Model Question Paper

Discrete Mathematics - Part V

12th Standard

Maths

Reg.No. :

I.Answer all the questions.

II.Use blue pen only.

Time : 01:30:00 Hrs

Total Marks : 85

Section-A

5 x 1 = 5

1) Which of the following are statements?

i. 7 + 2 < 10

ii. The set of rational numbers is finite

iii. How beautiful you are

iv. Wish you all success.

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

2) The truth values of the following statements are

i)All the sides of a rhombus are equal in length

ii) $1+\sqrt{19}$ is an irrational number

iii)Milk is white

iv)The number 30 has four prime factors.

(a) T T T F (b) T T T T (c) T F T F (d) F T T T

3) The truth values of the following statements are

i) Paris is in France

ii)sinx is an even function

iii) Every square matrix is non-singular

iv)Jupiter is a planet

(a) T F F T (b) F T F T (c) F T T F (d) F F T T

4) Let p be " Kamala is going to school " and q be " There are twenty students in the class ". " Kamala is not going to school or there are twenty students in the class " stands for

(a) $p \vee q$ (b) $p \wedge q$ (c) $\sim p$ (d) $\sim p \vee q$

5) In congruence modulo 5,$\{x \epsilon Z / x=5k+2, k \epsilon Z\}$ represents

(a) $[0]$ (b) $[5]$ (c) $[7]$ (d) $[2]$

Section-B

3 x 3 = 9

6) Prove that identity element of a group is unique.

7) Prove that inverse element of an element of a group is unique.

8) Show that $\left(a^{-1}\right)^{-1}=a \quad \forall \quad a \in G$, a group.

Section-C

4 x 6 = 24

9) Prove that (Z,+) is an infinite abelian group.

10) Show that (R- {0},.) is an infinite abelian group. Here denotes usual multiplication.

11) Prove that the set of all 4^{th} roots of unity forms an abelian group under multiplication

12) State and prove cancellation laws on groups.

Section-D

5 x 10 = 50

13) 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.

14) a) Show that the nth roots of unity form an abelian group of finite order with usual multiplication.

(OR)

b) Show that the set G of all positive rational forms a group under the composition * defined by a $a*b=\frac{ab}{3}$ for all $a, b \in G$.

15) a) Show that$(Z_n, +_n)$ forms group.

(OR)

b) Show that $(Z_7-\{[0]\} \cdot_7)$ forms a group.

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