



Time: 3.00 Hours

Standard 10  
MATHS  
PART - I

Marks: 100

## I. Answer all the questions

**14x1=14**

1) If there are 1024 relations from a set  $A = \{1, 2, 3, 4, 5\}$  to a set  $B$ , then the number of elements in  $B$  is  
 a) 3      b) 2      c) 4      d) 8

2) If  $f: A \rightarrow B$  is a bijective function and if  $n(B) = 7$ , then  $n(A)$  is equal to  
 a) 7      b) 49      c) 1      d) 14

3) The sum of the exponents of the prime factors in the prime factorization of 1729 is  
 a) 1      b) 2      c) 3      d) 4

4) The value of  $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$  is  
 a) 14400      b) 14200      c) 14280      d) 14520

5) The solution of  $(2x-1)^2 = 9$  is equal to  
 a) -1      b) 2      c) -1, 2      d) None of these

6) Transpose of a column matrix is  
 a) unit matrix      b) diagonal matrix      c) column matrix      d) row matrix

7) In the given figure  $\angle BAC = 90^\circ$  and  $AD \perp BC$   
 a)  $BD \cdot CD = BC^2$       b)  $AB \cdot AC = BC^2$   
 c)  $BD \cdot CD = AD^2$       d)  $AB \cdot AC = AD^2$

8) A man walks near a wall, such that the distance between him and the wall is 10 units. Consider the wall to be the y-axis. The path travelled by the man is  
 a)  $x = 10$       b)  $y = 10$       c)  $x = 0$       d)  $y = 0$

9) The equation of the line passing through the origin and perpendicular to the line  $7x - 3y + 4 = 0$  is  
 a)  $7x - 3y + 4 = 0$       b)  $3x - 7y + 4 = 0$       c)  $3x + 4y = 0$       d)  $7x - 3y = 0$

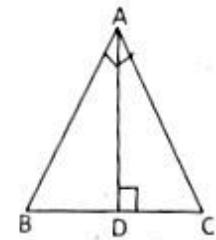
10) If  $\sin \theta = \cos \theta$ , then  $2\tan^2 \theta + \sin^2 \theta - 1$  is equal to  
 a)  $-\frac{3}{2}$       b)  $\frac{3}{2}$       c)  $\frac{2}{3}$       d)  $-\frac{2}{3}$

11) The ratio of the height of a tower and the length of its shadow is  $\sqrt{3} : 1$  then the angle of elevation of the sun has measure  
 a)  $45^\circ$       b)  $30^\circ$       c)  $90^\circ$       d)  $60^\circ$

12) The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be  
 a) 12 cm      b) 10 cm      c) 13 cm      d) 5 cm

13) Variance of 20 natural numbers is  
 a) 32.25      b) 44.25      c) 33.25      d) 30

14) If the standard deviation of  $x, y, z$  is  $p$ , then the standard deviation of  $3x+5, 3y+5, 3z+5$  is  
 a)  $3p+5$       b)  $3p$       c)  $p+5$       d)  $9p+15$



## PART - II

## II. Answer any Ten questions. Q.No. 28 is compulsory.

**10x2=20**

15) If  $A \times B = \{(3, 2), (3, 4), (5, 2), (5, 4)\}$  then find A and B

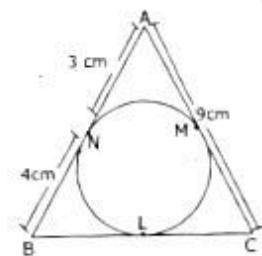
16) A function  $f$  is defined by  $f(x) = 3-2x$ , find  $x$  such that  $f(x^2) = (f(x))^2$

17) If  $13824 = 2^a \times 3^b$  then find  $a$  and  $b$

18) Find the sum  $3 + 1 + \frac{1}{3} + \dots \infty$

19) Find  $\frac{x^2 - 16}{x + 4} + \frac{x - 4}{x + 4}$

20) In the given figure,  $\triangle ABC$  is circumscribing a circle. Find the length of  $BC$



21) Calculate the slope and y-intercept of the straight line  $8x - 7y + 6 = 0$

22) Find the slope of the line joining the points  $(5, \sqrt{5})$  with the origin

23) Prove that  $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sec\theta + \tan\theta$

24) A tower stands vertically on the Ground. From a point on the ground, which is 48 m away from the foot of the tower, the angle of elevation of the top of the tower is  $30^\circ$ . Find the height of the tower.

