q">https://www.youtube.com/playlist?list=PLBlnK6fEyqRgLLlzdgiTUKULKJPYc0A4q</a></li> <li>2. Gate Smashers – Discrete Mathematics Playlist <a href="https://www.youtube.com/playlist?list=PLxCzCOWd7aiHf5IyQZ2Q2Z8WzY5Wk3bZP">https://www.youtube.com/playlist?list=PLxCzCOWd7aiHf5IyQZ2Q2Z8WzY5Wk3bZP</a></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC101T Course Name: Mathematics Foundations  
to Computer Science – I Tutorial**

<b>Teaching Scheme</b>	<b>Credit</b>	<b>Evaluation Scheme</b>
<b>Tutorial/Practical: 01 Hours/Week</b>	<b>01</b>	<b>ISA: 25 Marks</b>

**Prerequisites, if any:**

1. Basic knowledge of sets and relations
2. Understanding of elementary algebra
3. Familiarity with mathematical symbols and logic
4. Ability to perform basic arithmetic and matrix calculations

**Course Objectives:** The objective of the course is to

1. Develop understanding of basic set theory and logical operations.
2. Introduce principles of propositional logic and logical equivalence.
3. Build competency in matrix operations and determinants.
4. Explain fundamental concepts of graph theory and graph representations.
5. Strengthen mathematical reasoning required for computer science applications.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Apply set operations and power sets to solve mathematical problems.
<b>CO2</b>	Construct truth tables and analyze logical expressions.
<b>CO3</b>	Prove logical equivalence using laws of logic and truth tables.
<b>CO4</b>	Perform matrix operations including addition, multiplication, transpose, and determinant.
<b>CO5</b>	Understand graph theory concepts such as types of graphs, degree of vertices, and adjacency matrices.

**Course Description:**

This course introduces fundamental mathematical concepts essential for computer science. It covers set theory, relations, propositional logic, truth tables, matrices, determinants, and basic graph theory. Emphasis is placed on developing logical reasoning, analytical thinking, and problem-solving skills through structured questions, proofs, and numerical examples.

**Course Content**

Sr. No.	Topic of Practical / Experiment / Tutorial	Assigned Hours
1	<p><b>Question 1: Multiple Choice Questions (2 marks) Choose the correct answer:</b></p> <p><b>a) If <math>A = \{1, 2, 3\}</math> and <math>B = \{3, 4, 5\}</math>, then <math>A \cap B = ?</math></b></p> <p>(i) <math>\{1, 2, 3, 4, 5\}</math></p> <p>(ii) <math>\{3\}</math></p> <p>(iii) <math>\{1, 2, 4, 5\}</math></p> <p>(iv) <math>\{1, 2, 3, 3, 4, 5\}</math></p>	1

	<p><b>b) The power set of <math>\{a, b\}</math> contains how many elements?</b></p> <p>(i) 2 (ii) 3 (iii) 4 (iv) 5</p>	
2	<p><b>Question 2: Short Answer Question (4 marks)</b>  Given: <math>U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}</math> <math>A = \{2, 4, 6, 8\}</math> <math>B = \{1, 3, 5, 7, 9\}</math>  Find:  a) <math>A \cap B</math> (1 mark)  b) <math>A'</math> (1 mark)  c) <math>(A \cup B)'</math> (2 marks)</p>	1
3	<p><b>Question 3: Truth Table Construction (3 marks)</b>  Construct the truth table for the logical expression: <math>(P \vee Q) \rightarrow (P \wedge Q)</math> Also determine if it's a tautology, contradiction, or contingency.</p>	1
4	<p><b>Question 4: Logical Equivalence (3 marks)</b>  Using De Morgan's Laws, prove that: <math>\sim (P \vee Q) \equiv (\sim P \wedge \sim Q)</math> Verify your answer using a truth table.</p>	1
5	<p><b>Question 5: Matrix Multiple Choice (2 marks)</b>  <b>a)</b> If A is a <math>3 \times 2</math> matrix and B is a <math>2 \times 4</math> matrix, then AB will be:  (i) <math>3 \times 4</math> matrix  (ii) <math>2 \times 2</math> matrix  (iii) <math>3 \times 2</math> matrix  (iv) Not possible  <b>b)</b> The determinant of <math>\begin{bmatrix} 2 &amp; 3 \\ 1 &amp; 4 \end{bmatrix}</math> is:  (i) 5  (ii) 8  (iii) 11  (iv) -5</p>	1
6	<p><b>Question 6: Matrix Operations (5 marks)</b>  Given: <math>A = \begin{bmatrix} 1 &amp; 2 \\ 3 &amp; 4 \end{bmatrix}</math> and <math>B = \begin{bmatrix} 2 &amp; 1 \\ 1 &amp; 3 \end{bmatrix}</math> Calculate:  a) <math>A + B</math> (1 mark)  b) <math>AB</math> (2 marks)  c) <math>\det(A)</math> (1 mark)  d) <math>A^T</math> (1 mark)</p>	1
7	<p><b>Question 7: Graph Basics (3 marks)</b>  <b>a)</b> Define the following terms: (1.5 marks) Simple graph Complete graph Bipartite graph  <b>b)</b> Draw <math>K_4</math> (complete graph with 4 vertices) (1.5 marks)</p>	1
8	<p><b>Question 8: Graph Properties (3 marks)</b>  For the graph with vertices <math>\{A, B, C, D, E\}</math> and edges <math>\{AB, AC, BC, BD, DE\}</math>:  <b>a)</b> Find the degree of each vertex (1 mark)  <b>b)</b> Write the adjacency matrix (2 marks)</p>	1

## **Learning Resources:**

### **Text Books**

1. Satinder Bal Gupta, Discrete Mathematics & Structures, University Science Press.  
Yashavant Kanetkar, Let Us C, BPB Publications.

### **Reference Books**

1. Shantinayakan, Matrices, S. Chand & Co., New Delhi.
2. Schaum Series, Discrete Mathematics.

### **e-Books**

1. Applied Discrete Structures – Alan Doerr & Kenneth Levasseur (Free PDF)  
<https://discrete.openmathbooks.org/dmoi3/dmoi.html>
2. Schaum's Outline of Discrete Mathematics – Seymour Lipschutz (PDF)  
<https://archive.org/details/schaumsoutlineof0000lips>

### **MOOC / NPTEL/YouTube Links**

1. Neso Academy – Discrete Mathematics Playlist  
<https://www.youtube.com/playlist?list=PLBlnK6fEyqRgLLlzdgiTUKULKJPYc0A4q>
2. Gate Smashers – Discrete Mathematics Playlist  
<https://www.youtube.com/playlist?list=PLxCzCOWd7aiHf5IyQZ2Q2Z8WzY5Wk3bZP>

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC102 Course Name: Problem Solving Techniques Using C**

Teaching Scheme	Credit	Evaluation Scheme
Lectures: 04 Hours/Week	04	ISE: 40 Marks ESE: 60 Marks

**Prerequisites, if any:**

1. Basic knowledge of computer fundamentals and operating systems.
2. Logical reasoning and basic mathematics understanding.
3. No prior programming experience required.

**Course Objectives:** The objective of the course is to

1. To develop logical thinking and problem-solving abilities.
2. To introduce algorithms, flowcharts, and pseudo code as tools for problem formulation.
3. To provide an in-depth understanding of the syntax and semantics of the C language.
4. To help students write, debug, and execute C programs effectively.
5. To demonstrate the use of functions and modular programming techniques.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Identify and classify computational problems and design algorithms using stepwise refinement.
<b>CO2</b>	Develop and analyze flowcharts and pseudo code for solving problems.
<b>CO3</b>	Write, compile, and execute C programs using basic data types, operators, and control structures.
<b>CO4</b>	Implement modular programming concepts using user-defined and recursive functions.
<b>CO5</b>	Apply structured programming techniques to real-life problem-solving situations.

**Course Description:** This course provides a foundation in discrete mathematics concepts essential for computer science. It introduces sets, logic, matrices, and graph theory to enhance students' analytical and reasoning skills. The course emphasizes mathematical structures, logical arguments, and their applications in computing, algorithm analysis, and problem-solving.

