CLASS: MCA   SEMESTER : II
BRANCH: MCA   SESSION : SP/19

SUBJECT: CA455 FUNDAMENTALS OF DATA STRUCTURES

TIME: 3 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)   Consider a two dimensional array Arr[10][5] with its base address as 2000 and the number of   [5]
         bytes per elements of the array is 4. Compute the address of the element Arr[8][4]. Assume the
         elements are stored in row major order. State the advantage of dynamic memory allocation over
         static memory allocation with example.

Q.1(b)   State the disadvantage of the circularly linked lists and how to solve the issue? Design a   [5]
         pseudocode to interchange the value of the first element with the last element, second element
         with second last element and so on in a doubly linked list.

Q.2(a)   Which data structure is used to convert an infix expression into its corresponding POLISH   [5]
         notation? Use an appropriate data structure to construct a postfix expression for the given infix
         expression. Also evaluate the postfix expression for the given infix expression. Infix: (-
         (A*B)/D)^C+E-F*H*I where A=1, B=2, C=3, D= -1, E= -2, F= -3, H= 0.2, I= -0.2

Q.2(b)   How a priority queue can be implemented? Design an algorithm to count the number of items in   [5]
         a queue.

Q.3(a)   What is the draw back of a binary search tree explain with example? Construct an AVL tree for   [5]
         the given data set O, L D, U, X, M and perform the following operations: Delete L, Delete U,
         Delete X

Q.3(b)   Write down the features of B Tree. Construct a B Tree of order 5 by inserting the list of elements   [5]
         3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, 19. Show every step of
         construction.

Q.4(a)   Compare and contrast Merge sort and Quick sort algorithms. Design the partitional function in   [5]
         Quick sort to justify the position of the pivot element.

Q.4(b)   What do you mean by a complete binary tree? Arrange the given data set to form binary min   [5]
         heap and show one deletion operation maintaining the properties of min heap. The data set is:
         50,40, 35, 25,20,27, 33.

Q.5(a)   Define mathematically the transitive closure of a graph. Justify the sequential representation of   [5]
         a graph with an example.

Q.5(b)   Construct a minimum spanning tree of the following graph using Prims's algorithm. Show every   [5]
         step of the construction.