

X-MAT**QUARTERLY EXAMINATION - 2012-13****STANDARD - X** Reg.No.

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MATHS**Marks: 100****Time : 2.30 hrs**

INSTRUCTION: 1. Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

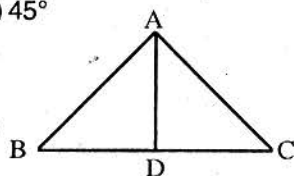
2. This question paper contains **FOUR SECTIONS**.

SECTION - I (MARKS : 15)**Note:** (i) Answer all the 15 questions.(ii) Choose the correct answer in each question. Each of these questions contains four options with just one correct option. **15 × 1 = 15**

- If $n[P(A)] = 64$ then $n(A)$ is a) 6 b) 8 c) 4 d) 5
- If the range of a function is a singleton set, then it is a) a constant function b) an identity function c) a bijective function d) an one-one function
- In a G.P., $t_2 = \frac{3}{5}$ and $t_3 = \frac{1}{5}$. Then the common ratio is a) $\frac{1}{5}$ b) $\frac{1}{3}$ c) 1 d) 5
- The n^{th} term of the sequence $\frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \dots$ is a) $1 + \frac{1}{2n}$ b) $1 - \frac{1}{2n}$ c) $1 - \frac{1}{n+2}$ d) $n - \frac{1}{n+2}$
- The value of a for which the system $ax - 6y = 12, 2x - 6y = 15$ has no solution is a) 1 b) 2 c) 3 d) 4
- The number of zeros (real numbers) of the polynomial $P(x) = x^2 + 1$ is a) 0 b) 1 c) 2 d) 3
- If $A \times \begin{pmatrix} 1 & 1 \\ 0 & 2 \end{pmatrix} = \begin{pmatrix} 1 & 2 \end{pmatrix}$ then the order of A is a) 2×1 b) 2×2 c) 1×2 d) 3×2
- If $(5 \times 1) \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} = 20$, then the value of x is a) 7 b) -7 c) $\frac{1}{7}$ d) 0
- In the line segment joining the points $A(3, 4)$ and $B(14, -3)$ meets the x -axis at P , then the ratio in which P divides the segment AB is a) 4:3 b) 3:4 c) 2:3 d) 4:1
- The angle of inclination of the straight line $5y = 5x + 10$ is a) 0° b) 30° c) 60° d) 45°

11. In figure if $\frac{AB}{AC} = \frac{BD}{DC}$, $\angle B = 30^\circ$ and $\angle C = 70^\circ$ then $\angle BAD =$

- a) 30° b) 50° c) 80° d) 40°

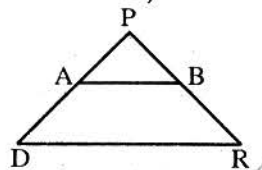


12. Triangles ABC and DEF are similar. If their areas are 100cm^2 and 49cm^2 respectively and BC is 8.2cm then $EF =$

- a) 5.47cm b) 5.74cm c) 6.47cm d) 6.74cm

13. In the figure $AB \parallel QR$, $\frac{PQ}{AP} = 2$ and $QR = 8\text{cm}$ then $AB =$

- a) 10cm b) 8cm c) 6cm d) 4cm



14. $(1 + \tan^2 \theta) \sin^2 \theta =$

- a) $\sin^2 \theta$ b) $\cos^2 \theta$ c) $\tan^2 \theta$ d) $\cot^2 \theta$

15. $x = 5 \sec \theta$, $y = 5 \cot (90^\circ - \theta)$ then $y^2 - x^2 =$

- a) 0 b) 5 c) 25 d) -25

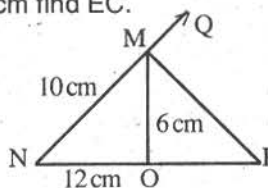
SECTION - II**Note:** (i) Answer 10 questions. (ii) Each question carries Two marks.**10 × 2 = 20**

(iii) Question No. 30 is Compulsory. Select any 9 questions from the first 14 questions.

- Let $A = \{1, 2, 3, 4, 5\}$, $B = N$ and $f: A \rightarrow B$ be defined by $f(x) = x^2$. Find the range of f . Identify the type of function.
- Draw the Venn diagram of $(B \cup C) - A$.
- If $1^3 + 2^3 + 3^3 + \dots + n^3 = 36100$ then find $1 + 2 + 3 + \dots + n$.
- How many terms are there in the A.P. 7, 13, 19, 205?
- Using the cross multiplication method, Solve: $3x + 5y = 25$; $7x + 6y = 30$
- Find the L.C.M. of the polynomials $(x^2 - 5x + 6)$, $(x^2 + 4x - 12)$ whose G.C.D. is $(x-2)$.
- Prove that $\begin{pmatrix} 3 & 5 \\ 1 & 2 \end{pmatrix}$ and $\begin{pmatrix} 2 & -5 \\ -1 & 3 \end{pmatrix}$ are multiplicative inverse to each other.
- Construct a 3×2 matrix $A = [a_{ij}]$ whose elements are given by $a_{ij} = \frac{|2i - 3j|}{2}$

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24. Find the centroid of the triangle whose vertices are (1, 3) (2, 7) and (12, -16) .
25. Find the equation of the straight line passing through the point (- 2, 3) with slope $\frac{1}{3}$.
26. In ΔABC , $DE \parallel BC$ and $\frac{AD}{DB} = \frac{2}{3}$. If $AE = 3.7$ cm find EC .
27. In a ΔMNO , MP is the external bisector of M meeting NO produced at P .
If $MN = 10$ cm, $MO = 6$ cm,
 $NO = 12$ cm then find OP .



