



বিদ্যাসাগর বিশ্ববিদ্যালয়
VIDYASAGAR UNIVERSITY

Question Paper

B.Sc. Honours Examinations 2020

(Under CBCS Pattern)

Semester - III

Subject: MATHEMATICS

Paper: SEC1T

Full Marks : 40

Time : 2 Hours

Candidates are required to give their answer in their own words as far as practicable.

The figures in the margin indicate full marks.

LOGIC AND SETS

Answer any *two* from the following questions :

2×20

1. (a) Write the negation of the following statement :

(i) Kolkata is a city.

(ii) Every odd integers is divisible by 3.

(b) What do you mean by Principal. Conjunctive normal form ? Write complete C.N.F of 2 variables. Write the function

$$f(p, q, r) = p \vee (p \wedge q \wedge r) \vee (p \wedge \sim q \wedge \sim r) \vee (q \wedge r) \vee (\sim q \wedge r)$$

in conjunctive normal form.

(c) Prove that $\sqrt{5}$ is irrational by contradiction method.

(d) Convert disjunction normal form to conjunction normal form.

$$f(p, q, r) = (\sim p \wedge q \wedge r) \vee (p \wedge q \wedge \sim r) \vee (\sim p \wedge q \wedge \sim r) \vee (p \wedge \sim q \wedge r) \quad 2+6+6+6$$

2. (a) What do you mean Conjunction and Disjunction ?

(b) Prove that $(\sim p \wedge q) \rightarrow (\sim p \vee (\sim p \vee q)) = \sim p \vee q$ without using truth table.

(c) Determine the truth values of the following statements.

(i) If $a - b = 0$, then $a^2 - b^2 = 0$

(ii) 2 is even and 5 is even.

(iii) If $4 > 5$, then $7 > 6$.

(iv) $4 < 5$ and 4 is a positive integer.

(d) For the sets $A = \{1, 3, 5, 7, 9\}$, $B = \{2, 4, 6, 8\}$ and $C = \{3, 6, 9\}$, verify the associated property. 2+6+6+6

3. (a) (i) Find the following set in set-builder form

$$A = \{1, 8, 27, 64, \dots\}$$

(ii) Represent the following set in tabular form

$$A = \{x : x = 2n\}, \text{ (n being a natural number)}$$

(b) (i) Let S be the set of all positive divisor of 30. Prove that (S, \leq) is a poset where $a \leq b$ means 'a' is a divisor of 'b' for $a, b \in S$.

(ii) Determine the nature of the following relation R on the set $Z : aRb$ if and only if $a - b$ is divisible by 5.

(c) Find the total number of distinct relations from a finite set A to another finite set B .

(d) Define universal relation and empty relation. 2+(7+5)+3+3

4. (a) If $A = \{x : -1 \leq x \leq 6\}$ and $B = \{x : x > 3\}$. Find $A \cup B$ and $A \cap B$.

(b) Prove that an equivalence relation R on a set S determines a partition of S . Conversely, each partition of S yields an equivalence relation on S . 6

(c) Prove that $B - A = A' \cap B$.

(d) Let A , B and C be three sets such that $A \cap C = B \cap C$ and $A \cup C = B \cup C$, then prove that $A = B$. 2+(7+5)+3+3

OBJECT ORIENTED PROGRAMMING

Answer any *two* from the following questions : 2×20

1. (a) What does it mean by Object Oriented Programming ? How does it differ from traditional C Programming language ? Write an example class.
(b) What is the difference between local variable and data member ? State the meaning of function parameter and list down the differences between parameter and Argument. (3+5+3)+(4+2+3)
 2. (a) What are pointers and function overloading ? Explain both with examples.
(b) Define the 'this' pointer, with an example, indicate the steps involved in referring to members of the invoking object. Explain inline functions. (5+5)+(5+5)
 3. (a) What is a constructor ? How is it created ? List some of the properties of constructor function. Give example.
(b) Give the comparison of Data Hiding, Data abstraction, encapsulation and polymorphism. (3+3+3+2)+9
 4. (a) What is a friend function ? Why is it required ? Also, give the difference between 'public' and 'protected' access specifiers.
(b) Explain different types of inheritance with block diagram and an example for each. (4+3+3)+10
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