



## Standard 10 MATHS

Time: 3.00 Hours

Marks: 100

**14×1=14****I. Choose the best answer:**

- 1)  $f(x) = (x+1)^3 - (x-1)^3$  represents a function which is  
 a) linear                      b) cubic                      c) reciprocal                      d) quadratic
- 2) Let  $n(A) = m$  and  $n(B) = n$  then the total number of non-empty relations that can be defined from A to B is  
 a)  $m^n$                       b)  $n^m$                       c)  $2^{mn}-1$                       d)  $2^{mn}$
- 3) If  $A = 2^{65}$  and  $B = 2^{64} + 2^{63} + 2^{62} + \dots + 2^0$  which of the following is true?  
 a) B is  $2^{64}$  more than A                      b) A and B are equal  
 c) B is larger than A by 1                      d) A is larger than B by 1
- 4) If the HCF of 65 and 117 is expressible in the form of  $65m - 117$ , then the value of m is  
 a) 4                      b) 2                      c) 1                      d) 3
- 5) What is the value of x in  $3\sqrt{x} = 9$   
 a) 3                      b) 9                      c) 27                      d)  $\sqrt{9}$
- 6) Find the matrix X if  $2X + \begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix} = \begin{pmatrix} 5 & 7 \\ 9 & 5 \end{pmatrix}$   
 a)  $\begin{bmatrix} -2 & -2 \\ 2 & -1 \end{bmatrix}$                       b)  $\begin{bmatrix} 2 & 2 \\ 2 & -1 \end{bmatrix}$                       c)  $\begin{bmatrix} 1 & 2 \\ 2 & 2 \end{bmatrix}$                       d)  $\begin{bmatrix} 2 & 1 \\ 2 & 2 \end{bmatrix}$
- 7) The perimeters of two similar triangles  $\triangle ABC$  and  $\triangle PQR$  are 36 cm and 24 cm respectively. If  $PQ = 10$  cm, then the length of AB is  
 a)  $6\frac{2}{3}$  cm                      b)  $\frac{10\sqrt{6}}{3}$  cm                      c)  $66\frac{2}{3}$  cm                      d) 15 cm
- 8) If  $(5, 7)$ ,  $(3, k)$  and  $(6, 6)$  are collinear then the value of the k is  
 a) 12                      b) 9                      c) -9                      d) -12
- 9) When proving that a quadrilateral is a trapezium, it is necessary to show.  
 a) Two sides are parallel                      b) Two parallel and two non-parallel sides  
 c) opposite sides are parallel                      d) all sides are of equal length
- 10)  $\cos^4 x - \sin^4 x =$   
 a)  $2 \sin^2 x - 1$                       b)  $2 \cos^2 x - 1$                       c)  $1 + 2 \sin^2 x$                       d)  $1 - 2 \cos^2 x$
- 11) A tower is 60 m height. Its shadow reduces by x metres when the angle of elevation of the sun increases from  $30^\circ$  to  $45^\circ$  then x is equal to  
 a) 41.92 m                      b) 43.92 m                      c) 43 m                      d) 45.6 m
- 12) A spherical ball of radius  $r_1$  units is melted to make 8 new identical balls each of radius  $r_2$  units. Then  $r_1:r_2$  is  
 a) 2:1                      b) 1:2                      c) 4:1                      d) 1:4
- 13) If S is the standard deviation of values p, q, r then standard deviation of  $p-3, q-3, r-3$ , is  
 a) S                      b)  $S-3$                       c)  $S+3$                       d)  $S-9$
- 14) If a letter is chosen at random from the English alphabets  $\{a, b, c, \dots, z\}$ , then the probability that the letter chosen precedes x  
 a)  $\frac{12}{13}$                       b)  $\frac{1}{13}$                       c)  $\frac{23}{26}$                       d)  $\frac{3}{26}$

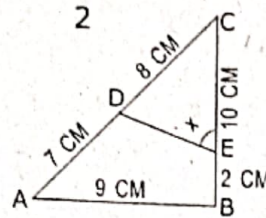
**II. Answer any 10 questions. (Q.No. 28 is compulsory)****10×2=20**

- 15) Let  $f(x) = x^2 - 1$ . Find fof.
- 16) Solve  $5x \equiv 4 \pmod{6}$
- 17) Find the number of terms in the A.P. 3, 6, 9, 12, ..... 111.
- 18) Reduce the rational expressions to its lowest form  $\frac{x-3}{x^2-9}$

19) If  $A = \begin{bmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{bmatrix}$  then find the transpose of  $-A$ .

