B. E. Fourth Semester (Computer Technology) / SoE – 2014-15 Examination

Course Code : CT 1223 **Course Name : Advanced Data Structures**

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions carry marks as indicated.
(2) Due credit will be given to neatness and adequate dimensions.
(3) Assume suitable data wherever necessary.

1. Solve any **Two** of the following :—

   (a) What is a Binary Search Tree (BST) ? Make a BST for the following sequence of numbers 45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48 Traverse the tree in Preorder, Inorder and postorder. 3·5

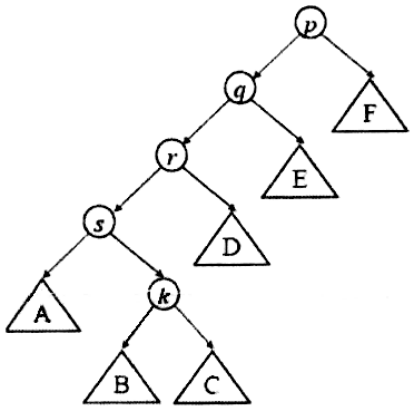
   (b) Build a step wise AVL tree using following sequence and mention balance factor of each node at every level : 21, 26, 30, 9, 4, 14, 28, 18, 15, 10, 2, 3, 7. 3·5

   (c) Construct Red Black Tree using following sequence : C, O, R, N, F, L, A, K, E, S. 3·5

2. Solve any **Two** of the following :—

   (a) What is Multidimensional Search tree. Draw k – D tree for 2 Dimensional and also show graphical representation of it using following sequence : {(3, 7) (8, 1) (6, 6) (2, 6) (1, 7) (8, 6) (5, 9)}. 4

   (b) Consider the following Splay tree and splay the node k.



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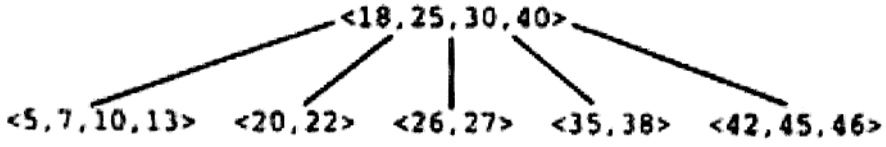
(c) Construct suffix tree for the string addaadd. 4

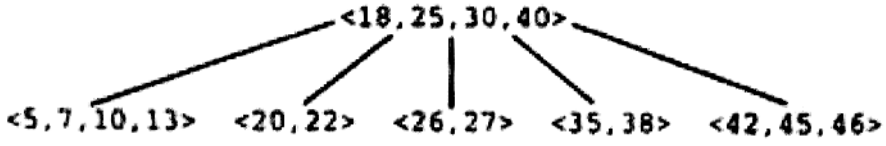
3. Solve any **Two** of the following :—

(a) Insert 42, 32, 15 in following m – way tree where m = 5.



3·5

(b) Perform deletion of 30, 35, 20 in following 5 – way tree.

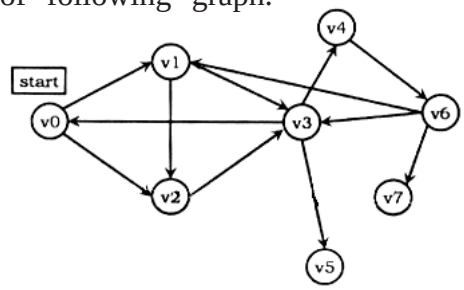


3·5

(c)Build a B tree using following sequence a, g, f, b, k, d, h, m, j, e, s, i, r, x, c, l, n, t, u, p. To construct above tree consider B tree of order 5. 3·5

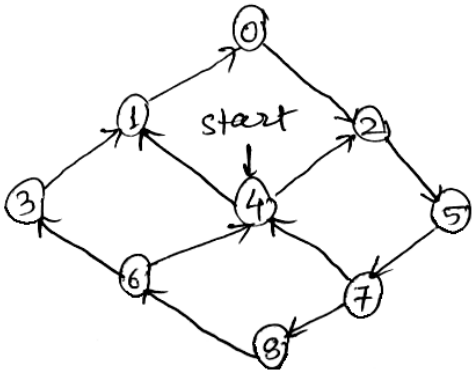
4. Solve any **Two** of the following :—

(a) Define Breadth – First Search and write the BFS algorithm. Also find the BFS sequence of following graph.



