MF-109

March-2019

B.B.A., Sem.-I

CC-107 : Basic of Mathematics

Time : 2:30 Hours]   **[Max. Marks : 70**

Instruction :   Use of simple calculator is allowed.

1.   (A)   (1)   In usual notation prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ 7

         (2)   If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{1, 3, 5\}$, $B = \{3, 6, 7, 8\}$ and $C = \{1, 2, 3, 5, 8, 9\}$ then prove that   7

             (i) $(A \cup B)' = A' \cap B'$

             (ii) $A - (B \cup C) = (A - B) \cap (A - C)$

OR

         (1)   If $A = \{1, 2\}$, $B = \{2, 3\}$ and $C = \{3, 4\}$ then prove that

             (i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$

             (ii) $A \times (B - C) = (A \times B) - (A \cup C)$

         (2)   For certain test, a candidate could offer Gujarati and English or both subjects. Total numbers of students was 500, of whom 350 appeared in Gujarati and 90 in both the subjects. Use set operations to show :

             (i)   How many appeared in Gujarati only ?

             (ii)   How many appeared in English ?

             (iii)   How many appeared in English only ?

  (B)   Short questions. (MCQ) (Any **Two**)   4

         (1)   State the set of subsets for set $A = \{2, 4, 6\}$

         (2)   If $A = \{2, 4, 5, 6\}$ and $B = \{1, 2\}$ then $A \times B =$ _____ .

         (3)   Define : Singleton set

2. (A) (1) If $f(x) = \dfrac{1 + x^2 + x^4}{x^2}$, prove that $f\left(\dfrac{1}{x}\right) = f(x)$. 　　　7

(2) Evaluate : (Any **Two**) 　　　7

(i) $\displaystyle\lim_{x \to 2} \dfrac{1}{x-2} - \dfrac{2(2x-3)}{x^3 - 3x^2 + 2x}$

(ii) $\displaystyle\lim_{x \to 2} \dfrac{x^2 - 4}{\sqrt{3x - 2} - \sqrt{x + 2}}$

(iii) $\displaystyle\lim_{x \to 0} \dfrac{3^x - 2^x}{x}$

OR

(1) A manufacturer sells a product for ₹ 10 per unit. The manufacturer's fixed cost is ₹ 10,200 per month and the variable cost is ₹ 2.50 per unit. How many units must be produce each month to breakeven ? What will be his profit/loss if he produce 250 units ?

(2) Evaluate : (Any **Two**)

(i) $\displaystyle\lim_{x \to 0} (1 + 5x)^{\frac{7}{x}}$

(ii) $\displaystyle\lim_{x \to 1} \dfrac{x^{\frac{3}{2}} - 1}{x^{\frac{7}{2}} - 1}$

(iii) $\displaystyle\lim_{n \to \infty} \dfrac{1 + 2 + 3 + ... + n}{3n^2 + 2n + 1}$

(B) MCQ : (Any **Two**) 　　　4

(1) $\displaystyle\lim_{x \to 0} \dfrac{a^x - 1}{x} = $ _____ .

(2) If $f(x) = 3x^2 + 5x + 4$, then $f(-2) = $ _____ .

(3) Define function.

(4) $\displaystyle\lim_{x \to a} \dfrac{x^n - a^n}{x - a} = $ _____ .

3. (A) (1) Using the digits 3, 5, 6, 8, 0 how many 3 digits numbers can be formed ? How many of them are even numbers ? **7**

      (2) A candidate is required to answer 7 questions out of 12 questions, which are divided into two groups, each containing 6 questions. He is not permitted to attempt more than 5 questions from either group. Find the number of different ways of doing questions. **7**

<div align="center">OR</div>

      (1) Find the numbers of positive integers greater than 1000 and less than 2000 which are divisible by 5 provided that no digit is to be repeated.

      (2) A group consists of 4 girls and 6 boys. In how many ways can a team of 5 members be selected if the team has

         (i) No girl

         (ii) At least one boy and one girl

         (iii) at least three girls

  (B) MCQs : (Any **Three**) **3**

      (1) If $^nC_{12} = {}^nC_8$, then n = _____.

      (2) If $^nP_r = 840$, $^nC_r = 35$ then r = _____.

      (3) $^{15}C_8 + {}^{15}C_9 - {}^{15}C_6 - {}^{15}C_7 =$ _____.

      (4) If $^nP_5 = 42 \cdot {}^nP_3$, then n = _____.

      (5) If $6[^nP_3] = 7 \cdot {}^{n-1}P_3$, n = _____.

4. (A) (1) Obtain an equation of line passing through intersecting point of lines $2x + y - 7 = 0$ and $x + 3y - 11 = 0$ and parallel to line $8x + 5y - 10 = 0$. **7**

      (2) $7 + 77 + 777 + 7777 + \ldots$ n terms. **7**

<div align="center">OR</div>

      (1) Find the equation of line which passes through the point (1, 3) and is perpendicular to the line whose equation is $8x + 3y - 18 = 0$.

      (2) Three numbers are in arithmetic progression. There sum is 15 and their product is 80. Determine the three numbers.

(B) MCQs : (Any **Three**)   3

  (1) $2 + 8 + 14 + 20 + \ldots$ 20th term = _____.

  (2)   If $3x + 2y + 8 = 0$, then slope (m) = _____.

  (3)   If $5x + y - 6 = 0$, then intercept of y axis = _____.

  (4)   If $2x - 3y + 9 = 0$, then slope (m) = _____.

  (5) $3, 9, 27, 81, \ldots$ 10th term = _____.

                              _____