TJ-114

BBA Semester-I
May-2013

BASICS OF MATHEMATICS

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

1. (a) Define the following terms : **4**
    (1) Empty set
    (2) Universal set
    (3) Finite set
    (4) Intersection of sets
    OR
    If A, B and C are any three sets prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

   (b) In a college, there are 500 girls and of them 300 have taken Economics and 250 have taken Mathematics. How many of them have taken both the subjects ? All girls have taken at least one of these two subjects. **5**
    OR
    If A = {2, 3, 4}, B = {3, 4, 5, 6}, C = {2, 4, 6, 8}. verify that
    (i) $A \cup B = (A - B) \cup B$
    (ii) $A - (B - C) = (A \cap B) - (A \cap C)$

   (c) If u = {a, b, c, d, e, f, g} A = {a, c, d f} and B = {b, c, f, g} then verify the following :
    (i) $(A \cup B)' = A' \cap B'$
    (ii) $(A \cap B)' = A' \cup B'$ **5**
    OR
    If A = {x/x² – 17x + 60 = 0}
       B = {x/x² – 7x + 12 = 0}
    Find (A∪B) and A∩B.

2. (a) Define the following terms : **4**
    (1) Equal function
    (2) One-one function
    (3) Many-one function
    (4) Constant function
    OR
    If $f(x) = x^2 (x - 1)^2$, $x \in \mathbb{R}$. Find the value of $f(x + 1) - f(x)$.

(b) (i) If $f(x) = \dfrac{1}{x}$, $x \in z - \{-1, 0, 1\}$, prove that $f(x + 1) - f(x - 1) = \dfrac{2}{1 - x^2}$

(ii) If $f(x) = x^3 - 2x + 1/x$, find the value of $f(x) + f(-x)$ **4**

OR

A text-book publisher finds that the production cost of each book is ₹ 30 and the fixed cost is ₹ 15,000. If each book can be sold for ₹ 45, the determine

(i) The Cost function

(ii) The Revenue function

(iii) The break-even point

(c) Evaluate following limits : (any **three**) **6**

(i) $\displaystyle\lim_{x \to -1} \dfrac{x^{17} + 1}{x^{15} + 1}$

(ii) $\displaystyle\lim_{n \to \infty} \dfrac{\sqrt{n^4 - 3n + 8}}{n^2 + 7n - 1}$

(iii) $\displaystyle\lim_{x \to 1} \dfrac{\sqrt{x + 2} - \sqrt{5}}{x - 3}$

(iv) $\displaystyle\lim_{x \to 1} \dfrac{x^{5/2} - 1}{x^{3/2} - 1}$

OR

Evaluate the following :

(1) $\displaystyle\lim_{x \to 1} \dfrac{\sqrt{3 + x} - \sqrt{5 - x}}{x^2 - 1}$

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

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

(4) $\displaystyle\lim_{x \to 0} \left[\dfrac{1}{x} \left(\dfrac{2x + 9}{x + 3} \right) - 3 \right]$

3. (a) Find k if $^8P_5 = {}^7P_5 + k\, {}^7P_4$ **4**

OR

Find the value of n.

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

(b) Out of six men and four women in how many ways a committee of five members can be formed in which
    (i)   there are at the most 2 of women.
    (ii)   a particular men is included and a particular women is excluded.   **5**

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

How many four digit numbers which are divisible by 5 can be formed with 0, 1, 4, 6, 5, 8, 9

(c) How many different numbers of five digits can be formed by using all digits of number 60421 ?   **5**

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

A man has 7 friends in which there are 3 females. He wants to invite 8 friends on a dinner such that at least one female must be included among invites. In how many ways can be invited them ?

4. (a) The sum of 6 terms of an A.P. is 57 and the sum of its 10 terms is 155, find the 20th term.   **4**

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

The sum of three numbers in A.P is 24 and sum of their squares is 200. Find the number.

(b) Find the sum of the first n terms of the series $5 + 55 + 555 + 5555 + ...$ **5**

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

The fourth and the seventh term of a G.P are 72 and 576, find the sum of first n terms.

(c) Obtain equation of the line passing through (3, 1) and the point of intersection of $4x + 5y + 7 = 0$ and $3x - 2y - 12 = 0$.   **5**

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

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 $5x + 2y + 11 = 0$.

5. Answer the following :   **14**
   (1)   If A = {1, 3, 5, 7, 9};
         B = {2, 4, 6, 8, 10}
         C = {3, 4, 7, 8, 11, 12}
         Find A∪B∪C.

   (2)   Define infinite set.

   (3)   If A = {1, 2, 3} B = {2, 3, 4}, S = {1, 3, 4}
        T = {2, 4, 5} find $(A \times B) \cap (S \times T)$

   (4)   If $f(x) = x(x + 1)(2x + 1)$ find $f(x - 1)$

(5)   If f: z − {−1} → z, $f(x) = \dfrac{x^3 + 1}{x + 1}$; $x \in z − \{−1\}$.

g : z → z $g(x) = x^2 − x + 1$; $x \in z$ examine whether the functions are equal.

(6) $g(x) = \dfrac{x^3 − 1}{x^3 + 1}$ ∴ $g(1) =$

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

(8) $\displaystyle\lim_{x \to −2} \dfrac{x^3 + 8}{x^2 + 8x + 12} =$ _____.

(9)   Find the value of $^{10}C_4$.

(10) If $^{14}P_x = 2184$ find x.

(11) Find the slopes of lines joining the following pairs of points.
          (7, 11) (5, 2)

(12) Find the equation of line with slope 1/3 and passing through (−2, 7)

(13) Find the 30th terms of
          10, 14, 18, 22 ………… 30th terms.

(14) Find the sum of
          256 + 128 + 64 + ………… 8 terms.

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