City University

Faculty of Science & Engineering

Department of Computer Science and Engineering

Program: B.Sc. in CSE(EVE)

Final Examination Semester: Summer 2018

Course Code: CSE 307 Course Title: Discrete Mathematics

Total Marks: 40 Duration: 2 hours

Answer any 4(four) questions **4 X 10 =40**

1 a) Find the set V (G) of vertices, set E (G) of edges and degree of each vertex of graph G. **3**

b) Prove that sum of the degree of vertices is equal to twice the number of edges. **2**

c) Show the adjacency list representation of G. **2**

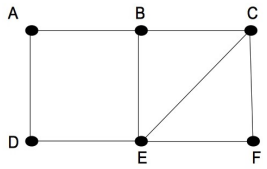

Figure: G

d) Construct an expression tree by using the following algebraic expression. Find out the prefix and postfix notation (7- (2*3))↑ 4) + (9/3). **3**

2 a) Draw a weighted graph Q from adjacency matrix where vertices are in alphbatic order A, B, C, D, E, F (Use right side vertices for drawing Q) **2**

$$\begin{bmatrix} 0 & 0 & 7 & 0 & 4 & 7 \\ 0 & 0 & 8 & 3 & 7 & 5 \\ 7 & 4 & 0 & 0 & 6 & 0 \\ 0 & 3 & 0 & 0 & 0 & 4 \\ 4 & 7 & 6 & 0 & 0 & 0 \\ 7 & 5 & 0 & 4 & 0 & 0 \end{bmatrix}$$

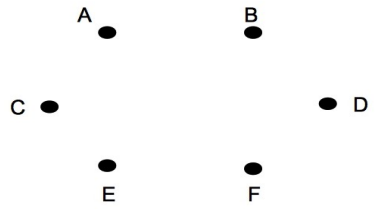

Figure: Q

b) Find the minimum spanning tree (MST) of the graph Q (note: Q has six vertices and MST will have five edges). 4

c) Create the Binary Search Tree (BST) using the following data set and show the array representation of the tree. L = [43, 10, 79, 90, 12, 54, 11, 9, 50]. 4

3 a) Solve the following system equations using its augmented matrix **6**

$$x + 2y - 4z = -3$$
$$2x + 6y - 5z = 2$$
$$3x + 11y - 4z = 12$$

b) Let $A = \begin{bmatrix} 1 & 2 \\ 4 & -3 \end{bmatrix}$. Find (a) A^2 (b) f (A), where $f(x) = x^2+2x-2$. **4**

4 a) In how many ways can four mathematics books, three history books, three chemistry books, and two sociology books be arranged on a shelf so that all books of the same subject are together? **5**

b) A bag contains six white marbles and five red marbles. Find the number of ways four marbles can be drawn from the bag if (a) they can be any color; (b) two must be white and two red; (c) they must all be of the same color. **5**

5 a) Two cards are drawn at random from an ordinary deck of 52 cards. Find the probability p that (a) both are spades (b) one is a spade and one is a heart. **5**

b) A pair of fair dice is thrown. If the two numbers appearing are different, find the probability p that (a) the sum is 6; (b) an ace appears; (c) the sum is 4 or less. **5**