Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)
Hingna Road, Wanadongri, Nagpur - 441 110
Ph.: 07104-237919, 234623, 329249, 329250 Fax: 07104-232376, Website: www.ycce.edu
Department of Computer Technology
Session 2021-22

1. **Course Teacher** : S.J. Karale

   Office : Deptt. of Computer Technology

   Office Hours : Monday to Friday 10.00 A.M.to 5.00 P.M

   Phone : 9822221324

   Email : sjkarale@gmail.com

2. **Course Objectives**

   i. To understand the core concepts of language construct such as loops, scope of variable, structures, functions, parameter passing mechanism etc.

   ii. To understand the role of array for handling similar type of data in case of applications like sorting and searching

   iii. To understand syntax of memory allocation functions for dynamic memory allocation

   iv. To impart the basic knowledge of linear data structures and file handling

3. **Course Outcomes**

   CO1: Acquire the basic concepts of language constructs and use them for problem solving

   CO2: Demonstrate the use of loops and arrays for handling similar type of data and perform various data manipulations on it using basic arithmetic to design good working solution for given problem

   CO3: Use technique of dynamic memory allocation for structures to solve problems of unknown input size

   CO4: Select appropriate linear data structures and use files to design good working solution for given problem

4. **Mapped Program Outcomes: 1,2,3,4,12 PSO1**
   1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
   2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
   3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
   4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
   12. **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

   PSO1: An ability to acquire skills to design & develop quality software using cutting-edge technologies of Computer Engineering.

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5. **Grading:** Grading is based on the following components that are weighted as described below

SN	Criteria	Distribution of marks (%)
1	Quizzes/Online tests	12
2	**TEACHER'S ASSESSMENT METHODS** (16 = 12 +4) **12 Marks :** Students have to solve and submit coding challenges from CodeChef/HackerRank/Leetcode platforms and have to submit their report of Leaderboard before and after solving challenges. For CodeChef : Students have to submit either 2 short challenges (Lunchbreak challenges2*6Marks=12) or one long challenge(12 Marks) condition to submission of report of leaderboard. **4 Marks** : Will be based on Participation in Various Competitions (Coding, Paper-presentation, Web-site design, Sports, Hackathons etc. *(Mostly Technical)* **These 4 marks will be allotted for all courses of 3rd Sem.**	16 = 12+4
3	Class performance Attendance% [90 to 100 %:2 Marks, 75 – 80 % - 1 Mark, <75 % - Detention / 0	2
4	Mid Semester Examinations-I (based on Units 1,2,3)	30
5	Mid Semester Examinations-II (based on Units 4,5,6)	
7	End Semester Examination (All 6 units)	40
	TOTAL	100

6. **Syllabus and Mark Distribution Unit Wise**

CT2204	PC: Data Structures		L=4	T=0	P=0	CREDITS = 4
		EVALUATION SCHEME				
MSE – I, MSE – II		**TA**	**ESE**	**TOTAL**	**ESE DURATION**	
15	15	30	40	100	3 Hr (Offline) 2 Hr (P-Online)	

Unit	Syllabus	MSE-I	MSE-II	ESE

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I	Types and operations, Iterative constructs and loop invariants, Quantifiers and loops, Structured programming and modular design, Illustrative examples, Scope rules, parameter passing mechanisms, recursion, program stack and function invocations including recursion[7Hrs]	5	- -	6 OR 7
II	Overview of arrays and array based algorithms - searching and sorting:merge sort,quick sort, Sparse matrices.[7Hrs]	5	- -	6 OR 7
III	Structures (Records) and array of structures (records). Database implementation using array of records. Dynamic memory allocation and deallocation. Dynamically allocated single and multi-dimensional arrays, polynomial representation.[7Hrs]	5	- -	6 OR 7
IV	Concept of an Abstract Data Type (ADT), Lists as dynamic structures, operations on lists, implementation of linked list using arrays and its operations. Introduction to linked list implementation using self-referential structures/pointers.[6Hrs]	- -	5	6 OR 7
V	Stack, Queues and its operations. Implementation of stacks and queues using both array-based and pointer-based structures. Applications of stacks and queues.[6 Hrs]	- -	5	6 OR 7
VI	Files, operations on them, examples of using file.[5Hrs]	- -	5	6 OR 7

