Seat No. : _____

N36-120

December-2014

B.B.A., Sem.-I

CC-107 : Basics of Mathematics

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

Instruction : **All** questions are compulsory.

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

(i) Proper Subsets

(ii) Power Set

(iii) Complement of a Set

(iv) Disjoint Sets

OR

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

(b) If $A = \{0, 1, 2, 3, 4\}$, $B = \{x \mid x^2 + x - 6 = 0, x \in A\}$ and $C = \{x \mid x^2 + x - 12 = 0, x \in A\}$ then prove that **5**

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

(ii) Obtain $(B - C) \cup (C - B)$

OR

If $A = \{a \mid a^2 - 1 < 10, a \in Z\}$

$B = \{b \mid |b - 1| < 2, b \in N\}$

$C = \{c \mid |c| \leq 1, \in Z\}$

Prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$

(c) A town has a total population of 50,000 persons and in them 28,000 read "Gujarat Samachar" and 23,000 read Sandesh. While 4,000 read both the papers. Indicate how many read neither, "Gujarat Samachar" nor "Sandesh". **5**

OR

In a class of 42 students, each play at least one of the three games Cricket, Hockey and Football. It is found that 14 plays Cricket, 20 play Hockey and 24 play Football, 3 play both Cricket and Football, 2 play both Hockey and Football. None play all the three games. Find the number of students who play cricket but not hockey.

2. (a) The cost of producing x units is given by $c(x) = x^2 - 17x + 72$. **4**

(i) If the selling price is ₹ 5 per unit, then what number of units should be produced to ensure no loss ?

(ii) If 40 units can be sold daily, then what price should be charged to guarantee no loss ?

OR

If $f(x) = \frac{1}{x+1}$, prove that

$$f(x) - f(-x) = \frac{2x}{x^2 - 1}$$

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

(i) $\lim_{x \to 0} \frac{5^x - 3^x}{2x}$

(ii) $\lim_{x \to \infty} \left(1 + \frac{2}{x}\right)^{\frac{15x}{2}}$

(iii) $\lim_{x \to a} \frac{x^{-3} - a^{-3}}{x^{-2} - a^{-2}}$

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

OR

Evaluate : (any **three**)

(i) $\lim_{x \to 3} \frac{\sqrt{3x-1} - 2\sqrt{2}}{\sqrt{2x-1} - \sqrt{5}}$

(ii) $\lim_{x \to 0} (1 + 3x)^{\frac{2x+3n}{x}}$

(iii) $\lim_{x \to 0} \frac{1}{x}\left\{\frac{1}{(x+a)^3} + \frac{1}{a^3}\right\}$

(iv) $\lim_{x \to (-3)} \frac{x^3 + 27}{x + 3}$

(c) Define following terms : **4**

(i) Constant function

(ii) Limit

(iii) Function

(iv) Equal function

OR

(i) $f(x) = 2x^2 - 1$, $g(x) = 2x - 1$, $x \in \{0, 1, 2\}$. Are the functions equal.

(ii) $\lim_{x \to 0} \frac{x^3 + 2x + 5}{x^2 + 3x + 1}$

3. (a) Define the following terms : **4**

(i) Permutations

(ii) Combination

OR

Prove that :

$nP_r + r \cdot np_{r-1} = {}_{n+1}P_r$

(b) How many different words can be made out of the letters of the word "ANANDPURA" ? In how many of these will the vowels occupy the even places ? **5**

OR

Find the number of committees of 5 members from 7 boys and 4 girls that can be formed so that each committee contains at least one girl.

(c) Find value of n, if **5**

$n + 1\ C_6 : nC_5 = 11 : 6$

OR

In how many ways can 5 boys and 3 girls stand in a row so that no two girls may be together ?

4. (a) (i) Find the equation of a line whose intercepts on the axes are –2 and –3. **4**

(ii) Find the slope and intercepts on y axis of following line $2x - 5y + 7 = 0$.

OR

A line passes through the point of intersection of lines $x + 2y - 1 = 0$ and $2x + 3y = 4$ and it makes equal intercepts on both axes. Prove that its equation is $x + y = 3$.

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

$0.7 + 0.77 + 0.777 +$ _____.

OR

₹ 3,120 is to be distributed among 4 persons in such a way that the amount received by them are in G.P. If the sum of the amounts of the first and last persons is to be ₹ 2,520, find the amount each one will receive.

(c) The sum of five numbers is A.P. is 25 and the sum of their squares is 165, find the numbers. **5**

OR

Find the equation of a line passing through the point of intersection of the lines $2x + 7y - 9 = 0$ and $3x + 2y - 5 = 0$ and perpendicular to $3x = 2y$.

5. Do as directed : **14**

(1) Define Arithmetic progression.

(2) If $\lim_{x \to a} \frac{x^n - a^n}{x - a} =$ _____.

(3) Who is the pioneer of co-ordinate geometry ?

(4) If two lines are parallel their slopes are reciprocal. (true/false)

(5) If $g(x) = 5x + 2$, $x \in N$, and $g(x) = 17$, then $x =$ _____.

(6) Define Singleton Set.

(7) If $A = \{1, 3, a, \{1\}, \{1, a\}\}$, state whether the statement is true or false for $\{1, a\} \subset A$.

(8) If the equation of a straight line is $2x + 7y + 9 = 0$, find its slope.

(9) For an A.P., if $S_n = n(n - 7)$, find T_{10}.

(10) Find the value of $8P_2$ and $6C_4$.

(11) Define Domain.

(12) If $a = 4$ and $b = 6$, what will be GM ?

(13) If $f(x) = 2x^2 + 3x - 1$, then $f(-1) =$ _____.

(14) If $A = \{a, b, c\}$, give power Set of A.

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