**Course Content**

Unit-1	Introduction	15
Problem and Problem Instances, Type of Computational Problems, Classification of Problems, Procedure (Steps involved in problem solving), Breaking the Problem into Sub problems, Algorithm, Step of Algorithm, Example, Flow Chart, Advantages of Flow Chart, Symbols used in flow Charts, Pseudo Code		

<b>Unit-2</b>	<b>C Language</b>	<b>15</b>
Introduction To Programming Languages, Different Generations of Programming Languages. Typed and Type less Programming Languages, History of C Language, Features of C Language, Character Set, Structure of a C Program, Data Type in C, Tokens, Variables, Keywords, Constants- Character Constants and Integer Constants		
<b>Unit-3</b>	<b>Operators, Statements, Loop</b>	<b>15</b>
Operators :Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment And Decrement Operator, Bitwise Operators; Expressions, Statements-Data Input and Output, getchar(), putchar(), gets(), puts(), scanf(), printf() Example; Assignment Statements, Conditional Statements- If Statement, If-else Statements, Nested else-If Statements, Nested if-else Statements ,Switch Statement, Looping Statement: While Statement, do-while Statement, for Statement, Nested Looping Statements, Multi Branching Statement Break and Continue, Conditional Branching (Go To Statement) with Example.		
<b>Unit-4</b>	<b>Function</b>	<b>15</b>
Introduction, Return Statement, Difference between Function and Procedures, Advantages of Function, Function Definition, Function call, Passing Parameters, Advanced Featured of Functions – Functional Prototypes, Calling Function by value by reference, Recursion; Recursion as a way of solving problems and examples.		
<b>Learning Resources:</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. E. Balagurusamy, Programming in ANSI C, Tata McGraw Hill, Latest Edition.</li> <li>2. Yashavant Kanetkar, Let Us C, BPB Publications.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. Kernighan &amp; Ritchie, The C Programming Language, Prentice Hall.</li> <li>2. Ashok Kamthane, Programming in C, Pearson Education.</li> <li>3. Tanenbaum, Structured Computer Organization, Pearson.</li> </ol>		
<b>e-Books</b>		
<ol style="list-style-type: none"> <li>1. Let Us C – Yashavant Kanetkar (PDF) <a href="https://archive.org/details/let-us-c-yashavant-kanetkar">https://archive.org/details/let-us-c-yashavant-kanetkar</a></li> <li>2. Programming in ANSI C – E. Balagurusamy (PDF) <a href="https://archive.org/details/programming-in-ansi-c-balagurusamy">https://archive.org/details/programming-in-ansi-c-balagurusamy</a></li> </ol>		
<b>MOOC / NPTEL/YouTube Links</b>		
<ol style="list-style-type: none"> <li>1. Jenny’s Lectures – C Programming (Problem Solving focus) <a href="https://www.youtube.com/playlist?list=PLdo5W4Nhv31a8UcMN9-35ghv8qyFWD9_S">https://www.youtube.com/playlist?list=PLdo5W4Nhv31a8UcMN9-35ghv8qyFWD9_S</a></li> <li>2. Neso Academy – C Programming Playlist <a href="https://www.youtube.com/playlist?list=PLBlNk6fEyqRggZZ1LTM6yruYpJQvE2L8G">https://www.youtube.com/playlist?list=PLBlNk6fEyqRggZZ1LTM6yruYpJQvE2L8G</a></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC103 Course Name: Computer Architecture**

Teaching Scheme	Credit	Evaluation Scheme
<b>Lectures: 04 Hours/Week</b>	<b>04</b>	<b>ISE: 40 Marks ESE: 60 Marks</b>

**Prerequisites, if any:**

1. Fundamentals of Computer Organization
2. Basic Programming Skills.

**Course Objectives:** The objective of the course is to

1. Understand number systems and data representation.
2. Analyze and perform integer arithmetic operations
3. Explore floating-point arithmetic
4. Apply knowledge to real-world digital systems and processors

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	At the end of successful completion of the course, the student will be able to
<b>CO2</b>	To Understand the basics of Digital Electronics and Binary Number System
<b>CO3</b>	To Learn the implementation of Combinational Circuit.
<b>CO4</b>	To Learn the implementation of Sequential Circuit.
<b>CO5</b>	To Understand the Organization of basic computers and concept of memory organization

**Course Description:** This course provides a comprehensive understanding of **Computer Architecture**, focusing on the internal structure, organization, and functionality of modern computer systems. It covers fundamental concepts such as **instruction set architecture (ISA)**, **CPU design**, **memory hierarchy**, **input/output systems**, and **pipelining**. Students will learn how hardware components interact to execute programs efficiently and understand the trade-offs involved in architectural design decisions.

**Course Content**

<b>Unit-1</b>	<b>Digital Principles:</b>	<b>15</b>
Digital Principles: Definition for Digital signals, Digital logic, Boolean Laws and Theorems, K-Map: Truth Tables to K-Map, 2, 3 and 4 variable K Map, K-Map Simplifications, Don't Care Conditions, SOP and POS		
<b>Unit-2</b>	<b>Number Systems:</b>	<b>15</b>
Number Systems: Decimal, Binary, Octal, Hexadecimal, Number System Conversions, Binary Arithmetic, Addition and subtraction of BCD, Octal Arithmetic, Hexadecimal Arithmetic, Binary Codes, Decimal Codes, Error detecting and correcting codes, Excess-3 Code, The Gray Code.		

<b>Unit-3</b>	<b>Combinational Circuits:</b>	<b>15</b>
<p>Combinational Circuits: Half Adder and Full Adder, Subtractor, Decoders, Encoder, Multiplexer, Demultiplexer. Sequential Circuits: Flip-Flops- SR Flip- Flop, D Flip-Flop, J-K Flip-Flop, T FlipFlop. Register: 4 bit register with parallel load, Shift Registers- Bidirectional shift register with parallel load. Binary Counters-4 bit synchronous and Asynchronous binary counter</p>		
<b>Unit-4</b>	<b>Basic computer functions and interconnections</b>	<b>15</b>
<p>Basic computer functions and interconnections- Computer components, computer function, instruction fetch and execute, interrupts, I/O functions. Interconnection structures – Bus interconnections, point to point interconnect. , Computer Registers- Types of registers: Program Counter (PC), Accumulator (AC), Instruction Register (IR). Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory, Virtual Memory, Memory Management Hardware.</p>		
<b>Learning Resources:</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. Donald P Leach, Albert Paul Malvino, Goutam Saha- “Digital Principles &amp; Applications” , Tata McGraw Hill Education Private Limited,2011Edition.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. William Stallings- “Computer Organization and Architecture”, Pearson/PHI, SixthEdition</li> <li>2. Andrew S. Tanenbaum- “Structured Computer Organization”, PHI /Pearson 4th Edition</li> </ol>		
<b>e-Books</b>		
<ol style="list-style-type: none"> <li>1. Digital Logic Applications – John Yarbrough <a href="https://archive.org/details/digitallogicapplicationsProgramming%20in%20ANSI%20C%20%E2%80%9E/Balagurusamy%20(PDF)">https://archive.org/details/digitallogicapplicationsProgramming in ANSI C – E. Balagurusamy (PDF)</a></li> <li>2. Digital Logic and Computer Design – M. Morris Mano</li> <li>3. <a href="https://archive.org/details/digitallogiccomputerdesign">https://archive.org/details/digitallogiccomputerdesign</a></li> </ol>		
<b>MOOC / NPTEL/YouTube Links</b>		
<ol style="list-style-type: none"> <li>1. Digital Circuits and Systems – NPTEL Lectures (YouTube) <a href="https://www.youtube.com/playlist?list=PLJR61fXkAx11x3N2_2nQKy3UyoRb1xHkD">https://www.youtube.com/playlist?list=PLJR61fXkAx11x3N2_2nQKy3UyoRb1xHkD</a> (search this on YouTube)</li> <li>2. Memory Hierarchy &amp; Cache Memory Explained <a href="https://www.youtube.com/watch?v=KpU0A4h7s9g">https://www.youtube.com/watch?v=KpU0A4h7s9g</a></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC104 Course Name: English Communication Skills & Lab**

Teaching Scheme	Credit	Evaluation Scheme
<b>Lectures: 3 Hours/Week</b>	<b>04</b>	<b>ISE: 40 Marks ESE: 60 Marks</b>

**Prerequisites, if any:**

1. Basic English grammar, reading comprehension, and simple writing skills.

**Course Objectives:** The objective of the course is to

1. To provide learning environment to practice listening, speaking, reading and writing skills.
2. To assist the students to carry on the tasks and activities through guided instructions and materials
3. To effectively integrate English language learning with employability skills and training.
4. To provide hands-on experience through case-studies, mini-projects, group and individual presentations.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Enhance vocabulary and understand word formation, roots, prefixes, suffixes, synonyms, antonyms, and abbreviations.
<b>CO2</b>	Develop the ability to write grammatically correct sentences and organized paragraphs with proper punctuation and coherence.
<b>CO3</b>	Identify and correct common errors in writing, including subject-verb agreement, noun-pronoun agreement, misplaced modifiers, articles, prepositions, and redundancies.
<b>CO4</b>	Apply descriptive, defining, classifying, and evidential writing techniques; compose introductions, conclusions, essays, and precise writing pieces.
<b>CO5</b>	Improve listening comprehension and oral communication skills, including pronunciation, intonation, stress, and rhythm.

**Course Description:** This course develops students' English communication skills in writing and speaking, focusing on vocabulary, sentence and paragraph construction, coherence, precise writing, and grammar. It also enhances listening, pronunciation, intonation, and professional communication for workplace and everyday contexts.

**Course Content**

<b>Unit-1</b>	<b>Vocabulary and Basic Writing</b>	<b>8</b>
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**Vocabulary Building:** The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms, and standard abbreviations.

