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Register No. 10010

QUARTERLY EXAMINATION - 2024

Time : 3.00 Hours

MATHEMATICS

Marks : 100

I. Choose the best answer.

14x1=14

- If there are 1024 relation 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
- If the ordered pairs $(a+2,4)$ and $(5, 2a+b)$ are equal then (a,b) is
a) $(2,-2)$ b) $(5,1)$ c) $(2,3)$ d) $(3,-2)$
- If $f(x)=2x^2$ and $g(x)=\frac{1}{x}$, then $f \circ g$ is
a) $\frac{3}{2x^2}$ b) $\frac{2}{3x^2}$ c) $\frac{2}{9x^2}$ d) $\frac{1}{6x^2}$
- Using Euclids division lemma, if the cube of any positive integer is divided by 9 then the possible remainders, are
a) 0,1,8 b) 1,4,8 c) 0,1,3 d) 1,3,5
- The sum of exponents of the prime factors in the prime factorization of 1729 is
a) 1 b) 2 c) 3 d) 4
- The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \dots$ is
a) $\frac{1}{24}$ b) $\frac{1}{27}$ c) $\frac{2}{3}$ d) $\frac{1}{81}$
- If $(x-6)$ is the HCF of $x^2-2x-24$ and x^2-kx-6 , then K is
a) 3 b) 5 c) 6 d) 8
- Which of the following should be added to make x^2+64 a perfect square
a) $4x^2$ b) $16x^2$ c) $8x^2$ d) $-8x^2$
- The solution of $(2x-1)^2 = 0$ is Equal to
a) -1 b) 2 c) -1,2 d) None of there
- If in $\triangle ABC$, $DE \parallel BC$, $AB = 3.6\text{cm}$, $AC = 2.4\text{cm}$, and $AD = 2.1\text{cm}$ then the length of AE is
a) 1.4 cm b) 1.8 cm c) 1.2 cm d) 1.05 cm
- The Point of intersection of $3x-y = 4$ and $x+y=8$ is
a) $(5,3)$ b) $(2,4)$ c) $(3,5)$ d) $(4,4)$
- The straight line given by the equation $x=11$ is
a) Parallel to X-axis b) Parallel to Y-axis c) Passing through Origin d) Passing through $(0,11)$
- The Slope of the line which is perpendicular to a line joining the points $(0,0)$ and $(-8,8)$ is
a) -1 b) 1 c) $\frac{1}{3}$ d) 8
- $\tan \theta \operatorname{Cosec}^2 \theta - \tan \theta$ is Equal to
a) $\sec \theta$ b) $\cot^2 \theta$ c) $\sin \theta$ d) $\cot \theta$

II. Answer any 10 from the following and Q.No : 28 is compulsory

10x2=20

- If $A \times B = \{(3,2) (3,4), (5,2), (5,4)\}$ then find A and B
- If $f(x) = x^2 - 5x + 6$ then evaluate $f(2)$
- Find k if $f \circ f(k) = 5$ Where $f(k) = 2k-1$
- If $800 = a^b \times b^a$, then find a and b.

19. Find the sum of $6+13+20+\dots+97$
20. Find x so that $x+6$, $x+12$, and $x+15$ are Consecutive Terms of a geometric progression
21. Find the Lcm of $8 X^4 Y^2$, $48 X^2 Y^4$
22. Simplify : $\frac{x^3}{x-y} + \frac{y^3}{y-x}$
23. Determine the quadratic Equation, Whose Sum and Product of roots are $-9,20$
24. If ΔABC is Similar to ΔDEF Such that $BC = 3\text{cm}$, $EF = 4\text{ cm}$, and area of $\Delta ABC = 54\text{ Cm}^2$ find the area of ΔDEF
25. Find the slope of a line joining $(-6,1)$ and $(-3,2)$
26. Find the equation of a line whose inclination is 30° and making as intercept -3 on the Y - axis
27. Prove that $\sqrt{\frac{1+\cos \theta}{1-\cos \theta}} = \operatorname{Cosec} \theta + \cot \theta$
28. Show that the straight line $5x+23y+14=0$ and $23x-5y+9=0$ are perpendicular.

III. Answer any 10 from the following Q.No : 42 is compulsory

10x5=50

29. If $A = \{5,6\}$, $B = \{4,5,6\}$, $C = \{5,6,7\}$, Shows that $A \times A = (B \times B) \cap (C \times C)$
30. Let $A = \{1,2,3,4\}$ and $B = \{2,5,8,11,14\}$ be two sets let $f: A \rightarrow B$ be a function given by $f(x) = 3x-1$, Represent this function
(1) set of ordered pairs. (2) Table form. (3) arrow diagram. (4) Graphical form
31. A function f in defined by $f(x) = 3-2x$. find x such that $f(x^2) = [f(x)]^2$
32. If the highest common factor of 210 and 55 is Expressible in the form $55x-325$. Then find x .
33. The ratio of 6^{th} and 8^{th} term of an A.P is 7:9. Find the ratio of 9^{th} term to 13^{th} term.
34. Rekha has 15 squares colour papers of sizes 10cm, 11cm, 12cm,..... 24cm how much area can be decorated with these colour papers ?
35. If $x = \frac{a^2+3a-4}{3a^2-3}$ and $y = \frac{a^2+2a-8}{2a^2-2a-4}$ then find the value of $x^2 y^2$
36. Find the square root of $64x^4-16x^3+17x^2-2x+1$
37. If α, β are the roots of $2x^2-7x+5=0$. Find the value of 1) $\frac{1}{\alpha} + \frac{1}{\beta}$ 2) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
38. State and prove basic Proportionality theorem.
39. Find the area of the Quadrilateral formed by the points $(8,6)$, $(5,11)$, $(-5,12)$ and $(-4,3)$
40. $A(-3,0)$ $B(10,-2)$, $C(12,3)$ are the vertices of ΔABC . Find the equation of the Altitude through A and B
41. Prove that $\frac{\sin A}{1+\cos A} + \frac{\sin A}{1-\cos A} = 2 \operatorname{Cosec} A$
42. Solve : $x+y+z=5$; $2x-y+z=9$; $x-2y+3z = 16$.

IV. Answer any one from given two questions (EACH) $2 \times 8 = 16$

43. (a) Construct a Triangle similar to a given triangle PQR with its sides equal to $\frac{3}{5}$ of the corresponding sides of the triangle PQR [Scale factor $\frac{3}{5} < 1$] (or)
(b) Construct a Triangle Smilar to a given Triangle PQR with its sides equal to $\frac{6}{5}$ of the corresponding sides of the Triangle PQR [scale factor $\frac{6}{5} > 1$]
44. (a) A bus is travelling at a uniform speed of 50 km/hm draw distance - time graph and find
1. How far will it go in 90 minutes ?
2. Time required to cover the distance of 300 km. (or)
(b) Draw the graph of $xy = 24$, $x, y > 0$, Using the graph find
i) y When $x=3$ and (ii) x When $y=6$