Seat No. : _____

JF-107

January-2016

B.B.A., Sem.-I

CC-107 : Basic of Mathematics

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) Figure to the right indicate marks.
(2) Show calculations as part of your answer.

1. (a) Define following terms : **4**
   (1) Singleton set
   (2) Union of two sets
   (3) Proper subset
   (4) Complement of a set

   OR

   If A, B and C be any three sets then prove that $A - (B \cap C) = (A - B) \cup (A - C)$.

   (b) If $A = \{1, 2, 3\}$, $B = \{2, 3, 4\}$, $C = \{1, 3, 4\}$, $D = \{2, 4, 5\}$, verify that $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$. **4**

   OR

   If $A = \{1, 4\}$, $B = \{2, 3\}$, $C = \{3, 5\}$, prove that $A \times B \neq B \times A$. Also find $(A \times B) \cap (A \times C)$.

   (c) If $A = \{x/x^2 - 1 < 10, x \in Z\}$, $B = \{x/|x - 1| < 2, x \in N\}$, $C = \{x/|x| \leq 1, x \in Z\}$ prove that, $A \times (B \cap C) = (A \times B) \cap (A \times C)$. **6**

   OR

   In a survey of 120 consumers conducted in a shopping mall, 80 consumers indicated that they buy brand A of certain product, 68 buy brand B and 42 buy both brands. How many consumers participating in the survey ?
   (i) Buy at least one of these brands
   (ii) Exactly one of these brands
   (iii) Only brand A
   (iv) None of these brands

2. (a) Define following terms : **4**

(i) Limit

(ii) Many one function

(iii) Equal function

(iv) Range of a function

OR

If $f(x) = x(x + 1)(2x + 1)$, prove that $f(x) - f(x - 1) = 6x^2$

(b) Evaluate : (any **three**) **6**

(i) $\lim_{x \to 2} \left(\frac{1}{x-2} - \frac{1}{x^2 - 3x + 2} \right)$

(ii) $\lim_{x \to -1} \left(\frac{x^{21} + 1}{x^{23} + 1} \right)$

(iii) $\lim_{x \to 0} \left(1 - \frac{3x}{5} \right)^{\frac{2}{x}}$

(iv) $\lim_{n \to \infty} \frac{1 + 2 + 3 + \ldots + n}{2n^2 + 5}$

OR

Evaluate : (any **three**)

(i) $\lim_{x \to 2} \frac{x^4 - 16}{x^3 - 8}$

(ii) $\lim_{x \to 3} \frac{x^3 - 27}{\sqrt{x + 1}}$

(iii) $\lim_{x \to 5} \frac{\sqrt{x} - \sqrt{5}}{x - 5}$

(iv) $\lim_{x \to 1} \frac{7 - 5x - 2x^2}{3 - 2x - x^2}$

(c) A book publisher finds that the production cost of a book is ₹ 30 and the fixed cost per year amount to ₹ 25,000. If each is sold at the rate of ₹50, find…

(i) Cost function

(ii) The revenue function

(iii) The minimum number of books to be sold per year in order that there is no loss. **4**

OR

(i) $f(x) = x^2 + 4x + 5$ and $g(x) = 3x - 1$, prove that $f(1) - 2g(2) = 0$

(ii) Obtain $\lim_{x \to -1} \frac{x^3 + 1}{x^2 - 1}$

3. (a) Solve the following equation : **4**

$^{2n}C_3 = 11\ ^nC_3$

OR

If $^{10}C_{n+1} : {}^{10}C_n = 7 : 4$ then find n.

(b) A bag contains 8 rupees coins, 6 two rupees coins and 4 five rupees coins. In how many ways selection of 3 coins can be made so that :

(i) All three are rupee coins.

(ii) One is of each denomination :

(iii) None is a rupee coin. **6**

OR

A test consists of ten true – false and eight multiple – choice questions.

(i) In how many ways can a student select six true – false and five multiple – choice. (Questions to answer) ?

(ii) In how many ways can a student select ten questions, at least six of which are multiple choice ?

(c) In how many ways can 4 men and 3 ladies be arranged at a round table if the three ladies (i) Always sit together (ii) Never sit together ? **4**

OR

Prove that $\frac{1}{(n-1)!} + \frac{1}{(n-2)!} = \frac{n^2}{n!}$

4. (a) (i) Find the slope and intercepts on x-axis of following line $3x - 5y + 7 = 0$ **4**

(ii) Find the equation of a line whose intercepts on the axes are 3 and 5.

OR

A line passes through the point of intersection of the lines $5x + 2y - 11 = 0$ and $3x - y + 11 = 0$ and it is perpendicular to $4x - 3y + 2 = 0$. Find its equation.

(b) Find the sum of n terms : **5**

$0.5 + 0.55 + 0.555 + 0.5555 + \ldots\ldots\ldots\ldots$

OR

A refrigerator passes through three stages before it reaches to a customer from the manufacturer. At each stage the cost is increased by 10%. If the manufacturer's cost is ₹ 4,000, find the amount a customer will have to pay for it.

(c) Insert 4 geometric many between $\frac{1}{2}$ and 512. **5**

OR

Determine the value of K such that ……

(i) $3Kx + 5y + K = 0$ passes through the point $(-1, 4)$

(ii) $4x - Ky - 7 = 0$ has the slope 3.

5. Do as directed : **14**

(1) Define Geometric Progression.

(2) $\lim_{h \to 0} \frac{e^h - 1}{h} =$ _____

(3) If two lines are perpendicular their slopes are equal. (true / false)

(4) Define Cartesian product of two sets.

(5) If $g(x) = 7x + 3$, $x \in N$, and $g(x) = 17$, then $x =$ _____.

(6) If A = {2, 4, b, {3}, {1, a}}, state whether the statement is true or false for {1, a} ∈ A.

(7) Give the formula for finding out A.M.

(8) If A = {2, 3, 4}, give power set of A.

(9) Give the meaning of $x \to 0$.

(10) Find the value of ${}^7P_2$ and ${}^5C_4$.

(11) Define Combination.

(12) What is the formula for n^{th} term of A.P. ?

(13) Solve the equation : ${}^xC_2 = 28$.

(14) Find the equation of a line makes intercept 3 on y-axis and its slope is 2.

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