

COMMON QUARTERLY EXAMINATION - 2023

A

Standard X

Reg.No.

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MATHEMATICS

Time : 3.00 hrs

Part - I

Marks : 100

I. Choose the most suitable answer from the given four alternatives.

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 $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$ then $f \circ g$ is
 - a) $\frac{3}{2x^2}$
 - b) $\frac{2}{3x^2}$
 - c) $\frac{2}{9x^2}$
 - d) $\frac{1}{6x^2}$
3. If $n(A) = p$, $n(B) = q$, then the total number of relations that exist from A to B is
 - a) p^q
 - b) q^p
 - c) $2^{pq} - 1$
 - d) 2^{pq}
4. The sum of the exponents of the prime factors in the prime factorization of 1729 is
 - a) 1
 - b) 2
 - c) 3
 - d) 4
5. An A.P consists of 31 terms. If its 16th term is m , then the sum of all the terms of this AP is
 - a) 16 m
 - b) 62 m
 - c) 31 m
 - d) $\frac{31}{2} m$
6. The next term of the sequence $\frac{1}{2}, \frac{1}{6}, \frac{1}{10}, \frac{1}{14}, \dots$ is
 - a) $\frac{1}{15}$
 - b) $\frac{1}{16}$
 - c) $\frac{1}{18}$
 - d) $\frac{1}{20}$
7. 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) $x = 1, y = -2, z = 3$
8. $\frac{3y - 3}{y} + \frac{7y - 7}{3y^2}$ is
 - a) $\frac{9y}{7}$
 - b) $\frac{9y^3}{21y - 21}$
 - c) $\frac{21y^2 - 42y + 21}{3y^3}$
 - d) $\frac{7(y^2 - 2y + 1)}{y^2}$

9. The square root of $\frac{256x^8y^4z^{10}}{25x^6y^6z^6}$ is equal to

- a) $\frac{16}{5} \left| \frac{x^2z^4}{y^2} \right|$ b) $16 \left| \frac{y^2}{x^2z^4} \right|$ c) $\frac{16}{5} \left| \frac{y}{xz^2} \right|$ d) $\frac{16}{5} \left| \frac{xz^2}{y} \right|$

10. If in $\triangle ABC$, $DE \parallel BC$, $AB = 3.6$ cm, $AC = 2.4$ cm and $AD = 2.1$ cm, then the length of AE is

- a) 1.4 cm b) 1.8 cm c) 1.2 cm d) 1.05 cm

11. In a $\triangle ABC$, AD is the bisector of $\angle BAC$. If $AB = 8$ cm, $BD = 6$ cm and $DC = 3$ cm. The length of the side AC is

- a) 6 cm b) 4 cm c) 3 cm d) 8 cm

12. The arc of triangle formed by the points $(-5, 0)$, $(0, -5)$ and $(5, 0)$ is

- a) 0 sq. units b) 25 sq. units
c) 5 sq. units d) none of these

13. The slope of the line joining $(12, 3)$, $(4, a)$ is $\frac{1}{8}$. The value of 'a' is

- a) 1 b) 4 c) -5 d) 2

14. If $(\sin\theta + \cos\theta) = a$ and $(\sec\theta + \operatorname{cosec}\theta) = b$, then the value of $b(a^2 - 1)$ is equal to

- a) $2a$ b) $3a$ c) 0 d) $2ab$

Part - II

II. Answer any 10 questions.

(Q.No.28 is compulsory)

10 x 2 = 20

15. A relation R is given by the set $\{(x, y) / y = x + 3, x \in \{0, 1, 2, 3, 4, 5\}\}$. Determine its domain and range.

16. If $A \times B = \{(3, 2), (3, 4), (5, 2), (5, 4)\}$ then find A and B .

17. Let $X = \{1, 2, 3, 4\}$ and $Y = \{2, 4, 6, 8, 10\}$ and $R = \{(1, 2), (2, 4), (3, 6), (4, 8)\}$. Show that R is a function and find its domain, co-domain and range.

