

Seat No. : _____

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 $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$. **5**
- (ii) If $P = \{a, b\}$, $Q = \{c, d\}$ and $R = \{d, e\}$, then prove that $P \times (Q \cap R) = (P \times Q) \cap (P \times R)$. **5**
- (B) (i) Define the following : **5**
- (a) Finite set
 - (b) Singleton set
 - (c) Empty set
 - (d) Intersection of sets
 - (e) Complement of a set
- (ii) $U = \{1, 2, 3, 4, 5, 6\}$, $A = \{2, 3, 6\}$, $B = \{3, 5, 6\}$
Prove that $(A \cup B)' = A' \cap B'$. **5**
2. (A) (i) If $f(x) = x^2(x-1)^2$, $x \in \mathbb{R}$, Prove that $f(x+1) - f(x) = 4x^3$ **5**
- (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. **5**

- (B) (i) Defined limit and state rules of limit. 5
- (ii) Evaluate : 5
- (a) $\lim_{x \rightarrow -1} \frac{x^2 + 3x + 2}{x + 2}$
- (b) $\lim_{n \rightarrow \infty} \frac{1^2 + 2^2 + \dots + n^2}{2n^3}$
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 : 5
- $2n C_3 : n C_2 = 44 : 3$
- (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 4th term of an A.P. is 19 and its 12th term is 51, find its 21st term. 5
- (B) (i) Obtain the sum of the following series : 5
- $2 + 22 + 222 + 2222 + \dots$ up to n terms.
- (ii) Insert 3 geometric means between $3/49$ and 147. 5

Section – II

5. Answer the following : (any ten)

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