7. **Examissions:**

a. **QUIZZES / ONLINE TESTS (12 MARKS): There will be a 12 No of online Quizzes**—The students remaining absent for ONLINE QUIZ / TEST shall get ZERO marks and no re-test shall be conducted. For quizzes & online Tests the syllabus shall be AS SPECIFIED BY COURSE TEACHER.

b. **TEACHERS ASSESSMENT (16 MARKS) :** AS GIVEN IN Teacher's Assessment Plan Table 5 (Sr. No.2)

8. **Advanced Topics Planned:**

S.N.	Advanced Topics Planned
1	Time Complexity Analysis

9. **Innovative Teaching Method Planned:**

S.N.	Innovative Teaching Method
1	Solving Programming Challenges through various programming platforms: CodeChef/ /HackerRank/ Leetcode etc.
2.	

10. **Text Books**

SN	Author Name	Title	Publication
1.	Ellis Horowitz, Sartaj Sahani, Dinesh Mehta	Fundamentals of Data Structures in C++	University Press
2.	Robert Kruse, CI Tondo	Data Structures and Program Design	Person Education

11. **Reference Books/websites**

SN	Author Name	Title	Publication
1.	https://www.codechef.com/		

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2.	https://www.geeksforgeeks.org/

Teaching Plan   By: S.J. Karale

Sr. No.	Topic covered	Date	Remark
Unit 1			
1.	Types and operations	15th Sept 2021	
2.	Memory Hierarchy and program execution	17th Sept 2021	
3.	Iterative constructs and loop invariants	20th Sept 2021	
4.	Quantifiers and loops, Structured programming and modular design, Illustrative examples,	21st Sept 2021	
5.	Scope rules, parameter passing mechanisms	22nd April 2021	
6.	Recursion, program stack	21st Sept 2021	
7.	Function invocations including recursion	21st Sept 2021	
Unit 2			
8.	Overview of arrays and array based algorithms	28th sept21	
9.	searching and sorting	29th Sept21	
10.	Merge sort	4th Oct21, 8th Oct21	
11.	quick sort	1st Oct21	
12.	Sparse matrices		
Unit 3			
13.	Structures (Records) Dynamic memory allocation and deallocation.	5th Oct. 21	
14.	Array of structures (records),	6th Oct. 2021	
15.	Nested structures	20th Oct. 2021	
16.	Database implementation using array of records.	11th Oct 21	
17.	Dynamically allocated single and multi-dimensional arrays	12th Oct 2021	
18.	Dynamically allocated single and multi-dimensional arrays	13th Oct. 21	
19.	Polynomial representation.	13th Oct. 21	
20.	Examples	18th Oct. 21	
21.	Advanced Topic: Time complexity	27th Oct. 21	
Unit 4			
22.	Concept of an Abstract Data Type		

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	(ADT),		
23.	Lists as dynamic structures Introduction to linked list implementation using self-referential structures/pointers.		
24.	Operations on lists		
25.	Operations on lists		
26.	Implementation of linked list using arrays and its operations.		
27.	Implementation of linked list using arrays and its operations.		
Unit 5			
28.	Stacks and its operations		
29.	Queues and its operations.		
30.	Implementation of stacks using both array-based and pointer-based structures		
31.	Queues using both array-based and pointer-based structures. Applications of stacks and queues.		
32.	Applications of stacks and queues.		
33.	Applications of stacks and queues.		
Unit 6			
34.	Files, operations on them, examples of using file.		
35.			
36.			
37.			

Total Lectures : 35-38 Approximately

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