Aliah University

End-Semester Examination - 2020

(For 2nd Year 3rd Semester B.Tech. CSE[Regular & Supplementary])

Paper Name: ***Discrete Mathematics*** **Full Marks:** ***80***

Paper Code: ***MATUGBS04 (Regular) / MA 237 (Supplementary)*** **Time:** ***3 Hrs***

Group – A **(10X1=10)**

1. **Mention whether statements are True/False –**
   a) All Regular graphs are simple.
   b) The relation R={(a,b), (b,a)} on set X={a,b} is Irreflexive.
   c) All Strictly Binary Trees are Complete Binary Tree.
   d) A bridgeless graph can't have Cut-vertex.
   e) Euler graph has at least one Euler trail.
   f) $(p \rightarrow q) \wedge (\neg p \leftrightarrow q)$ is a Contingency.
   g) Any graph with chromatic number 2 is a Tree.
   h) If |A|=n then |P(A)|= Cardinality of power set of A $=2^n$.
   i) Vertex connectivity is always "less than or equal to" Edge connectivity for any graph.
   j) Every To-set is a Lattice.

Group – B
(Answer any 6 questions) **(6X5=30)**

2. Prove that – a non-empty and non-trivial simple graph has at-least 2 vertices of equal degree.

3. A complete Binary Tree is having 62 nodes. Then calculate the height of that tree.

4. What is the Chromatic Polynomial of a Complete Bipartite graph $K_{m,n}$ when 'x' is the number of color given?

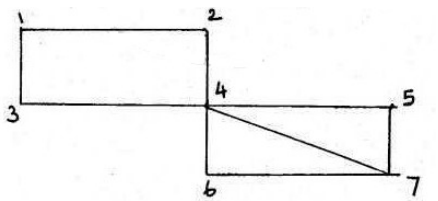
5. If there exists Functions from set A to set B, where |A|=m and |B|=n then how many one-to-one and onto functions are possible?

6. Find out number of "neither Reflexive nor Irreflexive relations" possible on set A, where cardinality of A=n. Explain your answer.

7. Show that the statement given below is a tautology (without using truth table) –

$$(P \vee Q) \wedge \neg(\neg P \wedge (\neg Q \vee \neg R)) \vee (\neg P \wedge \neg Q) \vee (\neg P \wedge \neg R)$$

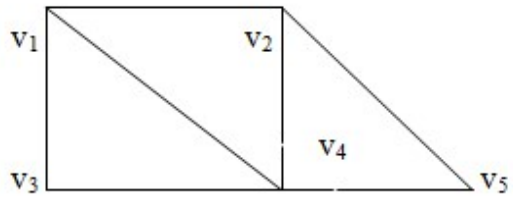
8. Find Hamiltonian path, Hamiltonian cycle (if exits) and state whether the graph given below is Hamiltonian graph or not?



Group – C
(Answer any 4 questions) (10X4=40)

9. a) What is Spanning Tree? Mention some important characteristics of Spanning Trees.

b) Calculate number of spanning trees possible for – Complete graph - K_7, Cyclic graph - C_9 and the graph given below- 4+6=10

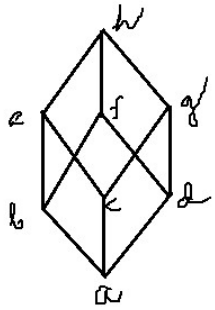


10. a) Define Binary Search Tree. Insert values given below (in the order) and form the binary search tree(BST) –

Values are (in order): 15, 22, 18, 7, 20, 3, 35, 32, 9, 91

b) Delete 22 and show new BST. 2+6+2=10

11. Look at graph below and answer –



a) Is it a Distributive Lattice? Explain why?

b) Is it a Planar Graph? Explain why? 5+5=10

12. Define set in set theory. Explain concepts (with example) of Power set, Subtraction of sets, Compliment of any set and Cartesian Products of two sets. 2+2*4=10

13. Consider the set D_{50} = {1,2,5,10,25,50} and the relation divides (/) make a Po-set =(D_{50}, /).

a) Draw the Hasse Diagram of D50 with relation divides (/).

b) Find Upper Bound and Lower bound of {5,10}

c) Find GLB and LUB for {5,10}

d) Is it a Lattice? 5+2+2+1=10