**Basic Writing Skills:** Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, creating coherence, organizing principles of paragraphs in documents, Techniques for writing precisely

<b>Unit-2</b>	<b>Writing</b>	<b>8</b>
<p><b>Identifying Common Errors in Writing:</b> Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies</p> <p><b>Nature and Style of sensible Writing:</b> Describing, Defining, Classifying, providing examples or evidence, writing introduction and conclusion, Module V: Writing Practices, Comprehension, Precise Writing, Essay Writing</p>		
<b>Unit-3</b>	<b>Oral Communication - I</b>	<b>7</b>
<p><b>Oral Communication-I:</b> Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common Everyday Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal Presentations.</p>		
<b>Unit-4</b>	<b>Oral Communication - II</b>	<b>7</b>
<p><b>Oral Communication –II:</b> Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common Everyday Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal Presentations</p>		
<b>Learning Resources:</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. Meenakshi Raman &amp; Sangeeta Sharma, Technical Communication: Principles and Practice, Oxford University Press</li> <li>2. Raymond Murphy, English Grammar in Use, Cambridge University Press</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. Martin Cutts, Oxford Guide to Plain English, Oxford University Press</li> <li>2. Ashraf Rizvi, Effective Technical Communication, McGraw Hill</li> </ol>		
<b>e-Books</b>		
<ol style="list-style-type: none"> <li>1. English Addict with MrDuncan <a href="https://www.youtube.com/@EnglishAddictBusinessCommunication">https://www.youtube.com/@EnglishAddictBusiness Communication</a></li> <li>2. Meenakshi Raman <a href="https://archive.org/search?query=business+communication+meenakshi+raman">https://archive.org/search?query=business+communication+meenakshi+raman</a></li> </ol>		
<b>MOOC / NPTEL/YouTube Links</b>		
<ol style="list-style-type: none"> <li>1. Learn English with Lucy <a href="https://www.youtube.com/@LearnEnglishwithLucyMemoryHierarchy&amp;CacheMemoryExplained">https://www.youtube.com/@LearnEnglishwithLucyMemory Hierarchy &amp; Cache Memory Explained</a></li> <li>2. Oxford Online Skills <a href="https://www.youtube.com/@OxfordOnlineSkills">https://www.youtube.com/@OxfordOnlineSkills</a></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC105 Course Name: Indian Vision for Human Society**

Teaching Scheme	Credit	Evaluation Scheme
Lectures: 02 Hours/Week	02	ISE: 20 Marks ESE: 30 Marks

**Prerequisites, if any:**

1. Basic Understanding of Society and Culture.

**Course Objectives:** The objective of the course is to

1. To introduce the foundational values of Indian society.
2. To explore the Indian philosophical vision of human life and society
3. To examine the contributions of Indian thinkers and reformers
4. To promote value-based thinking in addressing contemporary challenges

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Understand the foundational values of Indian society
<b>CO2</b>	Analyze the vision of key Indian thinkers and leaders
<b>CO3</b>	Learn and practice data modelling using the entity-relationship and developing database designs.
<b>CO4</b>	Develop a human-centric and holistic worldview
<b>CO5</b>	Reflect on ethical and moral responsibilities in modern society

**Course Description** The course "Indian Vision for Human Society" is designed to introduce students to the profound and holistic worldview of Indian civilization. Rooted in timeless philosophical traditions, the Indian vision of society emphasizes universal harmony, ethical living, spiritual progress, and social justice.

**Course Content**

Unit-1	The world view & Vision of Human Society	8 Hrs
The concept of non-duality of Prakriti (Jad) and Purush (Chetana), human as coexistence of Jad & Chetan, Pancha-mahabhutas, the root of sorrow and suffering, freedom from sorrow, salvation, eternal peace truth (vyaharika satya), ultimate truth. The acceptance of various systems of philosophy for realization of truth and complementariness in society in ancient Indian system.		
Unit-2	Aspiration and Purpose of Individual and Human Society	8 Hrs
Aims of Human life; at individual level and societal level. At societal level; Four purusarthas Dharma, Artha, Kama, Moksha. Individual level; Abhyudaya (progress),Nihsreyasa (perfection) Pravrtti, Nivrtti. Dharma; Dharma sutras (Gautama, Apastamba, Baudhayana, Vasistha). Dharma-Shastra; (Manusmriti, Naradamrti,Visnumrti, Yajnavalkya Smriti) sociology, different stages of life like studenthood, householdership, retirement and renunciation, rites and duties,judicial matters, and personal laws (Aachara, Vyavahara, Prayaschitta). Artha;Kautliya Arthashastra, Kamandakiya Nitisara, Brihaspati Sutra, Sukra Niti,Moksha: Human liberation (Ignorance to Knowledge).		

<b>Unit-3</b>	<b>Program for Ensuring Human Purpose: at Individual and Societal Level – I</b>	<b>7 Hrs</b>
<p>Fundamental concept of Nitishastra: Satyanishtha Aur Abhiruchi (Ethics, Integrity &amp; aptitude). The true nature of self; Shiksha Valli, Bhriгу Valli (concept of Atman-Brahman (self, soul). The true constitution of Human: Ananda Valli (Annamaya Kosha, Pranamaya Kosha, Manomaya Kosha, Vijnanamaya Kosha, Anandamaya Kosha). The four states of consciousness (Waking state, Dreaming state, Deep Sleep State, Turiya the fourth state), Consciousness (seven limbs and nineteen mouths), Prajna, Awareness. The Life Force Prana (Praana-Apaana-Vyaana-Udaana- Samaana).</p>		
<b>Unit-4</b>	<b>Program for Ensuring Human Purpose: at Individual and Societal Level - II</b>	<b>7 Hrs</b>
<p>Differentiating Vidya and Avidya, human bondages, Higher and Lower Knowledge (Para Vidhya &amp; Apara Vidhya). Concept of Sattva, Rajas, Tamas and need of balancing the same, Patanjali yog sutra; Yama, Niyama, Asanas, pranayams, pratyahara, dharna, dhyana, Samadhi, Sixteen category of adartha, pramans (pratyaksh, anumana, upaman, shabda). Saadhana chatushtayam (viveka, vairagya, mumukshatavam, shadsampathi (sama, dama, uparama, titiksha, shradha, samadhana), Understanding Nitya karma, Naimittika Karma, Kanya karma, prayaschitta karma, Nishidha Karma. Meditation and Progressive meditation (Narada's education), Ativadin to self-knowledge, Jyan yog, Karma yog, sanyas yog in aspect to harmonious practice in society.</p>		
<b>Learning Resources:</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. Indian Vision for Human Society – AICTE Prescribed Textbook (UHV / Indian Knowledge System based)</li> <li>2. Foundations of Indian Culture – Dr. S. Radhakrishnan</li> <li>3. Indian Philosophy – S. Radhakrishnan</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. The Cultural Heritage of India (Vol. I–VI) – Ramakrishna Mission</li> <li>2. My Experiments with Truth – Mahatma Gandhi</li> <li>3. The Complete Works of Swami Vivekananda</li> <li>4. Sri Aurobindo and the Indian Ideal of Human Unity – Sri Aurobindo</li> <li>5. Indian Ethics – R.N. Dandekar</li> </ol>		
<b>e-Books</b>		
<ol style="list-style-type: none"> <li>1. Indian Philosophy – S. Radhakrishnan (PDF) <a href="https://archive.org/details/indianphilosophy01radh">https://archive.org/details/indianphilosophy01radh</a></li> <li>2. The Cultural Heritage of India – Ramakrishna Mission (PDF) <a href="https://archive.org/details/culturalheritageofindi">https://archive.org/details/culturalheritageofindi</a></li> </ol>		
<b>MOOC / NPTEL/YouTube Links</b>		
<ol style="list-style-type: none"> <li>1. NPTEL – Indian Philosophy &amp; Culture (IIT Lectures) <a href="https://www.youtube.com/playlist?list=PLLy_2iUCG87CNXxHkY0lZgQ6pVw1Gq9cO">https://www.youtube.com/playlist?list=PLLy_2iUCG87CNXxHkY0lZgQ6pVw1Gq9cO</a></li> <li>2. Vasudhaiva Kutumbakam &amp; Indian Values – AICTE / UHV Content <a href="https://www.youtube.com/playlist?list=PL9RcWoqXmzaJ8m1c4UrxR4Z3k0K0K7K0G">https://www.youtube.com/playlist?list=PL9RcWoqXmzaJ8m1c4UrxR4Z3k0K0K7K0G</a></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC106 Course Name: Environmental Science & Sustainability**

Teaching Scheme	Credit	Evaluation Scheme
Lectures: 02 Hours/Week	02	ISE: 20 Marks ESE: 30 Marks

**Prerequisites, if any:**

Basic science knowledge, awareness of environmental issues, and understanding of sustainability concepts.

**Course Objectives:** The objective of the course is to

1. To familiarize students with basic environmental concepts, their relevance to business operations, and forthcoming sustainability challenges
2. To become environmentally sensitive and responsible managers.
3. To equip students to make decisions that consider environmental consequences.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Explore the basic environmental concepts and issues relevant to the business and management field.
<b>CO2</b>	Recognize the interdependence between environmental processes and socioeconomic dynamics.
<b>CO3</b>	Determine the role of business decisions, policies, and actions in minimizing environmental degradation
<b>CO4</b>	Identify possible solutions to curb environmental problems caused by managerial actions.

**Course Description:**

This course covers fundamental environmental concepts, natural resources, ecosystems, pollution, and sustainability practices, emphasizing the relationship between environment, society, and business, and strategies for conservation and compliance with environmental laws.

**Course Content**

<b>Unit-1</b>	<b>Understanding Environment, Natural Resources, and Sustainability</b>	<b>8</b>
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Fundamental environmental concepts and their relevance to business operations; Components and segments of the environment, the man-environment relationship, and historical environmental movements. Concept of sustainability; Classification of natural resources, issues related to their overutilization, and strategies for their conservation. Sustainable practices in managing resources, including deforestation, water conservation, energy security, and food security issues. The conservation and equitable use of resources, considering both intergenerational and intergenerational equity, and the importance of public awareness and education.

