Academic Year Planner & Syllabus

BCA 1st & 2nd Semester

Academic Year Planner (July 2024 – June 2025)

The Academic Session 2024-25 is divided into two semesters each of approximately 20 weeks duration:

Odd semesters (1st/ 3rd/ 5th) : July–December Even semesters(2nd/ 4th/ 6th) : January–June

This Academic Year Planner explains about the scheduled dates for Examinations, Events and Holidays. Students are required to plan & prepare themselves for examinations, vacations and various events. This planner is published to be followed with utmost accuracy which may require minor deviations depending upon various factors. These deviations will be notified to the staff and students before relevant date & time through proper channel.

Holiday:

Event:

Examinations:

July – 2	2024	(To	otal Ac	ademic	: Days-	26)
Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

HOLIDAYS		
17-07-2024	Muharram	

EVENTS

August – 2024 (To	tal Academic Days- 24
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Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

HOLIDAYS

19-08-2024 Rakshya Bandhan (Rakhi Purnima) 26-08-2024 Janmasthami

EVENTS

Student Induction Programme
Independence Day

(Total Academic Days- 24) September – 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

HOLIDAYS

EVENTS 05-09-2024 07-09-2024

Teachers Day Ganesh Puja

October – 2024 (Total Academic Days- 19)

						<u>, ,</u>
Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

HOLIDAYS	
02-10-2024	Gandhi & Sastri Jayanti / Mahalya
11-10-2024	Dussehra
То	&
17-10-2024	Kumara Purnima
31-10-2024	Kali Puja/Diwali
EVENTS	
05-10-2024	1st Unit/Midterm Exam
07-10-2024	1 st Unit/Midterm Exam
08-10-2024	1 st Unit/Midterm Exam

November – 2024			(Total	Acade	mic Da	<u>iys- 24)</u>
Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

HOLIDAYS	
15-11-2024	Rasa Purnima
23-11-2024	Prathamasthami
EVENTS	
14-11-2024	Children Day
07-11-2024	2 nd Unit/Mid- term Exam
08-11-2024	2 nd Unit/Mid-term Exam
09-11-2024	2 nd Unit/Mid- term Exam
11-11-2024	2 nd Unit/Mid- term Exam

December – 2024	(Total Academic Days- 20)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

HOLIDAYS 25-12-2024 To 31-12-2024	Christmas/Winter Vacation
EVENTS	
19-12-2024	3 rd Unit/Mid-term Exam
20-12-2024	3 rd Unit/Mid-term Exam
21-12-2024	3 rd Unit/Mid-term Exam
23-12-2024	3 rd Unit/Mid-term Exam

J	a	n	u	а	ry	1	-	2	0	2	5			
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January – 2025			(Total	Acade	emic Da	iys- 25)
Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

HOLIDAYS	
01-01-2025	New Year Day
14-01-2025	Makara Sankranti
EVENTS	
23-01-2025	Netaji Jayanti
26-01-2025	Republic Day
16-01-2025	4 th Unit/Mid-term Exam
17-01-2025	4 th Unit/Mid-term Exam
18-01-2025	4 th Unit/Mid-term Exam
20-01-2025	4 th Unit/Mid-term Exam

February – 2025 (Total Ac	ademic Days- 22)
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Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

HOLIDAYS 26-02-2025 Maha Shivaratri EVENTS

03-02-2025	Basanta Panchami/Saraswati Puja
12-02-2025	1⁵tUnit/Midterm Exam
13-02-2025	1⁵tUnit/Midterm Exam
14-02-2025	1⁵tUnit/Midterm Exam
15-02-2025	1⁵tUnit/Midterm Exam

March – 2025 (Total Academic Days- 24)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

HOLIDAYS	
15-03-2025	Holi
31-03-2025	Eid al-fitr
EVENTS	

05-03-2025	2 nd Unit/Midterm Exam
06-03-2025	2 nd Unit/Midterm Exam
07-03-2025	2 nd Unit/Midterm Exam
08-03-2025	2 nd Unit/Midterm Exam

April – 2025

(Total Academic Days- 24)

•			•			,
Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

HOLIDAYS

14-04-2025 18-04-2025	Maha Vishuva Sankranti Good Friday
EVENTS	
01-04-2025	Utkal Divas
09-04-2025	3 rd Unit/Midterm Exam
10-04-2025	3 rd Unit/Midterm Exam
11-04-2025	3 rd Unit/Midterm Exam
12-04-2025	3 rd Unit/Midterm Exam

Sun	Mon	Tue	Wed	Thu	Fri	Sat	
				1	2	3	
4	5	6	7	8	9	10	
11	12	13	14	15	16	17	
18	19	20	21	22	23	24	
25	26	27	28	29	30	31	

May - 2025 (Total Academic Days- 09)

EVENTS 07-05-

HOLIDAYS

07-05-2025	4 th Unit/Midterm Exam
08-05-2025	4 th Unit/Midterm Exam
09-05-2025	4 th Unit/Midterm Exam
10-05-2025	4 th Unit/Midterm Exam

June – 2025

(Total Academic Days- 10)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
21	22	23	24	25	26	27
28	29	30				

HOLIDAYS	
15-04-2025	Raja Sankranti
27-04-2025	Sri Gundicha Rath Yatra
EVENTS	

19-04-2025 Start of 3rd Semester Classes

Note:

- In addition to the declared holidays, the Principal may declare two (02) days as holidays at his discretion during the Academic Year.
- Eclipse if any falling during the year will be separately declared as holiday vide the notification/letter of Govt. of Odisha
- The working hour of the college office is from 10.00 AM to 6.00 PM with a break for launch from 2.00 PM to 3.00 PM
- The Academic hour of the college is from 8.00 AM to 2.00 PM with a 30 minutes break for breakfast.
- Summer Vacation will be declared later as per decision taken by Dept. of Higher Education, Govt. of Odisha

SYLLABUS (1st & 2nd Semester)

Course Structure and Mark Structure of UG Computer Application (BCA 1st Year) SEMESTER-I

SL. No.	Course Code	Course Title	L	Т	Р	Credit		
3 WEEKS COMPULSORY INDUCTION PROGRAM (UHV-I)								
1	CC101	Mathematics Foundations to Computer Science- I	3	0	0	3		
2	SEC 101	Problem Solving Techniques	3	0	4	5		
3	CC102	Computer Architecture	3	0	4	5		
4	AEC101	Genera English-I	1	1	0	2		
5	MDE101	Indian Knowledge System	2	0	0	2		
6	VAC101	Environmental Science and sustainability	2	0	0	2		
7	AEC102	Additional Course - Indian or Foreign Language Other than Mother Tongue and English(1-1-0)) [optional course]*	1	1	0	0*		
TOTAL						19		

SEMESTER -1

Mathematics Foundation to Computer Science-I

Course Objectives

CO1: Provide a basic understanding of fundamental mathematical concepts such assets, functions, matrix algebra, and discrete mathematics.

CO2: This course enables the students to use mathematical models and techniques to analyze and understand problems in computer science.

CO3: This course demonstrates how the mathematical principles give succinct abstraction of computer science problems and help them to efficiently analyze.

UNIT-I: Set, Relation and Function:

Set, Set Operations, Properties of Set operations, Subset, Venn Diagrams, Cartesian Products.

