

“Dissemination of Education for Knowledge, Science and Culture”

- Shikshanmaharshi Dr. Bapuji Salunkhe

**Shri Swami Vivekanand Shikshan Sanstha's
Vivekanand College, Kolhapur
(An Empowered Autonomous)**



DEPARTMENT OF B.C.A

**B.C.A Part - I
Semester-I& II**

**SYLLABUS as per
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
Draft CBCS Course Structure to be implemented
From Academic Year 2024-25**

GENERAL COURSE STRUCTURE & THEME

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (P) per week	1 Credit

B. Course code and definition:

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
CC	Core Courses
AEC	Ability Enhancement Courses
MDE	Multi-Disciplinary Elective course
VAC	Value added Courses
SEC	Skill Enhancement courses
DSE	Discipline Specific Elective
OE	Open Elective

INDUCTION PROGRAM

The Essence and Details of Induction program can also be understood from the 'Detailed Guide on Student Induction program', as available on AICTE Portal, (Link: <https://www.aicteindia.org/sites/default/files/Detailed%20Guide%20on%20Student%20Induction%20program.pdf>). For more, Refer

Appendix III.

Induction program (mandatory)	Three-week duration
Induction program for students to be offered right at the start of the first year.	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Department/Branch & Innovations

Mandatory Visits/ Workshop/Expert Lectures:

1. It is mandatory to arrange one industrial visit every semester for the students of each branch.
2. It is mandatory to conduct a One-week workshop during the winter break after fifth semester on professional/ industry/ entrepreneurial orientation.
3. It is mandatory to organize at least one expert lecture per semester for each branch by inviting resource persons from domain specific industry.

For Summer Internship / Projects / Seminar etc.

1. Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

Note: The internal assessment is based on the student's performance in mid semester tests (two best out of three), quizzes, assignments, class performance, attendance, viva-voce in practical, lab record etc.

Mapping of Marks to Grades

Each course (Theory/Practical) is to be assigned 100 marks, irrespective of the number of credits, and the mapping of marks to grades may be done as per the following table:

Range of Marks	Assigned Grade
91-100	AA/A ⁺
81-90	AB/A
71-80	BB/B ⁺
61-70	BC/B
51-60	CC/C ⁺
46-50	CD/C
40-45	DD/D
< 40	FF/F (Fail due to less marks)
-	F ^R (Fail due to shortage of attendance and therefore, to repeat the course)

SEMESTER I

S.No.	Course Code	Course Title	L	T	P	Credit
1	CC101	Mathematics Foundations to Computer Science - I	4	0	0	4
2	SEC101	Problem Solving Techniques	4	0	2	6
3	CC102	Computer Architecture	4	0	2	6
4	AEC101	General English - I	1	1	0	2
5	MDE101	Indian Knowledge System^	2	0	0	2
6	VAC101	Yoga/Sports/NCC/NSS/Disaster Management	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						22

SEMESTER II

S.No.	Course Code	Course Title	L	T	P	Credit
1	CC103	Mathematics Foundations to Computer Science - II	4	0	0	4
2	CC104	Data Structures	4	0	2	6
3	CC105	Operating Systems	4	0	2	4
4	SEC102	Object Oriented Programming using Java	4	0	2	6
5	VAC102	Indian Constitution	2	0	0	2
6	AEC103	Additional Course - Indian or Foreign Language Other than Mother Tongue and English (1-1-0)) [optional course]*	1	1	0	0*
TOTAL						22

SEMESTER –I

BCA-I-Sem-I

MATHEMATICS FOUNDATION TO COMPUTER SCIENCE - I

CC101

Course Outcomes	CO1: Provide a basic understanding of fundamental mathematical concepts such as sets, 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.					
Total Hours of Teaching : 60		Lecture 4	Tutorial 0	Practical 0	Total Per Week 4	Credit Points : 4
Total Marks :		External Exam Theory :				
Syllabus Contents:						
Unit: I	Set, Relation and Function: Set, Set Operations, Properties of Set operations, Subset, Venn Diagrams, Cartesian Products. Relations on a Set, Properties of Relations, Representing Relations using matrices and digraphs, Types of Relations, Equivalence Relation, Equivalence relation and partition on set, Closures of Relations. Functions, properties of functions (domain, range), composition of functions, surjective (onto), injective (one-to-one) and bijective functions, inverse of functions. Exponential and Logarithmic functions, Polynomial functions, Ceiling and Floor functions.					15 Hours
Unit: II	Counting and Recurrence Relation: Basics of counting, Pigeonhole principle, permutation, combination, Binomial coefficients, Binomial theorem. Recurrence relations, modelling recurrence relations with examples, like Fibonacci numbers, the tower of Hanoi problem					15 Hours
Unit: III	Elementary Graph Theory: Basic terminologies of graphs, connected and disconnected graphs, subgraph, paths and cycles, complete graphs, digraphs, weighted graphs, Euler and Hamiltonian graphs					15 Hours
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, inverse of a matrix					15 Hours

Text Books:	1. Garg, Reena, Engineering Mathematics, Khanna Book Publishing Company, 2024.(AICTE Recommended Textbook) 2. Garg, Reena, Advanced Engineering Mathematics, Khanna Book Publishing Company,2023. 3. Kolman B., Busby R. and Ross S., Discrete Mathematical Structures, 6th Edition,Pearson Education, 2015. 4. Deo Narsingh, Graph Theory with Application to Engineering and Computer Science,Prentice Hall, India, 1979.
Reference Books:	1. Grimaldi Ralph P. and Ramana B. V., Discrete and Combinatorial Mathematics: AnApplied Introduction, Fifth Edition, Pearson Education, 2007. 2. Rosen Kenneth H. and Krithivasan Kamala, Discrete Mathematics and its Applications,McGraw Hill, India, 2019. 3. West Douglas B., Introduction to Graph Theory, Second Edition, Pearson Education,2015
Web Resources	1. https://nptel.ac.in/courses/106103205 2. https://nptel.ac.in/courses/111101115