<b>Unit-2</b>	<b>Ecosystems, Biodiversity, and Sustainable Practices</b>	<b>8</b>
<p>Various natural ecosystems, learning about their structure, functions, and ecological characteristics. The importance of biodiversity, the threats it faces, and the methods used for its conservation. Ecosystem resilience, homeostasis, and carrying capacity, emphasizing the need for sustainable ecosystem management. Strategies for in situ and ex situ conservation, nature reserves, and the significance of India as a mega diverse nation.</p>		
<b>Unit-3</b>	<b>Environmental Pollution, Waste Management, and Sustainable Development</b>	<b>7</b>
<p>Various types of environmental pollution, including air, water, noise, soil, and marine pollution, and their impacts on businesses and communities. Causes of pollution, such as global climate change, ozone layer depletion, the greenhouse effect, and acid rain, with a particular focus on pollution episodes in India. Importance of adopting cleaner technologies; Solid waste management; Natural and man-made disasters, their management, and the role of businesses in 7 Hours mitigating disaster impacts.</p>		
<b>Unit-4</b>	<b>Social Issues, Legislation, and Practical Applications</b>	<b>7</b>
<p>Dynamic interactions between society and the environment, with a focus on sustainable development and environmental ethics. Role of businesses in achieving sustainable development goals and promoting responsible consumption. Overview of key environmental legislation and the judiciary's role in environmental protection, including the Water (Prevention and Control of Pollution) Act of 1974, the Environment (Protection) Act of 1986, and the Air (Prevention and Control of Pollution) Act of 1981. Environmental justice, environmental refugees, and the resettlement and rehabilitation of affected populations; Ecological economics, human population growth, and demographic changes in India.</p>		
<b>Learning Resources:</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. Benny Joseph, Environmental Studies, Tata McGraw Hill</li> <li>2. R. Rajagopalan, Environmental Studies: From Crisis to Cure, Oxford University Press</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses, University Press</li> <li>2. Sharma, Environmental Science and Engineering, Krishna Prakashan Media</li> </ol>		
<b>e-Books</b>		
<ol style="list-style-type: none"> <li>1. Environmental Science: Principles &amp; Practices – G. Tyler Miller, Jr. (PDF) <a href="https://archive.org/details/EnvironmentalSciencePrinciplesPractices12thEdition_GTylerMillerJr">https://archive.org/details/EnvironmentalSciencePrinciplesPractices12thEdition_GTylerMillerJr</a></li> <li>2. Environmental Science – Daniel B. Botkin &amp; Edward A. Keller (PDF) <a href="https://archive.org/details/EnvironmentalScienceBotkinKeller">https://archive.org/details/EnvironmentalScienceBotkinKeller</a></li> </ol>		
<b>MOOC / NPTEL/YouTube Links</b>		
<ol style="list-style-type: none"> <li>1. NPTEL – Environmental Science &amp; Engineering (IIT Lectures) <a href="https://www.youtube.com/playlist?list=PLbMVogVj5nJQW1s_5P_TfXBBXb1VZ9Bv2">https://www.youtube.com/playlist?list=PLbMVogVj5nJQW1s_5P_TfXBBXb1VZ9Bv2</a></li> <li>2. Crash Course – Environmental Science (Basics &amp; Sustainability) <a href="https://www.youtube.com/playlist?list=PL3EED4C1D684D3ADF">https://www.youtube.com/playlist?list=PL3EED4C1D684D3ADF</a></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC102P Course Name: Problem Solving Techniques Using C - Lab**

Teaching Scheme	Credit	Evaluation Scheme
Practical: 04 Hours/Week	02	ISA: - POE: 50 Marks

**Prerequisites, if any:**

1. Basic knowledge of computers and programming logic.
2. Familiarity with mathematical and logical operations.

**Course Objectives:** The objective of the course is to

1. Understand the fundamental concepts of structured and procedural programming.
2. Learn how to solve computational problems using the C programming language.
3. Develop algorithms and flowcharts for simple to complex problems.
4. Apply modular programming using functions and control structures.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Understand the problem-solving process, algorithms, and flowcharts.
<b>CO2</b>	Implement structured programming concepts using C.
<b>CO3</b>	Apply control statements, loops, and functions to solve problems.
<b>CO4</b>	Design modular and reusable C programs using functions and recursion.

**Course Description:** This course introduces students to problem-solving techniques using the C language. It covers basic programming concepts such as data types, operators, control structures, functions, and modular design to develop efficient C programs.

**Course Content**

Sr. No.	Topic of Practical / Experiment / Tutorial	Assigned Hours
1	Study of problem-solving steps and flowchart creation	2
2	Write algorithms and flowcharts for basic mathematical problems	2
3	Write a C program to find the largest of three numbers	2
4	Write a C program to check whether a number is even or odd	2
5	Write a C program to calculate the factorial of a number.	2
6	Write a C program to generate Fibonacci series	2
7	Write a C program to find whether a number is prime	2
8	Write a C program to demonstrate call by value and call by reference	2
9	Write a C program to display Armstrong numbers between 1 to 1000.	2

10	Write a C program to implement simple menu-driven calculator using switch	2
<b>Learning Resources:</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. <i>Programming in ANSI C</i> – E. Balagurusamy, McGraw Hill.</li> <li>2. <i>Let Us C</i> – Yashavant Kanetkar, BPB Publications.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. <i>The C Programming Language</i> – Brian W. Kernighan &amp; Dennis M. Ritchie, Prentice Hall.</li> <li>2. <i>Computer Fundamentals and Programming in C</i> – Reema Thareja, Oxford University Press.</li> </ol>		
<b>e-Books</b>		
<ol style="list-style-type: none"> <li>1. Let Us C – Yashavant Kanetkar (PDF) <a href="https://archive.org/details/let-us-c-yashavant-kanetkar">https://archive.org/details/let-us-c-yashavant-kanetkar</a></li> <li>2. Programming in ANSI C – E. Balagurusamy (PDF) <a href="https://archive.org/details/programming-in-ansi-c-balagurusamy">https://archive.org/details/programming-in-ansi-c-balagurusamy</a></li> </ol>		
<b>MOOC / NPTEL/YouTube Links</b>		
<ol style="list-style-type: none"> <li>1. Jenny's Lectures – C Programming (Problem Solving focus) <a href="https://www.youtube.com/playlist?list=PLdo5W4Nhv31a8UcMN9-35ghv8qyFWD9_S">https://www.youtube.com/playlist?list=PLdo5W4Nhv31a8UcMN9-35ghv8qyFWD9_S</a></li> <li>2. Neso Academy – C Programming Playlist <a href="https://www.youtube.com/playlist?list=PLBlNk6fEyqRggZZ1LTM6yruYpJQvE2L8G">https://www.youtube.com/playlist?list=PLBlNk6fEyqRggZZ1LTM6yruYpJQvE2L8G</a></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC104P Course Name: English Communication Skill Lab**

Teaching Scheme	Credit	Evaluation Scheme
Tutorial/Practical: 02 Hours/Week	02	ISA: POE: 25 Marks

**Prerequisites, if any:**

1. Basic understanding of personal and professional behaviour.
2. Willingness to participate in group activities and self-assessment exercises.

**Course Objectives:**

1. To enhance self-awareness and interpersonal effectiveness.
2. To develop leadership and team-building abilities.
3. To improve written communication and professional writing skills.
4. To manage stress and time effectively for personal and professional growth.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Demonstrate understanding of self-analysis and personality traits.
<b>CO2</b>	Develop leadership and teamwork qualities.
<b>CO3</b>	Exhibit proficiency in formal writing and communication.
<b>CO4</b>	Perform collaborative group activities to develop interpersonal and leadership skills.

**Course Description:** This course helps students develop self-awareness, leadership, teamwork, communication, and time/stress management skills. Through practical activities and exercises, students improve confidence, professional writing, and interpersonal effectiveness for personal and workplace success.

**Course Content**

Sr. No.	Topic of Practical / Experiment / Tutorial	Assigned Hours
1	Getting Acquainted with Behavioral Skills & Self Analysis	2
	<ul style="list-style-type: none"> <li>• Personality Types – Extraversion, Introversion, Intuition, Thinking, Perceiving</li> <li>• Meaning and Importance of SWOC Analysis</li> <li>• Johari Window Model – Building Self-Awareness and Trust</li> <li>• How to Improve Self-Confidence</li> </ul>	
2	Developing Leadership and Team-Building Qualities	2
	<ul style="list-style-type: none"> <li>• Leadership Qualities and Importance</li> <li>• Corporate Leadership Types and Styles</li> <li>• Team and Stages of Team Development</li> <li>• Types and Attributes of Successful Teams</li> </ul>	
3	Formal Writing Skills	2

	<ul style="list-style-type: none"> <li>• Writing Business Letters and Emails</li> <li>• Report Writing</li> <li>• Job Application and Resume Writing</li> </ul>	
4	Effective Stress Management and Time Management	2
	<ul style="list-style-type: none"> <li>• What is Stress? Sources and Types of Stress</li> <li>• Stress Management Techniques</li> <li>• Time Management Techniques</li> <li>• Strategies for Effective Time Management</li> </ul>	
5	Set of Activities (Practical Applications)	2
	<ul style="list-style-type: none"> <li>• Group Task Encouraging Discussions</li> <li>• Team Building and Value Sharing</li> <li>• Leadership and Role Play Activities</li> </ul>	

### Learning Resources:

#### Text Books

1. Meenakshi Raman & Sangeeta Sharma, Technical Communication: Principles and Practice, Oxford University Press
2. Raymond Murphy, English Grammar in Use, Cambridge University Press

#### Reference Books

1. *Soft Skills: Know Yourself and Know the World* – K. Alex, S. Chand Publications.
2. *Personality Development and Soft Skills* – Barun K. Mitra, Oxford University Press.