Relation Set, Properties of Relations, Representing Relations using matrices and digraphs, Types of Relations, Equivalence Relation, Equivalence relation and partition on set, Closures of Relations, Warshall's algorithm. Functions, properties of functions (domain, range), composition of functions, subjective (onto), injective (one-to-one) and Objective functions, inverse of functions. Some use full functions for Computer Science: Exponential and Logarithmic functions, Polynomial functions, Ceiling and Floor functions.

UNIT-II: Counting and Recurrence Relation:

Basics of counting, Pigeonhole principle, permutation, combination, Binomial coefficients, Binomial theorem.

Recurrence relations, modeling recurrence relations with examples, like Fibonacci numbers, the tower of Hanoi problem. Solving linear recurrence relation with constant coefficients using characteristic equation roots method.

UNIT-III: Elementary Graph Theory:

Basic terminologies of graph ,connected and disconnected graphs, sub graph, paths and cycles, complete graphs, digraphs, weighted graphs, Euler and Hamiltonian graphs.

Trees, properties of trees, concept of spanning tree. Planargraphs. Definitions and basic results on the topics mentioned.

UNIT-IV: Matrix Algebra:

Types of matrices, algebra of matrices–addition, subtraction, and multiplication of matrices, determinant of a matrix, symmetric and skew symmetric matrices, orthogonal matrix ,rank of a matrix, inverse of a matrix, applications of matrices to solve system of linear equations, Eigen values and Eigen vectors, Caley-Hamilton theorem.

Text Books:

1.Garg, Reena, Engineering Mathematics, Khanna Book Publishing Company, 2024. (AICTE Recommended Textbook)

2.Garg, Reena, Advanced Engineering Mathematics, Khanna Book

3.Deo Narsingh, Graph Theory with Application to Engineering and Computer Science, Prentice Hall, India, 1979. Vasishtha A.R. and Vasishtha A.K., Matrices, KrishnaPrakashan, 2022. **Reference Books:**

Grimaldi Ralph P. and Ramana B. V., Discrete and Combinatorial Mathematics: An Applied Introduction, Fifth Edition, Pearson Education, 2007.Rosen KennethH. And Krithivasan Kamala, Discrete Mathematics and its Applications, McGraw Hill, India, 2019.

West Douglas B., Introduction to Graph Theory, Second Edition, Pearson Education, 2015

Problem Solving Techniques

SEC101	Problem Solving Techniques	3L:0T:4P	5Credits

Course Objectives

CO1:Understand basic terminology of computers, problem solving ,programming Languages and their evolution (Understand)

CO2: Create specification from problem requirements by asking questions to disambiguate the requirement statement. (Create)

CO3: Design the solution from specification of a problem and write pseudo code of the algorithm using basic building blocks or structured programming constructs (Sequence, Selection and Repetition statement). (Create)

CO4: Translate an algorithm into a C computer program(Create)

CO5:Testingandanalysingprogramsusingdebuggingtools.(Analyze)

UNIT-I:(CO-1,CO-2)

Problems And Problem Instances, Generalization and Special Cases, Types of Computational Problems, Classification of Problems, Analysis of Problems, Solution Approaches, Algorithm Development, Analysis of Algorithm, Efficiency, Correctness, Role of Data Structures in Problem Solving, Problem-Solving Steps (Understand the Problem, Plan, Execute, And Review), Breaking the Problem into Subproblems, Input/Output Specification, Input Validation, Pre and Post Conditions.

UNIT-II:(CO-2,CO-3, CO-4)

StructuredProgrammingConcepts:Sequence(Input/Output/Assignment),Selection(If,If-Else)

AndRepetition(For, While, DoWhile)Statements, ControlStructureStackingandNesting.DifferentKindsofRepetitions:Entry Controlled, Exit Controlled, Counter Controlled, Definite, Indefinite and Sentinel-Controlled Repetitions. Pseudo code and Flow charts. Definition and Characteristics of Algorithms, Standard Algorithm Format. Problems Involving Iteration and Nesting: Displaying Different Patterns and Shapes Using Symbols and Numbers, Generating Arithmetic and Geometric Progression, Fibonacci and Other Sequences, Approximate Values For π ,Sin(x),Cos(x),Etc.UsingTaylorSeries.DifferentKindsofDatainTheRealWorldand How They are Represented in The Computer Memory. Representation of Integers: Signed Magnitude Form, 1's Complement And 2's Complement. Representation of Real Numbers: IEEE 754 Floating Point Representation. Representation of Characters: ASCII, UNICODE.

C Language: Introduction to Programming Languages, Different Generations of Programming Languages. Typed Vs Type less Programming Languages, History of C Language, An Empty C Program. C Language Counterparts for Input (scan f()), Output (printf()) Statements, Assignment, Arithmetic, Relational and Logical Operators. If, If-Else Statements, For, While, Do-While Statements. Data Types. Translating Pseudo code/Algorithm to C Program. Incremental Compilation and Testing of The C Program. Simple Problems Involving Input, Output, Assignment Statement, Selection and Repetition. Good Coding Practices.

UNIT-III:(CO-2,CO-3,CO-4)

Problems on Numbers: Extracting Digits of a Number (Left to Right and Right to Left), Palindrome, Prime Number, Prime Factors, Amicable Number, Perfect Number, Armstrong Number, Factorial, Converting Number from One Base to Another. Statistics (Maximum, Minimum, Sum and Average) on a Sequence of Numbers which are Read using Sentinel-Controlled Repetition using only a few Variables.

C Language: else-if Ladder, switch Case, Increment/Decrement Operators, break and continue Statements.

UNIT-IV:(CO-2,CO-3, CO-4,CO-5)

Modular Programming, Top-Down and Bottom-Up Approaches to Problem Solving. Recursion. Problems on Arrays: Reading and Writing of Array Elements, Maximum, Minimum, Sum, Average, Median and Mode. Sequential and Binary Search. Any one Sorting Algorithm. Matrix Operations.

C Language: Function Definition and Declaration (Prototype), Role of Return Statement, One Dimensional and Two-Dimensional Arrays. String Functions. Other Operators, Operator Precedence and Associativity. Debugging.

Text Books

Venkatesh, Nagaraju Y, Practical C Programming for Problem Solving, Khanna Book Publishing Company, 2024.

AICTE's Programming for Problem Solving (with Lab Manual), Khanna Book Publishing Company, 2024.

Harvey Deitel and Paul Deitel, Chow to Program, 9th edition, Pearson India, 2015.

RGD romey, How to Solve It by Computer.

Reference Books:

BrianW.KernighanandDennisRitchie,TheCProgrammingLanguage,2ndedition,Pearson,2015.

Jeri Hanly and Elliot Koffman, Problem Solving and Program Design in C, 8th edition, Pearson, 2015.

Problem Solving Techniques: Lab Problems

UNIT-II

- 1. Converting degrees Celsius to Fahrenheit and vice versa?
- 2. Display three input numbers in sorted (non-decreasing) order?
- 3. Given a positive integer value n(>=0). display number, square and cube of numbers from 1 to n in a tabular format?
- 4. Given an input positive integer number, display odd numbers from in the range [1,n].
- 5. Display first mathematical tables, each table up to 10rows? Generalize this to display first n (> 0) mathematical tables up to m (m > 0) rows?
- 6. Display following patterns of n rows (n>0), For the below examples n = 5? For each pattern write a separate algorithm/program?