BCA-I-Sem-I PROBLEM SOLVING TECHNIQUES SEC101						
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: Testing and analyzing programs using debugging tools. (Analyze)					
Total Hours of Teaching : 60		Lecture 4	Tutorial 0	Practical 2	Total Per Week 6	Credit Points : 6
Total Marks :		External Exam Theory :			Internal :	
Practical		External Exam. Practical:				
Syllabus Contents:						

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 Sub problems Input / Output Specification, Input Validation, Pre and Post Conditions.	15 Hours
Unit: II	(CO-2,CO-3, CO-4) Structured Programming Concepts: Sequence (Input/Output/Assignment), Selection (If, If-Else) And Repetition (For, While, Do-While) Statements, Control Structure Stacking and Nesting. Different Kinds of Repetitions : Entry Controlled, Exit Controlled, Counter Controlled, Definite, Indefinite and Sentinel-Controlled Repetitions. Pseudocode and Flowcharts. 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,. Different Kinds of Data in The Real World and 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 Typeless Programming Languages, History of C Language ,An Empty C Program. C Language Counterparts For Input (scanf()), Output (printf()) Statements, Assignment, Arithmetic, Relational and Logical Operators. If, If-Else Statements, For, While, Do-While Statements. Data Types. Translating Pseudocode/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.	15 Hours
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	15 Hours
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. Anyone 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	15 Hours

Text Books:	1. Venkatesh, Nagaraju Y, Practical C Programming for Problem Solving, Khanna Book Publishing Company, 2024. 2. AICTE's Programming for Problem Solving (with Lab Manual), Khanna Book Publishing Company, 2024. 3. Harvey Deitel and Paul Deitel, C How to Program, 9th edition, Pearson India, 2015.
Reference Books:	R G Dromey, How to Solve It by Computer. 1. Brian W. Kernighan and Dennis Ritchie, The C Programming Language, 2nd edition, 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?
Display three input numbers in sorted (non-decreasing) order?
2. of numbers from 1 to n in a tabular format?
3. Given an input positive integer number, display odd numbers from in the range [1,n]?
4. Display first mathematical tables, each table up to 10 rows?
Generalise this to display first n ($n > 0$) mathematical tables up to m ($m > 0$) rows?
5. Display following patterns of n rows ($n > 0$), For the below examples $n = 5$? For each pattern write a separate algorithm/program?

\$	\$	12345	12345
\$\$	\$\$	1234	1234
\$\$\$	\$\$\$	123	123
\$\$\$\$	\$\$\$\$	12	12
\$\$\$\$\$	\$\$\$\$\$	1	1

6. Display the following patterns of n rows ($n > 0$), for the below examples $n = 5$?

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

7. Given the first term (a), difference/multiplier (d) and number of terms ($n > 0$), display the first n terms of the arithmetic/geometric progression?
8. Display the first n ($n > 0$) terms of the fibonacci sequence?
9. Display the first n ($n > 0$) terms of the Tribonacci sequence?
10. Given two positive integer numbers n1 and n2 check if the numbers are consecutive numbers of the fibonacci sequence?

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. For example, for the input 2 7 32 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 ($0 \leq \text{marks} \leq 100$) 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. Compute 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 (inputBase) to another base (outputBase) ($2 \leq \text{input Base}$, $\text{outputBase} \leq 10$). Input number should be validated before converting to make sure the number uses only digits allowed in the input base?
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 question 4 (UNIT III), Compute how many students awarded each grade and display the frequency as a bar chart (horizontal) using single "*" for each student. Use sentinel 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.

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A:
*****

B:
*****

C: ***

D:
*****

F: *
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14. Compute maximum, minimum, sum and average of a sequence of numbers which are read using sentinel controlled repetition using only few variables?
15. Compute body mass index, $BMI = \text{weight in KGs} / (\text{Height in Meters} * \text{Height in Meters})$, 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
Underweight: less than 18.5
Normal: ≥ 18.5 and < 25
Overweight: ≥ 25 and < 30
Obese: ≥ 30

Unit IV

1. Design a modularized algorithm/program to compute a maximum of 8 numbers?
2. 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)?
3. Design a modular algorithm/program which reads an array of n integer elements and outputs median?
4. Implement your own string length and string reversal functions?
5. Design algorithm/program to perform matrix operations addition, subtraction and transpose?
6. Write a recursive program to count the number of digits of a positive integer number?

