Total No. of Questions – [06] Total No. of Printed Pages: 03

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IT: U239-142 (ESE)

DECEMBER 2019 ENDSEM
S. Y. B.TECH. (COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY)
(SEMESTER –III)
COURSE NAME: Discrete Mathematics
COURSE CODE: ES21182CS / ES21182IT
(PATTERN 2018)

Time: [2 Hours] [Max. Marks: 50]

(*) Instructions to candidates:
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.
4) Assume suitable data where ever required.

Q.1) Attempt any **one**

a) Let p, q, and r be the propositions [4]
p : Grizzly bears have been seen in the area.
q : Hiking is safe on the trail.
r : Berries are ripe along the trail.
Write following propositions using p, q, and r and logical connectives (including Negations).
a) Berries are ripe along the trail, but grizzly bears have not been seen in the area.
b) Grizzly bears have not been seen in the area and hiking on the trail is safe, but berries are ripe along the trail.
c) If berries are ripe along the trail, hiking is safe if and only if grizzly bears have not been seen in the area.
d) It is not safe to hike on the trail, but grizzly bears have not been seen in the area and the berries along the trail are ripe

b) A total of 1232 students have taken a course in Spanish, 879 have taken a course in French, and 114 have taken a course in Russian. Further, 103 have taken courses in both Spanish and French, 23 have taken courses in both Spanish and Russian, and 14 have taken courses in both French and Russian. If 2092 students have taken at least one of Spanish, French, and Russian, how many students have taken a course in all three languages? [4]

Q.2) Attempt any **one**

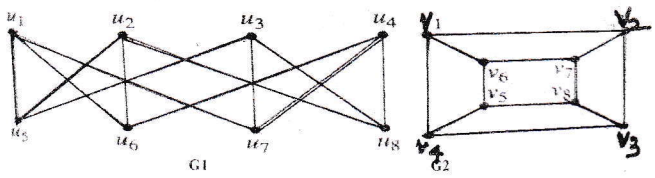
a) For Set A={1,2,3,4} Find the smallest relation containing the relation [4]
R= {(1, 2), (1, 4), (3, 3), (4, 1)} that is
a) Reflexive and transitive.
b) Reflexive and symmetric.

b) Answer these questions for the poset A={3, 5, 9, 15, 24, 45}, [4]
R = {(x, y): x/y }
a) Find all upper bounds of {3, 5}.
b) Find the least upper bound of {3, 5}, if it exists.

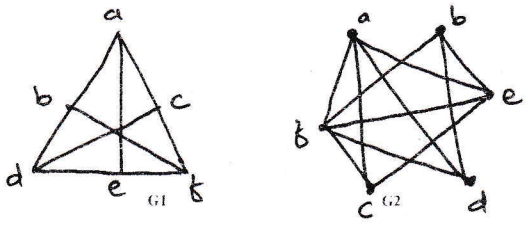
c) Find all lower bounds of {15, 45}.
d) Find the greatest lower bound of {15, 45}, if it exists.

Q.3) Attempt any **one**

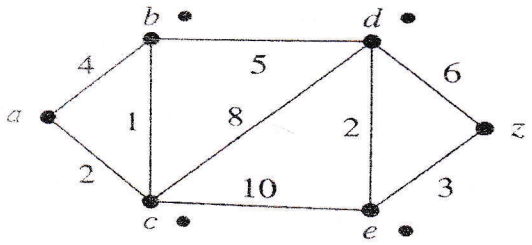
a) Determine whether two given graphs are isomorphic. [3]



Determine graphs are planner or not, if yes draw Planar embedding. [3]



b) Use Dijkstra's algorithm to find the length of a shortest path between the vertices a and z in the weighted graph displayed in Figure [6]

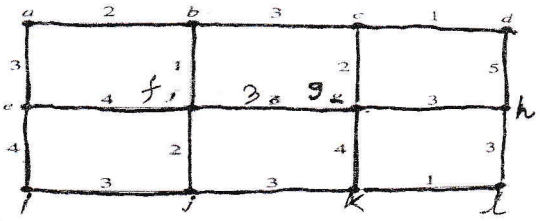


Q.4) Attempt any **one**

a) What is the value of each of these prefix expressions? [4]
i) − * 2 / 8 4 3 ii) ↑ − * 3 3 * 4 2 5

Represent the expression (x + x*y) + (x/y) using binary tree. Write this expression in [6]
i) Prefix notation ii) Postfix notation iii) Infix notation.

b) Find Minimum Spanning Tree using Prim's algorithm for given diagram [4]



Use Huffman coding to encode these symbols with given Frequencies: a: 0.20, b: 0.10, c: 0.15, d: 0.25, e: 0.30. What is the average number of bits required to encode a character? [6]

Q.5) Attempt any **one**

a) How many permutations of the letters *ABCDEFG* contain [6]
i) The string *BCD* ii) The string *CFGA* iii) The strings *BA* and *GF*
iv) The strings *ABC* and *DE*

The English alphabet contains 21 consonants and five vowels. How many strings of six lowercase letters of the English alphabet contain [7]
i) Exactly one vowel ii) Exactly two vowels iii) At least one vowel iv) At least two vowels

b) How many positive integers less than 1000 [6]
i) are divisible by 7 ii) are divisible by 7 but not by 11 iii) are divisible by both 7 and 11 iv) are divisible by either 7 or 11

How many ways can we make a licence place with [7]
i. 3 even number and 3 letters?
ii. 6 letters that are not the same?
iii. 2 numbers, 2 letters, 1 odd number, 1 even number and 2 vowels?

Q.6) Attempt any **one**

a) A die is thrown twice and the sum of the numbers appearing is observed to be 6. What is the conditional probability that the number 4 has appeared at least once? [6]

Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. Find the probability that there is at least one defective egg. [7]

b) A family has two children. What is the probability that both the children are boys given that at least one of them is a boy? [6]

If a fair coin is tossed 10 times, find the probability of (i) exactly six heads (ii) at least six heads [7]