



**MAULANA ABUL KALAM AZAD UNIVERSITY OF  
TECHNOLOGY, WEST BENGAL**

**Paper Code : BBAN-102**

**PUID : 01299 (To be mentioned in the main answer script)**

**BASICS OF MATHEMATICS**

*Time Allotted : 3 Hours*

*Full Marks : 70*

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own  
words as far as practicable.*

**GROUP - A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any ten of the following : 10 × 1 = 10

i) If  $A$  and  $B$  are two disjoint sets then

a)  $\{A \cap B\} = \{A\}$

b)  $\{A \cap B\} = \{B\}$

c)  $\{A \cap B\} = \{U\}$

d)  $\{A \cap B\} = \{\phi\}$ .

by their usual meaning.



vii) If set  $A : \{ 1, 2, 3, 4 \}$  and set  $B : \{ 3, 4, 5, 8, 12 \}$ ,  
then  $A \cup B$  is

a)  $\{ 1, 2, 3, 4, 3, 4, 5, 8, 12 \}$

b)  $\{ 1, 2, 3, 4, 5, 8, 12 \}$

c)  $\{ 3, 4 \}$

d)  $\{ 1, 2, 5, 8, 12 \}$

viii) The value of  ${}^{n+1}C_{r+1}$

a)  ${}^nC_r + {}^{n+1}C_r$

b)  ${}^nC_{r+1} + {}^{n+1}C_r$

c)  ${}^nC_r + {}^nC_{r+1}$

d)  ${}^nC_r + {}^{n+1}C_{r-1}$

ix) The value of  $\left(\frac{1}{81}\right)^4$  is equal to

a) 3

b) 21

c) 27

d) 9

x) The sum of the first  $n$  terms of an A.P. series

$\{ 1, 2, 3, 4, 5, 6, 7, \dots, n \}$  is

a)  $n/2$

b)  $(n+1)/2$

c)  $n(n+1)/2$

d)  $n(n-1)/2$



5. In how many ways the letters of the word TECHNICAL can be arranged so that the vowels will never be separated ?

6. Find the sum of  $6 + 66 + 666 + 6666 + \dots$  up to  $n$ th term.

**GROUP - C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) If the distance between the points  $P (-3, 3)$  and

$Q (4, K)$  be  $5\sqrt{2}$  units, find the co-ordinate of  $Q$ .

b) In a class of 50 students, 15 read economics, 22 read statistics and 20 read mathematics, 3 read both economics and statistics, 6 read statistics and mathematics and 5 read economics and mathematics. 4 read none of the subjects. How many students read all the subjects ?

c) Solve for  $x$ :  $\sqrt{4x-9} + \sqrt{4x+9} = 5 + \sqrt{7}$ .  $5 + 5 + 5$

8. a) If  $f(x) = \frac{x^2 - 1}{x^2 + 1}$ , find  $f\left\{f\left(\frac{1}{x}\right)\right\}$ .

b) If  $(a^2 + b^2 + c^2)(x^2 + y^2 + z^2) = (ax + by + cz)^2$ , show that  $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$ .

c) In a cricket team of 14 players, there are 6 bowlers. How many different teams of 11 players can be formed taking at least 4 bowlers in the team?

5 + 5 + 5

9. a) Prove that  $5 + \sqrt{13}$  is not a rational number.

b) Find the area of the triangle whose vertices are  $A(0, 0)$ ,  $B(0, 5)$ ,  $C(5, 0)$ .

c) Without using Venn Diagram prove that for any three sets  $A, B, C$

$$A - (B \cup C) = (A - B) \cap (A - C). \quad 6 + 3 + 6$$

10. a) Solve for  $x$  when  $4^{x+2} = 2^{2x+3} + 2$ .

b) A man can buy a flat for Rs. 1,00,000 cash or Rs. 50,000 down and Rs. 60,000 at the end of one year. If money is worth 10% per year compounded half yearly, which plan should be chosen?

c) The sum up to  $n$  terms of an A.P. is  $n^2$ . Find the common difference. Which term is 57?

5 + 5 + 5

11. a) If  $x = \log_a bc$ ,  $y = \log_b ca$ ,  $z = \log_c ab$

prove that  $\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1} = 1$ .

b) A train is going at  $1/3$  of its usual speed and it takes an extra 30 minutes to reach its destination.

Find its usual time to cover the same distance.

c) If  $x^2 - 6x + a = 0$  has two roots  $\alpha$ ,  $\beta$  and

$3\alpha + 2\beta = 20$ , then find the value of  $a$ . 6 + 4 + 5