BCA-I-Sem-I COMPUTER ARCHITECTURE CC102						
Course Outcomes	After Completion of course student will be able to :- CO1: To Understand the basics of Digital Electronics and Binary Number System CO2: To Learn the implementation of Combinational Circuit. CO3: To Learn the implementation of Sequential Circuit. CO4: To Understand the Organization of basic computers and concept of memory organization					
	Total Hours of Teaching : 60		Lecture 4	Tutorial 0	Practical 2	Total Per Week 6
Total Marks :		External Exam Theory :				Internal :
Practical		External Exam. Practical:				
Syllabus Contents:						
Unit: I	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					15 Hours
Unit: II	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					15 Hours
Unit: III	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 Flip-Flop. Register: 4 bit register with parallel load, Shift Registers- Bidirectional shift register with parallel load. Binary Counters-4 bit synchronous and Asynchronous binary counter					15 Hours
Unit-IV	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.					15 Hours
Text Books:	1. Donald P Leach, Albert Paul Malvino, Goutam Saha- “Digital Principles & Applications” , Tata McGraw Hill Education Private Limited, 2011 Edition. 2. M. Morris Mano- “Computer System Architecture”, Pearson/Phi, Third Edition. 3. R.P.Jain “Modern Digital Electronics” 4 th Edition Mc Graw Hill.					
Reference Books:	1 William Stallings- “Computer Organization and Architecture”, Pearson/PHI, Sixth Edition, 2 Andrew S. Tanenbaum- “Structured Computer Organization”, PHI /Pearson 4th Edition, 3 M.V .Subramanyam, “Switching Theory and Logic Design”, Laxmi Publications (P)Ltd. Ikvinderpal Singh, Computer Organization Architecture, Khanna Book Publishing. Publications (P)Ltd. 4 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 Buffergates.
2. To study and verify NAND as a Universal Gate
3. To Convert Binary to Grey Code
4. Design and verify operation of half adder and full adder.
5. Design and verify operation of half subtractor.

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. Configure BIOS settings- disable and enable USB and LAN
4. Adding additional RAM to the system.(expanding RAM size).
5. Install and configure windows OS
6. To study the installation of Printer and trouble shooting.

BCA-I-Sem-I
GENERAL ENGLISH
AEC102

Course Description	General English subject aims to improve basics of English language. It illustrates the minutiae of the English language and its various applications in our daily lives. It covers study about Vocabulary Building, Basic Writing Skills, Identifying Common Errors in Writing, Nature and Style of sensible Writing, Oral Communication. Students gain a solid understanding of English grammar concepts and related aspects by studying the English language.
Course Objectives	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 completion of course, students will be able to : 1. Explain concept of Word Formation in English Language. 2. Illustrate use of phrases and clauses in sentences in English Language. 3. Identify common errors in English Writing. 4. Develop reading and listening, writing and speaking skills.
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Total Hours of Teaching: 30	Lecture	Tutorial	Practical	Total Per Week	Credit Points
	1	1	0	2	: 02
Total Marks:50	Theory : 30				Internal : 20

Syllabus Contents:

Unit: I	A)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. B)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.	8 Hours
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Unit: II	A)Identifying Common Errors in Writing Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies B)Nature and Style of sensible Writing Describing, Defining, Classifying, providing examples or evidence, writing introduction and conclusion, Module V: Writing Practices, Comprehension, Precise Writing, Essay Writing	8 Hours
Unit: III	Oral Communication-I Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common Everyday Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal Presentations	7 Hours
Unit: IV	Oral Communication -II Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common Everyday Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal Presentations	7 Hours

Note: Unit-III and IV should be interactive practice sessions preferably in Language Lab.

Suggested Field Work or Practical Work

1. Exercises on Word Formation by the Addition of Prefixes and suffixes.
2. Word formation by conversion, compounding. Exercises on synonyms, antonyms.
3. Exercises on sentence structure; Phases and clauses.
4. Exercises on identifying common errors : Choosing the correct verb; Exercises on noun –pronoun exercise.
5. Exercises on modifiers ; articles , prepositions ,redundancies ; word stress , intonation
6. Exercises on writing short paragraph on given topic ; Exercise on comprehension writing.
7. Exercises on short precise writing on given topic ; short essay writing on given topic or topic of student's choice.
8. Exercise on listening and rewriting short comprehension; Exercises- group communication on given topics

BCA-I-Sem-I

INDIAN VISION FOR HUMAN SOCIETY MDE101

BCA-I-Sem-I						
Yoga/Sports/NCC/NSS/Diaster Management						
VAC201						
YOGA						
Course Outcomes	CO1:Gain a comprehensive understanding of yoga and its modern applications for holisticwell-being.					
	CO2:Demonstrate proficiency in yogic anatomy and physiology, enhancing yoga practiceand promoting physical and energetic balance.					
	CO3:Master the Eight Limbs of Yoga and comprehend their psychological impact, fosteringpersonal growth and self-realization.					
	CO4:Integrate yoga principles into sports and physical fitness activities to enhanceperformance and prevent injuries.					
	CO5:Develop skills in wellness management and nutrition					
Total Hours of Teaching		Lecture	Tutorial	Practical	Total Per Week	Credit Points : 2
:		2	0	0	2	
Total Marks :		External Exam Theory :			Internal :	
Syllabus Contents:						
Unit: I	Yoga: Meaning and definition Importance of yoga in 21st century Introduction to Yogic Anatomy and Physiology Yoga & sports, Yoga for healthy lifestyle Types of Yoga: - Hatha yaga, laya yoga, mantra yoga, bhakti yoga, karma yoga, jnana yoga, raj yoga Study of Chakras, Koshas, Pranas, Nadis, Gunas,Vayus and its application in Yogicpractices. Ashtang Yoga: - Yama, niyama, asana, pranayama, Pratyahar, dharna, dhyan, Samadhi :Benefits, Utilities & their psychological impact on body and mind. According to yogaconcept of normality in modern psychology, concept of personality & its development, yogic management of psycho-somatic ailments: frustration, anxiety, depression					
Unit: II	Sports for Physical Fitness: Meaning and definition Physical Activity – Concept, Benefits of Participation in Physical Activities Components and Significance of Physical Fitness -Health, Skill and Cosmetic Fitness Types of Physical Activities – Walking, Jogging, Running, Calisthenics, Rope Skipping,Cycling, Swimming, Circuit Training, Weight training, Adventure Sports Principles of Physical Fitness, Warming Up, Conditioning, Cooling Down, Methods toDevelop and Measure Health and Skill related components of Physical Fitness Measurement of Health Related Physical Fitness (HRPF)					