	<u> </u>	10045	10045
Ş	Ş	12345	12345
\$\$	\$\$	1234	1234
\$\$\$	\$\$\$	123	123
\$\$\$\$	\$\$\$\$	12	12
\$\$\$\$	\$\$\$\$	1	1

7. Display the following patterns of n rows(n>0), for the below example sn=5?

Hollow square pattern:	Triangle Patterns with numbers:	Square with diagonals:	Diamond Pattern:
####	1	* * * * *	*
# #	121	* * * *	* * *
# #	12321	* * *	* * * * *
# #	1234321	* * * *	* * *
#####	123454321	* * * * *	*

- 8. Given the first term (a), difference/multiplier (d) and number of terms (n > 0), display the first n terms of the arithmetic/geometric progression?
- 9. Display the first n(n>0) terms of the Fibonacci sequence?
- 10. Display the first n(n>0)terms of the Tribonacci sequence?
- 11. Given two positive integer numbers n1 and n2, check if the numbers are consecutive numbers of the Fibonacci sequence?
- 12. Compute approximate value of π considering first n(n>0) terms of the Taylor series for π .
- 13. Compute approximate value of e^x considering first n(n>0) terms of the Taylor series for e^x .
- 14. Compute approximate value of sin(x)/cos(x) considering first n(n>0) terms of the Taylor series for sin(x)/cos (x).

UNIT-III

- 1. Extract digits of an integer number (left to right and right to left)?
- 2. Given a sequence of digits form the number composed of the digits. Use sentinel-controlled repetition to read the digits followed by-1.Forexample, for the input 273 2 9 -1 the output number is 27329?
- 3. Check if a given positive integer number is a palindrome or not?
- 4. Compute character grade from the marks (0 ≤ marks ≤ 100) of a subject. Grading Scheme: 80-100 : A, 60 79: B, 50 59: C, 40-49: D, 0-39: F? Solve this using both else-if ladder and switch case?
- 5. Compute the sum of a sequence of numbers entered using sentinel controlled repetition?
- 6. Check if a given positive integer number is a prime number or not?
- 7. Computer prime factors of a positive integer number?
- 8. Check if two positive integer numbers are amicable numbers or not?
- 9. Check If a given positive integer number is a perfect number or not?
- 10. Check if a given positive integer number Armstrong number or not?
- 11. Converting a positive integer number (n > 0) from one base (input Base) to another base (output Base) (2 <= input Base, output Base <= 10). Input number should be validated before converting to make sure the number uses only digits allowed in the input base?</p>
- 12. Write a program to display a number in text form. For example If the number is 5432 the output should be "FIVE FOUR THREE TWO"?
- 13. Using the grading scheme described In the question4(UNITIII),Computer how many students awarded each grade and display the frequency as a bar chart(horizontal)using single"*"for each student. Us esentinel controlled repetition(-1 as sentinel value)in reading the students marks. Use else-if ladder/switch case to compute the grade and the corresponding frequency.

Sample bar chart when the class has 7-A,10-B, 3-C,7-D and 1-F grades.

```
A:
*******
B:
*********
C:
***
D:
******
F:
*
```

14. Compute maximum, minimum, sum and average of a sequence of numbers which are read using sentinelcontrolled repetition using only few variables. 15. Compute body mass index, BMI=weight in KGs/ (Height in Meters*Height in Meters), Both weight and height values are positive real numbers .Your program should display BMI value followed by whether the person is Underweight, Normal, Overweight or Obese using the below ranges:

BMI Values Under weight: less than 18.5 Normal: >=18.5 and <25 Over weight:>=25and <30 Obese:>=30

UNIT-IV

- 1. Design a modularized algorithm/program to check if a given positive integer number is a circular prime or not?
- 2. Design a modularized algorithm/programtocomputeamaximumof8numbers?
- 3. Design a modular algorithm/program which reads an array of n integer elements and outputs mean (average), range (max-min) and mode (most frequent elements)?
- 4. Design a modular algorithm/program which reads an array of n integer elements and outputs median?
- 5. Implement your own string length and string reversal functions?
- 6. Design algorithm/program to perform matrix operations addition, subtraction and transpose?
- 7. Write a recursive program to count the number of digits of a positive integer number?
- 8. Recursive solutions for the following problems:
 - A. Factorial of a number?
 - B. Display digits of a number from left to right(and right to left)?
 - C. Compute x ^y using only multiplication?
 - D. To print a sequence of numbers entered using sentinel-controlled repetition in reverse order?

C	omputer Arch	litecture		
	CC102	Computer Architecture	3L:0T:4P	5 Credits

UNIT-I

Digital Principles: Definition for Digital signals, Digital logic, Digital computers, Von Neumann Architecture, Boolean Laws and Theorems,K-Map:TruthTablestoK-Map,2,3and 4 variable K Map ,K-Map Simplifications, Don't Care Conditions, SOP and POS.

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, ASCII, EBCDIC, Excess- 3 Code, The Gray Code.

UNIT-II

Combinational Circuits: Half Adder and Full Adder ,Subtractor , Decoders, Encoder, Multiplexer, De multiplexer

Sequential Circuits: Flip-Flops- SR Flip- Flop, D Flip-Flop, J-K Flip-Flop, T Flip-Flop. Register: 4bit register with parallel load ,Shift Registers-Bidirectional shift register with parallel load

Binary Counters-4 bit synchronous and Asynchronous binary counter.

UNIT-III

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input- Output Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator logic .Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer(RISC), RISC Vs CISC.

UNIT-IV

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline. Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access, Input-Output Processor(IOP).

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Text Books:

1. Donald PLeach, Albert Paul Malvino, Goutam Saha-"Digital Principles& Applications", Tata McGraw Hill Education Private Limited, 2011Edition.

2. M.MorrisMano-"ComputerSystemArchitecture", Pearson/Phi, ThirdEdition.

Reference Books:

WilliamStallings-"ComputerOrganizationandArchitecture",Pearson/PHI,Sixth Edition,

AndrewS.Tanenbaum-"StructuredComputerOrganization", PHI/Pearson4thEdition,

M.V. Subramanyam, "Switching Theory and Logic Design", Laxmi Publications (P) Ltd.

Ikvinderpal Singh ,Computer Organization Architecture, Khanna Book Publishing.

Suggestive Laboratory Experiments:

- 1. Verify logic behavior of AND,OR, NAND,NOR,EX-OR,EX-NOR ,Invert and Buffer gates. To study and verify NAND as a Universal Gate
- 2. To verify De-Morgan's theoremfor2variables
- 3. Design and test of an S-R flip-flop using NAND/NOR gate.
- 4. ConvertBCDtoExcess-3codeusingNAND gate
- 5. To Convert Binary to Grey Code
- 6. Verification of Truth Tables of J-K Flip-Flop using NAND/NOR gate
- 7. Realize Decoder and Encoder circuit using Basic Gates.
- 8. Design and implement the 4:1 MUX using gates.
- 9. Implementation of 4-Bit Parallel Adder Using7483IC.
- 10. Design and verify operation of half adder and full adder.
- 11. Design and verify operation of half subtractor.
- 12. Design and Implement a 4bits hift register using Flip flops.
- 13. Implement Boolean function using logic gate sin both SOP and POS
- 14. Design and Implement a 4bit synchronous counter.
- 15. Design andverify4bitasynchronouscounter.

