Total No. of Pages 3 Roll No.....

III SEMESTER **B.Tech.**

Supplementary EXAMINATION ***Feb-2020***

IT-205 DISCRETE STRUCTURES

Time: 3:00 Hours *Max. Marks: 50*

Note: Answer any FIVE questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1[a] Show that $(\neg q \wedge (p \Rightarrow q)) \Rightarrow \neg p$ $(\neg q \wedge (p \Rightarrow q)) \Rightarrow \neg p$ is a tautology.[5]

[b] Use mathematical induction to show that
$1 + 2 + 3 + 4 + \ldots\ldots\ldots + n = n(n+1)/2$. [5]

Q.2[a] Solve the following recurrence relation: $a_n - 5\,a_{n-1} + 6\,a_{n-2} = 2^n$ with initial conditions $a_0 = -1$ and $a_1 = 1$. [5]

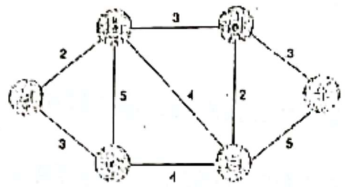
[b] Let the universal set U = {1, 2, 3.....,10}. Let A = {2, 4, 7, 9} B = {1, 4, 6, 7, 10} and C = {3, 5, 7, 9}.
Find 1) A ∪ B, 2) A ∩ B, 3) B∩C, 4) (A∩B) ∪C, 5) (B∪C) ∩ C [5]

Q.3 [a] Define Equivalence Relation. Let assume that F be a relation on the set R real numbers defined by xFy if and only if x-y is an integer. Prove that F is an equivalence relation on R. [5]

[b] Let f: R → R be a function defined as f(x) = 2x+1 and g: R → R be a function defined as $g(x) = x/3$. Find $f^{-1}(x)$, $g^{-1}(x)$, $(f \circ g)^{-1}(x)$, and $(g^{-1} \circ f^{-1})(x)$. What can you conclude? [5]

Q.4[a] Define Spanning Tree and Minimal Spanning Tree (MST). Discuss the difference between Prim's and Kruskal's algorithm to find MST

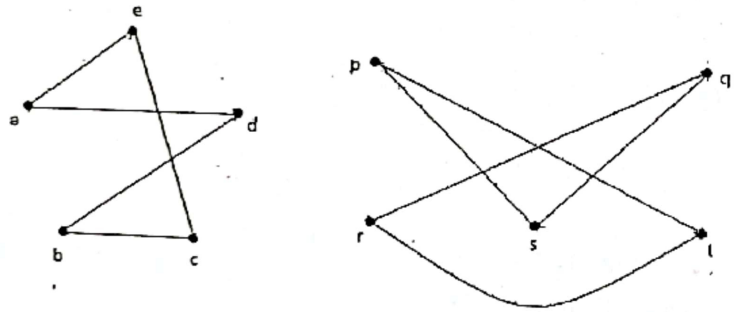
.Also, Find Minimal Spanning Tree of following graph using Kruskal's algorithm. [5]



[b] Draw Hasse diagram for ({3, 4, 12, 24, 48, 72}, /) and (D_{12}, /).

[5]

Q.5[a] What are Isomorphic graphs? Determine whether the following graphs are isomorphic or not?



[5]

[b] Explain Euler's Formula with Proof in Graph Theory. Let G be a graph that has: 21 edges and 7 vertices of degree 1 each; 3 vertices of degree 2 each; 7 vertices of degree 3 each; x vertices of degree 4 each. Compute how many vertices are in G. [2+3]

Q6 Write short notes on any two:

a) Pigeonhole principle with example
b) Partial Order Relation with example
c) Euler and Hamiltonian Cycle in graph

[END]