18. 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$. Find 'a' and 'b'.

19. Find the least positive value of x such that $71 \equiv x \pmod{8}$

20. Find the 19th term of an A.P: $-11, -15, -19, \dots$

21. Find the 8th term of the G.P: $9, 3, 1, \dots$

22. Find the LCM of $4x^2y, 8x^3y^2$

23. Find the square root of $256(x-a)^8(x-b)^4(x-c)^{16}(x-d)^{20}$

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X MATHEMATICS

24. $x^2 + x - 12 = 0$, Determine the nature of roots of this equation.
25. If $\triangle ABC$ is similar to $\triangle DEF$ such that $BC = 3$ cm, $EF = 4$ cm and area of $\triangle ABC = 54$ cm². Find the area of $\triangle DEF$.
26. Show that the given points are collinear : $(-3, -4)$, $(7, 2)$ and $(12, 5)$
27. Prove that $\tan^2\theta - \sin^2\theta = \tan^2\theta \sin^2\theta$
28. Find the area of the triangle whose vertices are $(-3, 5)$, $(5, 6)$ and $(5, -2)$

Part - III

III. Answer any 10 questions.

10 x 5 = 50

(Q.No.42 is compulsory)

29. Let $A = \{x \in W / x < 2\}$, $B = \{x \in N / 1 < x \leq 4\}$ and $C = \{3, 5\}$, verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$
30. $f(x) = x - 1$, $g(x) = 3x + 1$ and $h(x) = x^2$. Show that $(f \circ g) \circ h = f \circ (g \circ h)$
31. Use Euclid's Division Algorithm to find the highest common factor of 84, 90 and 120.
32. Find the sum of n terms of the series $5 + 55 + 555 + \dots$
33. Rekha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm,, 24 cm. How much area can be decorated with these colour papers?
34. Solve : $x + y + z = 5$; $2x - y + z = 9$; $x - 2y + 3z = 16$
35. Find the square root of $64x^4 - 16x^3 + 17x^2 - 2x + 1$
36. A bus covers a distance of 90 km at a uniform speed. Had the speed been 15 km / hour more it would have taken 30 minutes less for the journey. Find the original speed of the bus.
37. Find the area of the quadrilateral formed by the points $(8, 6)$, $(5, 11)$, $(-5, 12)$ and $(-4, 3)$
38. State and prove Basic Proportionality Theorem.
39. Show that the points $(-2, -1)$, $(4, 0)$, $(3, 3)$ and $(-3, 2)$ are vertices of a parallelogram.
40. A line makes positive intercepts on coordinate axes whose sum is 7 and it passes through $(-3, 8)$. Find its equation.
41. Prove that $\sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}} + \sqrt{\frac{1 - \sin\theta}{1 + \sin\theta}} = 2 \sec\theta$
42. Let $f : A \rightarrow B$ 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
- a set of ordered pairs
 - a table
 - an arrow diagram
 - a graph

Part - IV

IV. Answer all the questions.

2 x 8 = 16

43. a) Construct a triangle similar to a given triangle LMN with its sides equal to $\frac{4}{5}$ of the corresponding sides of the triangle LMN. (scale factor $\frac{4}{5} < 1$)

(OR)

- b) Construct a triangle ΔPQR such that $QR = 5$ cm, $\angle P = 30^\circ$ and the altitude from P to QR is of length 4.2 cm.
44. a) A garment shop announces a flat 50% discount on every purchase of items for their customers. Draw the graph for the relation between the marked price and the discount. Hence find
- The marked price when a customer gets a discount of ₹3250 (from graph)
 - The discount when the marked price is ₹2500

(OR)

- b) A company initially started with 40 workers to complete the work by 150 days. Later, it decided to fasten up the work increasing the number of workers as shown below.

Number of workers (x)	40	50	60	75
Number of days (y)	150	120	100	80

- Graph the above data and identify the type of variation.
- From the graph, find the number of days required to complete the work if the company decides to opt for 120 workers.
- If the work has to be completed by 30 days, how many workers are required?

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