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20) In figure

 $\angle A = \angle CED$  prove that $\Delta CAB \sim \Delta CED$ .Also find the value of  $x$ .

- 21) Calculate the slope and y intercept of the straight line  $4x+3y+12=0$
- 22) Find the area of the triangle formed by the points  $(1, -1)$ ,  $(-4, 6)$  and  $(-3, -5)$
- 23) Prove that  $\tan^2\theta - \sin^2\theta = \tan^2\theta \sin^2\theta$
- 24) A tower stands vertically on the ground. From a point on the ground, which is 15 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) Find the volume of a cylinder whose height is 2 m and whose base area is  $250 \text{ m}^2$ .
- 26) The standard deviation and mean of a data are 6.5 and 12.5 respectively. Find the coefficient of variation.
- 27) A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows an odd number and the coin shows a head.
- 28) Let  $f$  be a function from  $R$  to  $R$  defined by  $f(x) = 3x-5$ . Find the values of  $a$  and  $b$  given that  $(a, 4)$  and  $(1, b)$  belong to  $f$ .

**III. Answer any 10 questions. (Q.No. 42 is compulsory)****10×5=50**

- 29) Given the function  $f: x \rightarrow x^2 - 5x + 6$ , evaluate (i)  $f(-1)$  (ii)  $f(2a)$  (iii)  $f(2)$  (iv)  $f(x-1)$
- 30) Find the sum to  $n$  terms of the series  $3+33+333+\dots+n$  terms.
- 31) If  $9x^4+12x^3+28x^2+ax+b$  is a perfect square, find the values of  $a$  and  $b$
- 32) Solve  $\begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$
- 33) State and prove basic proportionality theorem.
- 34) Show that the given points form a parallelogram  $A(2.5, 3.5)$   $B(10, -4)$   $C(2.5, -2.5)$  and  $D(-5, 5)$
- 35) If the straight lines  $12y = -(P+3)x+12$ ,  $12x-7y = 16$  are perpendicular then find 'P'.
- 36) If  $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$ , then prove that  $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$
- 37) A building and a statue are in opposite side of a street from each other 33 m apart. From a point on the roof of building the angle of elevation of the top of statue is  $45^\circ$  and the angle of depression of base of the statue is  $30^\circ$ . Find the height of the statue? ( $\sqrt{3} = 1.732$ )
- 38) A container open at the top is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of Rs.40 per litre.
- 39) An aluminium sphere of radius 12 cm is melted to make a cylinder of radius 8 cm. Find the height of the cylinder.
- 40) The marks scored by the students in a slip test are given below. Find the standard deviation of their marks.
- |   |   |   |   |    |    |
|---|---|---|---|----|----|
| X | 4 | 6 | 8 | 10 | 12 |
| f | 7 | 3 | 5 | 9  | 5  |
- 41) Two unbiased dice are rolled once. Find the probability of getting (i) a doublet (equal numbers on both dice) (ii) the product as a prime number (iii) the sum as a prime number (iv) the sum as 1.
- 42) The sum of first  $n$ ,  $2n$  and  $3n$  terms of an A.P. are  $S_1$ ,  $S_2$  and  $S_3$  respectively. Prove that  $S_3 = 3(S_2 - S_1)$

**IV. Answer the following:****2×8=16**

- 43) Construct a triangle  $\Delta PQR$  such that  $QR = 5 \text{ cm}$ ,  $\angle P = 30^\circ$  and the altitude from  $P$  and  $QR$  is of length 4.2 cm. (OR)  
Draw the two tangents from a point which is 10 cm away from the centre of a circle of radius 5 cm. Also, measure the lengths of the tangents.
- 44) Draw the graph of  $xy = 24$ ,  $x, y > 0$ . Using the graph find, (i)  $y$  when  $x = 3$  and (ii)  $x$  when  $y = 6$ . (OR)  
Draw the graph of  $y = x^2+x-2$  and hence solve  $x^2+x-2 = 0$