10 P

Register No. 10110

HALF YEARLY EXAMINATION - 2024

Time : 3.00 Hours **MATHEMATICS** **Marks : 100**

I. ANSWER ALL THE QUESTIONS 14x1=14

1. If g={(1,1),(2,3), (3,5), (4,7)) is a function by g(x) = αx+β then the values of α and β are
   a) (-1, 2) b) (2, -1) c) (-1, -2) d) (1, 2)
2. The remainder when 7x13x19x23x29x31 is divided by 6 is
   a) 0 b) 1 c) 2 d) 3
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. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is
   a) $\frac{9y}{7}$ b) $\frac{9y^3}{21y-21}$ c) $\frac{21y^2-4xy+21}{3y^3}$ d) $\frac{7(y^2-2y+1}{y^2}$
5. Transpose of a Column matrix is
   a) unit matrix b) diagonal matrix c) Column matrix d) row matrix
6. If ΔABC is an isosceles triangle with ∠C 90° and AC= 5cm, then AB is
   a) 2.5 cm b) 5 cm c) 10 cm d) $5\sqrt{2}$ cm
7. How many tangents can be drawn to the circle from an exterior point?
   a) one b) two c) infinite d) zero
8. The point of intersection of 3x-y=4 and x+y=8 is
   a) (5,3) b) (2,4) c) (3,5) d) (4,4)
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. A tower is 60 m height. Its Shadow is x metres shorter when the sun's altitude is 45° than when it has been 30°, then x is equal to
    a) 41.92 m b) 43.92 m c) 43 m d) 45.6 m
11. Total Surface area of a hemisphere is equal to how many times the area of its base?
    a) 2 b) 3 c) 4 d) 5
12. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is
    a) 1:2:3 b) 2:1:3 c) 1:3:2 d) 3:1:2
13. Variance of first 20 natural number is
    a) 32.25 b) 44.25 c) 33.25 d) 30
14. The probability of getting a job for a person is $\frac{x}{3}$ If the probability of not getting the job is $\frac{2}{3}$ then the value of x is
    a) 2 b) 1 c) 3 d) 1.5

II. Answer any 10 questions. Question No. 28 is Compulsory. 10x2=20

15. Let A = {1,2,3} and B ={ x/x is a prime number less than 10}. Find B x A.
16. If $f(x) = x^2-1$, g(x)=x-2 find a, if-go f(a)=1.
17. If $13824=2^a x 3^b$ then find a and b.
18. Find the Sum $3+1+\frac{1}{3}+$ ..... α
19. Simplify: $\frac{P^2-10P+21}{P-7} \times \frac{P^2+P-12}{(P-3)^2}$
20. Show that the matrices. $A = \begin{pmatrix} 1 & 2 \\ 3 & 1 \end{pmatrix}$ $B = \begin{pmatrix} 1 & -2 \\ -3 & 1 \end{pmatrix}$. Satisfy commutative property AB = BA.

21. D and E are respectively the points on the sides AB and AC of a ΔABC such that AB = 5.6 cm AD= 1.4 cm, AC = 7.2cm and AE = 1.8 cm, show that DE || BC.
22. Find the intercepts made by the line 4x-9y +36=0 on the Co-ordinate axes.
23. A player sitting on the top of a tower of height 20m observes the angle of depression of a ball lying on the ground as 60°. Find the the distance between the foot of tower and the ball. ($\sqrt{3}$=1.732)
24. If the total surface area of a cone of radius 7 cm is 704 cm^2, then find its slant height.
25. If the ratio of radii of two spheres is 4:7, find the ratio of their volumes.
26. Find the standard deviation of first 21 natural numbers.
27. A coin is tossed thrice what is the Probability of getting two consecutive tails?
28. The line. through the points (-2,a) and (9,3) has slope - ½ Find the value of a.

III. Answer any 10 questions. Question No. 42 is compulsory. **10x5=50**

29. A-{x∈W / X<3}, B= {x∈N / 1<x ≤ 4} and C = {3, 5} verify that A x (B∪C) = (AxB) U (AXC)
30. The sum of first n, 2n and 3n terms of an A. P are S_1, S_2 and S_3 respectively. Prove that $S_3=3(S_2-S_1)$.
31. Rekha has 15 squre colour papers of sizes 10cm, 11 cm, 12 cm ..... 24cm. How much area can be decorated with Colour papers?
32. Find the GCD of the polynomials x^3+x^2-x+2 and $2x^3-5x^2+5x-3$
33. If A= $\begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ show that $A^2-5A+7I_2=0$
34. P and Q are the mid points of the sides CA and CB respectively of a ΔABC, right angled at C. Prove that $4(AQ^2+BP^2) = 5AB^2$
35. If vertices of a quadrilateral are at A (-5, 7), B (-4, K), C (-1, -6) and D (4, 5) and its area is 72 sq. units. Find the value of K.
36. Find the equation of the perpendicular bisector of the line joining the points A(-4,2) and B (6,-4)
37. From the top of a 12 m high building, the angle of elevation of the top a cable tower is 60° and the angle of depression of its foot is 30°. Determine the height of the tower.
38. A Container open at the top is in the form of a frustum of a cone of hight 16 cm 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 ₹ 40 per litre.
39. A metallic sphere of radius 16cm is melted and recast into small spheres each of radius 2 cm. How many small Spheres can be obtained?
40. Find the Co-efficient of Variation of 24, 26, 33, 37, 29, 31.
41. Three fair coins are tossed together. Find the probability of getting
    (i) all heads (ii) at least one tail (iii) at most one head (iv) at most two tails.
42. If $36x^4-60x^3+61x^2-mn+n$ is a perfect Square, find the values of m and n.

V. Answer all the Question **2x8=16**

43. Draw ΔPQR such that PQ = 6.8 cm, vertical angle is 50° and the bisector of the vertical angle Meets the base at D where PD = 5.2 cm

(OR)

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

44. A bus is travelling at a uniform speed of 50km/hr. Draw the distance - time graph and hence. find
    (i) The Constant of variation
    (ii) how far will it travel in 90 minutes?
    (iii) The time required to cover a distance of 300km from the graph. (OR)
    Draw the graph of $y=x^2+x$ and hence solve $x^2+1=0$