#### e-Books

1. English Addict with MrDuncan [https://www.youtube.com/@EnglishAddictBusiness Communication](https://www.youtube.com/@EnglishAddictBusinessCommunication) –
2. Meenakshi Raman  
<https://archive.org/search?query=business+communication+meenakshi+raman>

#### MOOC / NPTEL/YouTube Links

1. Learn English with Lucy  
[https://www.youtube.com/@LearnEnglishwithLucyMemory Hierarchy & Cache Memory Explained](https://www.youtube.com/@LearnEnglishwithLucyMemoryHierarchy&CacheMemoryExplained)
2. Oxford Online Skills  
<https://www.youtube.com/@OxfordOnlineSkills>

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC201 Course Name: Maths Foundations to Computer Science - II**

Teaching Scheme	Credit	Evaluation Scheme
Lectures: 03 Hours/Week	03	ISE: 40 Marks ESE: 60 Marks

**Prerequisites, if any:**

Basic knowledge of algebra, logic, and high-school level mathematics.

**Course Objectives:** The objective of the course is to

1. This course helps the students to understand correct lines of arguments and proofs.
2. This course introduces mathematical techniques that are foundations for understanding advanced computational methods, including numerical methods and optimization.
3. This course helps the students to understand various problem-solving strategies and methods to tackle both theoretical and practical challenges in computer science.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Understand and construct logical arguments and mathematical proofs.
<b>CO2</b>	Apply algebraic structures in computational problem-solving.
<b>CO3</b>	Use numerical methods and optimization techniques to solve mathematical and computer science problems.

**Course Description:**

This course introduces logic, proofs, algebraic structures, numerical methods, and optimization techniques essential for computer science problem-solving and algorithm design.

**Course Content**

Unit-1	Logic and Methods of Proofs:	15Hrs
Propositions, logical operations (basic connectives), compound statements, construction of truth table, quantifiers, conditional statements, tautology, contradiction, contingency, logical equivalence. Conjunctive Normal Forms (CNF) and Disjunctive Normal Forms (DNF). Methods of proofs: Rules of inference for propositional logic, modus ponens, modus tollens, syllogism, proof by contradiction, Mathematical Induction		
Unit-2	Algebraic Structures:	15 Hrs
Semi-group, Monoid, Group, Subgroup, Cyclic group		
Unit-3	Numerical Methods:	15 Hrs
Concept and importance of errors in numerical methods. Solution of algebraic and transcendental equations: Bisection method and Newton-Raphson methods. Numerical Interpolation: Newton's Forward and Newton's Backward interpolation formula and Lagrange's formula. Numerical Integration: Trapezoidal rule and Simpson's 1/3 rule. Only formula and problem solving for all the topics mentioned above.		

Unit-4	Optimization Techniques:	15 Hrs
<p>Linear programming: Introduction, LP formulation, Graphical method for solving LPs with two variables, Simplex method, Duality. Transportation problem: Definition, Linear form, North-west corner method, Least cost method, Vogel's approximation method for finding feasible solution, MODI method for finding optimum solution, MODI method for finding optimum solution.</p>		
<p><b>Learning Resources:</b></p>		
<p><b>Text Books</b></p> <ol style="list-style-type: none"> <li>1. Discrete Mathematics by <i>Swapan Kumar Sarkar</i> (S. Chand)</li> <li>2. Operations Research by <i>Kanti Swarup, P.K. Gupta, &amp; Man Mohan</i> (Sultan Chand &amp; Sons)</li> <li>3. Numerical Methods for Scientific and Engineering Computation by <i>M.K. Jain, S.R.K. Iyengar, &amp; R.K. Jain</i> (New Age International)</li> <li>4. A Course in Abstract Algebra by <i>V.K. Khanna &amp; S.K. Bhambri</i> (Vikas Publishing)</li> </ol>		
<p><b>Reference Books</b></p> <ol style="list-style-type: none"> <li>1. Discrete Mathematics and its Applications by <i>Kenneth H. Rosen</i> (McGraw Hill)</li> <li>2. Contemporary Abstract Algebra by <i>Joseph A. Gallian</i> (Narosa/Cengage)</li> <li>3. Computer Oriented Numerical Methods by <i>V. Rajaraman</i> (PHI Learning)</li> <li>4. Operations Research: Theory and Applications by <i>J.K. Sharma</i> (Macmillan)</li> </ol>		
<p><b>e-Books</b></p> <ol style="list-style-type: none"> <li>1. <i>Discrete Mathematics</i> by Seymour Lipschutz (Schaum's Outline Series) - <a href="#">Google Books Preview</a></li> <li>2. <i>Numerical Methods</i> by B.S. Grewal (Khanna Publishers) - Widely available in college libraries.</li> </ol>		
<p><b>MOOC / NPTEL/YouTube Links</b></p> <ol style="list-style-type: none"> <li>1. YouTube: <a href="#">Dr. Gajendra Purohit (MathsCare)</a> - <i>Highly Recommended for all 4 Units.</i></li> <li>2. NPTEL: <a href="#">Discrete Mathematics</a> by Prof. Sudarshan Iyengar (IIT Ropar).</li> <li>3. NPTEL: <a href="#">Numerical Methods</a> by Prof. Ameeya Kumar Nayak (IIT Roorkee).</li> <li>4. YouTube: <a href="#">Bhagwan Singh Vishwakarma</a> - <i>Excellent for Unit III (Numerical Methods).</i></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC201T Course Name: Maths Foundations to  
Computer Science – II Tutorial**

<b>Teaching Scheme</b>	<b>Credit</b>	<b>Evaluation Scheme</b>
<b>Tutorial: 01 Hours/Week</b>	<b>01</b>	<b>ISA: 25 Marks</b>

**Prerequisites, if any:**

1. Basic knowledge of higher secondary mathematics.
2. Understanding of sets, relations, and functions.
3. Fundamental concepts of algebra and calculus.
4. Logical thinking and basic problem-solving skills.

**Course Objectives:** The objective of the course is to

1. Understand and apply concepts of mathematical logic and proof techniques.
2. Analyze algebraic structures such as semigroups, monoids, and groups.
3. Apply numerical methods to solve algebraic and transcendental equations.
4. Formulate and solve linear programming and transportation problems.
5. Develop mathematical reasoning skills essential for computer science applications.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Apply principles of propositional logic and mathematical induction to solve problems.
<b>CO2</b>	CO2: Identify and analyze algebraic structures including semigroups, monoids, and groups.
<b>CO3</b>	CO3: Use numerical methods such as Bisection, Newton–Raphson, and Simpson’s rule for computations.
<b>CO4</b>	CO4: Formulate and solve linear programming problems using standard methods.
<b>CO5</b>	CO5: Solve transportation problems using initial solution techniques like the North-West Corner method.

**Course Description:**

This course builds a mathematical foundation for computer science students, covering logic, induction, algebraic structures, numerical methods, linear programming, and transportation problems, with a focus on problem-solving and analytical skills.

**Course Content**

Sr. No.	Topic of Practical / Experiment / Tutorial	Assigned Hours
1	<p><b>Question 1: Multiple Choice Questions (2 marks) Choose the correct answer:</b></p> <p><b>a)</b> The statement "If it rains, then the ground is wet" is logically equivalent to:</p> <p>(i) If the ground is not wet, then it does not rain</p> <p>(ii) If the ground is wet, then it rains</p> <p>(iii) It rains if and only if the ground is wet</p> <p>(iv) The ground is wet if and only if it rains</p> <p><b>b)</b> In CNF (Conjunctive Normal Form), the expression <math>(P \vee Q) (\neg P \vee R)</math> has:</p> <p>(i) 2 clauses</p>	1

	(ii) 3 clauses (iii) 4 literals (iv) Both (i) and (iii)	
2	<b>Question 2: Mathematical Proof (4 marks) Prove by Mathematical Induction:</b> For all positive integers $n \geq 1$ : Show all steps: Base case, Inductive hypothesis, and Inductive step.	1
3	<b>Question 3: Algebraic Structures Theory (3 marks)</b> a) Define a Semigroup and state its properties (1.5 marks) b) Give an example of a semigroup that is not a monoid (1.5 marks)	1
4	<b>Question 4: Group Theory Problem (3 marks)</b> Consider the set $G = \{1, -1, i, -i\}$ under multiplication where $i^2 = -1$ . a) Construct the multiplication table (2 marks) b) Verify that $G$ forms a group (1 mark)	1
5	<b>Question 5: Numerical Methods MCQ (2 marks)</b> a) The Newton-Raphson method formula is: (i) (ii) (iii) (iv) b) Simpson's 1/3 rule for with is: (i) (ii) (iii) (iv)	1
6	<b>Question 6: Numerical Methods Problem (5 marks)</b> Find the root of in the interval $[2, 3]$ using: a) One iteration of Bisection Method (2 marks) b) One iteration of Newton-Raphson Method starting with (3 marks)	1
7	<b>Question 7: Linear Programming Theory (3 marks)</b> a) State the standard form of a Linear Programming Problem (1 mark) b) What is the difference between basic and non-basic variables in Simplex Method? (2 marks)	1
8	<b>Question 8: Transportation Problem (3 marks)</b> Apply North-West Corner Method to find initial solution: Sources: A(50), B(60), C(40) Destinations: X(60), Y(50), Z(40) Find the allocations (ignore costs for this step).	1

### Learning Resources:

#### Text Books

1. Discrete Mathematics by *Swapan Kumar Sarkar* (S. Chand)
2. Operations Research by *Kanti Swarup, P.K. Gupta, & Man Mohan* (Sultan Chand & Sons)
3. Numerical Methods for Scientific and Engineering Computation by *M.K. Jain, S.R.K. Iyengar, & R.K. Jain* (New Age International)
4. A Course in Abstract Algebra by *V.K. Khanna & S.K. Bhambri* (Vikas Publishing)

#### Reference Books

1. Discrete Mathematics and its Applications by *Kenneth H. Rosen* (McGraw Hill)
2. Contemporary Abstract Algebra by *Joseph A. Gallian* (Narosa/Cengage)
3. Computer Oriented Numerical Methods by *V. Rajaraman* (PHI Learning)
4. Operations Research: Theory and Applications by *J.K. Sharma* (Macmillan)

#### e-Books

1. Discrete Mathematics by Seymour Lipschutz (Schaum's Outline Series) - [Google Books Preview](#)
2. Numerical Methods by B.S. Grewal (Khanna Publishers) - Widely available in college libraries.

