ARIYALUR DISTRICT



Register Number : 0 1 0 3 0 1

# HALF YEARLY EXAMINATION - 2024

**Std: 10** **MATHEMATIC** **Marks : 100** **Time : 3 hr**

## PART - I

**Instructions :**

1) Answer all the questions. 2) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer. **14x1=14**

1. A={a, b, q}, B= {2, 3}, C={p, q, r, s} then {n (AUC)xB} is
   a) 8 b) 20 c) 12 d) 16
2. let $f(x)=\sqrt{1+x^2}$ then
   a) $f(x\,y)=f(x).f(y)$ b) $f(xy)\geq f(x).f(y)$ c) $f(xy)\leq f(x).f(y)$ d) None of these
3. 74k = _____ (Mod 100) a) 1 b) 2 c) 3 d) 4
4. $\frac{x}{x^2-25}-\frac{8}{x^2+6x+5}$ gives
   a) $\frac{x^2-7x+40}{(x-5)(x+5)}$ b) $\frac{x^2+7x+40}{(x-5)(x+5)(x+1)}$ c) $\frac{x^2-7x+40}{(x^2-25)(x+1)}$ d) $\frac{x^2+10}{(x^2-25)(x+1)}$
5. The solution of the system $x+y-3x=-6, -7y+7z=7, 3x=9$ is
   a) x= 1, y=2, z=3 b) $x=-1, y=2, z=3$ c) $x=-1, y=-2, z=3$ d) $x=1, y=-2, z=3$
6. Transpose of a column matrix is
   a) unit matrix b) diagonalmatrix c) coloum matrix d) row matrix
7. In a ΔABC, AD is the bisector of $\angle BAC$ If AB = 8cm, BD = 6cm DC=3cm, The length of the side AC is
   a) 6cm b) 4cm c) 3cm d) 8cm
8. A tangent is perpendicular to the radius at the
   a) centre b) point of contact c) infinity
9. (2,1) is the point of intersection of two lines
   a) $x-y-3=0; 3x-y-7=0$ b) $x+y=3; 3x+y=7$ c) $3x+y=3; x+y=7$ d) $x+3y-3=0; x-y-7=0$
10. When proving that a quadrilateral is a parallelogram by using slopes you must find.
    a) Two sides are parallel b) Two parallel and two non parallel sides
    c) opposite sides are parallel d) all sides are equal length
11. $\sin\theta=\cos\theta$, then $2\tan^2\theta+\text{in}^2\theta-1$ is equal to
    a) $-\frac{3}{2}$ b) $\frac{3}{2}$ c) $\frac{2}{3}$ d) $-\frac{2}{3}$
12. The height of the right circular cone whose radices is 5cm and slant height is 13cm will be :
    a) 12cm b) 10cm c) 13cm d) 5cm
13. The range of the data 8,8,8,8 …….. 8 is
    a) 0 b) 1 c) 8 d) 3
14. Which of the following incorrect?
    a) $P(A)>1$ b) $O\leq P(A)\leq 1$ c) $p(\phi)=0$ d) $p(A)+P(\bar{A})=1$

## PART - II

**Note : Answer any 10 questions question No: 28 is compulsory.** **10x2=20**

15. If BxA={(-2,3)(-2,4),(0,3)(0,4),(3,3)(3,4)} find A and B
16. Show that the function f : N→N defined by f(m) = $m^2+m+3$ is one – one function.
17. Find 8th term of G.P. 9,3,1……..
18. Simplify $\frac{4x^2y}{2x^2}\times\frac{6xz^3}{20y4}$
19. If the difference between a number and its reciprocal is $\frac{24}{5}$, find the number.
20. What length of leader is needed to reach a height of 7ft. along the wall when the base of the ladder is 4ft. from the wall?

21. If the points A(-3, 9) B(a,b) and C(4,-5) are collinear and if a+b=1 then find a and b

22. Prove that $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta$

23. 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.

24. Find the diameter of a sphere whose surface area is 154 $m^2$.

25. Find the volume of a cylinder whose height is 2m and whose base area is 250$m^2$.

26. The mean of a data is 25.6 and its co efficient of variation is 18.75. Find the standard deviation.

27. A coin is tossed thrice. What is the probability of getting two consecutive tails?

28. Let $f(x) = 2x + 5$ If $x \neq 0$ then find $\frac{f(x+2) - f(2)}{x}$

## PART - III

**Note : Answer any 10 questions. Question no. 42 is compulsory.** **10x5=50**

29. Let A = The set of all natural numbers Less then B = the set all prime numbers less than 8, C= the set of even prime number, verify that $(A \cap B) \times C = (A \times C) \cap (B \times C)$

30. $f(x)=x-4, g(x)=x^2$ *and* $h(x)=3x-5$ prove that $(fog)\,oh = fo(goh)$

31. Find the sum of all natural numbers between 300 and 600 which are divisible by 7.

32. $x^4-8x^3+mx^2+nx+16$ is a perfect square, find the value of 'm' and 'n'

33. If the roots of the equation $(c^2-ab)x^2-2(a^2-bc)x-ac=0$ are real and equal prove that either a=0 (or) $a^2+b^2+c^2=3abc$

34. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ S.T $A^2-5A+7I^2=0$

35. State and prove Pythagoras theorem.

36. Find the area of the quadrilateral white vertices are at (-9, 0) (-8,6), (-1,-2) and (-6,-3)

37. Find the equation of the perpendicular bisector of line joining the points A(-4, 2) and B (6, -4)

38. From the top of a tower 50m high. The angles of depression of the top and bottom of a tree are observed to be $30^0$ and $45^0$ respectively. Find the length of the tree $(\sqrt{3} = 1.732)$

39. A girl wishes to prepare birthday caps in the form of right circular cones for her birthday party using a sheet of paper whose area is 5720 $cm^2$, how many caps can be made with radius 5cm and height 12cm.

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

41. In a class 50 students, 28 opted for NCC, 30 opted for NSS and 18 opted both NCC and NSS. One of the student is selected at random. Find the probability that.
    i) The student opted for NCC but Not NSS ii) The Student opted for NSS but not NCC
    iii) The student opted for exactly one of them.

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

## PART - IV

**Note: Answer all the questions** **2x8=16**

43. (a) Draw the tangents from a point which is 10cm away from the centre of a circle of radius 5cm. Also, measure the length of the tangents.

(OR)

(b) construct a $\Delta PQR$ in which QR = 5cm $\angle P = 40^0$ and the median PG from P to QR is 4.4cm. Find the length of the altitude from P to QR

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

(b) Draw the graph of $y = x^2+x$ and hence solve $x^2+1=0$

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