UNIVERSITY OF CALCUTTA · Previous Year Question Paper

2025

MATHEMATICS (IDC) — 3 years B.A. / B.Sc. / B.Com

Paper: IDC

(Mathematics in Daily Life)

Time: 2 Hours **Full Marks: 50**

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B.A. / B.Sc. / B.Com. Examinations-2025 (Under CCF 2022), Semester : II
Paper Code : MTHD
(College examination paper: Shyampur Siddheswari Mahavidyalaya, University of Calcutta)

Group - A
(Set Theory)

Answer *any two* question from the following $2 \times 5 = 10$

1. Let $A = \{x \in \mathbb{R} : -1 \leq x \leq 6\}$, $B = \{x \in \mathbb{R} : 3 \leq x\}$. Find $A \cup B$, $A \cap B$, $A - B$, $B - A$. **1+1+1.5+1.5**

2. Show by Set Theory that the G.C.D and L.C.M of the numbers 48 and 72 are respectively 24 and 144, where G.C.D stands for greatest common divisor and L.C.M stands for least common multiple. **2.5+2.5**

3. What do you understand by Power set of any set X. Write the Power set of the following set $X = \{a, b, c, x, y, z\}$. Write the number of elements in X. **1+3+1**

4. In an Examination out of 100 students, 75 passed in English, 60 passed in Mathematics, 55 passed in Science; of these 50 passed in both English and Mathematics, 45 passed in both English and Science, 40 passed in Both Math and Science, only 35 passed in all three subjects. Show by using Venn Diagram 30 students passed exactly in two subjects out of three subjects; 25 passed in exactly one subjects; while 10 students failed in all three subjects. **2+2+1**

Group - B
(Integers)

Answer *any four* question from the following $4 \times 5 = 20$

5. (a) What do you understand by Division Algorithm of two Integers x and y.

(b) Find the G.C.D of the two integers 252 and 595, and then express the G.C.D in the form $252x + 595y$; where x and y are any integers. **2+3**

6. Find the General solution in integers of the following Diophantine Equation $5x + 11y = 1$; x, y are integers. **2+3**

7. Find the remainder when $1! + 2! + 3! + \cdots + 50!$ is divided by 15. **5**

8. (a) What do you understand by 1st Principle of Mathematical Induction on the set of Natural numbers. **2**

(b) Applying the 1st Principle of Mathematical Induction prove that $3^{2n} - 8n - 1$ is divisible by 64 for all natural number n. **3**

9. Find the G.C.D of the integers 427 and 616, and then express it in the Form $427u + 616v$, where u, v are integers. **3+2**

10. (a) Define Prime number and Composite number. What do you understand by Relatively Primes. **1+1+1**

(b) What do you understand by Linear Diophantine equation. When this kind of equation possesses an integral solution.

1+1

Group - C
(Mathematical Logic)

Answer *any two* question from the following $2 \times 5 = 10$

11. (a) Define Conjunction and Disjunction of two statement in Mathematical Logic. **2**

(b) Write down the Truth Table of the following Propositional statements

$$((A \vee B) \Rightarrow (A \wedge B)), \qquad (((\sim A) \vee (\sim B)) \Rightarrow ((\sim A) \wedge (\sim B)))$$

3

12. (a) Find the Truth Tables of the following Propositional Statements

(i) $((A \vee (\sim B)) \Rightarrow ((\sim A) \wedge B))$

(ii) $((A \vee B \vee C) \Leftrightarrow ((\sim A) \wedge (\sim B) \wedge (\sim C)))$ **2+2**

(b) What do you understand by a Tautology in Mathematical Logic. **1**

13. (a) Verify whether the following Statements are **Tautology** or Not

(i) $A \Leftrightarrow (\sim (\sim A))$;

(ii) $(\sim (A \wedge (\sim A)))$. **3**

(b) Write the Truth Tables of Implication ($\Rightarrow$) and Double implications ($\Leftrightarrow$) **2**

Group - D
(Linear Programming Problem)

Answer *any two* question from the following $2 \times 5 = 10$

14. Solve graphically the following L.P.P **2+3**

Objective function : Max $z = x + y$

Subject to the constraints : $x - y \leq 3,\ x \leq 4,\ 2x + y \leq 12,\ y \leq 6,\ x \geq 0,\ y \geq 0$

15. An oil Company owns two refineries, say A and B. Refinery A is capable of producing 20 barrels of gasoline and 25 barrels of fuel oil per day; Refinery B is capable of producing 40 barrels of gasoline and 20 barrels of fuel oil per day. The company requires at least 1000 barrels of gasoline and at least 800 barrels of fuel oil. If it costs Rs 300 per day to operate Refinery A and Rs 500 per day to operate refinery B, how many days should each Refinery be operated by the Company so as to Minimize the Cost. Formulate this problem to an L.P.P. **5**

16. Solve graphically the following L.P.P **2+3**

Objective function : Min $z = 2x + 3y$

Subject to the constraints : $5x + 6y \leq 30,\ x + y \geq 2,\ x \geq 0,\ y \geq 0$