

MODEL QUARTERLY EXAMINATION 2023-2024**X – STD – MATHEMATICS****Time: 3.00 Hrs****Maximum Marks: 100**

Instructions: (1) check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue or Black** ink to write and underline and pencil to draw diagrams

Note: this question paper contains **four** parts.

PART – I**(Marks: 14)****Note:** (i) Answer all the 14 questions.**1 × 14 = 14**

(ii) Choose the most suitable answer from the given four alternatives and write the option code with the corresponding answer.

1. 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 **(Q.NO. I-4)** (A) 3 (B) 2 (C) 4 (D) 8

2. $f(x) = (x + 1)^3 - (x - 1)^3$ represents a function which is **(Q.NO. 15)**

(A) Linear (B) cubic (C) reciprocal (D) quadratic

3. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is **(Q.NO. II-5)**

(A) 2025 (B) 5220 (C) 5025 (D) 2520

4. The average of first 100 natural numbers is **(P.C -Pg. II-80)**

(A) 50.5 (B) 20.5 (C) 49.5 (D) 100

5. The values of Discriminant $\Delta = b^2 - 4ac$ is $\Delta = 0$ then nature of roots is **pg 117-III** (A) Real & equal (B) real & unequal (C) no real root (D) none of these

6. The solution of the system $x + y - 3z = -6$, $-7y + 7z = 7$, $3z = 9$ is

(Q.NO. III-2)(A) $x = 1, y = 2, z = 3$ (B) $x = -1, y = 2, z = 3$ (C) $x = -1, y = -2, z = 3$ (D) $x = 1, y = -2, z = 3$

7. $\frac{x}{x^2-25} - \frac{8}{x^2+6x+5}$ gives **(Q.NO. III-6)**

(A) $\frac{x^2 - 7x + 40}{(x - 5)(x + 5)}$ (B) $\frac{x^2 + 7x + 40}{(x - 5)(x + 5)(x + 1)}$ (C) $\frac{x^2 - 7x + 40}{(x^2 - 25)(x + 1)}$ (D) $\frac{x^2 + 10}{(x^2 - 25)(x + 1)}$

8. If ΔABC is an isosceles triangle with $\angle C = 90^\circ$ and $AC = 5$ cm, then AB is

(Q.NO. IV-3)

(A) 2.5cm

(B) 5cm

(C) 10cm

(D) $5\sqrt{2}$ cm

9. If in ΔABC , $DE \parallel BC$. $AB = 3.6$ cm, $AC = 2.4$ cm and $AD = 2.1$ cm then the length of AE is **(Q.NO. IV-6)** (A) 1.4 cm (B) 1.8 cm (C) 1.2 cm (D) 1.05 cm

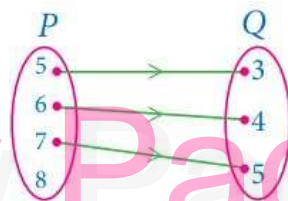
10. The inclination of X axis and every line parallel to X axis is ____ **pg.212-V**
 (A) 0° (B) 30° (C) 45° (D) 90°
11. the formula for converting Celsius to Fahrenheit is given by _____ **pg 223-V**
 (A) $F = \frac{9}{5}C + 37$ (B) $F = \frac{9}{5}C + 32$ (C) $F = \frac{9}{5}C + 35$ (D) $F = \frac{9}{6}C + 37$
12. The slope of the line which is perpendicular to a line joining the points (0, 0) and (-8, 8) is **(Q.NO. 7-V)** (A) -1 (B) 1 (C) $\frac{1}{3}$ (D) -8
13. $\tan \theta \operatorname{cosec}^2 \theta - \tan \theta$ is equal to **(Q.NO. 2-VI)**
 (A) $\sec \theta$ (B) $\cot^2 \theta$ (C) $\sin \theta$ (D) $\cot \theta$
14. $1 - \cos^2 \theta$ is _____ **pg 249 -VI**
 (A) $\cos^2 \theta$ (B) $\cot^2 \theta$ (C) $\sin^2 \theta$ (D) $\tan^2 \theta$

PART – II (Marks: 20)

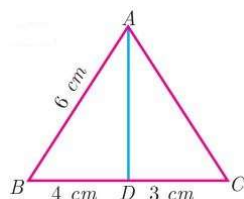
II. Answer 10 Questions. Question No. 28 is compulsory.