Unit: III	Physical Wellness: Concept, Components Types of wellness: psychological, social, emotional, and spiritual. Significance with reference to Positive Lifestyle 2.2 Concepts of Quality of Life and Body Image Factors affecting Wellness Wellness Programmes	
Unit-IV	Concept of Nutrients, Nutrition, Balanced Diet, Dietary Aids and Gimmicks Energy and Activity- Calorie Intake, Energy Balance Equation Obesity - Concept, Causes, Obesity Related Health Problems Weight Management through Behavioural Modifications	
Text Books:	1. Anand O P. Yog Dawra Kaya Kalp. Sewasth Sahitya Perkashan. Kanpur. 2. Brown, J.E. Nutrition Now Thomson-Wadsworth. 3. Corbin et.al.Fitness & Wellness-Concepts. McGraw Hill. Publishers. New York.U.S.A 4. Corbin, C. B., G. J. Welk, W. R Corbin, K. A. Welk, Concepts of Physical Fitness:Active Lifestyle for Wellness. McGraw Hill, New York, USA. 5. Hoeger, W W K and S.A. Hoeger. Principles and Labs for Fitness and Wellness,Thomson Wadsworth, California, USA. 6. Hoeger, W.W. & S. Hoeger Fitness and Wellness. 7th Ed. Thomson Wadsworth,Boston, USA. 7. Kamlesh, M. L. & Singh, M. K.) Physical Education (Naveen Publications). 8. Kansal, D.K. Text book of Applied Measurement, Evaluation & Sports Selection.Sports & Spiritual Science Publications, New Delhi. 9. Kumari, Sheela, S., Rana, Amita, and Kaushik, Seema,, Fitness, Aerobics and GymOperations, Khel Sahitya, New Delhi 10. Lumpkin, A. Introduction to Physical Education, Exercise Science and Sports Studies,McGraw Hill, New York, U.S.A. 11. Sarin N) Yoga Dawara Rogon Ka Upchhar.Khel Sahitya Kendra 12. Savard, M. and C. Svec The Body Shape Solution to Weight Loss and Wellness: The Apples & Pears Approach to Losing Weight, Living Longer, and Feeling Healthier. Atria Books, Sydney, Australia. 13. Siedentop, D. Introduction to Physical Education, Fitness and Sport, McGraw Hill Companies Inc., New York, USA. 14. Sri Swami Ramas. Breathing. Sadhana Mandir Trust.Rishikesh. 15. Swami Ram Yoga & Married Life Sadhana Mandir Trust. Rishikesh	

BCA-I-Sem-I Yoga/Sports/NCC/NSS/Diaster Management VAC201						
SPORTS						
Course Outcomes	CO1: Demonstrate a comprehensive understanding of sports management principles,including organizational structures, legal issues, and ethical considerations.					
	CO2: Evaluate marketing strategies and sponsorship opportunities in the sports industry,devising effective branding and promotional campaigns.					
	CO3: Apply financial management techniques to analyze revenue streams, control costs, andmake informed investment decisions in sports organizations.					
	CO4: Utilize sports analytics tools and technology to enhance performance evaluation,strategic planning, and fan engagement initiatives.					
	CO5: Synthesize course concepts through practical applications, demonstrating the ability toaddress real-world challenges in sports management scenarios.					
Total Hours of Teaching		Lecture	Tutorial	Practical	Total Per Week	Credit Points : 2
:		2	0	0	2	
Total Marks :		External Exam Theory :				Internal :
Syllabus Contents:						
Unit: I	Introduction to Sports Management Definition and scope of sports management Significance of sports management in society and its evolution over time Organizational structure of sports: amateur, professional, and non-profit entities Roles and responsibilities of key personnel: managers, coaches, and agents Governance bodies in sports: FIFA, IOC, and NCAA Legal issues: contracts, negotiations, intellectual property rights Ethical considerations: fair play and doping					
Unit: II	Sports Marketing and Sponsorship Unique aspects of sports marketing Fan engagement strategies Target audience identification and segmentation Branding strategies for sports teams and athletes Sponsorship and endorsement deals Negotiating and managing partnerships Event management: planning, organizing, and promoting sports events					
Unit: III	Financial Management in Sports Revenue generation in sports: ticket sales, broadcasting rights, merchandise sales Financial models: budgeting and forecasting Cost management: player salaries, facility expenses, operational costs Investment opportunities in sports Risk management techniques specific to sports organizations					