#### MOOC / NPTEL/YouTube Links

1. YouTube: [Dr. Gajendra Purohit \(MathsCare\)](#) - Highly Recommended for all 4 Units.
2. NPTEL: [Discrete Mathematics](#) by Prof. Sudarshan Iyengar (IIT Ropar).

3. NPTEL: [Numerical Methods](#) by Prof. Ameeya Kumar Nayak (IIT Roorkee).
4. YouTube: [Bhagwan Singh Vishwakarma](#) - Excellent for Unit III (Numerical Methods).

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC202 Course Name: Data Structure - I**

<b>Teaching Scheme</b>	<b>Credit</b>	<b>Evaluation Scheme</b>
<b>Lectures: 03 Hours/Week</b>	<b>03</b>	<b>ISE: 40 Marks ESE: 60 Marks</b>

**Prerequisites, if any:**

1. Basic C Programming Concepts (variables, loops, functions, arrays)
2. Mathematical logic and algorithms
3. Basic Computer Organization and Memory Concepts

**Course Objectives:** The objective of the course is to

1. Understand the need and concept of data structures in problem-solving and software design.
2. Distinguish between primitive and non-primitive data types and their applications.
3. Implement arrays, structures, and pointers efficiently in C programming.
4. Understand and apply stack and queue data structures in real-world applications
5. Develop algorithms for performing basic operations (insertion, deletion, traversal, searching, and sorting).

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Describe the classification of data structures as primitive and non-primitive.
<b>CO2</b>	Implement and manipulate arrays, structures, and pointers in C programs.
<b>CO3</b>	Apply stack operations and use them for expression evaluation and recursion.
<b>CO4</b>	Implement and perform operations on queues, circular queues, and priority queues.
<b>CO5</b>	Analyze algorithm efficiency using time and space complexity.

**Course Description:**

This course covers the fundamentals of data structures, including arrays, structures, pointers, stacks, and queues in C. It focuses on efficient data organization, algorithmic thinking, and practical implementation for effective problem-solving.

**Course Content**

<b>Unit-1</b>	<b>Primitive and Non-Primitive</b>	<b>15 Hrs</b>
Data Structures, Arrays Introduction to data structures, types (primitive/non-primitive), operations on data structures, memory management, array definition, types (1D, 2D, multi-dimensional), operations (traversal, insertion, deletion, searching, sorting), matrix representation, sparse matrices, applications.		
<b>Unit-2</b>	<b>Structures and Pointers</b>	<b>15 Hrs</b>
Structure definition, declaration, array of structures, nested structures, pointer to structure, passing structures to functions, difference between array and structure; pointers – declaration, initialization, arithmetic, pointer to pointer, null pointer, void pointer, dynamic memory allocation (malloc, calloc, free), pointers with arrays and structures, applications.		

<b>Unit-3</b>	<b>Stack</b>	<b>15 Hrs</b>
<p>Definition, concepts (TOP, PUSH, POP, overflow, underflow), representation using arrays and linked lists, stack operations, applications (infix to postfix/prefix conversion, expression evaluation, recursion, reversing string), algorithms and programs for stack operations.</p>		
<b>Unit-4</b>	<b>Queue</b>	<b>15 Hrs</b>
<p>Definition and need, terminologies (front, rear, enqueue, dequeue), representation using arrays and linked lists, types (simple, circular, double-ended, priority queue), operations (insert, delete, display), applications (job scheduling, process management), algorithms and programs for queue and circular queue.</p>		
<b>Learning Resources:</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. Data Structures Through C” – Yashavant Kanetkar, BPB Publications</li> <li>2. Data Structures Using C” – Reema Thareja, Oxford University Press</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. Data Structures Using C &amp; C++” – Tanenbaum, Langsam, Augenstein, Pearson Education</li> <li>2. Fundamentals of Data Structures in C” – Ellis Horowitz, Sartaj Sahni, Universities Press</li> <li>3. Data Structures and Algorithm Analysis in C” – Mark Allen Weiss, Pearson Education</li> </ol>		
<b>e-Books</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://www.vidyawarta.com/01/wp-content/uploads/2024/08/Book-Data-Structures-Using-C.pdf?utm_source=chatgpt.com">https://www.vidyawarta.com/01/wp-content/uploads/2024/08/Book-Data-Structures-Using-C.pdf?utm_source=chatgpt.com</a></li> <li>2. <a href="https://sonucgn.files.wordpress.com/2018/01/data-structures-by-d-samantha.pdf?utm_source=chatgpt.com">https://sonucgn.files.wordpress.com/2018/01/data-structures-by-d-samantha.pdf?utm_source=chatgpt.com</a></li> </ol>		
<b>MOOC / NPTEL/YouTube Links</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://www.youtube.com/watch?v=B31LgI4Y4DQ&amp;utm_source=chatgpt.com">https://www.youtube.com/watch?v=B31LgI4Y4DQ&amp;utm_source=chatgpt.com</a></li> <li>2. <a href="https://www.youtube.com/playlist?list=PLGjplNEQ1it-kmrbYmzQfLWjVOFj6JpEV&amp;utm_source=chatgpt.com">https://www.youtube.com/playlist?list=PLGjplNEQ1it-kmrbYmzQfLWjVOFj6JpEV&amp;utm_source=chatgpt.com</a></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC203 Course Name: Operating System**

<b>Teaching Scheme</b>	<b>Credit</b>	<b>Evaluation Scheme</b>
<b>Lectures: 04 Hours/Week</b>	<b>04</b>	<b>ISE: 40 Marks ESE: 60 Marks</b>

**Prerequisites, if any:**

Basic knowledge of computer fundamentals and programming concepts.

**Course Objectives:** The objective of the course is to

1. Understand the basic concepts and functions of an Operating System.
2. Learn process, memory, file, and I/O management.
3. Study CPU scheduling and multithreading concepts.
4. Analyze different types and structures of Operating Systems.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Explain the fundamentals of the operating system.
<b>CO2</b>	Comprehend multithreaded programming, CPU scheduling, process management, process synchronization, memory, deadlocks, and storage management.
<b>CO3</b>	Compare the performance of CPU scheduling algorithms
<b>CO4</b>	Identify the features of I/O and File handling methods.

**Course Description:**

This course provides an overview of Operating System concepts, including process management, CPU scheduling, memory, file, and I/O management, with a focus on how an OS manages system resources efficiently.

**Course Content**

<b>Unit-1</b>	<b>Operating Systems Overview</b>	<b>15 Hrs</b>
Operating Systems Overview: Definition, Evaluation of O.S, Components & Services of OS, Structure, Architecture, types of Operating Systems, Batch Systems, Concepts of Multiprogramming and Time Sharing, Parallel, Distributed and real time Systems. Operating Systems Structures: Operating system services and systems calls, system programs, operating system structure, operating systems generations.		
<b>Unit-2</b>	<b>Process Management &amp; Process Scheduling</b>	<b>15 Hrs</b>
Process Management: Process Definition, Process states, Process State transitions, Process Scheduling, Process Control Block, Threads, Concept of multithreads, Benefits of threads, Types of threads. Process Scheduling: Definition, Scheduling objectives, Scheduling algorithms, CPU scheduling Preemptive and Non-preemptive Scheduling algorithms (FCFS, SJF and RR), Performance evaluation of the scheduling Algorithms.		
<b>Unit-3</b>	<b>Process Synchronization &amp; Deadlocks</b>	<b>15 Hrs</b>

**Process Synchronization:** Introduction, Inter-process Communication, Race Conditions, Critical Section Problem, Mutual Exclusion, Semaphores, Monitors. **Deadlocks:** System model, deadlock characterization, deadlock prevention, avoidance, Banker's algorithm, Deadlock detection, and recovery from deadlocks.

**Unit-4**

**Memory Management & I/O Management**

**15 Hrs**

Memory Management: Logical and Physical address map, Swapping, Memory allocation, MFT, MVT, Internal and External fragmentation and Compaction, Paging, Segmentation. Virtual Memory: Demand paging, Page Replacement algorithms, Allocation of frames, thrashing. I/O Management: Principles of I/O Hardware: Disk structure, Disk scheduling algorithms.

**Learning Resources:**

**Text Books**

1. Ekta Walia, Operating Systems Concepts, Khanna Publishing House, 2022 (AICTE Recommended Textbook)
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7th edition OR Later edition, Wiley India Private Limited, New Delhi.

