

Seat No. : 129

NF-101

November-2019

B.B.A., Sem.-I

CC-107 : Basics of Mathematics

Time : 2:30 Hours]

[Max. Marks : 70

Instruction : Use of simple calculator in allowed.

1. (A) (I) Define the following terms with example : (Any 3) 7

- (1) Finite Set
- (2) Singleton Set
- (3) Equal Set
- (4) Power Set

(II) Answer the following : 7

- (1) If $A = \{p, r\}$, $B = \{q, s\}$, $C = \{q, r, t\}$ then verify that
 $A \times (B \cup C) = (A \times B) \cup (A \times C)$
- (2) If $P = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $Q = \{3, 5, 7\}$, $R = \{2, 4, 6\}$ then prove that
 $P - (Q \cup R) = (P - Q) \cap (P - R)$

OR

(A) (I) If A, B and C are any three sets, prove that 7

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

(II) Answer the following : 7

- (1) In a Company of 60 people, 45 person drinks Tea, 35 person drinks both Tea and Coffee and all the people drink atleast one of the two. How many people drink Coffee and not Tea? How many drink Coffee ?
- (2) If $A = \{4, 5\}$ then find A^2

(B) Answer the following: (Show calculation wherever necessary) (Any 4) 4

- (1) $A \cup A =$ _____
- (2) If $A = \{a, b, c, d\}$, the number of sets in its power set is _____
- (3) $A \cap \phi = \phi$ (True/False)
- (4) $A \times B$ and $B \times A$ have the same number of elements. (True/False)
- (5) Define Union of two sets.
- (6) The Commutative Property is given by $A \cup B = B \cup A$ (True/False)

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P.T.O.

2. (A) (I) Define Limit and State Rules of Limit. 7

(II) Answer the following : 7

(1) If $f(t) = t^2(t + 1)$, find the value of $f(a) - f(a - 1)$

(2)
$$\lim_{x \rightarrow 1} \frac{\sqrt{x+5} - \sqrt{6}}{x-1}$$

OR

(A) (I) The fixed cost of a factory manufacturing helmet is ₹ 3,00,000 and the variable cost per helmet is ₹ 300. If the selling price of a helmet is ₹ 450, find the number of helmets to be produced for no profit-no loss. Also find Cost for making 4,000 helmets. 7

(II) Answer the following : 7

(1)
$$\lim_{n \rightarrow \infty} \frac{n^2 + 5n + 6}{(n+4)(n+9)}$$

(2)
$$\lim_{x \rightarrow 0} \frac{x^2 + 4x + 6}{x^2 + 9x + 2}$$

(B) Answer the following: (Show calculation wherever necessary) (Any 4) 4

(1) The functions must be defined on the same domain in Equal function. (True/False)

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

(3) Define Domain

(4) Meaning of $x \rightarrow 4$

(5)
$$\lim_{t \rightarrow 4} \frac{t^3 - 64}{t - 4} = \underline{\hspace{2cm}}$$

(6)
$$\sum n^2 = \frac{n(n+1)(2n+1)}{6}$$
 (True/False)

3. (A) (I) Define Permutation and Combination with example and state formula of Permutation and Combination. 7

(II) Answer the following : 7

(1) How many different words can be permuted by using all the letters of the word "INSTITUTE"?

(2) ${}^{16}C_{6x+4} = {}^{16}C_{5x+9}$

OR

(A) (I) Answer the following :

7

- (1) There are 6 boxes to keep 6 books. One box is so small that any of the four big books cannot be kept in it. Find the number of ways in which six books can be kept in 6 boxes.
- (2) Find m and n if ${}^{(m+n)}P_2 = 30$ and ${}^{(m-n)}P_2 = 30$

(II) Answer the following :

7

- (1) A question paper includes 14 questions in all. If 8 questions including at least one from the first four questions are to be attempted. Find the number of ways of answering the paper.
- (2) How many different words can be formed by using all the letters of the word MONDAY? How many of them will begin with M? How many of them will begin with M and end with Y ?

(B) Answer the following: (Show calculation wherever necessary) (Any 3)

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- (1) ${}^nP_n = n!$ (True/False)
- (2) How many numbers of three digits can be formed from the digits 2,1,3,6,4,5.
- (3) Find the value of ${}^5C_4 + {}^7C_2$
- (4) The value of 7P_5 is 2521 (True/False)
- (5) If r things are to be arranged out of n things and if the repetitions of a thing is allowed then the total number of permutations is _____.

4. (A) (I) Define Arithmetic Progression and Geometric Progression with example and state formula for finding sum of n terms of the Arithmetic Progression and Geometric Progression.

7

(II) Answer the following :

7

- (1) A line passes through the point of intersection of $2x + 4y = 8$ and $6x + 2y = -6$, and makes the intercepts on both the axes equal in magnitude and opposite in signs. Find its equation.
- (2) The sum of n terms of an AP is n^3 , find its 11th term.

OR

(A) (I) Answer the following :

7

- (1) Prove that the lines $6x + 8y + 4 = 0$ and $24x + 32y - 14 = 0$ are Parallel.

- (2) Prove that $pq = r^2$, if the 5th term of a GP is 'p', 15th term is 'q' and 10th term is 'r'.

(II) Answer the following :

7

- (1) Find the sum of 'n' terms of the following series

$$4 + 44 + 444 + 4444 + \dots$$

- (2) Find an equation of a line having slope 2 and passing through the point of intersection of $x - 2y + 3 = 0$ and $2x - 3y + 4 = 0$.

(B) Answer the following: (Show calculation wherever necessary) (Any 3)

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- (1) If two lines are perpendicular to each other, the product of their slopes is -1 . (True/False)
- (2) Find slope of $x = 7y - 11$
- (3) If four numbers are in AP, the common difference is _____.
- (4) $T_n = S_n + S_{n-1}$ (True/False)
- (5) Common ratio of $\sqrt{2}, 2, 2\sqrt{2}, \dots$ is _____.