Unit-IV	Sports Analytics and Technology Introduction to sports analytics Evaluating player performance Devising game strategies Fan engagement through technology Analytical techniques: statistical analysis, data visualization, predictive modeling Key performance indicators (KPIs) in sports Applications of analytics: talent scouting, injury prevention, performance optimization	
Text Books:	1. Pedersen, P. M., Thibault, L., & Pedersen, P. M. (2019). Contemporary Sport Management. Human Kinetics. 2. Hoye, R., Smith, A. C. T., Nicholson, M., et al. (2021). Sports Management: Principles and Applications. Routledge. 3. Chelladurai, P., & Kerwin, S. (2017). Introduction to Sport Management: Theory and Practice. Human Kinetics. 4. Hoye, R., Cuskelly, G., & Nicholson, M. (2019). Sports Governance: A Guide for Sport Organizations. Routledge. 5. Conrad, M. (2018). The Business of Sports: A Primer for Journalists. Routledge. 6. Shank, M. D. (2019). Sports Marketing: A Strategic Perspective. Pearson. 7. Collett, P., & Fenton, W. (2019). The Sponsorship Handbook: Essential Tools, Tips and Techniques for Sponsors and Sponsorship Seekers. Kogan Page. 8. Fullerton, S. Jr., & Funk, D. C. (2019). Sports Marketing: A Practical Approach. Routledge. 9. Conrad, M. (2019). Winning in Sports Business: Essential Marketing, Finance, and Management Strategies. Routledge. 10. McCarty, L. A., & McPherson, G. (2019). Sports Event Management: The Caribbean Experience. Routledge. 11. Brown, M. T., Rascher, D., & Leeds, M. A. (2017). Financial Management in the Sport Industry. Routledge. 12. Winfree, J. A., & Rosentraub, M. S. (2017). Sports Finance and Management: Real Estate, Entertainment, and the Remaking of the Business. Taylor & Francis. 13. Foster, G., O'Reilly, N., & Cuskelly, G. (2018). Sports Business Management: Decision Making Around the Globe. Routledge. 14. Brown, M. T., & Shick, D. M. (2019). Financial Management in the Sport Industry. Routledge. 15. Conrad, M. (2018). The Business of Sports: A Primer for Journalists. Routledge. 16. Alamar, B. C. (2013). Sports Analytics: A Guide for Coaches, Managers, and Other Decision Makers. Columbia University Press. 17. Miller, T. W. (2019). Sports Analytics and Data Science: Winning the Game with Methods and Models. FT Press. 18. Marchi, M., Albert, J., & Baumer, B. (2014). Analyzing Baseball Data	

	with R.Chapman and Hall/CRC. 19. Schumaker, R. P., Hwang, R. S. Y., & Chen, H. (2016). Sports Data Mining. Routledge. 20. Alamar, B. C. (2013). Sports Analytics: A Guide for Coaches, Managers, and Other Decision Makers. Columbia University Press
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BCA-I-Sem-I Yoga/Sports/NCC/NSS/Diaster Management VAC201					
NCC					
Course Outcomes	CO1: Mastery of Discipline and Leadership through Drill Learners would demonstrate the ability to effectively command a group, foster discipline, and work collaboratively towards achieving shared objectives. CO2: Mastery of Grace and Dignity in Foot Drill Performance Learners would demonstrate an understanding of how these qualities enhance performance and foster teamwork within a group setting. CO3: Proficient Weapon Handling and Safety Adherence Learners would showcase a thorough understanding of the criticality of safety measures, emphasizing accident prevention through strict adherence to safety protocols. CO4: Enhanced Tactical Awareness and Strategic Decision-Making Learners would gain the ability to make informed decisions and effectively utilize terrain features to gain tactical advantage during operations.				
Total Hours of Teaching	Lecture	Tutorial	Practical	Total Per Week	Credit Points : 2
:	2	0	0	2	
Total Marks :	External Exam Theory :				Internal :
Syllabus Contents:					
Unit: I	Overview of NCC, its history, aims, objectives, and organizational structure, Incentives and duties associated with NCC cadetship; Maneuvers: Foot drill, Word of Command, Attention, and stand at ease, and Advanced maneuvers like turning and sizing; Parade formations: Parade line, open line, and closed line; Saluting protocols, parade conclusion, and dismissal procedures. Marching styles: style march, double time march, and slow march				
Unit: II	Weapon Training, Handling firearms, Introduction and characteristics of the .22 rifle; Handling Firearm techniques, emphasizing safety protocols and Best practices.				
Unit: III	Map Reading (MR): Topographical forms and technical terms, including relief, contours, and gradients, crucial for understanding terrain features; Cardinal points , magnetic variation and grid convergence				
Unit-IV	Field Craft & Battle Craft (FC & BC): Fundamental principles and techniques essential for effective field and battle craft operations; Methods of judging distance, including estimation, pacing, and visual cues				

References:	1. DGNCC Cadet's Hand Book - Common Subjects -All Wings 2. Tiwari, R. (2019). NCC: Grooming Feeling of National Integration, Leadership and Discipline among Youth. Edwin Incorporation. 3. Chhetri, R.S. (2010). Grooming Tomorrows Leaders, The National Cadet Corps. 4. Directorate General National Cadet Corps (2003). National Cadet Corps, Youth inAction. 5. Vanshpal, Ravi (2024). The NCC Days, Notion Press.
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BCA-I-Sem-I Yoga/Sports/NCC/NSS/Diaster Management VAC201						
NSS						
Course Outcomes	CO1: Students will demonstrate an understanding of the history, philosophy, and objectives of the National Service Scheme (NSS), thereby fostering increased social awareness and patriotism among them					
	CO2: Students will be able to organize and conduct various NSS programmes and activities effectively and through it understand the importance of leadership and team building.					
	CO3: Students will develop skills in community mobilization and partnership building.					
	CO4:Students will appreciate the importance of volunteerism and shramdan in societal development and thus, be able to understand role of community participation					
Total Hours of Teaching		Lecture	Tutorial	Practical	Total Per Week	Credit Points : 2
:		2	0	0	2	
Total Marks :		External Exam Theory :			Internal :	
Syllabus Contents:						
Unit: I	Introduction and Basic Concepts of NSS National Service Scheme (NSS) - history, philosophy, and fundamental concepts, aims and objectives, providing clarity on the organization's overarching goals. Symbols of NSS - Emblem, flag, motto, song, and badge; Organizational structure of NSS					
Unit: II	NSS Programmes and Activities Diverse programmes and activities conducted under the aegis of the National Service Scheme (NSS); Significance of commemorating important days recognized by the United Nations, Centre, State Government, and University; Examination of the methodology for adopting villages/slums and conducting surveys; Financial patterns of the NSS scheme					
Unit: III	Community Mobilization Dynamics of community mobilization within the framework of the National Service Scheme (NSS); Functioning of community stakeholders; The conceptual lens of community development					
Unit-IV	Volunteerism and Shramdan in the Indian Context: Roles and Motivations within the NSS Framework Ethos of volunteerism and shramdan (voluntary labor) within the cultural context of India and the framework of the National Service Scheme (NSS); Motivations and constraints shaping volunteer engagement; Role of NSS volunteers in initiatives such as the Swatch Bharat Abhiyan and Digital India					