**Reference Books**

1. Andrew S Tanenbaum, Modern Operating Systems, Third Edition, Prentice Hall India.
2. Sumitabha Das, UNIX Concepts and Applications, 4th Edition, Tata McGraw-Hill

**e-Books**

1. <https://pages.cs.wisc.edu/~remzi/OSTEP/>
2. <https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems.pdf>

**MOOC / NPTEL/YouTube Links**

1. <https://www.youtube.com/playlist?list=PLWPirh4EWFpG1vviVUVKyFXBCgJg9q3cS>
2. <https://www.youtube.com/playlist?list=PLBlnK6fEyqRiw-UlkR3jFBRyR2p7XmH0g>

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC204 Course Name: Object Oriented Programming using CPP**

Teaching Scheme	Credit	Evaluation Scheme
Lectures: 04 Hours/Week	04	ISE: 40 Marks ESE: 60 Marks

**Prerequisites, if any:**

1. Basic programming knowledge (variables, loops, conditional statements).
2. Understanding of algorithms and problem-solving.
3. Familiarity with computer fundamentals and file management.

**Course Objectives:** The objective of the course is to

1. Understand and apply object-oriented principles using C++.
2. Develop programs using classes, inheritance, and polymorphism.
3. Implement file handling and templates effectively.
4. Learn exception handling to make robust programs.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Explain the fundamental concepts and principles of Object-Oriented Programming (OOP).
<b>CO2</b>	Apply OOP features such as classes, objects, constructors, and destructors to develop programs.
<b>CO3</b>	Analyze relationships among classes using inheritance and polymorphism.
<b>CO4</b>	Develop programs using operator overloading, templates, and exception handling mechanisms.

**Course Description:**

This course introduces students to the concepts and techniques of object-oriented programming using C++. It focuses on classes, objects, inheritance, polymorphism, file handling, and templates. The course blends theoretical understanding with hands-on programming practice.

**Course Content**

Unit-1	Introduction to Programming Paradigms	15 Hrs
Procedure-Oriented vs Object-Oriented, Basic Concepts of OOP: Object, Class, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Message Passing, Benefits of OOP, Structure of C++ Program, Tokens, Keywords, Identifiers, Constants, Variables, Operators, Input/Output in C++: cin, cout, manipulators, Control Structures: if, if-else, switch, loops (for, while, do-while)		
Unit-2	Defining Classes and Creating Objects, Access Specifiers	15 Hrs
public, private, protected, Member Functions and Data Members, Constructors and Destructors (default, parameterized, copy), Arrays within Class, Static Members and Functions, Friend Functions.		

<b>Unit-3</b>	<b>Inheritance</b>	<b>15 Hrs</b>
Concept and Types (Single, Multiple, Multilevel, Hierarchical, Hybrid), Constructor and Destructor in Inheritance, Virtual Base Classes and Abstract Classes, Function Overloading and Operator Overloading, Virtual Functions and Runtime Polymorphism		
<b>Unit-4</b>	<b>File Streams</b>	<b>15 Hrs</b>
ifstream, ofstream, fstream, File Operations: open(), read(), write(), close() ,File modes (input/output/append), Templates: Function Templates and Class Templates, Exception Handling: try, catch, throw, Introduction to Standard Template Library (STL).		
<b>Learning Resources:</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. Object-Oriented Programming with C++ – E. Balagurusamy</li> <li>2. Programming in C++ – Robert Lafore</li> <li>3. The Complete Reference: C++ – Herbert Schildt</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. Object-Oriented Programming in Turbo C++ – Robert Lafore</li> <li>2. Mastering C++ – K. R. Venugopal &amp; Rajkumar</li> <li>3. C++ Primer – Stanley B. Lippman</li> </ol>		
<b>e-Books</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://www.learncpp.com/">https://www.learncpp.com/</a></li> <li>2. <a href="https://www.programiz.com/cpp-programming">https://www.programiz.com/cpp-programming</a></li> </ol>		
<b>MOOC / NPTEL/YouTube Links</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://www.youtube.com/watch?v=vLnPwxZdW4Y">https://www.youtube.com/watch?v=vLnPwxZdW4Y</a></li> <li>2. <a href="https://www.youtube.com/watch?v=yGB9jhsEsr8">https://www.youtube.com/watch?v=yGB9jhsEsr8</a></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC205 Course Name: Indian Constitution**

<b>Teaching Scheme</b>	<b>Credit</b>	<b>Evaluation Scheme</b>
<b>Lectures: 02 Hours/Week</b>	<b>02</b>	<b>ISE: 20 Marks</b> <b>ESE: 30 Marks</b>

**Prerequisites, if any:**

Basic understanding of Indian polity, governance, and fundamental economic concepts.

**Course Objectives:** The objective of the course is to

1. Develop an understanding of the Indian Constitution beyond legal and political lenses, emphasizing its significance for business students.
2. Recognize the importance of comprehending constitutional basics and their impact on trade, economy, and business practices.
3. Analyze the inclusion of economic justice in the preamble and its implications for post-colonial economic policies.
4. Explore the legal history of competing claims between economic development and principles of equity and justice in India.
5. Examine the transition from state-led industrialization to liberalization, highlighting the constitutional underpinnings of these economic shifts.
6. Investigate the constitutional provisions relevant to business, such as the fundamental right to practice any profession, occupation, trade, or business as enshrined in Article

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Explain concept of the Indian Constitution, particularly from the perspective of economic governance and business
<b>CO2</b>	Employ a nuanced analytical framework about ongoing constitutional debates and battles which affect the domain of business
<b>CO3</b>	Develop a sense of how questions of economic growth have to be balanced with other constitutional commitments, including social and economic justice.

**Course Description:**

This course explores the economic dimensions of the Indian Constitution, examining its impact on business, land reforms, liberalization, and fiscal federalism. It helps students understand how constitutional principles shape economic policies and business practices in India.

**Course Content**

<b>Unit-1</b>	<b>An Economic History of the Constitution of India</b>	<b>15 Hrs</b>
Historical understanding of the constitution as an economic document. Understanding the Preamble, starting from the land reform cases in the 1950s to the validity of the bitcoin ban imposed by the RBI, this module signpost all of the important economic moments in the constitutional history of post-colonial India; Constitutional design, Legal Regulation and economic justice		

<b>Unit-2</b>	<b>Fundamental Rights and Business in India</b>	<b>15 Hrs</b>
<p>Article 19(1)(g) grants every citizen the right, to practise any profession, or to carry on any profession, occupation, trade, or business. Like other fundamental rights, this right is subject to reasonable restrictions imposed by the state. This particular provision of the Constitution has been one of the most severely litigated freedoms. Fundamental Duties.</p>		
<b>Unit-3</b>	<b>Fundamental Rights and Business in India</b>	<b>15 Hrs</b>
<p>Article 19(1)(g) grants every citizen the right, to practise any profession, or to carry on any profession, occupation, trade, or business. Like other fundamental rights, this right is subject to reasonable restrictions imposed by the state. This particular provision of the Constitution has been one of the most severely litigated freedoms. Fundamental Duties.</p>		
<b>Unit-4</b>	<b>Constitutional battles that shaped the economy</b>	<b>15 Hrs</b>
<p>This module will be taught through key case studies that demonstrate the complex and fascinating overlap between the constitution and business and shall use Saurabh Kirpal's book Fifteen Judgments: Cases that Shaped India's Financial Landscape as our guide through this landscape. The case studies include the banning of diesel engine cars, Telecom regulation and ownership of broadcast media, Demonetisation, Aadhaar, the lifting of restrictions on dealing in cryptocurrencies.</p>		
<b>Learning Resources:</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. Saurabh Kirpal, Fifteen Judgments: Cases that Shaped India's Financial Landscape, Penguin Random House, 2022.</li> <li>2. M.P. Jain, Indian Constitutional Law, LexisNexis, 8th Edition, 2018.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1) The Oxford Handbook of the Indian Constitution, Oxford university press.</li> </ol>		
<b>e-Books</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://legislative.gov.in/constitution-of-india">https://legislative.gov.in/constitution-of-india</a></li> <li>2. <a href="https://www.legalserviceindia.com/legal/article-1597-fundamental-rights-trade-and-business-in-india.html">https://www.legalserviceindia.com/legal/article-1597-fundamental-rights-trade-and-business-in-india.html</a></li> </ol>		
<b>MOOC / NPTEL/YouTube Links</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://www.youtube.com/playlist?list=PLLRM7RONmA9FTQJ9vu9Mlk0b-nK6MZT8W">https://www.youtube.com/playlist?list=PLLRM7RONmA9FTQJ9vu9Mlk0b-nK6MZT8W</a></li> <li>2. <a href="https://www.youtube.com/playlist?list=PL3QkB5mZ5hcDvW08KBLcL60SMpA-kTe8V">https://www.youtube.com/playlist?list=PL3QkB5mZ5hcDvW08KBLcL60SMpA-kTe8V</a></li> </ol>		

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC202P Course Name: Data Structures – I - Lab**

Teaching Scheme	Credit	Evaluation Scheme
Practical: 02 Hours/Week	01	ISA: -  POE: 50 Marks

**Prerequisites, if any:**

1. Basic knowledge of computers and programming logic.
2. Familiarity with C programming, variables, loops, functions, and arrays.

**Course Objectives:** The objective of the course is to

1. Understand fundamental concepts of data structures and their applications.
2. Implement arrays, structures, and pointers in C programming.
3. Apply stack and queue data structures to solve real-world problems.
4. Develop problem-solving skills using modular and efficient C programs.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Understand the basics of data structures, arrays, and memory management.
<b>CO2</b>	Implement C programs using arrays, structures, and pointers.
<b>CO3</b>	Apply stack and queue concepts to solve computational problems.
<b>CO4</b>	Analyze, design, and implement efficient C programs using data structures.