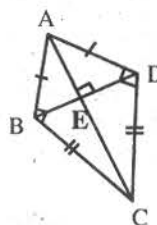
28. Prove the identity $\sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} = \operatorname{cosec} \theta - \cot \theta$.
29. Prove the identity $\sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \operatorname{cosec}^2 \theta$.
30. a) The first term of a G.P. is 1. The sum of the third term and fifth term is 90. Find the common ratio. (OR)
b) If the points $(p^2, 0)$, $(0, q^2)$ and $(1, 1)$ are collinear, prove that $\frac{1}{p^2} + \frac{1}{q^2} = 1$.

SECTION - III

Note: (i) Answer 9 questions. (ii) Each question carries Five marks. 9 × 5 = 45
(iii) Question No. 45 is Compulsory. Select any 8 questions from the first 14 questions.

31. Let $A = \{a, b, c, d, e, f, g, x, y, z\}$, $B = \{1, 2, c, d, e\}$ and $C = \{d, e, f, g, 2, y\}$.
Verify $A - (B \cup C) = (A - B) \cap (A - C)$ /
32. Let $A = \{4, 6, 8, 10\}$ and $B = \{3, 4, 5, 6, 7\}$. If $f : A \rightarrow B$ is defined by $f(x) = \frac{1}{2}x + 1$ then represent f by (i) arrow diagram, (ii) a set of ordered pairs, (iii) a table.
33. The sum of first three terms of a geometric sequence is $\frac{13}{12}$ and their products is -1 . Find the common ratio and the terms.
34. Factorize : $x^3 - 2x^2 - 5x + 6$.
35. Find the G.C.D. of the polynomials $x^4 + 3x^3 - x - 3$ and $x^3 + x^2 - 5x + 3$.
36. If $A = \begin{pmatrix} 3 & 2 \\ -1 & 4 \end{pmatrix}$, $B = \begin{pmatrix} -2 & 5 \\ 6 & 7 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 1 \\ -5 & 3 \end{pmatrix}$. Verify that $A(B+C) = AB + AC$
37. If $A = \begin{pmatrix} 5 & 2 \\ 7 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix}$ verify that $(AB)^T = B^T A^T$.
38. Find the points of trisection of the line segment joining the points $A(2, -2)$ and $B(-7, 4)$.
39. Find the area of the quadrilateral formed by the points $(-4, 5)$, $(0, 7)$, $(5, -5)$ and $(-4, -2)$.
40. The vertices of a ΔABC are $A(2, 1)$, $B(-2, 3)$ and $C(4, 5)$. Find the equation of the median through the vertex A .
41. Prove that the internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the corresponding sides containing the angle.

42. A boy is designing a diamond shaped kite, as shown in the figure where $AE = 16$ cm, $EC = 81$ cm. He wants to use a straight cross bar BD . How long should it be?



43. Prove that $\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \frac{1 + \sin \theta}{\cos \theta}$
44. If $x = a \sec \theta + b \tan \theta$ and $y = a \tan \theta + b \sec \theta$ then prove that $x^2 - y^2 = a^2 - b^2$
45. a) Simplify : $\frac{a^2 - 16}{a^3 - 8} \times \frac{2a^2 - 3a - 2}{2a^2 + 9a + 4} + \frac{3a^2 - 11a - 4}{a^2 + 2a + 4}$ (OR)
b) Find the sum : $0.7 + 0.97 + 0.997 + \dots +$ up to n terms.

SECTION - IV

Note: (i) This section contains Two questions, each with two alternatives. 2 × 10 = 20
(ii) Answer both the questions choosing either of the alternatives. (iii) Each question carries Ten marks.

46. a) Draw a circle of diameter 10cm. From a point P , 13 cm away from its centre, draw the two tangents PA and PB to the circle and measure their length. (OR)
b) Construct a triangle PQR such that $PQ = 4$ cm , $R = 25^\circ$ and the altitude from R to PQ is 4.5 cm.
47. (a) Draw the graph of $xy = 20$, $x, y > 0$. Use the graph to find y , when $x = 5$, and to find x when $y = 10$. (OR)
b) A bank gives 10% S.I. on deposits for senior citizens. Draw the graph for the relation between the sum deposited and the interest earned for one year. Hence find (i) the interest on the deposit of Rs. 650. (ii) the amount to be deposited to earn an interest of Rs. 45.