MF-104

March-2022

B.B.A., Sem.-I

CC-107 : Basics of Mathematics

Time : 2 Hours] [Max. Marks : 50

Instructions : (i) All questions in Section-I carry equal marks.

(ii) Attempt any **two** questions in Section-I.

(iii) Question No. **5** in Section-II is Compulsory.

(iv) Use of simple calculator is allowed.

Section – I

1. (A) (i) If A, B and C are any three sets, prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

(ii) If P = {a, b}, Q = {c, d} and R = {d, e}, then prove that $P \times (Q \cap R) = (P \times Q) \cap (P \times R)$.

(B) (i) Define the following :

(a) Finite set

(b) Singleton set

(c) Empty set

(d) Intersection of sets

(e) Complement of a set

(ii) $\cup = \{1, 2, 3, 4, 5, 6\}$, A = {2, 3, 6}, B = {3, 5, 6}

Prove that $(A \cup B)' = A' \cap B'$.

2. (A) (i) If $f(x) = x^2 (x - 1)^2$, $x \in R$, Prove that $f(x + 1) - f(x) = 4x^3$

(ii) Calculate the Break-even point from the following data. The fixed costs for the year are ₹ 70,000. The variable cost per unit is ₹ 5, selling price of each unit is ₹ 25.

(B) (i) Defined limit and state rules of limit. 5

(ii) Evaluate : 5

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

(b) $\lim_{n \to \infty} \frac{1^2 + 2^2 + ... + n^2}{2n^3}$

3. (A) (i) Define Permutation and combination and state formula of permutation and combination. 5

(ii) How many words can be formed using all the letters of the word 'TEJAL' ? Out of which in how many words (a) T is at the start ? (b) T is at the start and L is at the end ? 5

(B) (i) Find n in the following equation :

$2n C_3 : n C_2 = 44 : 3$ 5

(ii) From 7 students and 4 professors a committee of six is to be formed. In how many ways this can be done under the constraint that the committee contains atleast two Professors ? 5

4. (A) (i) Find the equation of a line passing through the intersection of $x - 2y + 15 = 0$ and $3x + y - 4 = 0$ and parallel to $2x - 3y + 7 = 0$. 5

(ii) The 4^{th} term of an A.P. is 19 and its 12^{th} term is 51, find its 21^{st} term. 5

(B) (i) Obtain the sum of the following series :

$2 + 22 + 222 + 2222 + ...$ up to n terms. 5

(ii) Insert 3 geometric means between 3/49 and 147. 5

Section – II

5. Answer the following : (any **ten**) 10

(1) The number of subsets of the sets {p, q, r} is _____.

(a) 8 (b) 5

(c) 3 (d) None

(2) $A \cap A' =$ _____.

(a) A (b) ϕ

(c) A' (d) None

(3) The complement of a set A is denoted by _____.

(a) A' (b) A^C

(c) a & b (d) None

(4) If A = {3, 6, 9}, B = {6, 8, 10}, find A – B.

(a) {3, 9} (b) {8, 10}

(c) {3, 9, 8, 10} (d) None

(5) If $f(x) = 2x^3 + 9x - 1$, then f (1) = _____.

(a) 9 (b) 10

(c) 5 (d) None

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

(a) a^{n-1} (b) e^x

(c) $n \cdot a^{n-1}$ (d) None

(7) The graph of quadric function is parabola.

(a) True (b) False

(8) How many numbers of three digits can be formed from the digits 1, 2, 3, 4, 5, 6 ?

(a) 100 (b) 120

(c) 10 (d) None

(9) The formula for circular permutations of n things _____.

(a) n ! (b) $\frac{(n-1)!}{2}$

(c) (n – 1) ! (d) None

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

(a) 56, 15 (b) 15, 56

(c) 56, 40 (d) None

(11) Find the slope of the line joining the following pairs of points :

(–2, –3), (–4, 11)

(a) m = 2 (b) m = 4

(c) m = 3 (d) None

(12) Find the equation of a line with slope 3 and passing through (2, 5).

(a) $3x = 1$ (b) $2x - y - 1 = 0$

(c) $3x - y - 1 = 0$ (d) None

(13) Formula for finding the n^{th} term of A.P.

(a) $T_n = a + (n - 1)\,d$ (b) $T_n = a.r^{n-1}$

(c) $S_n = \frac{n}{2}[a + l]$ (d) None

(14) Find A.M. of the following numbers :

2 and 18

(a) 10 (b) 20

(c) 8 (d) None

(15) If in a sequence the ratio of any term to its preceding term is constant, it is called a/an _____.

(a) Arithmetic progression (b) Geometric progression

(c) Arithmetic mean (d) None