

QUARTERLY EXAMINATION - 2024

10. Std

Time : 3.00 HOUR

MATHEMATICS

Reg.No

MARKS: 100

Instructions :

1. Write clearly and legibly without mistakes and overwriting utilising the maximum time allotted for the exam.
2. Answer should be in your own style without changing the main core concept.
3. Use only black or blue ink pen to write the exam.
4. Draw clear diagrams wherever necessary..

I Choose the correct answer.

14 X 1 = 14

1. If $n(A \times B) = 6$ and $A = \{1, 3\}$ then $n(B)$ is
a) 1 b) 2 c) 3 d) 6
2. 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) 5
3. Let $n(A) = m$, and $n(B) = n$ then the total number of non - empty relations that can be defined from A to B is
a) m^n b) n^m c) $2^{mn}-1$ d) 2^{mn}
4. If $\{(a,8), (6,b)\}$ represents an identity function, then the value of a and b are respectively
a) (8,6) b) (8,8) c) (6,8) d) (6,6)
5. If $f : A \rightarrow B$ is a bijective function and if $n(B) = 7$ then $n(A)$ is equal to
a) 7 b) 49 c) 1 d) 14
6. The sum of the exponents of the prime factors in the prime factorization of 1729 is
a) 1 b) 2 c) 3 d) 4
7. 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
8. If 6 times of 6th term of an A.P is equal to 7 times 7th term, then the 13th term of the A.P is
a) 0 b) 6 c) 7 d) 13

9. The value of $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$ is
 a) 14400 b) 14200 c) 14280 d) 14520
10. The solution of the system $x + y + 3z = -6$, $-7y + 7z = 7$, $3z = 9$ is
 a) $x = 1, y = 2, z = 3$ b) $x = -1, y = 2, z = 3$
 c) $x = -1, y = -2, z = 3$ d) $x = 1, y = -2, z = 3$
11. $\frac{3y+3}{y} + \frac{7y-7}{3y^3}$ is
 a) $\frac{9y}{7}$ b) $\frac{9y^3}{(21y-21)}$ c) $\frac{21y^2 - 42y + 21}{3y^3}$ d) $\frac{7(y^2 - 2y + 1)}{y^2}$
12. In $\triangle LMN$ $\angle L = 60^\circ$, $\angle M = 50^\circ$, If $\triangle LMN \sim \triangle PQR$ then the value of $\angle R$ is
 a) 40° b) 70° c) 30° d) 110°
13. The straight line given by the equation $x = 11$ is
 a) Parallel to x axis b) Parallel to y axis
 c) Passing through the origin d) Passing through the point (0, 11)
14. If slope of the line PQ is $\frac{1}{\sqrt{3}}$ then slope of the perpendicular bisector of PQ is
 a) $\sqrt{3}$ b) $-\sqrt{3}$ c) $\frac{1}{\sqrt{3}}$ d) 0

II Answer any 10 of the following questions. 28 th question is compulsory.

10 X 2 = 20

15. If $B \times A = \{(-2,3) (-2,4) (0,3) (0,4) (3,3) (3,4)\}$ find A and B.
16. $A = \{1, 2, 3, 4, \dots, 45\}$ and R be the relation defined as is square of a number on A. Write R as a. Subset of $A \times A$, Also find the domain and range of R.
17. Let $A = \{1, 2, 3\}$, $B = \{4, 5, 6, 7\}$ and $f = \{(1,4), (2,5) (3,6)\}$ be function from A to B. Show that f is one - one but not onto function.
18. Find k if $f \circ f(k) = 5$, where $f(k) = 2k - 1$.
19. 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$ find 'a' and 'b'.
20. Complete x such that $10^4 \equiv x \pmod{19}$.

