TVL10M

Tirunelveli District
Common Half Yearly Examination - 2024

Standard 10
MATHS
PART - I

Time: 3.00 Hours Marks: 100

I. Answer all the questions **14×1=14**

1) The range of the relation $R=\{(x, x^2) | x \text{ is a prime number less than } 13\}$ is
   a) {2, 3, 5, 7} b) {2, 3, 5, 7, 11}
   c) {4, 9, 25, 49, 121} d) {1, 4, 9, 25, 49, 121}
2) If {(a, 8), (6, b) represents an identity function, then the value of a and b are
   a) (8, 6) b) (8, 8) c) (6, 8) d) (6, 6)
3) If 6 times of 6^{th} term of an A.P. is equal to 7 times of 7^{th} term, then the 13^{th} term of the A.P is
   a) 0 b) 6 c) 7 d) 13
4) Let $t_{m+n} = t_m.t_n$ for all natural numbers on and n. $t_1 = 3$ then t_1, t_2, t_3 are in
   a) A.P b) G.P
   c) both A.P and G.P d) neither A.P nor G.P
5) The values of a and b if $4x^4 - 24x^3+76x^2 + ax + b$ is a perfect square are
   a) 100, 120 b) 10, 12 c) −120, 100 d) 12, 10
6) Transpose of a column matrix is
   a) Unit matrix b) diagonel matrix c) Column matrix d) Row matrix
7) If a line touches the given circle at only one point, then it is called ..... to the circle
   a) chord b) secant c) tangent d) straight line
8) If the equation 2x+3y=9 and ax+y=3 represent the same line, then the value of a is
   a) 2 b) $\frac{1}{3}$ c) $\frac{2}{3}$ d) 3
9) If the slope of the line is $\frac{1}{\sqrt{3}}$ then slope of the perpendicular bisector is
   a) $\sqrt{3}$ b) $-\sqrt{3}$ c) $\frac{-1}{\sqrt{3}}$ d) 0
10) $x = a \cos\theta$, $y = b \sin\theta$ then
   a) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ b) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ c) $\frac{y^2}{a^2} + \frac{x^2}{b^2} = 1$ d) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
11) The height of a right circular cone whose radius is 5cm and slandheight is 13 cm will be
   a) 12 cm b) 10 cm c) 13 cm d) 5 cm
12) The ratio of the volumes of a cylinder, cone and a sphere if each has same diameter and same height is
   a) 1 : 2 : 3 b) 2 : 1 : 3 c) 1 : 3 : 2 d) 3: 1 : 2
13) If the mean and co-efficient of variation of a data are 4 and 87.5% then the standard deviation is
   a) 3.5 b) 3 c) 4.5 d) 2.5
14) If a letter is chosen at random from the English alphabets. Then the probability that the letter is vowels is
   a) $\frac{12}{13}$ b) $\frac{1}{13}$ c) $\frac{23}{26}$ d) $\frac{5}{26}$

PART - II

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

15) If A × B = {(3, 2), (3, 4) (5, 2) (5, 4)} then find A and B
16) Define constant function, give an example
17) Solve $3x-2 \equiv 0 \pmod{11}$
18) Find the 19^{th} term of an A.P −11, −15, −19, ...
19) If a polynomial $P(x) = x^2-5x-14$ is divided by another Polynomial q(x) we get $\frac{x-7}{x+2}$ find q(x).

20) Solve: $\begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$

21) In ΔABC D and E are the points on the sides AB and AC respectively such that DE || BC. If AD = 8x−7 DB=5x−3 AE = 4x−3 and EC = 3x−1 find x.

22) Find the equation of a straight line whose inclination is 45° and y intercept is 11.

23) If the straight lines $12y = -(P+3)x + 12$, $12x-7y=16$ are perpendicular then find P.

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. Find the height of the tower.

25) If the ratio of radical two spheres is 4 : 7 find the ratio of their volumes?

26) Find the range and co-efficient of range of the following data 25, 67, 48, 53, 18, 39, 44

27) If $P(A)=\frac{2}{3}$, $P(B)=\frac{2}{5}$, $P(A \cup B) = \frac{1}{3}$ then find $P(A \cap B)$

28) The base area of a hollow cylinder is $40\pi cm^2$ and its outer radius is 7cm. Find the inner radius.

PART - III

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

29) Let $A = \{x \in W | x<2\}$ $B=\{x \in N | 1<x\leq 4\}$ and $C=\{3, 5\}$ Verify: $A\times(B\cap C)=(A\times B)\cap(A\times C)$

30) Let f: A→B be a function defined by $f(x) = \frac{x}{2} - 1$ where A={2, 4, 6, 10, 12} and B={0, 1, 2, 4, 5, 9} Represent f by
(i) set of ordered pairs (ii) a table (iii) a graph (iv) an arrow diagram

31) Find the sum to n terms of the series 5 + 55 + 555 + ...

32) A girl is twice as old as her sister. Five years hence the product of their ages will be 375. Find the present age.

33) If $A = \begin{bmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{bmatrix}$ verify that $(AB)^T = B^T A^T$

34) State and Prove Pythagoras theorem

35) Let A(3, −4) B(9, −4) C(5, −7) and D(7, −7) show that ABCD is a trapezium

36) Find the equation of a straight line which passes through the intersection of the lines x+y−2=0, 2x+y−3=0 and bisects the line joining the points (4, 2) and (−6, 4)

37) Two ships are sailing in the sea on either sides of a light house. The angle of elevation of the top of the light house as observed from the ship are 30° and 45° respectively. If the light house is 200 m high, find the distance between the two ships $(\sqrt{3} = 1.732)$

38) If $p = \sin\theta + \cos\theta$, $q = \sec\theta + \operatorname{cosec}\theta$ then prove that $q = (p^2 - 1) = 2p$

39) The radius of top of a bucket is 18cm and that of the bottom is 6 cm. Its depth is 24cm. Find the capacity of the bucket.

40) Find the Mean and variance of the first 'n' natural numbers.

41) Two dice are rolled once. Find the probability of getting odd number in first die or a total of face sum 8.

42) If a^2, b^2, c^2 are in A.P show that $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are in A.P.

PART - IV

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

43) a) Constract a triangle similar to a given triangle ABC with it sides equal to $\frac{6}{5}$ of corresponding sides of the triangle ABC.

(OR)

b) Construct a ΔPQR in which QR = 5cm, $\angle P = 40^\circ$ and the median PG from P to QR is 4.4cm. Find the length of the altitude from P to QR.

44) a) Draw the graph $y = x^2 + 3x - 4$ and hence use to solve $x^2 + 3x - 4 = 0$

(OR)

b) Draw the graph xy=24, x,y≥0 using this findy when x=4 and x when y=8