Hardware

- 1. Familiarize the computer system layout: marking positions of SMPS, motherboard, FDD, HDD, CD, DVD and add on cards.
- 2. Identify the Computer Name and Hardware Specification(RAM capacity ,Processor type, HDD, 32 bit/ 64 bit)
- 3. Identify and Troubleshoot the problems of RAM, SMP Sand motherboard
- 4. Configure BIOS settings- disable and enable USB and LAN
- 5. Adding additional RAM to the system.(expanding RAM size).
- 6. To Study mother board layout of a system.
- 7. Demonstrate the assembly of a PC
- 8. Demonstration of various ports: CPU, VGA port ,PS/2 (keyboard, mouse) ,USB, LAN, Speaker, Audio. Install and configure windows O S
- 9. To study the installation of Printer and troubleshooting.

General English-I

	AEC101	General English-I	1L:1T:0P	2 Credits
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Course Objective:

- To provide learning environment to practice listening, speaking, reading and writing skills.
- To assist the students to carry on the task sand activities through guided instructions and materials.
- To effectively integrate English language learning with employs ability skills and training.
- To provide hands-one experience through case-studies, mini-projects, group and individual presentations.

Unit-I: 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.

Unit-II: 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

Unit-III: Identifying Common Errors in Writing

Subject-verb agreement, Noun-pronoun agreement Misplaced modifiers, Articles, Prepositions, Redundancies

Unit-IV: Nature and Style of sensible Writing

Describing, Defining, Classifying, providing examples or evidence, writing introduction and conclusion, Module V: Writing Practices, Comprehension, Précis Writing, Essay Writing

Unit-V: Oral Communication (This Module involves interactive practice sessions in Language Lab)

Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common Everyday Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal Presentations

Text/Reference Books:

AICTE's Prescribed Textbook: Communication Skills in English (with Lab Manual), Anjana Tiwari, Khanna Book Publishing Co., 2023.

Effective Communication Skills .Kul Bhushan Kumar,Khanna BookPublishing, 2022.

Practical English Usage. Michael Swan. OUP. 1995.

Remedial English Grammar. F.T. Wood. Macmillan.2007

On Writing Well. William Zinsser. Harper Resource Book.2001

Study Writing. Liz amp-Lyons and Ben Heasly. Cambridge University Press. 2006.

Communication Skills.Sanjay Kumar and PushpLata.Oxford UniversityPress.2011.8. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

ıdian Knowled	ge System		
MDE101	Indian Knowledge System	2L:0T:0P	2 Credits

Course Objectives

- To sensitize the students about context in which they are embedded i.e. Indian culture and civilization including its Knowledge System and Tradition.
- To help student to understand the knowledge, art and creative practices, skills and values in ancient Indian system.
- To help to study the enriched scientific Indian heritage.
- Tointroduce the contribution from Ancient Indian system & tradition to modern science & Technology

Indian Knowledge System (IKS)

Institutions are advised to choose any one of the following module as per the available resources/ university norms.

- **1. IKS-I:** Introduction to Indian Culture and Civilization (with some present practices)
- 2. IKS-II: Indian Culture and Civilization with its Knowledge Systems and Traditions
- 3. IKS III: Vision for a Human Society (Vishva Kalyan thru Vasudhaiva Kutumbkam)*1
- 4. IKS IV: Indian Science, Engineering and Technology- Past, Present & Future*1
- 5. IKS V: Indian Town Planning and Architecture*1
- 6. IKS VI: Indian Mathematics and Astronomy*1
- 7. IKS VII: Indian Aesthetics (including Music & Musical Instruments)/ Arthashastra*1
- 8. IKS VIII: Indian Health, Wellness and Psychology- including Ayurveda*1

Other Possible Courses in IKS -

- Indian System of Proof and Logic (including Nyay Shastra)
- Indian Linguistics and Phonetics (including Panini's grammar, languages)
- Indian Governance, Administration and Management Systems (including Arthshastra) Indian Physics (e.g. Vaisheshik)
- Textile Industry in India Shipbuilding and Maritime Trade Transport Systems in India
- Principles and practice of Mechanics and Machines Water Management in India
- Ecology and Geography in India
- Natural Agriculture and horticulture (e.g. vriksha ayurved) Practices in India Indian Economics (Arthshastra)

IKS-I: Indian Knowledge Systems and Tradition

Detailed contents:

Module 1: Introduction to IKS (Any eight of total sessions assigned for literary activity)

Introductory lecture on the any eight topics below:

- 1. Indian Knowledge System
- 2. Indian Culture & Civilization
- 3. Ancient Indian Chemistry
- 4. Ancient Indian Metallurgy
- 5. Ancient Indian Mathematics
- 6. Ancient Indian Astronomy
- 7. Indian Astronomical Instruments
- 8. Indian Knowledge System (Upveda: Ayurveda)
- 9. Indian Knowledge System (Upveda: Gandharveda)
- **10.** Indian Knowledge System (Vedangas: Shiksha, Kalpa, Vyakrana)
- 11. Indian Knowledge System (Vedangas: Jyotisha, Nirukta, Chandas)
- 12. Indian Architecture I: Sthapatya-Veda
- 13. Indian Architecture II: Temples
- 14. Indian Architecture III: Town & Planning
- **15.** Indian Philosophical System

Module 2: Introduction to Creative Practices (Twenty Lectures with at least five different topics of

total session under Creative activity)

Introductory lecture on the topics below:

- 1. Dhatuvada: art of metallurgy
- **2.** Akara jnana: art of mineralogy
- 3. Vastuvidya: art of engineering
- 4. Yantramatrika: art of mechanics
- **5.** Takshana: art of carpentry
- 6. Chalitakayoga: art of practicing as a builder of shrines
- 7. Raupyaratnapariksha: art of testing silver and jewels
- 8. Maniraga jnana: art of tinging jewels
- 9. Sucivayakarma: art of needle works and weaving
- 10. Vadya vidya: art of playing on musical instruments
- **11.** Geet vidya : art of singing
- 12. Nritya vidya: art of dancing
- **13.** Natya vidya: art of theatricals
- 14. Alekhya vidya: art of painting
- 15. Viseshakacchedya vidya: art of painting the face and body with color
- 16. Udakavadya: art of playing on music in water
- 17. Manasi kavyakriya: art of composing verse
- 18. Bhushanayojana: art of applying or setting ornaments
- 19. Citrasakapupabhakshyavikarakriya: art of preparing varieties of delicious food
- **20.** Dasanavasanangaraga: art of applying preparations for cleansing the teeth, cloths and painting the body
- 21. Utsadana: art of healing or cleaning a person with perfumes
- 22. Vastragopana: art of concealment of cloths
- **23.** Balakakridanaka: art of using children's toys
- 24. Tandulakusumabalivikara: art of preparing offerings from rice and flowers
- **25.** Pushpastarana: art of making a covering of flowers for a bed

References:

- 1. Textbook on IKS by Prof. B Mahadevan, IIM Bengaluru
- **2.** Kapur K and Singh A.K (Eds) 2005). Indian Knowledge Systems, Vol. 1. Indian Institute of Advanced Study, Shimla. Tatvabodh of sankaracharya, Central chinmay mission trust, Bombay, 1995.
- 3. The Cultural Heritage of India. Vol.I. Kolkata: Ramakrishna Mission Publication, 1972.
- 4. Nair, Shantha N. Echoes of Ancient Indian Wisdom. New Delhi: Hindology Books, 2008.
- **5.** Dr. R. C. Majumdar, H. C. Raychaudhuri and Kalikinkar Datta: An Advanced History of India (Second Edition) published by Macmillan & Co., Limited, London, 1953.
- 6. Rao, N. 1970. The Four Values in Indian Philosophy and Culture. Mysore: University of Mysore.

