United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Final Exam. : : Trimester: Fall 2019

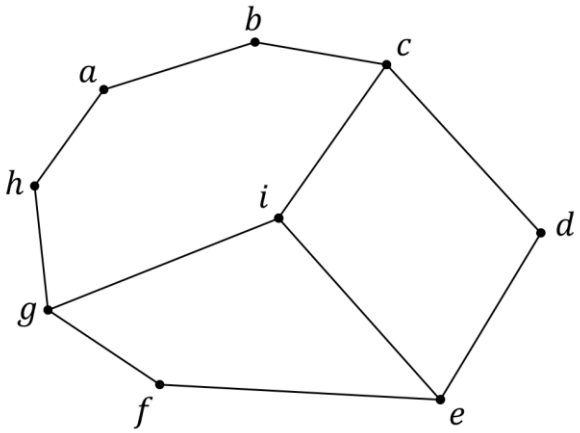
Course Code: CSE 2213, Course Title: DISCRETE MATHEMATICS

Total Marks: **40** Duration: 2 hr

Answer all the questions. Figures are in the right-hand margin indicate full marks.

Question 1

a) Find out if the following graph is bipartite or not, using two coloring algorithm. If bipartite, show the graph in bipartite form. [4]

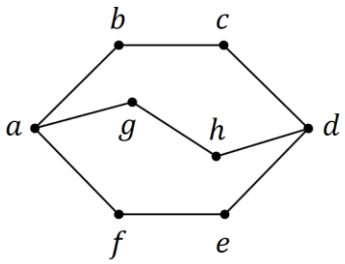


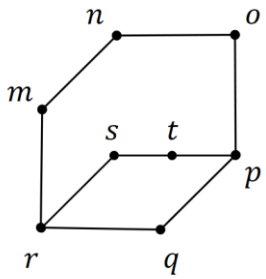
b) Using handshaking theorem, show that a complete bipartite graph $K_{m,n}$ has mn edges. [2]

c) An undirected graph has 9 vertices. 4 of them are of degree x, and the remaining 5 are of degree y. Which one among x and y must be even? Explain your answer using handshaking theorem. [2]

Question 2

a) Find out if the following graphs are isomorphic. [3]

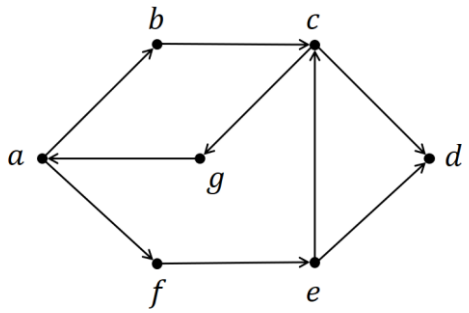




b) The adjacency list of a graph is given here. Draw the graph. [3]

Vertex	Adjacency
a	b, e
b	a, c, d, f
c	d
d	e, f
e	a, d
f	b

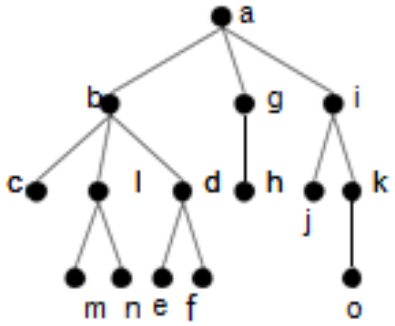
c) Find out if the following graph is strongly connected. Explain your answer briefly. [2]



Question 3

a) How many leaves does a full 3-ary tree with 100 vertices have? [2]

b) Find the preorder, inorder and postorder traversal orders of the following tree: [3]



c) Evaluate the following expressions: [1.5+1.5]

i) + – ↑ 3 2 ↑ 2 3 / 6 – 4 2

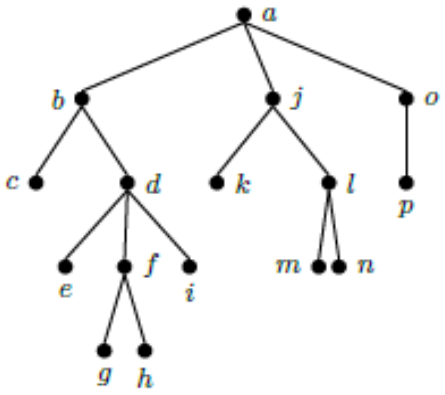
ii) 3 2 * 2 ↑ 5 3 – 8 4 / * –

Question 4

a) Construct a binary search tree using the following integers: [3]

10, 5, 15, -5, 4, 25, 20

b) How do you determine whether a rooted m-ary tree is balanced or not? Find out if the following tree (T) is balanced? [1+1]



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c) Find the following from the tree in Question 4(b). [1+1+1]

i. Ancestors of **h** ii. parent of **a** iii. sub-tree rooted at **o**

Question 5

a) The vehicle registration numbers in Dhaka city are formed as follow: first, these registration numbers contain the words “Dhaka Metro", followed by the vehicle class (represented by one of 31 Bangla letters), vehicle series (a 2-digit number from 11 to 99), and the vehicle number (represented by a 4-digit number). How many registration numbers can be created in this way? [3]

b) Among a set of 5 black balls and 3 red balls, how many selections of 5 balls can be made such that at least 3 of them are black balls. [3]

c) How many 4 digit numbers that are divisible by 10 can be formed from the numbers 3, 5, 7, 8, 9, 0 such that no number repeats? [2]