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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May-2017



Program Name: B. Tech. CS+ALL IBM
Course Name : Advanced Data Structures
Course Code : INFO 121
No. of page/s: 02

Semester -- II
Max. Marks : 100
Duration : 3 Hrs

NOTE- Section A, Section B and Section C having 20, 40 and 40 Marks respectively. Section A is having 4 questions of 5 marks each. Section B is having 4 questions of 10 marks each and Section C (Internal Choice) is having 2 questions of 20 marks each. Answer should be point to point and precise. Use programming wherever mentioned/required.

Section A(All questions are mandatory)

1. Construct a binary tree using following traversals:-

[Marks 5]

Inorder Traversal = {4, 8, 2, 5, 1, 6, 3, 7}

Postorder Traversal = {8, 4, 5, 2, 6, 7, 3, 1}

2. Write a class STRING that can be used to input two strings, store, add and equate the entered string.

[Marks 5]

3. Write an algorithm to append an element at the end of a linked list.

[Marks 5]

4. List out the operators that cannot be overloaded. Also write any two rules for Operator overloading

[Marks 5]

Section B(All questions are mandatory)

5. Class student contains roll number, name and course as data member and Input_student and display_student as member function. A derived class exam is created from the class student with publicly inherited. The derived class contains mark1, mark2, mark3 as marks of three subjects and input_marks and display_result as member function. Create an array of object of the exam class and display the result of 5 students.

[Marks 10]

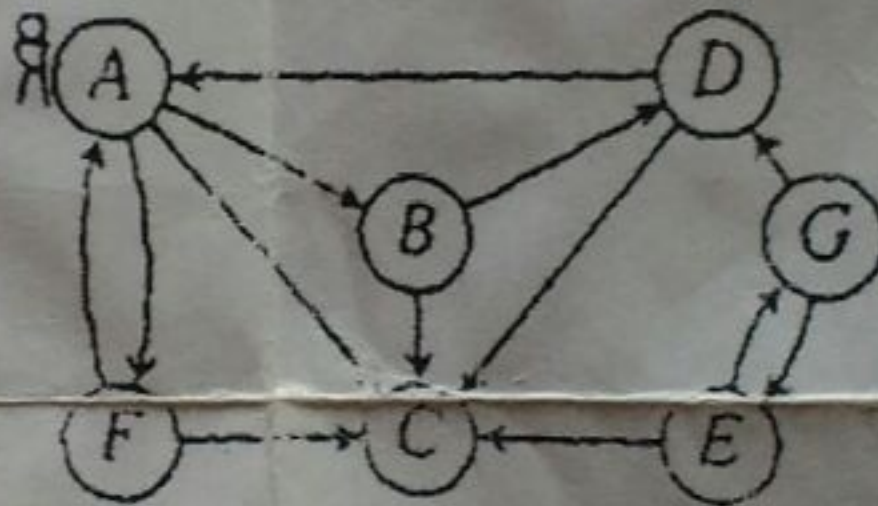
6. Create a B-tree of order 3 for the following data when inserting R, Y, F, X, A, M, C, E, E, T, H, V, L, W, G. You need only draw the trees just before and after each split. [Marks 10]

7. The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an empty hash table of length 10 using open addressing with hash function $h(k) = k \bmod 10$ and linear probing. Find the resultant hash table. [Marks 10]

8. Create an AVL tree for the following sequence K, T, E, V, P, A, M, N, B. [Marks 10]

Section C (All questions are mandatory)

9. Justify the statement, "Graphs are non-linear Data Structures". Write an algorithm for Depth First Search (DFS) traversal of Graphs. Apply DFS algorithm for the following graph from the start node A. [3+7+10]



10. A hospital keeps the records of indoor patients getting treatment in its four major specialty departments: Cardiovascular, Chest, Cancer and Orthopedics. Declare a base class patient with name of its patient, address of patient and name of specialty with input & display functions; and derive four classes namely cardio, chest, cancer and ortho. The derived classes add additional information, date of admission, date of discharge, expenditure incurred by a patient. Write a program for 4 patients each availing services of one of specialty. Display complete information about the patient. (Also use appropriate constructors and destructors in your program) [Marks 20]

OR

Apply Max Heap algorithm to construct binary heap for the following numbers: 14, 34, 35, 17, 28, 79, 10, 12, 65, 78. Apply heap deletion technique to sort the given sequence.

14+6