

**1476/I**

**BCA (Part I) Examination, 2017**

**(First Semester)**

**Paper - II**

**(BCA 102: Principles of Mathematics)**

**Time : Three Hours ]**

**[ Maximum Marks : 70**

**Note:** (i) Answer *five* questions in all.

(ii) All questions carry *equal* marks.

(iii) Question No.1 is *compulsory*.

(iv) Answer remaining *four* questions, selecting *two* questions from each

**Section A and B.**

(v) Symbols have their usual meaning.

**1. Solve the following:**

a) Find all the subsets of the set  $S = \{a, b, c, d\}$ .

b) Show that  $f: R \rightarrow R$  defined  $f(x) = x + 1$  is an onto function.

c) Find the value of the determinant

$$\begin{vmatrix} 14 & 15 & 33 \\ 21 & 25 & 55 \\ 28 & 35 & 77 \end{vmatrix}$$

d) Find the 20<sup>th</sup> term of sequence:

-10, -6, -2, ...



## Section – A

**Note:** Answer any **two** among the following.

2. (a) Prove that:

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

- (b) Let N be the set of Natural numbers. Let a relation R be defined in the  $N \times N$  as follows:

$$(a, b) R (c, d) \text{ if } a + d = b + c$$

Where  $a, b, c, d \in N$ . Show that R is an equivalence relation.

3. (a) Prove that :  $\tan\left(45^\circ - \frac{A}{2}\right) = \frac{\cos A}{1+\sin A}$

- (b) In the expansion of  $\left(3x - \frac{2}{x^2}\right)^{15}$  which term is free from x. Find the term also.

4. (a) If  $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ , then prove that  $A^3 = 4A$

- (b) The frequency distribution of marks obtained by 40 students of a class is as under.  
Calculate the Arithmetic mean:

Marks : 0-8    8-16    16-24    24-32    32-40    40-48

Students: 5    3    10    16    4    2

5. (a) If pth, qth, rth terms of an arithmetic progression are a, b, respectively, then prove that:  $a(q-r) + b(r-p) + c(p-q) = 0$

- (b) Find the sum of the following series:  $\frac{2}{3} + \frac{3}{3^2} + \frac{2}{3^3} + \frac{3}{3^4} + \frac{2}{3^5} + \frac{3}{3^6} + \dots \infty$



## Section – B

6. (a) If A and B are two sets, prove that :  $(A \cup B)' = A' \cap B'$

(b) Calculate the median from the following data:

Wages in ₹: 20 21 22 23 24 25 26 27 28

No. of Workers: 8 10 11 16 20 25 15 9 6

7. (a) Prove that :  $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$

(b) If  $A = \begin{bmatrix} 2 & 5 \\ 3 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 5 & 7 \\ 2 & 0 \end{bmatrix}$  then prove that  $(AB)' = B'A'$

8. (a) Let  $A = \{1, 2, 3\}$ . Find all one-to-one functions from A to A.

(b) Find the three geometric mean (GM) is between  $\frac{1}{3}$  and 432.

9. (a) Prove that  $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = 4a^2b^2c^2$

(b) If  $A = \{1, 2\}$ ,  $B = \{2, 3\}$ , and  $C = \{3, 7\}$ , then prove that:

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