References:	1. Ministry of Youth Affairs and Sports, Government of India. (2022). National Service Scheme (NSS) Manual. 2. Agarwalla, S. (2021). NSS and Youth Development. Mahaveer Publications 3. Bhattacharya, P. (2024). Stories Of NSS (English Version). Sahityasree. 4. Borah, R. and Borkakoty, B. (2022). NSS in Socioeconomic Development. Unika Prakashan. 5. Wondimu, H., & Admas, G. (2024). The motivation and engagement of student volunteers in volunteerism at the University of Gondar. Discover Global Society, 2(1), 1-16. 6. Saha, A. K. (2002). Extension Education–The Third Dimension Needs and Aspirations of Indian Youth. Journal of Social Sciences, 6(3), 209-214. 7. Mills, S. (2013). “An instruction in good citizenship”: scouting and the historical geographies of citizenship education. Transactions of the Institute of British Geographers, 38(1), 120–134. http://www.jstor.org/stable/24582445 8. Mishra, S. K., Sachdev, S., Marwaha, N., & Avasthi, A. (2016). Study of knowledge and attitude among college-going students toward voluntary blood donation from north India. Journal of blood medicine, 19-26. 9. Mukherji, B. (2007). Community Development in India. Orient Longmans. 10. History Background of NSS and its Philosophy, Aims and Objectives 11. https://www.osmania.ac.in/NSS%20URL/9.%20%20Historical%20Background%20of%20NSS%20and%20its%20Philosophy,%20Aim.pdf 12. In Defence of Nationalism https://www.mkgandhi.org/indiadreams/chap03.htm 13. Unlocking Youth Potential for Nation Building: Strengthening NYKS and NSS 14. https://www.undp.org/india/projects/strenghtening-nyks-and-nss
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BCA-I-Sem-I Yoga/Sports/NCC/NSS/Disaster Management VAC201						
Disaster						
Course Outcomes	CO1: Articulate the critical role of disaster management in reducing risks and enhancing resilience					
	CO2: .Identify and describe key institutional frameworks and processes in disaster management.					
	CO3:..Conduct risk assessments and develop disaster management plans for specific scenarios					
Total Hours of Teaching		Lecture	Tutorial	Practical	Total Per Week	Credit Points : 2
:		2	0	0	2	
Total Marks :		External Exam Theory :				Internal :
Syllabus Contents:						

Unit: I	Concepts and Terminologies Understanding key concepts of Hazards, disasters; Disaster types and causes (Geophysical, Hydrological, Meteorological, Biological and Atmospheric; Human-made); Global trends in disasters - Impacts (Physical, Social, Economic, Political, Environmental and Psychosocial); Defining Vulnerability (Physical Vulnerability; Economic Vulnerability; Social Vulnerability)	
Unit: II	Key concepts of Disaster Management Cycle Components of disaster management cycle (Phases: Response and recovery, Risk assessment, Mitigation and prevention, Preparedness planning, Prediction and warning); Disaster risk reduction (DRR), Community based disaster risk reduction	
Unit: III	Initiatives at national and international level Disaster Risk Management in India and at international level: Related policies, plans, programmes and legislation; International strategy for disaster reduction and other initiatives	
Unit-IV	Emergency Management Explosion and accidents (Industrial, Nuclear, Transport and Mining) - Spill (Oil and Hazardous material); Threats (Bomb and terrorist attacks) - Stampede and conflicts Training and Demonstration Workshops (at least two workshops) be organized in association with the NIDM, NDRF, NCDC, Param Military, Fire Brigade, CISF, local administration etc.	
Reading:	1. Sharma, S.C. (2022), Disaster Management, Khanna Book Publishing. 2. Clements, B. W., (2009): Disasters and Public Health: Planning and Response, Elsevier Inc. 3. Dunkan, K., and Brebbia, C. A., (Eds.) (2009): Disaster Management and Human Health Risk: Reducing Risk, Improving Outcomes, WIT Press, UK. 4. Singh, R. B. (ed.), (2006) Natural Hazards and Disaster Management: Vulnerability and Mitigation, Rawat Publications, New Delhi. 5. Ramkumar, Mu, (2009) Geological Hazards: Causes, Consequences and Methods of Containment, New India Publishing Agency, New Delhi. 6. Modh, S. (2010) Managing Natural Disaster: Hydrological, Marine and Geological Disasters, Macmillan, Delhi. 7. Carter, N. (1991) Disaster Management: A Disaster Management Handbook. Asian Development Bank, Manila. 8. Govt. of India (2008) Vulnerability Atlas of India. BMTPC, New Delhi. 9. Govt. of India (2011) Disaster Management in India. Ministry of Home Affairs, New Delhi. 10. Matthews, J.A., (2002) Natural Hazards and Environmental Change, Bill McGuire, Ian Mason.	
E-Resource	http://www.ndma.gov.in/en/ http://nidm.gov.in/ https://www.unisdr.org/ http://www.emdat.be https://www.weather.gov/safety/ https://www.preventionweb.net/risk/vulnerability	

