(114)

YMCA UNIVERSITY OF SCIENCE AND TECHNOLOGY, FARIDABAD

B.TECH EXAMINATION (Under CBS)

DISCRETE STRUCTURES (CE – 203)

TIME: 3 hrs **M. Marks: 60**

Note : Part – I is compulsory and in part – II attempt any four questions.

PART - I

Q. No. 1(a) If A = {1,2,3}, B={3,4}, and C={ 4,5,6} determine A X (B ∩ C).

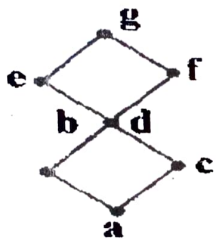
(b) Define symmetric difference of two sets A and B and explain it with Venn – diagram.

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

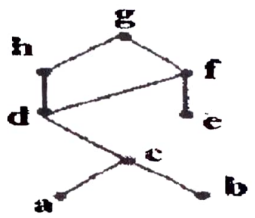
(d) In how many ways can five examinations be scheduled in a week so that no two examinations are scheduled on the same day considering Sunday as a holiday?

(e) In how many ways can a committee consisting of three men and two women be chosen from seven men and five women?

(f) Determine whether the posets shown below are lattices or not.



(I)



(II)

(g) Define cut point and bridge of a graph with examples.

(h) Prove that the sum of the degrees of all vertices of a graph is equal to twice the number of edges.

(i) Solve the difference equation $a_r - 3a_{r-1} + 2a_{r-2} = 0$.

(j) Consider the set A = {-1, 0, 1}. Investigate the set A as closure under addition and multiplication. [2*10]

PART – II

Q. NO. 2(a) Prove the following by Mathematical Induction

$$1+2+2^2+2^3+\ldots\ldots\ldots\ldots\ldots\ldots+2^n = 2^{n+1} - 1 \quad (\text{for } n \geq 0)$$

Q. No. 2(b) In a survey among 1000 people, 595 are democrats, 595 wear glasses and 550 like ice – cream. 395 of them are democrats who wear glasses , 350 of them are democrats who like ice – cream. 400 of them wear glasses and like ice-crem and 250 all the three. Find out how many of them are not Democrats , do not wear glasses and do not like ice – cream?

Q. NO. 2(c) prove that $(A \cup B)^c = A^c \cap B^c$ [3+3+4]

Q. NO. 3(a) State and prove the Lagrange's theorem.

Q. No. 3(b) Define tautology and contradiction. Verify that the proposition $p \vee \neg (p \wedge q)$ is a tautology

[5+5]

Q. NO.4(a) Find the particular solution of the difference equation

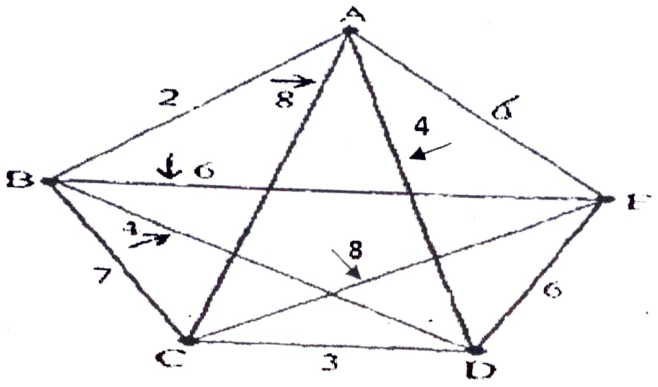
$$a_r - 4a_{r-1} + 4a_{r-2} = (r+1).2^r$$

Q. No. 4(b) Obtain a principal conjunctive Normal form (PCNF) for the following formula

$$(q \rightarrow p) \wedge (\neg p \wedge q)$$

[5+5]

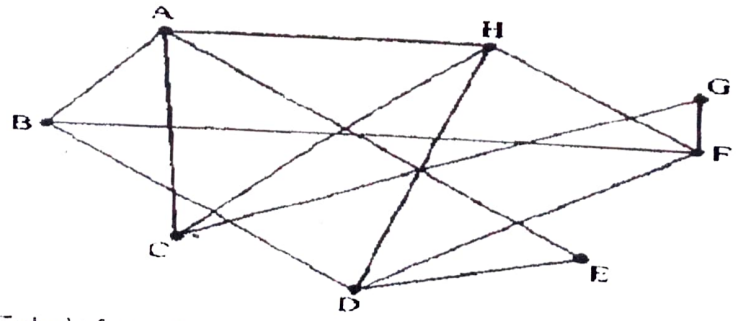
Q. No. 5(a) What is minimum spanning tree? Find a minimum spanning tree for the following weighted graph.



Q. No. 5(b) Solve the recurrence relation $a_{r+2} - 5a_{r+1} + 6a_r = 2$ by the method of generating functions satisfying the initial conditions $a_0 = 1$ and $a_1 = 2$.

Q. No. 6(a) What is Welch – Powell's algorithm? Use this algorithm to determine the chromatic number of following graph.

[5+5]



Q. No. 6(b) State Euler's formula for planer graphs and illustrates it for two such graphs.

5+5]

Q. No. 7(a) Show whether the relation $(x,y) \in R$, if $x \geq y$ defined on the set of positive integers is a partial order relation.

Q. No. 7(b) Define each of following and explain with example:

(i) Integral domain

(ii) Isomorphic graphs