

20A743**B.C.A. EXAMINATION, 2021**

(First Semester)

(C-Scheme) (Main & Re-appear)

(BCA)

MATHS111C

MATHEMATICS-I

*Time : 2½ Hours]**[Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. (a) If $A = \{2, 3\}$, $B = \{6, 8\}$, $C = \{1, 2\}$ and $D = \{6, 9\}$, then verify that :
$$(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$$

(b) Prove that Cartesian product of two countable sets is countable.
2. (a) Show that the relation R in the set of natural numbers N defined by xRy if $x^2 - 4xy + 3y^2 = 0$, $\{x, y \in N\}$ is reflexive, not symmetric and not transitive.
(b) Find the inverse of the function $f(x) = 3x + 4$.

3. (a) If $A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ 0 & 5 \\ 3 & 1 \end{bmatrix}$, then find the matrix X for which
$$A + B - X = 0.$$

(b) Evaluate the determinant :

$$\begin{vmatrix} x+\lambda & x & x \\ x & x+\lambda & x \\ x & x & x+\lambda \end{vmatrix}$$

4. Solve the following system of equations by using Cramer's rule :

$$\begin{aligned} x + y + z + w &= 2 \\ x - 2y + 2z + 2w &= -6 \\ 2x + y - 2z + 2w &= -5 \\ 3x - y + 3z - 3w &= -3 \end{aligned}$$

5. (a) The fourth term of an A.P. is equal to three times the first term and the seventh term exceeds twice the third term by one. Find the first term and the common difference.

(b) Derive a relationship between A.M. and G.M.

6. (a) The product of first three terms of a G.P. is 1000. If we add 6 to its second term and 7 to its third term, the resulting three terms form an A.P. Find the terms of G.P.

(b) Find the sum of the series :

$$1 - \frac{3}{2} + \frac{5}{4} - \frac{7}{8} + \dots$$

7. (a) The A.M. of 9 items is 15. If one more item is added to this series, the A.M. becomes 16. Find value of 10th item.

(b) Find the median for the following *f.d.* :

x	:	0	1	2	3	4	5	6
y	:	5	9	10	12	6	4	2

8. (a) A student obtained the A.M. and S.D. of 100 observations as 40 and 5.1 respectively. Later on it was discovered that he had wrongly copied down an observation as 50 instead of 40. Calculate the correct value of S.D.

(b) Explain the following :

(i) Inter Quartile Range

(ii) Percentile Range.

Also give the method to computation of the above.

9. (a) If $A = \{1, 4, 6, 10\}$, $B = \{2, 3, 6, 7, 10, 12\}$, then find $A \cup B$, $A \cap B$, $A - B$ and $B - A$.

(b) Show that the following points are collinear :

$$(b, c + a) \quad (c, a + b) \quad (a, b + c)$$

(c) Find four terms in A.P. whose sum is 20 and the sum of whose square is 120.

(d) Enumerate the measures of central tendencies along with one limitation.