SEMESTER II

BCA-I-Sem-II						
MATHEMATICS FOUNDATIONS TO COMPUTER SCIENCE - II						
CC103						
Course Objectives	CO1: This course helps the students to understand correct lines of arguments and proofs. CO2: This course introduces mathematical techniques that are foundations for understanding advanced computational methods, including numerical methods and optimization. CO3: This course helps the students to understand various problem-solving strategies and methods to tackle both theoretical and practical challenges in computer science.					
	Total Hours of Teaching : 60		Lecture 4	Tutorial 0	Practical 4	Total Per Week 4
Total Marks :100		External Exam Theory : 80				Internal : 20
Syllabus Contents:						
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					15 Hours
Unit: II	Algebraic Structures: Semi-group, Monoid, Group, Subgroup, Cyclic group					15 Hours
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 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					15 Hours
Unit-IV	Optimization Techniques: 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					15 Hours

Unit: I	Introduction and Overview: Definition, Classification and Operations of Data Structures. Algorithms: Complexity, Time-Space Trade-off. Arrays: Definition and Classification of Arrays, Representation of Linear Arrays in Memory, Operations (String Manipulation) on Linear Arrays: Traversing, Inserting, Deleting, Searching, Sorting and Merging. Two-Dimensional Arrays, Representation of Two-Dimensional Arrays in Memory, Matrices and Sparse Matrices, Multi-Dimensional Arrays. Searching: Linear Search and Binary Search Sorting: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort	15 Hours
Unit: II	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, Runtime Stack, Applications of Recursion: Factorial of Number, GCD, Fibonacci Series and Towers of Hanoi.	15 Hours
	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: III	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.	15 Hours
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.	15 Hours
Text Books:	1. R.B. Patel, "Expert Data Structures with C", Khanna Book Publishing Company, 2023(AICTE Recommended Textbook) 2. Seymour Lipschutz, "Data Structures with C", Schaum's Outlines, Tata McGraw-Hill, 2011. 3. Yashavant Kanetkar, "Data Structures Through C", 4th Edition, BPB Publications, 2022.	
Reference Books:	1. Reema Thareja, "Data Structures Using C", Second Edition, Oxford University Press, 2014. 2. Ellis Horowitz, Sartaj Sahni, and Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, Universities Press, 2007.	
Web Resource	1. GeeksforGeeks - Data Structures Tutorial 2. Khan Academy - Algorithms Course	

Practical

Lab Programs for Data Structure

1. Write a program for string manipulation operations in an array.
2. Write a program to search for an element in an array using Linear and Binary Search.
3. Write a program to sort an array using Bubble Sort, Selection Sort, Insertion Sort, merge sort
4. Write a program to add, subtract and multiply two matrices.
5. Write a program to perform different operations on Singly Linked List.
6. Write a program to perform different operations on Doubly Linked List.
7. Write a program to perform different operations on Circular Linked List.
8. Write a program to implement stack operations using an array & linked list.
9. Write a program to evaluate an expression in another form using a stack.
10. 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
11. Write a program to implement simple queue operations using an array & linked list.
12. Write a program to implement circular queue operations using an array & linked list.
13. Write a program to add two polynomials using a linked list.
14. Write a program to perform the following operations on a binary search tree.
 - (a) Preorder Traversal
 - (b) Inorder Traversal
 - (c) Postorder Traversal
15. Write a program to perform insertion operation in a binary search tree.

Lab Programs for Operating Systems

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.

Note: Student should certify & enclose minimum 10 programs from data structure & 10 programs from Operating System in main journal

BCA-I-Sem-II
OPERATING SYSTEMS
CC105

Course Outcomes	At the end of the course, students will be able to: CO1: Explain the fundamentals of the operating system. CO2: Comprehend multithreaded programming, CPU scheduling, process management, process synchronization, memory, deadlocks, and storage management. CO3: Compare the performance of CPU scheduling algorithms CO4: Identify the features of I/O and File handling methods.				
Total Hours of Teaching : 60	Lecture	Tutorial	Practical	Total Per Week	Credit Points : 4
	4	0	0	4	
Total Marks :	External Exam Theory :				Internal :
Syllabus Contents:					
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				15 Hours
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				15 Hours
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				15 Hours
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.				15 Hours

<i>Text Books:</i>	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. 3. Stallings (2006), Operating Systems, Internals and Design Principles, 5th edition, Pearson Education, India.
<i>Reference Books:</i>	1. Andrew S Tanenbaum, Modern Operating Systems, Third Edition, Prentice Hall India. 2. Sumitabha Das, UNIX Concepts and Applications, 4th Edition, Tata McGraw-Hill

BCA-I-Sem-II(NEP 2.0)
OBJECT ORIENTED PROGRAMMING USING JAVA
SEC102

Course Outcomes	CO1: To introduce the object oriented programming system concepts CO2: To introduce syntax and semantics of Java programming language 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				
Total Hours of Teaching : 60	Lecture	Tutorial	Practical	Total Per Week	Credit Points : 6
	4	0	2	6	
Total Marks :	External Exam Theory :				Internal :
Practical	External Exam. Practical:				
Syllabus Contents:					
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. (Text Book 1: Chapters 1, 2 and 3)				15 Hours
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, Labelled loops. (Text Book 1: Chapters 4, 5, 6, and 7.)				15 Hours
Unit: III	Classes, Objects and Methods: Defining Class, Methods Declaration, Constructors, Methods Overloading, Overriding Methods, Inheritance Arrays, Strings and Vectors: 1D arrays, Creating an Array, 2D arrays, Strings, Vectors, Wrapper Classes, Enumerated Types Inheritance: Defining, extending classes, and Implementing Interfaces. Multiple inheritance and polymorphism, overriding methods, concept of Multithreading in Java (Text Book 1: Chapters 8, 9, and 10)				15 Hours