25) The volume of a solid right circular cone is  $11088\text{cm}^3$ . If its height is 24cm, then find the radius of the cone

26) The range of the data is 13.67 and the largest value is 70.08. Find the smallest value.

27) What is the probability that a leapyear selected at random will contain 53 saturdays.

28) If  $A = \begin{pmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{pmatrix}$  then verify  $(A^T)^T = A$

**PART - III****III. Answer any Ten questions. Q.No. 42 is compulsory.****10×5=50**

29) Let  $A = \{1, 2, 3, 4\}$   $B = \{2, 5, 8, 11, 14\}$  be two sets. Let  $f: A \rightarrow B$  be a function given by  $f(x) = 3x-1$ . Represent this function

- by arrow diagram
- in a table form
- as a set of ordered pairs
- in a graphical form

30) If  $f(x) = x^2$ ,  $g(x) = 3x$ , and  $h(x) = x - 2$  prove that  $(f \circ g) \circ h = f \circ (g \circ h)$ .

31) The sum of three consecutive terms that are in AP is 27 and their product is 288. Find the three terms.

32) Rekha has 15 square colour papers of sizes 10cm, 11cm, 12cm, ..., 24cm. How much area can be decorated with these colour papers?

33) Find the square root of  $64x^4 - 16x^3 + 17x^2 - 2x + 1$

34) If  $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$  show that  $A^2 - 5A + 7I_2 = 0$

35) State and prove Angle Bisector Theorem.

36) Find the area of the triangle formed by the points  $(-10, -4)$ ,  $(-8, -1)$  and  $(-3, -5)$

37) From the top of a tower 50m high, the angle of depression of the top and bottom of a tree are observed to be  $30^\circ$  and  $45^\circ$  respectively. Find the height of the tree. ( $\sqrt{3} = 1.732$ )

38) An industrial metallic bucket is in the shape of the frustum of a right circular cone whose top and bottom diameters are 10 m and 4 m and whose height is 4m. Find the curved and total surface area of the bucket.

39) A capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends. If the length of the entire capsule is 12mm and the diameter of the capsule is 3mm, how much medicine it can hold?

40) Find the coefficient of variation of 24, 26, 33, 37, 29, 31

41) In a class of 50 students, 28 opted for NCC, 30 opted for NSS and 18 opted both NCC and NSS. One of the students is selected at random. Find the probability that

- The student opted for NCC but not NSS
- The student opted for NSS but not NCC
- The student opted for exactly one of them

42) Find the equation of the straight line through the point of intersection of the lines  $8x+3y = 18$ ,  $4x+5y = 9$  and bisecting the line segment joining the points  $(5, -4)$  and  $(-7, 6)$

**PART - IV****IV. Answer all the questions.****2×8=16**

43) a) Construct a  $\triangle PQR$  in which  $QR = 5\text{cm}$ ,  $\angle P = 40^\circ$  and the median  $PQ$  from  $P$  to  $QR$  is 4.4 cm. Find the length of the altitude from  $P$  to  $QR$  (OR)

b) Draw the two tangents from a point which is 5 cm away from the centre of a circle of diameter 6 cm. Also measure the length of the tangents

44) a) Graph the following linear function  $y = \frac{1}{2}x$ . Identify the constant of variation and verify it with the graph. Also (i) find  $y$  when  $x = 9$  (ii) Find  $x$  when  $y = 7.5$  (OR)

b) Graph the following quadratic equations and state their nature of solutions,  $x^2 - 6x + 9 = 0$