Tsi10M

Tenkasi District

Common Half Yearly Examination - 2023

03-01-2024

Standard 10

MATHS

Time: 3.00 Hours Marks: 100

Part - I

Note: **Answer all the questions.** **14x1=14**

Choose the correct option and write the answer with its option code

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) $f(x)=(x+1)^3-(x-1)^3$ represents a function which is
   a) linear b) cubic c) reciprocal d) Quadratic

3) Given $F_1=1$, $F_2 = 3$, and $F_n = F_{n-1} + F_{n-2}$ then F_5 is
   a) 3 b) 5 c) 8 d) 11

4) What is the HCF of least Prime and the least composite number?
   a) 1 b) 2 c) 3 d) 4

5) The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the x-axis is
   a) 0 b) 1 c) 0 or 1 d) 2

6) The solution of $x^2 - 25 = 0$ has
   a) no real roots b) Real and equal roots
   c) Real and unequal roots d) Imaginary roots

7) In a $\triangle ABC$, AD is the bisector of $\angle BAC$, If AB=8cm, BD = 6cm, DC=3cm. The length of side AC is
   a) 6 cm b) 4 cm c) 3 cm d) 8 cm

8) The point of intersection of $3x - y = 4$ & $x + y = 8$ is
   a) (5, 3) b) (2, 4) c) (3, 5) d) (4, 4)

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) 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 angle of elevation and depression are usually measured by a device called
   a) Clinometer b) Kaleidoscope c) Periscope d) Telescope

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) The toal surface area of a hemi-sphere is how much times the square of its radius.
   a) π b) 4π c) 3π d) 2π

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

Part - II

Do any 10 sums. Q.No: 28 is compulsory. **10x2=20**

15) If A × B = {(3, 2) (3, 4) (5, 2) (5, 4) then find A and B

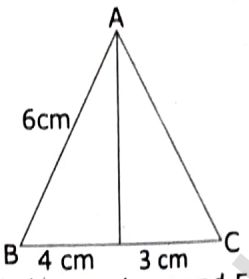
16) Computer x, such that $10^4 \equiv x \pmod{19}$

17) Find the sum of $6 + 13 + 20 + \ldots + 97$

18) Reduce the rational expression $\frac{9x^2 + 81x}{x^3 + 8x^2 - 9x}$ to its lowest form.

19) What is a square matrix? Give one example.

20) In the given figure, AD is the bisector of $\angle A$. If BD = 4 cm, DC=3cm and AB=6cm then find AC?



21) If radii of two concentric circles are 4 cm and 5 cm then find the length of the chord of one circle which is a tangent to the other circle.

22) The line 'r' passes through the points (–2, 2) and (5, 8) and the line 's' passes through the points (–8, 7) and (–2, 0). Is the line 'r' perpendicualr to 's'?

23) Find the area of the triangle formed by the points (–10, –4), (–8, –1) and (–3, –5)

24) Prove the identity $\frac{\cos\theta}{1+\sin\theta} = \sec\theta - \tan\theta$

25) Find the angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of a tower of height $10\sqrt{3}$ m

26) If the total surface area of a cone of radius 7cm is 704cm^2, then find its slant height.

27) Find the range and coefficient of range of the following data: 63, 89, 98, 125, 79, 108, 117, 68

28) If the ratio of radii of two spheres is 4 : 7, find the ratio of their volumes.

Part - III

Do any 10 sums with detailed steps. Q.No: 42 is compulsory. **10x5=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) If the function f: R → R is defined by

$$f(x) = \begin{cases} 2x + 7; & x < -2 \\ x^2 - 2 & -2 \leq x < 3 \\ 3x - 2; & x \geq 3 \end{cases}$$ then find the values of

(i) f(4) (ii) f(–2) (iii) $\frac{f(1) - 3f(4)}{f(-3)}$

31) In an A.P, sum of four consecutive terms is 28 and the sum of their squares is 276. Find the four numbers.

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

33) There are 12 pieces of five, ten and twenty rupee currencies whose total value is Rs.105. When first 2 sorts are interchanged in their numbers its value will be increased by Rs.20. Find the number of currencies is each sort.

34) State and prove Baudhayana (Pythagoras) theorem.

35) Find the vlaue of k, if the area of a quadrilateral is 28 sq.units, whose veritces are taken in the order (-4, -2), (-3, k) (3, -2) and (2, 3)

36) Find the equation of a straight line through the intersection of lines $7x + 3y = 10$, $5x - 4y = 1$ and parallel to the line $13x + 5y + 12 = 0$.

37) The horizontal distance between two buldings is 140m. The angle of depression of the top of the first building when seen from the top of the second building is 30°, If the height of the first building is 60M, find the height of the second building. ($\sqrt{3} = 1.732$)

38) A container open at the top is in the form of a frustom of a cone of height 16cm with radii of its lower and upper ends are 8cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of Rs.40 per litre.

39) A metallic sphere of radius 16cm is melted and recast into small spheres each of radius 2cm. How many small spheres can be obtained?

40) Find the standard deviation of the wages of 9 workers give below.
Rs.310, Rs.290, Rs.320, Rs.280, Rs.300, Rs.290, Rs.320, Rs.310, Rs.280

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

42) Find the square root of the polynomial $37x^2 - 28x^3 + 4x^4 + 42x + 9$ by division method.

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Part - IV

Answer the questions. **2x8=16**

43) a) Construct a ΔPQR such that QR = 6.5 cm $\angle P = 60^\circ$ and the altitude from P to QR is of length 4.5 cm.

(OR)

b) Draw a circle of diameter 6cm from a point P, Which is 8 cm away from its centre. Draw the two tangents PA and PB to the circle measure their lengths.

44) a) A company initially started with 40 workers to complete the work by 150 days. Later it decided to fasten up the work increasing the number of workers as shown below.

Number of worker (x)	40	50	60	75
Number of days (y)	150	120	100	80

i) Graph the above data and identify the type of variation

ii) From the graph, find the number of days required to complete the work if the company decides to opt for 120 workers?

iii) If the work has to be completed by 30 days, how many workers are required?

(OR)

b) Graph the quadratic equation $x^2 - 9x + 20 = 0$ and state the nature of solution.

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