7. Avari, B. 2016. India: The Ancient Past: A History of the Indian Subcontinent from c. 7000 BCE to CE 1200. London: Routledge.

IKS-II: Indian Culture and Civilization

Detailed contents:

Module 1: Introduction to IKS

Caturdaśa Vidyāsthānam, 64 Kalas, Shilpa Śāstra, Four Vedas, Vedānga, Indian Philosophical Systems, Vedic Schools of Philosophy (Sāmkhya and Yoga, Nyaya and Vaiśeṣika, Pūrva-Mīmāmsā and Vedānta), Non-Vedic schools of Philosophical Systems (Cārvāka, Buddhist, Jain), Puranas (Maha-puranas, Upa-Puranas and Sthala-Puranas), Itihasa (Ramayana, Mahabharata), Niti Sastras, Subhasitas

Module 2: Foundation concept for Science & Technology

Linguistics & Phonetics in Sanskrit (panini's), Computational concepts in Astadhyayi Importance of Verbs, Role of Sanskrit in Natural Language Processing, Number System and Units of Measurement, concept of zero and its importance, Large numbers & their representation, Place Value of Numerals, Decimal System, Measurements for time, distance and weight, Unique approaches to represent numbers (Bhūta Saṃkhya System, Kaṭapayādi System), Pingala and the Binary system, Knowledge Pyramid, Prameya – A Vaiśeṣikan approach to physical reality, constituents of the physical reality, Pramāṇa, Saṃśaya

Module 3: Indian Mathematics & Astronomy in IKS

Indian Mathematics, Great Mathematicians and their contributions, Arithmetic Operations, Geometry (Sulba Sutras, Aryabhatiya-bhasya), value of π , Trigonometry, Algebra, Chandah Sastra of Pingala,

Indian Astronomy, celestial coordinate system, Elements of the Indian Calendar Aryabhatiya and the Siddhantic Tradition Pancanga – The Indian Calendar System Astronomical Instruments (Yantras) Jantar Mantar or Raja Jai Singh Sawal.

Module 4: Indian Science & Technology in IKS

Indian S & T Heritage, sixty-four art forms and occupational skills (64 Kalas) Metals and Metalworking technology (Copper, Gold, Zinc, Mercury, Lead and Silver), Iron & Steel, Dyes and Painting Technology), Town & Planning Architecture in India, Temple Architecture, Vastu Sastra,

Module 5: Humanities & Social Sciences in IKS

Health, Wellness & Psychology, Ayurveda Sleep and Food, Role of water in wellbeing Yoga way of life Indian approach to Psychology, the Triguna System Body-Mind-Intellect- Consciousness Complex. Governance, Public Administration & Management reference to Ramayana, Artha Sastra, Kautilyan State

References:

- 1. Textbook on IKS by Prof. B Mahadevan, IIM Bengaluru.
- 2. Kapur K and Singh A. K (Eds) 2005). Indian Knowledge Systems, Vol. 1. Indian Institute of Advanced Study, Shimla. Tatvabodh of sankaracharya, Central chinmay mission trust, Bombay, 1995.
- 3. Nair, Shantha N. Echoes of Ancient Indian Wisdom. New Delhi: Hindology Books, 2008.
- 4. SK Das, The education system of Ancient hindus, Gyan publication house, India
- 5. BL Gupta, Value and distribution system in India, Gyan publication house, India
- 6. Reshmi ramdhoni, Ancient Indian Culture and Civilization, star publication ,2018
- 7. Supriya Lakshmi Mishra, Culture and History of Ancient India (With Special Reference of Sudras), 2020.
- **8.** Gambirananda, Swami, Tr.Upanishads with the Commentary of Sankarachrya. Kolkata: Advaita Ashrama publication Department, 2002.
- 9. Ranganathananda, Swami the Massage of the Upanishads.Bombay: Bharathya Vidya Bhaven, 1985.
- 10. Om Prakash, Religion and Society in Ancient India, Bhariya Vidhya Prakashan, 1985
- 11. J Auboyer, Daily Life in Ancient India from Approximately 200 BC to AD 700,
- **12.** Munshi ram Manoharlal publication, 1994.
- **13.** DK Chakkrabarty, Makkhan Lal, History of Ancient India (Set of 5 Volumes), Aryan book Internation publication, 2014
- 14. Dr. Girish Nath Jha, Dr. Umesh Kumar Singh and Diwakar Mishra, Science and Technology in Ancient Indian Texts, DK Print World limited,
- **15.** Swami BB Vishnu, Vedic Science and History Ancient Indian's Contribution to the Modern World, gosai publication, 2015
- 16. Chatterjee, S.C. The Nyaya Theory of Knowledge. Calcutta: University of Calcutta Press, 1950.
- 17. Dasgupta, Surendra. A History of Indian Philosophy. Delhi: Motilal Banarsidass, 1991.Vols. III & IV.
- **18.** Mercier, Jean L. From the Upanishads to Aurobindo. Bangalore: Asian Trading Corporation, 2001.
- **19.** M. Hiriyanna. Essentials of Indian Philosophy. London: Diane Publications, 1985.
- 20. Hume, Robert Ernest, Tr. The Thirteen Principal Upanishads. Virginia: Oxford
- **21.** University Press, 1931.
- 22. Radhakrishnan, S. Principal Upanishads. New York: Harper Collins, 1963.
- 23. Satprakashananda. The Methods of Knowledge according to Advaita Vedanta.
- Calcutta: Advaita Ashram, 2005.
 Potter, K.H. Encyclopedia of Indian Philosophies, Vol. III. Delhi: Motilal Banarasidass, 2000.

Environmental Science and Sustainability

VAC 101	Environmental Science and Sustainability	2L:0T:0P	2 Credits	
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Course description:

This course aims to familiarize students with fundamental environmental concepts and their relevance to business operations, preparing them to address forthcoming sustainability challenges. It is designed to equip students with the knowledge and skills needed to make decisions that account for environmental consequences, fostering environmentally sensitive and responsible future managers. The course content is divided into four comprehensive units.

Unit 1: Introduces basic environmental principles, the man-environment relationship, and sustainability issues.

Unit2: Focuses on ecosystems, biodiversity, and sustainable practices.

Unit 3: Addresses environmental pollution, waste management, and sustainable development strategies. Finally,

Unit 4: Explores social issues, environmental legislation, and practical applications through hands-on fieldwork. Through this holistic approach, students will gain a deep understanding of environmental processes, the importance of sustainable practices, and their role in promoting sustainability within business contexts.

Detailed Course Content:

Unit1: Understanding Environment ,Natural Resources, and Sustainability

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.

Unit2: Ecosystems, Biodiversity, and Sustainable Practices

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.

Unit 3: Environmental Pollution, Waste Management, and Sustainable Development

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 mitigating disaster impacts.

Unit4: Social Issues, Legislation, and Practical Applications

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.