Unit-IV	Packages: Basics of packages, System packages, Creating and accessing packages, Creating user defined packages, Adding class to a package. Exception Handling: Using the main keywords of exception handling: try, catch, throw, throws and finally; Nested try, Multiple catch statements, Creating user defined exceptions (Text Book 1: Chapters 11 & 13)	15 Hours
Text Books:	1. Balaguruswamy E. (2023). Programming with JAVA: A Primer. 7th edition. India: McGraw Hill Education Schildt, H. (2022). Java: The Complete Reference. 12th edition. McGraw-Hill Education	
Reference Books:	1. Arunesh Goyal, The Essentials of JAVA, Khanna Book Publishing Company Private Limited, 2012. 2. Tanweer Alam, Core JAVA, Khanna Book Publishing Company Private Limited, 2015. 3. 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.	
Web Resources	1. https://www.w3schools.com/java/ . 2. http://www.java2s.com/ . https://onlinecourses.nptel.ac.in/noc22_cs47/preview	

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 commandline arguments.
3. Write a program to send the name and surname of a student through command line arguments and print a welcome message for the student.

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 nonrecursive functions.
6. Write a java program to multiply two given matrices.
7. Write a Java program for sorting a given list of names in 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 superclass. 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.
 - a. USN, NAME, BRANCH, PHONE, PERCENTAGE
 - b. 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 'rate_of_interest()'. 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 exceptionDemo 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.

BCA-I-Sem-II
INDIAN CONSTITUTION
VAC201

Course Description	This course offers a unique perspective on the Constitution of India, focusing on its economic dimensions and impact on business. It delves into the historical and ideological underpinnings of the Constitution as an economic document, tracing its evolution from post-colonial economic governance to contemporary debates. Students explore constitutional battles over land reforms, economic liberalization, and fiscal federalism, gaining insights into competing economic ideologies and interests. Through case studies and legal analysis, they examine fundamental rights related to business, fiscal federalism, and constitutional issues shaping India's economic landscape. By the end of the course, students will develop a nuanced understanding of the Constitution's role in shaping economic policies and its implications for business practices, equipping them with valuable insights for careers in business management and policy advocacy.
Course Objectives	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 19.

Course Outcomes	After completion of course, students will be able to :					
	1. Explain concept of the Indian Constitution, particularly from the perspective of economic governance and business					
	2. Employ a nuanced analytical framework about ongoing constitutional debates and battles which affect the domain of business					
3. Develop a sense of how questions of economic growth have to be balanced with other constitutional commitments, including social and economic justice.						
Total Hours of Teaching		Lecture	Tutorial	Practical	Total Per Week	Credit Points
: 30		2	0	0	2	: 02
Total Marks:		Theory: 30				Internal: 20
Syllabus Contents:						
Unit: I	An Economic History of the Constitution of India 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					8 Hours
Unit: II	Fundamental Rights and Business in India 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 impose by the state. This particular provision of the Constitution has been one of the most severely litigated freedoms. Fundamental Duties.					8 Hours
Unit: III	Fiscal Federalism Article articles 301 to 307 of the Constitution pertains to Trade, Commerce and Intercourse within the Territory of India; Challenges associated with fiscal federalism in India including the vertical fiscal imbalance; Article 280 of the Constitution.					7 Hours

Unit: IV	Constitutional battles that shaped the economy 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.	7 Hours
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Note: Relevant case studies based on the above units should be discussed in the class.

Suggested Field Work or Practical Work

1. Study and analyse case-Rustom Cavasjee Cooper v. Union of India, (1970) 1 SCC 248
2. Study and analyse case- State of Rajasthan v. Mohan Lal Vyas, AIR 1971 SC 2068 (confirmation of a private monopoly, not a violation of fundamental right)
3. Study and analyse case -Mithilesh Garg v. Union of India, (1992) 1 SCC 168 : AIR 1992 SC 221 (Right to carry on business, not breached when it is liberalised)
4. Study and analyse case -Chintamanrao v. The State of Madhya Pradesh, AIR 1951 SC 118 (scope of reasonable restrictions in relation to trade and occupation)
5. Study and analyse case -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)
6. Study and analyse case- T. B. Ibrahim v. Regional Transport Authority. Tanjore, AIR 1953 SC 79
7. Study and analyse case- Harman Singh v. RTA, Calcutta, AIR 1954 SC 190
8. . Study and analyse case- Dwarka Prasad Laxmi Narain v. State of U.P., AIR 1954 SC 224
9. Study and analyse case- State of Bombay v. R.M.D. Chamarbaugwala, AIR 1957 SC 699
10. Study and Analyse case-Parbhani Transport Coop. Society Ltd. v. Regional Transport Authority, Aurangabad, AIR 1960 SC 801
- 11.

Note:

Each student should prepare report any 5 practical or field work including detailed information as per guidelines and structure/format given by subject teacher. The report should be hand-written. Take photographs in your cell phone with prior permission during the visit to business units and discussion with people. Produce the black and white print of photographs in your report.

References

- The Oxford Handbook of the Indian Constitution, Oxford university press.

Cases

- Rustom Cavasjee Cooper v. Union of India, (1970) 1 SCC 248
- State of Rajasthan v. Mohan Lal Vyas, AIR 1971 SC 2068 (confirmation of a private monopoly, not a violation of fundamental right)
- Mithilesh Garg v. Union of India, (1992) 1 SCC 168 : AIR 1992 SC 221 (Right to carry on business, not breached when it is liberalised)
- 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 vs State of Tamil Nadu, 1975 SCC (1) 375
- Automobile Transport (Rajasthan) Ltd. Vs State of Rajasthan, AIR 1962 SC 1406