Model Question Paper

Discrete Mathematics - Part II

12th Standard

Maths

Reg.No. :

I.Answer all questions.

II.Use Blue pen only.

Time : 01:00:00 Hrs

Total Marks : 75

Section-A

5 x 1 = 5

1) Which of the following is a contradiction?

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

2) $p \leftrightarrow q$ is equivalent to

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

3) Which of the following is not a binary operation on R?

(a) a * b = ab (b) a * b = a – b (c) a * b = $\sqrt{ab}$ (d) a * b = $\sqrt{a^2 + b^2}$

4) A monoid becomes a group if it also satisfies the

(a) closure axiom (b) associative axiom (c) identity axiom (d) inverse axiom

5) Which of the following is not a group?

(a) $(Z_n, +_n)$ (b) (Z, +) (c) (Z, .) (d) (R, +)

Section-B

6 x 3 = 18

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

7) Construct the truth tables for the following statements: $\sim (p \vee q)$

8) Construct the truth tables for the following statements: $(p \vee q) \vee (\sim p)$

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

Section-C

3 x 6 = 18

10) Show that $((\sim P) \vee (\sim q)) \vee p$ is a tautology.

11) Use the truth table to determine whether the statement $((\sim P) \vee q) \vee (p \wedge (\sim q))$ is a tautology.

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

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

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

Section-D

3 x 10 = 30

14) Show that $(Z_7 - \{[0]\}\ ._7\ )$ forms a group.

15) 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 $a, b \in G$.

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