UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Programme Name: B.Tech. CSE (AI&ML, BAO, BFSI, BigData, CCVT, CSF, DevOps, ECom&RA, GG, IT Infra, MAD, MFT, OGI, OS&OS, IOT&SC), B.Tech. CSE LLB Cyber Law

Course Name : Advanced Data Structures   **Semester** : II
Course Code : CSEG1004   **Time** : 03 hrs
Nos. of page(s) : 2   **Max. Marks : 100**

Instructions: Questions in each Section should be answered in the given sequence.

SECTION A (20 marks)

S.No.	Questions	Marks	CO
Q1	Write a short note on *this* pointer of C++ with a suitable example.	4	CO1
Q2	What are the merits and possible demerits of using a friend function?	4	CO1
Q3	With suitable code snippet compare redefinition and overriding.	4	CO2
Q4	How does set_terminate() modify the behavior of terminate()?	4	CO2
Q5	How is a Complete Tree and Perfect Tree different from each other? Give example.	4	CO3

SECTION B (40 marks)

Q6	Explain with appropriate code the application of a member initialization list to initialize a reference data member and a *const* qualified data member.	10	CO1
Q7	Write C++ program with a generic function to sort the given elements in ascending order using bubble sort algorithm. This generic function must support integer and float types. (OR) Write a C++ program which writes multiple lines into a Text file. Later the program obtains a word from the user as input, compute the number of occurrences of this word in the file and print the count.	10	CO2
Q8	Construct a Binary tree with the breadth-first traversal order 1,10,13,9,32,20. Create a Threaded Binary Tree and state how the threaded Binary tree is better than a Binary tree? (3+7)	10	CO3
Q9	Consider the implementation of hash table using an array of 9 linked lists and separate chaining method of collision avoidance. (i) Insert the following 9 keys (5, 28, 19, 15, 20, 33, 12, 17, 10) in the given order into the hash table using h(k)=k mod 9 as hash function and draw the final implementation neatly (5 marks). (ii) Calculate the maximum, minimum and average chain lengths in the hash table.	10	CO3

SECTION-C (40 marks)

Q10	Explain the properties of an AVL tree. With suitable diagrams and explanations insert the elements 21, 26, 30, 9, 4, 14, 28, 18, 15, 10, 2, 3, 7 into AVL tree by performing the necessary rotations. (5+15 marks) (OR) Explain the properties of a Binary Heap Tree. The Breadth-First Traversal pattern of a Complete Binary Tree (CBT) is 8, 3, 4, 1, 5, 7, 9, 2, 6, 0. Construct a CBT and later sort the elements in the CBT using Heap Sort Algorithm to obtain the elements in Descending order. (5+5+10 marks)	20	CO4
Q11	With adequate examples and diagrams explain the different methods used to represent a Graph. Compare the complexity of these methods. (15+5 marks)	20	CO5

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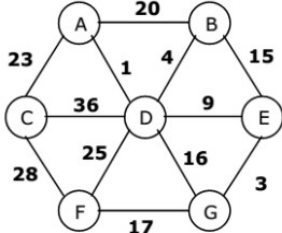
Instructions: Questions in each Section should be answered in the given sequence.

	SECTION A (20 marks)		
S.No.	**Questions**	**Marks**	**CO**
Q1	Write a C++ program with a class having a member function defined using the keyword 'inline' to compute cube and square of a given integer.	4	CO1
Q2	Compare the use of new operator and malloc() function.	4	CO1
Q3	Explain how abstract classes can be used to simulate the concept of interfaces in C++ with an example?	4	CO2
Q4	List down and briefly explain the different member functions used for file random access in C++ with appropriate syntax.	4	CO2
Q5	Consider the implementation of hash table of size(M)=19 using an array and linear probing method of collision avoidance. If keys A,B,C,…,Z are equivalent to 1,2,3,…,26 insert the following keys A,S,E,A,R,C,H,I,N,G,E,X,A,M,P,L,E in the given order into the hash table using h(k)=k mod M as hash function and draw the final implementation neatly.	4	CO3
	SECTION B (40 marks)		
Q6	With a suitable program explain the use of default constructor, parameterized constructor and copy constructor.	10	CO1
Q7	Illustrate Stack unwinding while working with Exception Handling using a C++ program. (OR) Differentiate overriding and overloading. Implement unary minus operator overloading using a friend function. (3+7 marks)	10	CO2
Q8	Consider the elements of Binary Tree which are organized in the given Breadth-First Order: 7,1,0,3,2,5,4,6,9,8,10. Perform the following: (i) Create a Binary Search Tree, (ii) Find the preorder and postorder traversal patterns. (5+5)	10	CO3

Q9	A hash function is defined to get a student SAP-ID and categorize them in to their 10 families based on the last three digits. E.g. Student with SAP-ID 5000423 belongs to family 9 and student with SAP-ID 5000425 belongs to family 2 based on last three digits. Implement a menu-driven hash table using arrays (1) to perform insert operation using the above hash function and by displaying a warning message if there is any collision (2) to close the program.	**10**	**CO3**
	SECTION-C (40 marks)		
Q10	By performing necessary rotations and with suitable diagrams and explanations perform the following operations in an AVL tree: (i) Insert the elements 14, 17, 11, 7, 53, 4, 13, 12, 8 (13 marks) (ii) Delete the elements 53, 11, 8 (7 marks) (OR) With suitable diagrams and explanations perform the following operations directly into a Binary Max Heap tree (Note: After every insertion/deletion the constructed tree should obey the max heap property): (i) Insert the elements 35, 33, 42, 10, 14, 19, 27, 44, 26, 31, 2 (13 marks) (ii) Delete the elements 2, 44, 27 (7 marks)	**20**	**CO4**
Q11	With suitable diagrams and explanations find the breadth-first traversal pattern and dept-first traversal pattern of the given digraph starting at node A. (10+10 marks) 	**20**	**CO5**