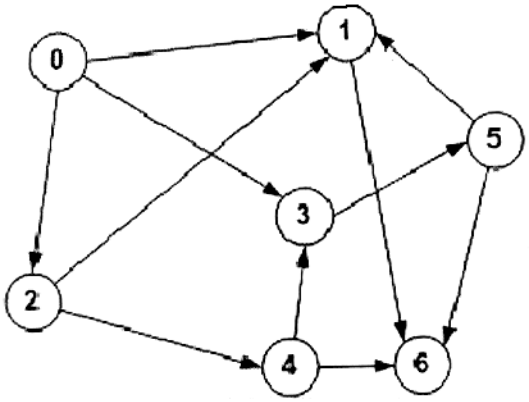
1 + 2 + 1

(b) Define Depth – First Search and write the DFS algorithm. Also find the DFS sequence of following graph.



1 + 2 + 1

(c) Apply topological sort on following graph and obtain the topological sequence/s. Starting vertex is 0.



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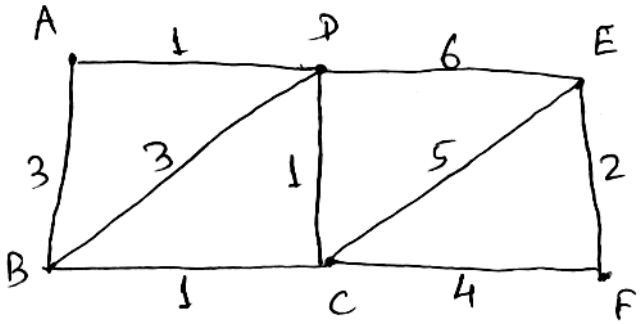
5. Solve any **Three** of the following :—

(a) Discuss Spanning Tree. Apply Kruskal's algorithm to find out minimum spanning tree for the following graph.



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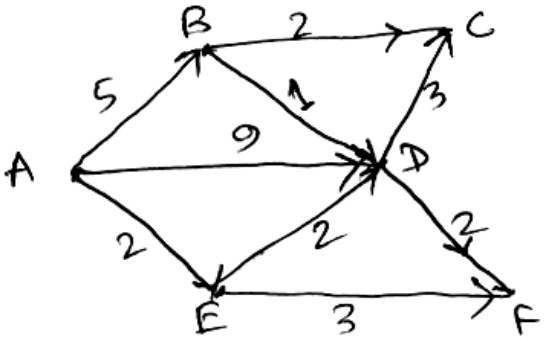
(b) Apply Dijkstra's shortest path algorithm on following graph to explore shortest path from starting vertex A to every other vertex present in the graph.



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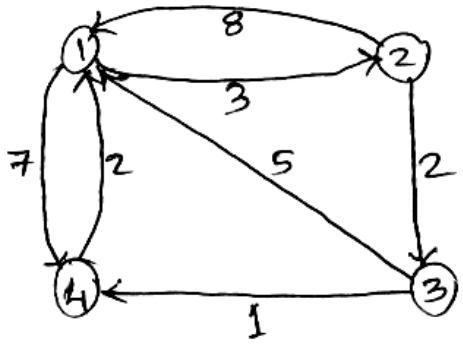
(c) Apply all pair shortest path algorithm on following graph.



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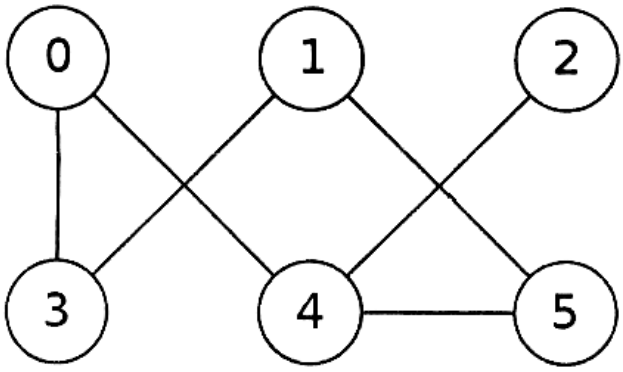
(d) Write a program for checking whether graph is bi – connected or not. Also verify whether following graph is bi – connected or not.



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6. Solve any **Three** of the following :—

(a) Give the syntax of different functions used for dynamic memory allocation and de – allocation. 5

(b) Discuss various functions of disjoint set. 5

(c) Consider the social media network of N people represented by disjoint set. Following queries are performed on them. What will be output of each of them if N = 10 ?

(i) U 2 8

(ii) Q (2)

(iii) U 3 9

(iv) Q (F{2})

(v) U 1 6

(vi) U (F{3}, F{2})

(vii) U (F{2} / F{3})

(viii) U 5 4

(ix) Q U (F{2} / F{3})

(x) Q U (F{3}, F{2})

Where
U indicates Union operation,
Q indicates printing,
F indicates find set. 5

(d) What is garbage collection ? How is it done in C ? 5