

**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  $A = \{x/x^2 - 1 < 10, x \in \mathbb{Z}\}$ ,  $B = \{x/|x - 1| < 2, x \in \mathbb{N}\}$ ,  $C = \{x/|x| \leq 1, x \in \mathbb{Z}\}$  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)  $\lim_{x \rightarrow 2} \left( \frac{1}{x-2} - \frac{1}{x^2 - 3x + 2} \right)$
- (ii)  $\lim_{x \rightarrow -1} \left( \frac{x^{21} + 1}{x^{23} + 1} \right)$
- (iii)  $\lim_{x \rightarrow 0} \left( 1 - \frac{3x}{5} \right)^{\frac{2}{x}}$
- (iv)  $\lim_{n \rightarrow \infty} \frac{1 + 2 + 3 + \dots + n}{2n^2 + 5}$

**OR**

Evaluate : (any three)

- (i)  $\lim_{x \rightarrow 2} \frac{x^4 - 16}{x^3 - 8}$
- (ii)  $\lim_{x \rightarrow 3} \frac{x^3 - 27}{\sqrt{x} + 1}$
- (iii)  $\lim_{x \rightarrow 5} \frac{\sqrt{x} - \sqrt{5}}{x - 5}$
- (iv)  $\lim_{x \rightarrow 1} \frac{7 - 5x - 2x^2}{3 - 2x - x^2}$

(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  $\lim_{x \rightarrow -1} \frac{x^3 + 1}{x^2 - 1}$

3. (a) Solve the following equation :

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

**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.

**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 ?

**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  $3x - 5y + 7 = 0$
- (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 :

$$0.5 + 0.55 + 0.555 + 0.5555 + \dots$$

**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 :

(1) Define Geometric Progression.

(2)  $\lim_{h \rightarrow 0} \frac{e^h - 1}{h} = \underline{\hspace{2cm}}$

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

(4) Define Cartesian product of two sets.

(5) If  $g(x) = 7x + 3$ ,  $x \in \mathbb{N}$ , and  $g(x) = 17$ , then  $x = \underline{\hspace{2cm}}$ .

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

(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  $x \rightarrow 0$ .

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

(11) Define Combination.

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

(13) Solve the equation :  ${}^x C_2 = 28$ .

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

\_\_\_\_\_