

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, April/May 2018**

**Course: Data Structures**  
**Program: BCA**  
**Course Code: CSBC 1003**  
**Time: 03 hrs.**

**Semester: II**

**Max. Marks: 100**

**Instructions: All the questions are compulsory except Q-10. In Q-10 you have internal choice.**

**SECTION A**

S. No.		Marks	CO
Q 1	Show the result of running the partition subroutine of quicksort on the following array, assuming that the index of the pivot is chosen to be 0 (the pivot is A[0]=17). What value does partition return? A=[17, 2, 34, 23, 6, 11, 49, 7, 22, 33]	4	CO4
Q 2	Consider the following insertion of element 5, 28, 19, 15, 20, 33, 12, 17, 10 into hash table. The hash table has nine slots and function being $h(k) = k \text{ mod } 9$ is applied. Show the resulting table after inserting the values in the given order using linear probing collision resolution technique.	4	CO2
Q 3	Draw a binary expression tree for the following prefix expression: + * a b / + c d e	4	CO3
Q 4	Proof mathematically that maximum number of nodes in a binary tree of height h is $2^h - 1$ .	4	CO5
Q 5	Explain the concept of circular queue. What are the advantages of circular queue over linear queue. (2+2= 4 marks)	4	CO2

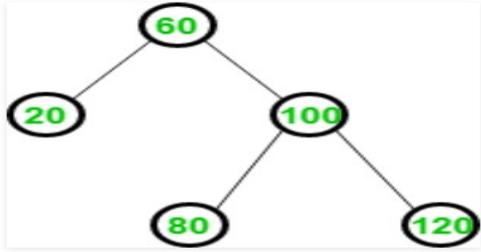
**SECTION B**

Q 6	Explain step by step procedure of binary search method with the help of example. Write C program to input an integer array in sorted order by the user at run time and search a number using binary search method. What will be the worst case time complexity of binary search? (4+5+1= 10 marks)	10	CO4
Q 7	Write C program to input an array and pass the array into a function named "array_func" as a parameter and print the elements of an array on the screen in function definition of "array_func".	10	CO1
Q 8	a) What is the output of the given code? <pre>int main() {     int i=3;     i=func(i);</pre> (4 marks)	10	CO1

	<pre> i=func(i); printf("%d",i); } int func(int i) {     if(i%2)         return 0;     else         return 1; } </pre> <p>b) Explain call by value and call by reference with the help of C program. (6 marks)</p>		
Q 9	<p>a) Explain the properties of binary heap. Draw max heap of elements: 6, 7, 12, 10, 15, 17, 5 (2+3= 5 marks)</p> <p>b) Proof that time complexity of heap sort is <math>O(n \log n)</math>. (5 marks)</p>	10	CO3
<b>SECTION-C</b>			
Q 10	<p>Write C program (including main function) to implement the singly linked list with the data field as character array, integer and double type representing the name, roll number and percentage of marks of the student with the following operations (separate function for each operation): - (5+5+5+5= 20 marks)</p> <ul style="list-style-type: none"> <li>i) Insertion from the end</li> <li>ii) Deletion from the beginning</li> <li>iii) Traversing</li> </ul> <p>Note: 5 marks for main function and 5 marks for each function.</p> <p style="text-align: center;"><b>OR</b></p> <p>Write the program (including main function) to implement the doubly linked list with the data field as integer type with the following operations (separate function for each operation): - (5+5+5+5= 20 marks)</p> <ul style="list-style-type: none"> <li>i) Insertion</li> <li>ii) Deletion</li> <li>iii) Traversing</li> </ul> <p>Note: 5 marks for main function and 5 marks for each function.</p>	20	CO2, CO5
Q 11	<p>a) What do you understand by balanced binary tree? Give examples of balanced binary tree? Explain different rotations to balance the tree with the help of examples.</p>	20	CO3

(5+2+8= 15 marks)

b) Consider the following AVL tree. What will be the updated AVL tree after insertion of 70? (5 marks)



Name:

Enrolment No:

