MODEL QUESTION PAPER

WITH ANSWERS OF MULTIPLE-CHOICE QUESTIONS

For

B. Sc. (Hons.) Semester-5

Subject: Mathematics

Paper: DSEMATH502A

By

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Group-A
(Compulsory)
Each part of question carries 2 marks.

1. Choose the correct answer .

(i) If $f: X \to Y$ be any arbitrary mapping and A$\subseteq Y$, then …

(a) $f^{-1}(A^c) \subset f^{-1}(A)^c$

(b) $f^{-1}(A^c) \supset f^{-1}(A)^c$

(c) $f^{-1}(A^c) = f^{-1}(A)^c$

(d) $f^{-1}(A^c) = \varphi$

(ii) If $\{A_i: i \epsilon I\}$ be any indexed family of subsets of universal set Ω and if $B \subseteq \Omega$ then which of the following is correct?

(a) $B \cup (\bigcup_i A_i) = \bigcup_i (B \cup A_i)$

(b) $B \cup (\bigcup_i A_i) = \bigcup_i (B \cap A_i)$

(c) $B \cap (\bigcup_i A_i) = \bigcup_i (B \cup A_i)$

(d) none of these.

(iii) The interval [0,1] is …

(a) finite set.

(b) denumerable set.

(c) uncountable set.

(d) not a set

(iv) Cardinal number of continuum is…

(a) λ

(b) c

(c) 1

(d) none of these.

(v) If $X = \{1,2\}$ then $(P(X), \subseteq)$ is …

(a) a partially ordered set which is also totally ordered.

(b) a partially ordered set which is not totally ordered.

(c) is not a partially ordered set.

(d) none of these.

(vi) The equation $x^8 + 10x^3 + x - 4 = 0$ has …

(a) at most one real root.

(b) at most two real roots.

(c) at most three real roots.

(d) no real root.

(vii) If α, β, γ be the roots of $ax^3 + 3bx^2 + 3cx + d = 0$ then $\alpha + \beta + \gamma =$ …

(a) $\frac{3b}{a}$

(b) $\frac{3c}{a}$

(c) $-\frac{3b}{a}$

(d) $-\frac{3c}{a}$

(viii) If α, β, γ be the roots of $x^3 + px^2 + qx + r = 0$ then $\sum \alpha^2 = \cdots$

(a) $p^2 - q$

(b) $2p^2 - q$

(c) $p^2 - 3q$

(d) $p^2 - 2q$

(ix) If the cubic equation is $z^3 + 3Hz + G = 0$ and $G^2 + 4H^3 < 0$ then the cubic has …

(a) only one real root.

(b) two equal roots.

(c) three real roots.

(d) nothing can be said about the nature of roots.

(x) The equation whose roots are the roots of $x^5 + 4x^3 - 7x^2 + 5 = 0$ with sign changed is…

(a) $x^5 + 4x^3 + 7x^2 + 5 = 0$

(b) $x^5 - 4x^3 - 7x^2 + 5 = 0$

(c) $x^5 + 4x^3 - 7x^2 - 5 = 0$

(d) $x^5 + 4x^3 + 7x^2 - 5 = 0$

Group-B

Answer any four questions.

Each question carries 5 marks.

2. State and prove generalised De-Morgan's law.

3. If $f: X \to Y$ be any arbitrary mapping and A, $B \subseteq Y$, then prove that $f(A \cap B) \subseteq f(A) \cap f(B)$ also show that equality need not hold.

4. Prove that countable union of countable sets is countable.

5. Distinguish between partially and totally ordered set by constructing an example of a partially ordered set which is not totally ordered.

6. State and prove Descarte's rule of signs.

7. Solve the equation $6x^3 - 11x^2 + 6x - 1 = 0$, it is given that roots are in harmonic progression.

8. If α, β, γ be the roots of $x^3 + 2x + 6 = 0$ then then prove that $s_7 = 2(s_4 - s_6)$ where $s_n = \sum \alpha^n$

9. Discuss the Cardon's method of solving a cubic equation.

Group-C

Answer any two questions

Each question carries 15 marks.

10. State and prove fundamental theorem on equivalence relation.

11(a). Show that $(R, \leq)$ is a partially ordered set which is also totally ordered, where $\leq$ is the usual "less than or equal to" relation on set of real numbers.

(b). Define lattice, sublattice, complete lattice and give examples of a complete lattice & an incomplete lattice.

12. State and prove Newton's theorem on the sums of the powers of the roots.

13. Solve:

$x^4 - 3x^2 - 42x - 40 = 0.$

ANSWER TO OBJECTIVE TYPE QUESTION:

(i) c

(ii) a

(iii) c

(iv) b

(v) b

(vi) b

(vii) c

(viii) d

(ix) c

(x) d