Total No. of Questions – [06] Total No. of Printed Pages: 2

G.R. No.	

DECEMBER 2021 – END SEM EXAM

S. Y. B. TECH. (COMPUTER ENGINEERING) (SEMESTER - I)

COURSE NAME: DISCRETE MATHEMATICS

COURSE CODE: ES21203CS

(PATTERN 2020)

Time: [1 Hr] [Max. Marks: 30]

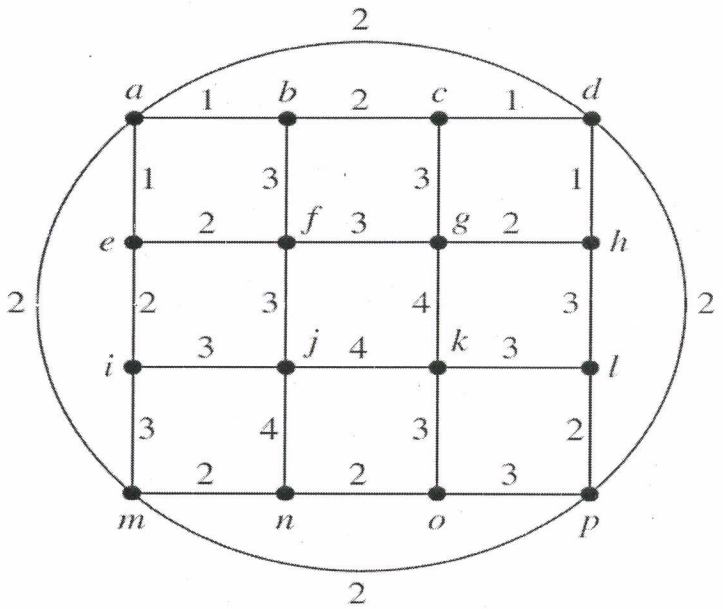
Instructions to candidates:

1) **Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed.**
4) **Use suitable data where ever required.**

Q.1 a Construct BST for following Data: [4]

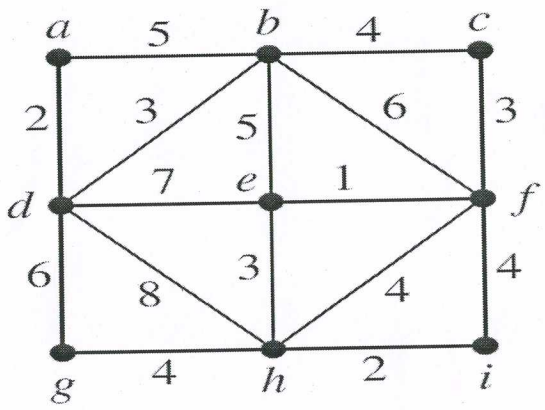
13, 3, 4, 12, 14, 10

Q.1 b Solve to find a maximum spanning tree for the weighted graph given below: [6]



OR

Q.2 a Solve to find a minimum spanning tree using Kruskal's algorithm for the weighted graph given below: [4]



Q.2 b Represent the expression ((x +2) ↑ 3) * (y −(3+x)) − 5 using a binary tree. 6
Write this expression in:
a) prefix notation.
b) postfix notation

Q.3 a Imagine a certain college has 6,000 American students, at least one from each of the 50 states. Then show there must be a group of 120 students coming from same state. 4

Q.3 b Calculate many permutations of the letters ABCDEFG contain? 6
a) the string BCD?
b) the string CFGA?
c) the strings BA and GF?
d) the strings ABC and DE?
e) the strings ABC and CDE?
f) the strings CBA and BED?.

OR

Q.4 a Expand $(x^3 - y^2)^4$ using binomial coefficient 4

Q.4 b Thirteen people on a softball team show up for a game. 6
a) How many ways are there to choose 10 players to take the field?
b) How many ways are there to assign the 10 positions by selecting players from the 13 people who show up?
c) Out of the 13 people who show up, three are women. How many ways are there to choose 10 players to take the field if at least one of these players must be a woman?

Q.5 a Prove that the set Z of all integers is a ring with respect to the addition and multiplication of integers. 4

Q.5 b If M is set of all non-singular matrices of order 'n x n'. then show that M is a group with respect to matrix multiplication. Is (M, *) an abelian group? Justify your answer. 6

OR

Q.6 a Show that the set G = {1,2,3,4,5,6} is an abelian group with respect to multiplication modulo 7. 4

Q.6 b Prove that the necessary and sufficient conditions for a non-empty subset S of the ring R to be a subring of R are: 6
(i) a,b ∈ S => a-b ∈ S
(ii) a,b ∈ S => a.b ∈ S