Code: 15A05302 **R15**

B.Tech II Year I Semester (R15) Supplementary Examinations June 2018

DISCRETE MATHEMATICS

(Common to CSE & IT)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Show that the propositions $p \rightarrow q$ and $\neg p \vee q$ are logically equivalent.

(b) Write the statement in symbolic form “Some integers are not square of any integers”.

(c) Define a set and a power set. Determine the power set of P{ 4, 5, 6 }.

(d) Let the relation R is defined by x+2y = 10. Find the domain and range of R

(e) What is the difference between semi group and subgroup?

(f) What do you mean by group isomorphism? Give example.

(g) What do you mean by graph isomorphism, show it by example.

(h) Define Bi-Connected components and articulation points with an example.

(i) Write about generating functions.

(j) Write short notes on arrangements with Forbidden positions.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) What is meant by tautology? Show that $((P \vee Q) \wedge \neg(\neg P \wedge (\neg Q \vee \neg R))) \vee (\neg P \wedge \neg Q) \vee (\neg P \wedge \neg R)$ is a tautology.

(b) Obtain the PCNF of $P \vee (\neg P \rightarrow (Q \vee (\neg Q \rightarrow R)))$.

OR

3 (a) Define PDNF and obtain Principal Disjunctive Normal Form $(\neg P \vee \neg Q) \rightarrow (P \leftrightarrow \neg Q)$.

(b) Show that $\neg (p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are equivalent.

UNIT – II

4 (a) If relations R and S are reflexive, symmetric, and transitive, show that R ∩ S is also reflexive, symmetric, and transitive.

(b) Let A={0,1,2} and B={a, b}. Find A*B and B*A.

OR

5 Use Demorgan’s laws to prove that the complement of:

$(\overline{A} \cap B) \cap (A \cup \overline{B}) \cap (A \cup C)$ is $(A \cup \overline{B}) \cup (\overline{A} \cap (B \cup \overline{C}))$.

UNIT – III

6 Draw a POSET diagram for [D6; /] and examine whether it is meet-semi lattice or not.

OR

7 Let G_1 and G_2 be subgroups of a group G:

(i) Show that $G_1 \cap G_2$ is also a subgroup of G

(ii) Is $G_1 \cup G_2$ is always a subgroup of G.

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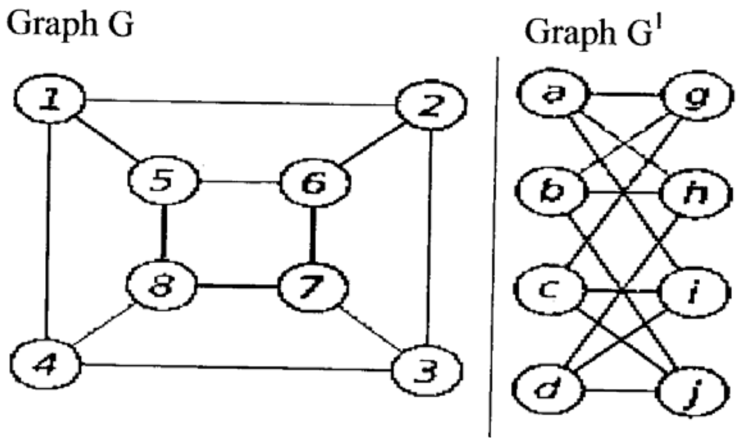
UNIT – IV

8 Differentiate between Eulerian graph & Hamiltonian graph with example. And also give an example of a graph which is Eulerian but not Hamiltonian.

OR

9 When we say that two graphs G and G^1 are isomorphic. Are the following two graphs are isomorphic or not?



UNIT – V

10 (a) Use the principle of inclusion–exclusion to find the number of positive integers less than 10,000 that are not divisible by either 4 or by 6.

(b) Write the principle of inclusion–Exclusion. From a group of 10 Professors how many ways can committees of 5 members are formed so that at least one Professor A and Professor B will be included.

OR

11 Examine in how many ways a photographer at a wedding can arrange 6 people in a row from a group of 10 people, where the bride and the groom are among these 10 people, if: (i) The bride must be in the picture? (ii) Both the bride and groom must be in the picture? (iii) Exactly one of the bride and the groom is in the picture.

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