MODEL QUESTION PAPER

(SET-II)

WITH ANSWERS OF MULTIPLE-CHOICE QUESTIONS

For

P.G. (Mathematics) Semester-3

Paper: CCMATH307

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Section-I
(Compulsory)
Each part of question carries 1 mark.

1. Choose the correct answer

(i) Let $(X, \leq)$ be a partially ordered relation where $X = \{2, 3, 6, 12, 24, 36\}$ and $a \leq b$ means "a divides b" then the minimal element(s) is(are)…

(a) 2.

(b) 3.

(c) 2 & 3.

(d) non-existent.

(ii) Which of the following is called absorption law?

(a) $a \wedge (a \vee b) = a$
(b) $a \wedge (b \wedge C) = (a \wedge b) \wedge c$
(c) $a \wedge a = a$
(d) $a \wedge b = b \wedge a$.

(iii) The statement "Every chain is a modular lattice" is …

(a) true.

(b) false.

(iv) Let B be a Boolean algebra and $a, b \in B$. Then $a \leq b$ if and only if…

(a) $a + b = b$

(b) $a + b = a$

(c) $a.b = a$

(d) $a.b = b$

(v) If there are n variables then the total number of min-terms in complete disjunctive normal form is …

(a) $2^n - 1$.

(b) 2^n.

(c) 2^{n-1}.

(d) $2n$.

(vi) In a graph the degree of isolated vertex is …

(a) 0.

(b) 1.

(c) 2.

(d) always odd.

(vii) In a Eulerian path …

(a) every vertex is traversed exactly once.

(b) every edge is traversed exactly once.

(c) every edge and every vertex are traversed exactly once.

(d) degree of every vertex is odd.

(viii) In a Hamiltonian path …

(a) every vertex is traversed exactly once.

(b) every edge is traversed exactly once.

(c) every edge and every vertex are traversed exactly once.

(d) degree of every vertex is odd.

(ix) Which of the following is true for a connected simple planar graph with $n(\geq 3)$ vertices, e edges and f regions?

(a) $3f \leq 2e$

(b) $3f \geq 2e$

(c) $3f \leq e$

(d) none of these.

(x) Out of 500 words, the minimum number of words whose initial letter is "B" is…

(a) 19

(b) 20

(c) 26

(a) 21

Section-II

Answer any four questions.

Each question carries 15 marks.

2. Define a modular lattice and prove that two lattices L and M are modular lattices if and only if $L \times M$ is modular lattice.

3. Prove that a lattice L is distributive if and only if

$$(a \vee b) \wedge (b \vee c) \wedge (c \vee a) = (a \wedge b) \vee (b \wedge c) \vee (c \wedge a)$$

4. In a Boolean algebra $(B, +, *, ', 0, 1)$ state and prove the boundedness laws and associative laws.

5. Define Eulerian path, Eulerian circuit and Euler graph. State and prove the necessary and sufficient condition for a graph to be a Euler graph.

6. Explain the combinatorial and geometric graph. Also define planar graph and derive the Euler's formula for a connected planar graph.

7. Explain the term “Colouring of graph”. Define chromatic number. Prove that a cycle with n vertices is 2-chromatic if n is even otherwise it is 3-chromatic. Also prove that every tree with 2 or more vertices is 2- chromatic.

8. State and prove principle of inclusion and exclusion. Also find the number of integers between 1 and 250 that are divisible by any of integers 2, 3 and 7.

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ANSWER TO OBJECTIVE TYPE QUESTION:

(i) c

(ii) a

(iii) a

(iv) a

(v) b

(vi) a

(vii) b

(viii) a

(ix) a

(x) b