- TextBooks(Latest Editions):
- Poonia, M.P. *EnvironmentalStudies*(3rded.), KhannaBookPublishingCo.
- Bharucha, E. *Textbookof EnvironmentalStudies*(3rded.)OrientBlackswanPrivate Ltd.
- Dave, D., & Katewa, S.S. *TextBookofEnvironmentalStudies*. CengageLearningIndiaPvt Ltd.
- Rajagopalan, R. *Environmentalstudies: from crisistocure*(4thed.). OxfordUniversityPress.
- Miller, G.T. & Spoolman S. *LivingintheEnvironment*. (20thed.). Cengage.
- Basu, M., & Xavier Savarimuthu, S. J. *Fundamentals of environmental studies*. Cambridge University Press.
- Roy, M.G. SustainableDevelopment:Environment,EnergyandWaterResources.Ane Books.
- Pritwani, K.Sustainability of business in the context of environmental management. CRCPress.
- Wright, R.T. & Boorse, D.F. Environmental Science: Toward A Sustainable Future (13thed,). Pearson.
- CourseOutcome(s):
- Explore the basic environmental concepts and issues relevant to the business and management field.
- Recognize the interdependence between environmental processes and socio-economic dynamics.
- Determinetheroleofbusinessdecisions,policies,andactionsinminimizing environmental degradation.
- $\bullet \quad Identify possible solutions to curben vironmental problems caused by managerial actions.$
- Developskillstoaddressimmediateenvironmentalconcernsthroughchangesinbusiness operations, policies, and decisions.

SEMESTER-II

S1.No	Course		Ŧ	T	П	Onedit
•	Code	Course little	L	1	Р	Credit
1	CC103	Mathematics Foundations to Computer Science-II	3	0	0	3
2	CC104	Data Structures	3	0	4	5
3	CC105	Operating Systems	3	0	2	4
4	SEC102	Object Oriented Programming using Java	3	0	4	5
5	SEC103	Web Technologies	1	0	2	2
6	VAC102	Indian Constitution	2	0	0	2
7	AEC103	Additional Course - Indian or Foreign Language Other than Mother Tongue and English (1-1-0)[optional course]*	1	1	0	0*
		TOTAL				21

Mathematics Foundation to Computer Science-II

CC103 Mathematics Foundation to Computer Science-II 3L:0T:0P 3 Credits

UNIT-I:

Logic and Methods of Proofs:

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-II:

Algebraic Structures:

Semi-group, Monoid, Group, Subgroup, Cyclic group.

UNIT-III:

Numerical Methods:

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 Back ward 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-IV:

Optimization Techniques:

Linear programming :Introduction, LP formulation, Graphical method for solving LPs with two variables, Special cases in graphical methods, 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.

Text Books

- Kolman B., Busby R. and RossS.,DiscreteMathematicalStructures,6thEdition, Pearson Education, 2015.
- Sastry S.S., Introductory Methods of Numerical Analysis, Fifth Edition ,PHL, 2022.
- Taha Hamdy A., Operations Research: An Introduction, Eighth Edition ,Pearson Prentice Hall, 2003.
- S.B.Singh, Discrete Structures ,Khanna BookPublishing,2023(AICTE Recommended Textbook)

Reference Books

- Rosen Kenneth H. and Krithivasan Kamala, Discrete Mathematics and its Applications, McGraw Hill, India, 2019.
- ChakravortyJ.G. and Ghosh P.R., Linear Programming and Game Theory, Moulik Library, 2017.
- SharmaJ.K.,OperationsResearch:TheoryandApplications,FourthEdition, Macmilllan Publishers, 2007.

Data Structures			
CC104	Data Structures	3L:0T:4P	5 Credits

Prerequisite:

Programming Fundamentals: Understanding the basic syntax and semantics of C programming language.

Problem-Solving Skills: Ability to break down a problem into smaller steps and devise a stepby-step solution and familiarity with simple algorithms.

UNIT-I:

Introduction and Overview: Definition, Classification and Operations of Data Structures. Algorithms: Complexity, Time-Space Tradeoff.

Arrays: Definition and Classification of Arrays, Representation of Linear Arrays in Memory, Operations on Linear Arrays: Traversing, Inserting, Deleting ,Searching ,Sorting and Merging. Searching: Linear Search and Binary Search, Comparison of Methods. Sorting: Bubble Sort, Selection Sort, and Insertion Sort. Two-Dimensional Arrays, Representation of Two-Dimensional Arrays in Memory, Matrices and Sparse Matrices, Multi-Dimensional Arrays.

UNIT-II:

Linked Lists: Definition, Comparison with Arrays, Representation, Types of Linked lists, Traversing, Inserting, Deleting and Searching in Singly Linked List, Doubly Linked List and Circular Linked List. Applications of Linked Lists: Addition of Polynomials.

Hashing and Collision: Hashing, Hash Tables, Types of Hash Functions, Collision, Collision Resolution with Open Addressing and Chaining.

UNIT-III:

Stacks: Definition, Representation of Stacks using Arrays and Linked List, Operations on Stacks using Arrays and Linked List, Application of Stacks: Arithmetic Expressions, Polish Notation, Conversion of Infix Expression to Postfix Expression, Evaluation of Postfix Expression.

Recursion: Definition, Recursive Notation, Run time Stack, Applications of Recursion: Factorial of Number, GCD, Fibonacci Series and Towers of Hanoi.

Queues: Definition, Representation of Queues using Array and Linked List, Types of Queue: Simple Queue, Circular Queue, Double-Ended queue, Priority Queue, Operations on Simple Queues and Circular Queues using Array and Linked List, Applications of Queues.

UNIT-IV:

Graphs: Definition , Terminology, Representation, Traversal.

Trees: Definition, Terminology, Binary Trees, Traversal of Binary Tree, Binary Search Tree, Inserting, Deleting and Searching in Binary Search Tree, Height Balanced Trees: AVL Trees, Insertion and Deletion in AVL Tree.

Text Books

- R. B. Patel, "Expert Data Structures with C", Khanna Book Publishing Company, 2023 (AICTE Recommended Textbook)
- Seymour Lipschutz, "Data Structures with C", Schaum's Outlines, Tata McGraw-Hill, 2011.

• Yashavant Kanetkar, "Data Structures Through C", 4th Edition, BPB Publications, 2022.

Reference Books

- ReemaThareja, "Data Structures Using C", Second Edition, Oxford University Press, 2014.
- Ellis Horowitz, Sartaj Sahni, and Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, Universities Press, 2007.

Lab Programs:

- 1. Write a program for insertion and deletion operations in an array.
- 2. Write a program to search for an element in an array using Linear Search and Binary Search.
- 3. Write a program to sort an array using Bubble Sort, Selection Sort and Insertion Sort.
- 4. Write a program to merge two arrays.
- 5. Write a program to add and subtract two matrices.
- 6. Write a program to multiply two matrices.
- 7. Write a program to insert an element into a Singly Linked List:
 - a) At the beginning
 - b) At the end
 - c) At a specified position
- 8. Write a program to delete an element from a Singly Linked List:
 - a) At the beginning
 - b) At the end
 - c) A specified element
- 9. Write a program to perform the following operations in a Doubly Linked List:
 - a) Create
 - b) Search for an element
- 10. Write a program to perform the following operations in a Circular Linked List:
 - a) Create
 - b) Delete an element from the end
- 11. Write a program to implement stack operations using an array.
- 12. Write a program to implement stack operations using a linked list.
- 13. Write a program to add two polynomials using a linked lists.
- 14. Write a program to evaluate a post fix expression using a stack.
- 15. Write a program to perform the following using recursion:
 - a) Find the factorial of a number
 - b) Find the GCD of two numbers
 - c) Solve Towers of Hanoi problem
- 16. Write a program to implement simple queue operations using an array.
- 17. Write a program to implement circular queue operations using an array.
- 18. Write a program to implement circular queue operations using a linked list.
- 19. Write a program to perform the following operations on a binary search tree.
 - a) Preorder Traversal
 - b) In order Traversal
 - c) Post order Traversal
- 20. Write a program to perform insertion operation in a binary search tree.