21. Find a_0 and a_{15} whose n^{th} term is $a_n = \begin{cases} \frac{n^2 - 1}{n + 3} ; & n \text{ is even, } n \in \mathbb{N} \\ \frac{n^2}{2n + 1} ; & n \text{ is odd, } n \in \mathbb{N} \end{cases}$

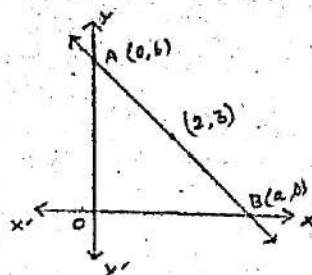
22. If $3 + k$, $18 - k$, $5k + 1$ are in A.P then find k .
23. Find the excluded values of $\frac{y}{y^2 - 25}$.
24. Simplify $\frac{5t^3}{4t-8} \times \frac{6t-12}{10t}$
25. In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $\frac{AD}{DB} = \frac{3}{4}$ and $AC = 15$ cm. Find AE.
26. Show that the points $(-3, -4)$, $(7, 2)$ and $(12, 5)$ are collinear.
27. Find the slope of a line joining the points $(5, \sqrt{5})$ with the origin.
28. The father's age is six times his son's age. Six years hence the age of father will be four times his son's age. Find the present age (in years) of the son and father.

III Answer any 10 of the following questions. 42nd question is compulsory.

10 X 5 = 50

29. Let $A = \{x \in \mathbb{N} / 1 < x < 4\}$, $B = \{x \in \mathbb{W} / 0 \leq x < 2\}$ and $C = \{x \in \mathbb{N} / x < 3\}$. Verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$.
30. Let $A = \{2, 4, 6, 10, 12\}$, $B = \{0, 1, 2, 4, 5, 9\}$ be two sets. Let $f: A \rightarrow B$ be a function given by $f(x) = x/2 - 1$. Represent this function
 (i) by arrow diagram (ii) in a table form
 (iii) as a set of ordered pairs (iv) in a graphical form
31. If $f(x) = 2x + 3$, $g(x) = 1 - 2x$ and $h(x) = 3x$ prove that $f \circ (g \circ h) = (f \circ g) \circ h$.
32. If $P_1^{x_1} \times P_2^{x_2} \times P_3^{x_3} \times P_4^{x_4} = 113400$, where P_1, P_2, P_3, P_4 and x_1, x_2, x_3, x_4 are integers find the value of P_1, P_2, P_3, P_4 and x_1, x_2, x_3, x_4 .
33. Find the sum of all natural numbers between 300 and 600 which are divisible by 7.
34. Find the sum of n terms of the series $3 + 33 + 333 + \dots$ n terms.
35. Rekha has 15 square colour papers of sizes 10cm, 11 cm, 12 cm 24 cm. How much area can be decorated with these colour papers?
36. Find the GCD of the polynomials $x^3 + x^2 - x + 2$ and $2x^3 - 5x^2 + 5x - 3$.
37. If $A = \frac{2x+1}{2x-1}$ and $B = \frac{2x-1}{2x+1}$ find $\frac{1}{A-B} - \frac{2B}{A^2 - B^2}$.

38. Find the square root of $37x^2 - 28x^3 + 4x^4 + 42x + 9$. Polynomial by division method.
39. State and prove Basic proportionality Theorem.
40. Find the area of the quadrilateral formed by the points (8, 6) (5, 11) (-5, 12) and (-4, 3).
41. Find the equation of the perpendicular bisector of the line joining the points A (-4, 2) and B (6, -4).
42. A straight line cuts the co-ordinates axes at A and B, If the mid point of AB is (2, 3) Find the equation of AB.



IV Answer the following questions.

2 X 8 = 16

43. a) Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR (Scale factor $\frac{7}{3} > 1$).

(OR)

- b) Construct a ΔPQR which the base $PQ = 4.5$ cm, $\angle R = 35^\circ$ and the median from R to PQ is 6 cm.
44. a) A bus is travelling at a uniform speed 50km/hr. Draw the distance - time graph and hence find

(i) the constant of variation (ii) how far will it travel in $1\frac{1}{2}$ hour.

(iii) 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
(i) y when $x = 3$, (ii) x when $y = 12$



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