Total No. of Questions – [03]

Total No. of Printed Pages: 02

G.R. No.	

paper code: U239-142(T1) - IT
paper code: U239-122(T1) - comp

OCTOBER 2019/ INSEM (T1)
S. Y. B.TECH. (COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY)
(SEMESTER – III)

COURSE NAME: DISCRETE MATHEMATICS
COURSE CODE: ES21182CS / ES21182IT
(PATTERN 2018)

Time: [1 Hour] [Max. Marks: 20]

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 and q be the propositions [04]
p : It is below freezing.
q : It is snowing.
Write these propositions using p and q and logical connectives (Including negations).
1. It is below freezing and snowing.
2. It is below freezing but not snowing.
3. It is not below freezing and it is not snowing.
4. It is either snowing or below freezing (or both).

Prove that $1 \cdot 1! + 2 \cdot 2! + \cdots + n \cdot n! = (n+1)! - 1$ whenever n is a positive integer [04]

b) In a survey of 270 college students, it is found that 64 like brussels sprouts, 94 like broccoli, 58 like cauliflower, 26 like both brussels sprouts and broccoli, 28 like both Brussels sprouts and cauliflower, 22 like both broccoli and cauliflower, and 14 like all three vegetables. How many of the 270 students do not like any of these vegetables? [04]

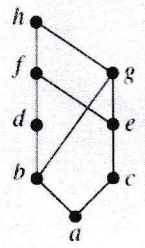
Show that $A \oplus B = (A - B) \cup (B - A)$ using Venn Diagram [04]

Q 2 Attempt any **one**

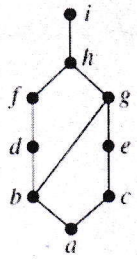
a) Categorize whether given relation on the set {1, 2, 3, 4} is reflexive, symmetric, antisymmetric or transitive. [04]
1. {(2, 2), (2, 3), (2, 4), (3, 2), (3, 3), (3, 4)}
2. {(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4)}

Determine whether the posets with these Hasse diagrams are lattices. [04]

I)



II)



b) Determine whether each of these functions is a bijection from **R** to **R**. [04]

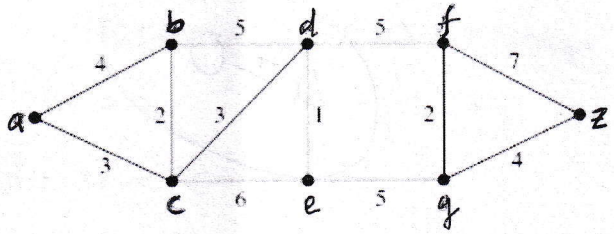
1. $f(x) = 2x + 1$
2. $f(x) = x^2 + 1$
3. $f(x) = x^3$
4. $f(x) = (x^2 + 1)/(x^2 + 2)$

Solve using Warshall's algorithm to find the transitive closures of the following relations [04]

$\{(2, 1), (2,3), (3,1), (3,4), (4,1), (4, 3)\}$

Q 3 Attempt any **one**

a) Construct a shortest path between a and z in given weighted graphs using Dijkstra's Algorithm. [04]



b) In following graph, determine whether the given graph has a Hamilton circuit and Eulerian cycle. If it does, find such a circuit/cycle. If it does not, give an argument to show why no such circuit/cycle exists. [04]