CC105	Operating Systems	3L:0T:2P	4 Credits

UNIT-I:

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.

UNIT-II:

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

UNIT-III:

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-IV:

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.

Text Books:

- Ekta Walia, Operating Systems Concepts, Khanna Publishing House, 2022 (AICTE Recommended Textbook)
- Abraham Silberschatz, Peter Baer Galvin, Greg Gagne(2006), Operating System Principles, 7th edition OR Later edition, Wiley India Private Limited, New Delhi.
- Stallings(2006), Operating Systems, Internals and Design Principles, 5th edition, Pearson Education, India.

Reference Books:

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

Operating Systems LAB

List of experiments:

- 1. Write C program to simulate the FCFS CPU Scheduling algorithm.
- 2. Write C program to simulate the SJF CPU Scheduling algorithm.
- 3. Write C program to simulate the Round Robin CPU Scheduling algorithm.
- 4. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance.
- 5. Write a C program to implement the Producer–Consumer problem using semaphores.
- 6. Write a C program to illustrate the IPC mechanism using Pipes.
- 7. Write a C program to illustrate the IPC mechanism using FIFOs.
- 8. Write a C program to simulate Paging memory management technique.
- 9. Write a C program to simulate Segmentation memory management technique.
- 10. Write a C program to simulate the Best Fit contiguous memory allocation technique.
- 11. Write a C program to simulate the First Fit contiguous memory allocation technique.
- 12. Write a C program to simulate the concept of Dining-Philosophers problem.
- 13. Write a C program to simulate the MVT algorithm.
- 14. Write a C program to implement FIFO page replacement technique.
- 15. Write a C program to write a C program for implementing sequential file allocation method.

Course Outcomes(COs):

CO1: To implement scheduling of algorithms.

CO2: Understanding the concept of critical section problems. CO3: Concepts of file allocation of frames.

CO4: Concept of Page replacement algorithms.

Object Oriented Programming using Java

SEC102	Object Oriented Programming using Java	3L:0T:4P	5 Credits
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Course Objectives

CO1:To introduce the object oriented programming system concepts CO2:TointroducesyntaxandsemanticsofJavaprogramminglanguage CO3:To develop modular programs using Java

CO4: To setup JDK environment to create, debug and run Java programs

Prerequisite:

Knowledge of Problem Solving Techniques using C programming language

Course Content:

UNIT I:

Fundamentals of Object-Oriented Programming: Basic Concepts of Object-Oriented Programming (OOP), Benefits and Applications of OOP.

Java Evolution: Java Features, Difference between Java, C and C++,Java and Internet, Java Environment.

Overview of Java Language: Introduction to Simple Java Program, Use of Comments and Math function, Application of two classes, Java Program Structure, Java Tokens and statements, Implementing Java program And JVM, Command Line Arguments.

TextBook1: Chapters 1, 2 and 3.

UNIT II:

Constants, Variables and Data Types: Constants, Variables, Data Types, Declaration of Variables, Giving values to Variables, Symbolic Constants, Typecasting.

Operators & Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment & Decrement operators, conditional operators, Bitwise operators, Arithmetic Expressions, Evaluation of Expressions, Type Conversions in Expressions, Operator Precedence & Associativity.

Decision Making, Branching & Looping: Decision Making with Control Statements, Looping statements, Jump in loops, Libeled loops.

TextBook1: Chapters 4, 5, 6, and 7.

UNIT III:

Classes, Objects and Methods: Defining Class, Methods Declaration, Constructors, Methods Overloading, Overriding Methods, Inheritance Arrays, Strings and Vectors: 1Darrays, Creating an Array, 2Darrays, Strings, Vectors, Wrapper Classes, Enumerated Types

Inheritance: Defining, extending classes, and Implementing Interfaces. Multiple inheritance and polymorphism.

TextBook1: Chapters 8, 9, and 10.

UNIT IV:

Packages: Basics of packages, System packages, Creating and accessing packages, Creating user defined packages, Adding class toe package. Exception Handling: Using the main key words of exception handling: try, catch, throw, throws and finally; Nested try, multiple catch statements, creating user defined exceptions.

TextBook1: Chapters 11 & 13.

Text Books

- Balaguruswamy E. (2023). Programming with JAVA: A Primer.7th edition. India: McGraw Hill Education
- Schildt, H.(2022).Java:TheCompleteReference.12th edition. McGraw-Hill Education.

Reference Books

- Arunesh Goyal, The Essentials of JAVA, Khanna Book Publishing Company Private Limited, 2012.
- Tanweer Alam, Core JAVA, Khanna Book Publishing Company Private Limited, 2015.
- Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson, 2008.
- S. Malhotra and S. Choudhary, Programming in Java, 2nd Edition, Oxford University Press, 2014.

List of Practical:

- 1. Write a program to read two numbers from user and print their product.
- 2. Write a program to print the square of a number passed through command line arguments.
- 3. Write a program to send the name and surname of a student through command line argument sand print a welcome message for the student.
- 4. Write a java program to find the largest number out of n natural numbers.
- 5. Write a java program to find the Fibonacci series & Factorial of a number using recursive and non-recursive functions.
- 6. Write a java program to multiply two given matrices.
- 7. Write a Java program for sorting a given list of name sin ascending order.
- 8. Write a Java program that checks whether a given string is a palindrome or not . Ex: MADAM is a palindrome.
- 9. Write a java program to read n number of values in an array and display it in reverse order.
- 10. Write a Java program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class to use the member data of the super class. MulDiv should have methods to multiply and divide a main function should access the methods and perform the mathematical operations.
- 11. Create a JAVA class called Student with the following details as variables within it.

USN, NAME, BRANCH, PHONE, PERCENTAGE

Write a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentage of these objects with suitable headings.

- 12. Write a Java program that displays the number of characters, lines and words in a text.
- 13. Write a Java program to create a class called Shape with methods called getPerimeter() and getArea(). Create a subclass called Circle that overrides the getPerimeter() and getArea() methods to calculate the area and perimeter of a circle.
- 14.Write a Java program to create a class Employee with a method called calculateSalary(). Create two subclasses Manager and Programmer. In each subclass, override the calculateSalary() method to calculate and return the salary based on their specific roles.
- 15. Write a Java program using an interface called 'Bank' having function 'rateOfInterest()'. Implement this interface to create two separate bank classes 'SBI' and 'PNB' to print different rates of interest. Include additional member variables, constructors also in classes 'SBI' and 'PNB'.
- 16.Write a Java package program for the class book and then import the data from the package and display the result.
- 17.Write a Java program for finding the cube of a number using a package for various data types and then import it in another class and display the results.
- 18. Write a Java program for demonstrating the divide by zero exception handling.
- 19. Write a Java program that reads a list of integers from the user and throws an exception if any numbers are duplicates.
- 20. Create an exception subclass UnderAge, which prints "Under Age" along with the age value when an object of UnderAge class is printed in the catch statement. Write a class exception Demo in which the method test() throws UnderAge exception if the variable age passed to it as argument is less than 18. Write main() method also to show working of the program.

Web Technologies				
SEC103	Web Technologies	1L:0T:2P	2 Credits	

Course Objectives

CO1: To understand the concept sand architecture of the World Wide Web, Markup languages along with Cascading Style Sheets.

