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Register No.

Time : 3.00 Hrs

Quarterly Examination - 2023
MATHEMATICS

Marks : 100

PART - I

Choose the correct answer **14 x 1 = 14**

1. If there are 1024 relations from a set A = {1, 2, 3, 4, 5) to set B, then the number of elements in B
   a) 3 b) 2 c) 4 d) 8
2. 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)
3. If f : A → B is a bijective function and if n(B) = 7, then n(A) is
   a) 7 b) 49 c) 1 d) 14
4. Using Euclids division comma, 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
5. 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
6. The least number that is divisible by all the numbers from 1 to 10 is
   a) 2025 b) 5220 c) 5025 d) 2520
7. Which of the following should be added to make $a^4 + 64$ perfect square
   a) $4x^2$ b) $16x^2$ c) $8x^2$ d) $-8x^2$
8. If (x – 6) is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - b$, then value of k is
   a) 3 b) 5 c) 6 d) 8
9. The solution of $(2x - 1)^2 = 9$ is equal to
   a) –1 b) 2 c) –1, 2 d) none of these
10. Graph of a linear equation is
    a) straight line b) circle c) parabola d) hyperbola
11. In ΔLMN, ∠L = 60°, ∠LM = 50°, ΔLMN ~ ΔPQR then value of ∠R is
    a) 40° b) 70° c) 30° d) 110°
12. The point of intersection of 3x – y = 4 and x + y = 8 in
    a) (5, 3) b) (2, 4) c) (3, 5) d) (4, 4)
13. 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) 1/3 d) –8
14. If x = a tanθ and y = b secθ then

    a) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ b) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ c) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ d) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$

PART - II

Note : Answer any 10 of the following. Question No.28 is compulsory. **10 x 2 = 20**

15. If A = {1, 3, 5}, B = {2, 3} then find A x B and B x A.
16. If function $f(x) = x^2 - 5x + b$ then find the value of f(2)
17. If $13824 = 2^a \times 3^b$ then find a and b.
18. If x, 10, y, 24, z are in Arithmetic progression then find the value of x, y and z.
19. If 9, 3, 1, ...are in G.P, then find 8^{th} term.
20. Find the sum of 3, 7, 11... upto 40 terms.
21. Find the LCM of $9a^3b^2$, $12a^2b^2c$.
22. Simplify : $\frac{x^3}{x-y} - \frac{y^3}{y-x}$

23. Determine the nature of root of the equation $9x^2 - 24x + 16 = 0$
24. Solve $x^2 + 2x - 2 = 0$ by formula method.
25. Find the slope of the straight line joining (–6, 1) and (–3, 2)
26. Prove that $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sec\theta + \tan\theta$
27. Find the slope and y-intercept of $\sqrt{3}x + (1 - \sqrt{3})y = 3$
28. If $f(x) = x^2 - 1$, $g(x) = x - 2$, find a, if $gof(a) = 1$

PART - III

Note : Answer any 10 of the following. Question No.42 is compulsory. **10 x 5 = 50**

29. If $A = \{x \in N / 1 < x < 4\}$, $B = \{x \in W / 0 \leq x < 2\}$, $C = \{x \in N / x < 3\}$ then verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$
30. Let $f : A \to B$ be a function defined by $f(x) = \frac{x}{2} - 1$ where A = {2, 4, 6, 10, 12}, B = {0, 1, 2, 4, 5, 9}. Represent f by 1) set of ordered pairs 2) table 3) an arrow diagram 4) a graph
31. Find x, if $fog(x) = gof(x)$, $f(x) = 3x + 1$, $g(x) = x + 3$
32. The ratio of 6th and 8th term of an A.P is 7 : 9 Find the ratio of 9th and 13th term.
33. If d is the highest common factor of 32 and 60. Find x and y satisfying $d = 32x + 60y$
34. Find the sum of $15^2 + 16^2 + 17^2 + \ldots + 28^2$
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 $37x^2 - 28x^3 + 4x^4 + 42x + 9$
37. Solve : $3x - 2y + z = 2$, $2x + 3y - z = 5$, $x + y + z = 6$
38. State and prove basic proportionality theorem
39. Find the Area of quadrilateral whose vertices are (–9, –2), (–8, –4), (2, 2) and (1, –3)
40. A line makes positive intercepts on coordinates axes whose sum is 7 and it passes through (–3, 8). Find its equation.
41. If $\sqrt{3}\sin\theta - \cos\theta = 0$, then show that $\tan 3\theta = \frac{3\tan\theta - \tan^3\theta}{1 - 3\tan^2\theta}$
42. If α are β the roots of the equation $2x^2 - x - 1 = 0$, then form the equation whose roots are $\alpha^2\beta$, $\beta^2\alpha$

PART - IV

Note : Answer all the questions. **2 x 8 = 16**

43. a) Construct a triangle similar to a given triangle with its sides equal to $\frac{6}{5}$ of the corresponding sides of the triangle ΔABC. (scale factor $\frac{6}{5} > 1$)

(OR)

b) 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.

44. a) A bus is travelling at a uniform speed of 50km/hr. Draw the distance - time and hence find, 1) The constants of variation 2) How far will it travel in 1½ hr. 3) The time required to cover a distance of 300 km from the graph. **(OR)**

b) Draw the graph of xy = 24, x, y > 0 using the graph find 1) y when x = 3 2) x when y = 6