Model Question Paper

Discrete Mathematics - Part I

12th Standard

Maths

Reg.No. :

I.Answer all the questions

II.Use Blue pen only.

Time : 01:00:00 Hrs

Total Marks : 65

Section-A

5 x 1 = 5

1) Which of the following are statements? i) May God bless you. ii) Rose is a flower iii) Milk is white. iv) 1 is a prime number

(a) (i), (ii), (iii) (b) (i), (ii),(iv) (c) (i), (iii), (iv) (d) (ii), (iii), (iv)

2) If a compound statement is made up of three simple statements, then the number of rows in the truth table is

(a) 8 (b) 6 (c) 4 (d) 2

3) If p is T and q is F, then which of the following have the truth value T ? (i) p ∨q (ii) ~ p ∨q iii) p v~q iv) p ^ ~ q

(a) (i), (ii), (iii) (b) (i), (ii),(iv) (c) (i), (iii), (iv) (d) (ii), (iii), (iv)

4) The number of rows in the truth table of ~ [p ^ (~q)] is

(a) 2 (b) 4 (c) 6 (d) 8

5) The conditional statement $p \rightarrow q$ is equivalent to

(a) p v q (b) p v ~ q (c) ~p v q (d) p ^ q

Section-B

4 x 3 = 12

6) Use the truth table to establish which of the following statements are tautologies and which are contradictions . $(p \vee q) \vee (\sim (p \vee q))$

7) Use the truth table to establish which of the following statements are tautologies and which are contradictions . $(p \wedge (\sim q)) \vee ((\sim p) \vee q)$

8) Use the truth table to establish which of the following statements are tautologies and which are contradictions . $q \vee (p \vee (\sim q))$

9) Use the truth table to establish which of the following statements are tautologies and which are contradictions . $(p \wedge (\sim p)) \wedge ((\sim q) \wedge p)$

Section-C

4 x 6 = 24

10) Construct the truth table for the following statements: $(p \vee q) \wedge (\sim q)$

11) Construct the truth table for $(p \wedge q) \vee (\sim r)$

12) Construct the truth table for $(p \vee q) \wedge r$

13) Show that $\sim (p \vee q) \equiv (\sim P) \wedge (\sim q)$

Section-D

3 x 10 = 30

14) Show that $(z, *)$is an infinite abelian group where * is defined as $a * b = a + b + 2.$

15) a) Let G be the set of all rational numbers except 1 and * be defined on G by $a * b = a + b - ab$ for all $a, b \in G$. Show that (G , *) is an infinite abelian group.

(OR)

b) Prove that the set of four functions f_1, f_2, f_3, f_4 on the set of non-zero complex numbers $C - \{0\}$ defined by $f_1(z) = z, f_2(z) = -z, f_3(z) = \frac{1}{z} and f_4(z) = -\frac{1}{z} \forall z \in C - \{0\}$ forms an abelian group with respect to the composition of functions.

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