CO2: To understand the concepts of event handling and data validation mechanisms.

CO3: To understand the concepts of embedded dynamic scripting on client and server-side Internet Programming and basic full stack web development.

CO4: To develop modern interactive web applications

Course Content:

Unit I:

Introduction to HTML, history of HTML, Objective, basic Structures of HTML, Header Tags, body tags, Paragraph Tags. Tags for FORM Creation, TABLE, FORM, TEXTAREA, SELECT, IMG, IFRAME, FIELDSET, ANCHOR.

Lists in HTML, Introduction to DIV tag, NAVBAR Design.

Introduction to CSS, types, Selectors, and Responsiveness of a webpage.

Introduction to Bootstrap, downloads/linking, using classes of Bootstrap, understanding the Grid System in Bootstrap.

Introduction to www, Protocols and Programs, Applications and development tools, web browsers, DNS, Web hosting Provider, Setting up of Windows/Linux/Unix web servers, Web hosting in cloud, Types of Web Hosting.

Unit II:

Introduction to JavaScript: Functions and Events, Document Object model traversing using JavaScript. Output System in JavaScript i.e. Alert, throughput, Input box, Console. Variables and Arrays in JavaScript. Date and String handling in JavaScript.

Manipulating CSS through JavaScript: Form Validation like Required validator, length validator, Pattern validator. Advanced JavaScript, Combining HTML, CSS and JavaScript events and buttons, controlling your browser. Introduction to AJAX, Purpose, advantages and disadvantages, AJAX based Web applications and alternatives of AJAX.

Introduction to XML: uses, Key concepts, DTD8 schemas, XSL, XSLT, and XSL Elements and transforming with XSLT. Introduction to XHTML.

JSON: Introduction to JSON, Keys and Values, Types of Values, Arrays, Objects

Text Books

- Laura Lemay, Mastering HTML, CSS & JavaScript Web Publishing, BPB Publications, 2016
- Thomas A. Powell, The Complete Reference HTML & CSS, Fifth Edition, 2017

Reference Books

- Silvio More to, Bootstrap4 By Example, ebook, 2016.
- Tanweer Alam, Web Technologies, Khanna Book Publishing, 2011.

Practical list of Programs:

PART-A

- 1. Create your class time table using table tag.
- 2. Design a Webpage for your college containing description of courses, department, faculties, library etc. using list tags, href tags, and anchor tags.
- 3. Create webpage using Frame with rows and columns where we will have header frame, left frame, right frame, and status bar frame. On clicking in the left frame, information should be displayed in right frame.
- 4. Create Your Resume using HTML, use text, link, size, color and lists.
- 5. Create a Web Page of a super market using(internal CSS)
- 6. Use Inline CSS to format your resume that you have created.
- 7. Use External CSS to format your time table created.
- 8. Use all the CSS (inline, internal and external) to format college web page that you have created.
- 9. Write a HTML Program to create your college website using for mobile device.

PART-B

- 1. Write an HTML/JavaScript page to create login page with validations.
- 2. Develop a Simple calculator for addition, subtraction, multiplication and division operation using JavaScript.
- 3. Use Regular Expressions for validations in Login Page using JavaScript.
- 4. Write a Program to retrieve date from a text file and displaying it using AJAX.
- 5. Create XML file to store Student Information like Register Number, Name, Mobile Number, DOB, and Email-Id.
- 6. Create a DTD for (0).
- 7. Create XML scheme for(0).
- 8. Create XSL file to convert XML file to XHTML file.
- 9. Write a Java Script program using Switch case.
- 10. Write a Java Script program using any 5 events.
- 11. Write a Java Script program using built in Java Script objects.
- 12. Write program for populating values from JSON text.
- 13. Write a program to transform JSON text to a Java Script object.

VAC100			0.0
VAC102	Indian Constitution	2L:01:0P	2 Credits
ourse Content:			
nit1: The Constit	ution- Introduction		
The History	of the Making of the Indian Const	itution	
Preamble ar	nd the Basic Structure, and its into	erpretation	
Fundamenta	al Rights and Duties and their inte	erpretation	
State Policy	Principles		
Init2: Union Gove	rnment		
Structure of	the Indian Union		
President-R	ole and Power		
Prime Minis	ter and Council of Ministers		
LokSabha a	nd RajyaSabha		
Init3: State Govern	nment		
Governor-R	ole and Power		
Chief Minist	er and Council of Ministers		
State Secret	ariat		
nit4: Local Admir	istration		
District Adn	ninistration		
Municipal C	orporation		
Zilla Pancha	lyat		
nit5: Election Con	nmission		
Role and Fu	nctioning		
Chief Election	on Commissioner		
State Election	on Commission		

Suggested Learning Resources:

Ethics and Politics of the Indian Constitution by Rajeev Bhargava, Oxford University Press, New Delhi, 2008 The Constitution of India by B.L. Fadia Sahitya Bhawan; New edition(2017) Introduction to the Constitution of India by DD Basu Lexis Nexis; Twenty-Third,2018edition

Suggested Software/Learning Websites:

https://www.constitution.org/cons/india/const.html http://www.legislative.gov.in/constitution-of-india https://www.sci.gov.in/constitution https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/ Cases Rustom Cavasjee Cooper v. Union of India, (1970) 1SCC248 State of Rajasthan v. Mohan Lal Vyas, AIR 1971 SC 2068 (confirmation of a private monopoly, not a violation of fundamental right) MithileshGargv.UnionofIndia,(1992)1SCC168:AIR1992SC221(Righttocarry on business, not breached when it is libera lised) Chintamanrao v. The State of Madhya Pradesh, AIR 1951 SC 118 (scope of reasonable restrictions in relation to trade and occupation) Cooverjee B. Bharucha v. Excise Commissioner, Ajmer, AIR 1954 SC 220 (the reasonableness of the restriction imposed may depend upon the nature of the business and prevailing conditions including public health and morality) T. B. Ibrahim v. Regional Transport Authority. Tanjore, AIR 1953 SC 79 Harman Singh v. RTA, Calcutta, AIR 1954 SC 190 Dwarka Prasad Laxmi Narain v. State of U.P., AIR 1954 SC 224 State of Bombay v. R.M.D. Chamarbaugwala, AIR 1957 SC 699 Parbhani Transport Coop. Society Ltd. v. Regional Transport Authority, Aurangabad, AIR 1960 SC 801 State of Bombay v. R. M. D. Chamarbaugwala, (1957) S.C.R. 874, G.K. Krishnan v s State of Tamil Nadu, 1975 SCC(1) 375 Automobile Transport (Rajasthan) Ltd. V s State of Rajasthan, AIR 1962 SC 140CourseOutcome(s): Upon completion of this course, students will be able to: Constitutional Framework: Analyze the India Constitution' history Preamble, Fundamental Rights, and basic structure. Union Government Structure: Describe the roles of the President ,Prime Minister, and the legislative bodies (Lok Sabha and Rajya Sabha). state Government Mechanisms: Examine the powers of the Governor, Chief Minister, and the State Secretariat. Local Administration: Assess the functionin go flocal government bodies like District Administration, Municipal Corporations, and Zila Panchayats. Electoral Processes: Analyze the role of the Election Commission in conducting free and fair elections. Application of Knowledge: Apply constitutional principles to contemporary political issues and evaluate governance effectiveness.