**Course Description:**

This lab provides hands-on experience with arrays, structures, pointers, stacks, and queues using C programming. Students will perform operations like insertion, deletion, traversal, searching, and sorting, and develop modular, efficient, and reusable programs, including mini projects combining multiple data structure concepts.

**Course Content**

Sr. No.	Topic of Practical / Experiment / Tutorial	Assigned Hours
1	Write a C program to read and display elements of a 1-D array.	2
2	Write a C program to find the sum and average of array elements.	2
3	Write a C program to find the largest and smallest element in an array.	2
4	Write a C program to represent a 2-D array and perform matrix addition and multiplication.	2
5	Write a C program to add two matrices.	2
6	Write a C program to store and display student information using structure.	2
7	Write a C program to access array elements using pointers.	2
8	Write a C program to implement stack using array (PUSH and POP).	2

9	Write a C program to implement simple queue using array (INSERT & DELETE).	2
10	Write a C program to demonstrate dynamic memory allocation using malloc() and calloc().	2

### Learning Resources:

#### Text Books

1. Data Structures Through C – Yashavant Kanetkar, BPB Publications
2. Data Structures Using C – Reema Thareja, Oxford University Press

#### Reference Books

1. Data Structures Using C & C++ – Tanenbaum, Langsam, Augenstein, Pearson
2. Fundamentals of Data Structures in C – Ellis Horowitz, Sartaj Sahni, Universities Press
3. Data Structures and Algorithm Analysis in C – Mark Allen Weiss, Pearson

#### e-Books

1. [https://www.vidyawarta.com/01/wp-content/uploads/2024/08/Book-Data-Structures-Using-C.pdf?utm\\_source=chatgpt.com](https://www.vidyawarta.com/01/wp-content/uploads/2024/08/Book-Data-Structures-Using-C.pdf?utm_source=chatgpt.com)
2. [https://sonucgn.files.wordpress.com/2018/01/data-structures-by-d-samantha.pdf?utm\\_source=chatgpt.com](https://sonucgn.files.wordpress.com/2018/01/data-structures-by-d-samantha.pdf?utm_source=chatgpt.com)

#### MOOC / NPTEL/YouTube Links

1. [https://www.youtube.com/watch?v=B31LgI4Y4DQ&utm\\_source=chatgpt.com](https://www.youtube.com/watch?v=B31LgI4Y4DQ&utm_source=chatgpt.com)
2. [https://www.youtube.com/playlist?list=PLGjplNEQ1it-kmrbYmzQfLWjVOFj6JpEV&utm\\_source=chatgpt.com](https://www.youtube.com/playlist?list=PLGjplNEQ1it-kmrbYmzQfLWjVOFj6JpEV&utm_source=chatgpt.com)

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC204P Course Name: Object Oriented Programming using CPP-Lab**

Teaching Scheme	Credit	Evaluation Scheme
<b>Practical: 04 Hours/Week</b>	<b>02</b>	<b>ISA: - POE: 25 Marks</b>

**Prerequisites, if any:**

1. Basic knowledge of programming concepts
2. Familiarity with C++ syntax
3. Understanding of variables, data types, and operators
4. Basic knowledge of control structures (if, loops)
5. Familiarity with file handling in any programming language is a plus

**Course Objectives:** The objective of the course is to

1. After completion of this lab, students will be able to:
2. Understand the concepts of Object-Oriented Programming (OOP) in C++.
3. Create and use classes, objects, constructors, and member functions.
4. Implement inheritance, polymorphism, and function/operator overloading.
5. Work with static members, friend functions, and runtime polymorphism.
6. Perform file handling operations, use templates, and handle exceptions.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Write C++ programs using basic input/output and control structures.
<b>CO2</b>	Develop programs using classes, objects, and constructors.
<b>CO3</b>	Apply inheritance, function overloading, operator overloading, and polymorphism in programs.
<b>CO4</b>	Use static members, friend functions, and virtual functions effectively.
<b>CO5</b>	Implement file operations, function templates, and exception handling in C++.

**Course Description:**

This lab provides practical experience in C++ Object-Oriented Programming. Students learn to implement classes, objects, inheritance, polymorphism, function/operator overloading, file handling, templates, and exception handling. It develops hands-on skills for real-world OOP applications

**Course Content**

Sr. No.	Topic of Practical / Experiment / Tutorial	Assigned Hours
1	Write a program to demonstrate basic input/output using cin and cout.	2
2	Write a program to demonstrate control structures: Conditional Statements and loops.	2
3	Write a program to define a class, create objects, and access its data members and member functions.	2

4	Write a program to demonstrate constructors: default, parameterized, and copy constructor.	2
5	Write a program to demonstrate static data members and static member functions.	2
6	Write a program to demonstrate friend function.	2
7	Write a program to demonstrate single and multilevel inheritance.	2
8	Write a program to demonstrate function overloading and operator overloading.	2
9	Write a program to demonstrate virtual functions and runtime polymorphism.	2
10	Write a program to demonstrate file operations (open(), read(), write(), close()) or function template.	2

### Learning Resources:

#### Text Books

1. "Object Oriented Programming with C++" – E. Balagurusamy, McGraw-Hill
2. "Programming in C++" – Robert Lafore, Sams Publishing

#### Reference Books

1. "Let Us C++" – Yashavant Kanetkar
2. "The C++ Programming Language" – Bjarne Stroustrup
3. "C++: How to Program" – Deitel & Deitel
4. Online resources: GeeksforGeeks C++ , Programiz C++

#### e-Books

1. <https://www.learncpp.com/>
2. <https://www.programiz.com/cpp-programming>

#### MOOC / NPTEL/YouTube Links

1. <https://www.youtube.com/watch?v=vLnPwxZdW4Y>
2. <https://www.youtube.com/watch?v=yGB9jhsEsr8>

**Yashwantrao Chavan Warana Mahavidyalay, Warananagar.  
First Year of Bachelor of Computer Application (FYBCA)**

**Course Code: 2502UBCAPCC206P Course Name HTML - Lab**

<b>Teaching Scheme</b>	<b>Credit</b>	<b>Evaluation Scheme</b>
<b>Practical: 02 Hours/Week</b>	<b>01</b>	<b>ISA: - POE: 50 Marks</b>

**Prerequisites, if any:**

1. Basic computer knowledge
2. Knowledge of operating system (Windows/Linux)
3. Familiarity with any text editor (Notepad, VS Code)
4. Basic understanding of Internet and Web Browsers

**Course Objectives:** The objective of the course is to

1. Understand the structure and syntax of HTML documents.
2. Create web pages using various HTML tags and attributes.
3. Develop forms for data collection using input controls.
4. Incorporate multimedia elements like audio, video, and images into web pages.
5. Apply table formatting, semantic tags, and advanced HTML features.

**Course Outcomes:** After successful completion of the course, student will be able to

<b>CO1</b>	Design static web pages using HTML.
<b>CO2</b>	Use text formatting, lists, links, images, and tables effectively.
<b>CO3</b>	Create interactive forms with input validation using HTML5 controls.
<b>CO4</b>	Embed multimedia and external content in web pages.
<b>CO5</b>	Understand and implement semantic HTML and table advanced features for better web structure.

**Course Description:**

HTML Lab gives hands-on experience in creating web pages using HTML. It covers basic structure, text formatting, lists, links, images, tables, forms, multimedia, and semantic elements. Students gain practical skills in building structured and interactive web pages.

**Course Content**

<b>Sr. No.</b>	<b>Topic of Practical / Experiment / Tutorial</b>	<b>Assigned Hours</b>
1.	Write a program to create a basic HTML page using all mandatory tags.	2
2.	Write a program to demonstrate text formatting tags in HTML (<b> <i> <u> <sub> <sup>).	2
3.	Write a program to create an Ordered List and an Unordered List in HTML.	2
4.	Write a program to create hyperlinks and open a link in a new tab.	2
5.	Write a program to insert an image in a web page.	2
6.	Write a program to create a table with rows and columns in HTML.	2

7.	Write a program to create a simple HTML form with text input, password input, and submit button.	2
8.	Write a program to demonstrate radio buttons and checkboxes in a form.	2
9.	Write a program to create a dropdown (select) list in HTML.	2
10.	Write a program to add audio and video in a web page using HTML.	2
11.	Write a program to use HTML semantic tags: <header> <nav> <section> <footer>.	2
12.	Write a program to demonstrate the use of <iframe> in HTML.	2
13.	Write a program to demonstrate colspan and rowspan in an HTML table.	2
14.	Write a program to demonstrate HTML5 input types: email, date, range, etc.	2
15.	Write a program to embed a YouTube video using <iframe> in HTML.	2

### Learning Resources:

#### Text Books

1. “Web Technologies” – Uttam K. Roy, 2nd Edition, McGraw-Hill
2. “Web Design with HTML, CSS, JavaScript” – John Duckett, Wiley

#### Reference Books

1. “HTML5 & CSS3 All-in-One For Dummies” – Andy Harris
2. “Learning Web Design” – Jennifer Niederst Robbins
3. “HTML5: Up and Running” – Mark Pilgrim
4. Online resources: W3Schools, MDN Web Docs

#### e-Books

1. <https://www.w3schools.com/html/>
2. <https://developer.mozilla.org/en-US/docs/Web/HTML>

#### MOOC / NPTEL/YouTube Links

1. <https://www.youtube.com/watch?v=pQN-pnXPaVg>
2. <https://www.youtube.com/watch?v=BsDoLVMnmZs>