10×2=20

15. The arrow diagram shows (fig 1) a relationship between the sets P and Q. Write the relation in (i) set builder form (ii) Roster form (iii) what is the domain and range of R. **(Eg.1.5)**



16. Let $f(x) = x^2 - 1$. find (i) $f \circ f$ (ii) $f \circ f \circ f$ **(Ex 1.5 - 6)**
17. Find x, y and z , given that the numbers $x, 10, y, 24, z$ are in A.P. **(Ex 2.5 - 9)**
18. Find the sum $3 + 1 + \frac{1}{3} + \dots \dots \infty$ **(Eg.2.49)**
19. If $1 + 2 + 3 + \dots \dots + n = 666$ then find n . **(Eg.2.58)**
20. solve $x^4 - 13x^2 + 42 = 0$ **(Eg.3.28)**
21. Determine the nature of the roots for the following quadratic equations
 (i) $15x^2 + 11x + 2 = 0$ (ii) $\sqrt{2}t^2 - 3t + 3\sqrt{2} = 0$ **(Ex.3.13 - 1(ii),(iii))**
22. find the square root of $64x^4 - 16x^3 + 17x^2 - 2x + 1$ **(Eg.3.21)**
23. In the Fig, AD is the bisector of $\angle A$. If $BD = 4$ cm, $DC = 3$ cm and $AB = 6$ cm, find AC. **(Eg. 4.15)**



24. In ΔABC , D and E are points on the sides AB and AC respectively. For each of the following cases show that $DE \parallel BC$ (i) $AB = 12\text{cm}$, $AD = 8\text{cm}$, $AE = 12\text{cm}$ and $AC = 18\text{cm}$. (Ex 4.2 - 3)
 (ii) $AB = 5.6\text{cm}$, $AD = 1.4\text{cm}$, $AC = 7.2\text{cm}$ and $AE = 1.8\text{cm}$.
25. Determine whether the sets of points are collinear? (Ex 5.1 - 2)
 (i) $(-\frac{1}{2}, 3)$, $(-5, 6)$ and $(-8, 8)$ (ii) $(a, b + c)$, $(b, c + a)$ and $(c, a + b)$
26. The line through the points $(-2, a)$ and $(9, 3)$ has slope $-\frac{1}{2}$ Find the value of a. (Ex 5.2 - 7)
27. Prove that $\tan^2\theta - \sin^2\theta = \tan^2\theta \sin^2\theta$ (Eg 6.1)
28. Prove the following identities. (Ex 6.1 - 3(i)) $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sec\theta + \tan\theta$

PART - III (Marks: 50)

III. Answer 10 Questions. Question No. 42 is compulsory.

10×5=50

29. If the function f is defined by $f(x) = \begin{cases} x + 2 & \text{if } x > 1 \\ 2 & \text{if } -1 \leq x \leq 1 \\ x - 1 & \text{if } -3 < x < -1 \end{cases}$ find the

value of (i) $f(3)$ (ii) $f(0)$ (iii) $f(-1.5)$ (iv) $f(2) + f(-2)$ (Ex 1.4 - 9)

30. Find x if $gff(x) = fgg(x)$, given $f(x) = 3x + 1$ and $g(x) = x + 3$ (Eg 1.24)

31. In an A.P., sum of four consecutive terms is 28 and their sum of squares is 276. Find the four numbers. (Eg. 2.29)

32. In a G.P. the product of three consecutive terms is 27 and the sum of the product of two terms taken at a time is $\frac{57}{2}$. Find the three terms. (Ex 2.7-9)

33. Find the GCD of $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$ (Eg. 3.11)

34. If $A = \frac{2x+1}{2x-1}$, $B = \frac{2x-1}{2x+1}$ find $\frac{1}{A-B} - \frac{2B}{A^2-B^2}$ (Ex. 3.6-5)

35. Find the values of a and b if the following polynomials are perfect squares

$$4x^4 - 12x^3 + 37x^2 + bx + a \quad (\text{Ex. 3.8- 3(i)})$$

36. Basic Proportionality Theorem (BPT) or Thales theorem (Th.4.1)

37. In ΔABC , if $DE \parallel BC$, $AD = x$, $DB = x - 2$, and $AE = x + 2$, and $EC = x - 1$ then find the lengths of the sides AB and AC. (Eg. 4.12)

38. You are downloading a song. The percent y (in decimal form) of mega bytes remaining to get downloaded in x seconds is given by $y = -0.1x + 1$ (Ex. 5.3-11) (i) Graph the equation. (ii) Find the total MB of the song.

(iii) After how many seconds will 75% of the song gets downloaded?

(iv) After how many seconds the song will be downloaded completely?

39. Find the equation of a straight line through the point of intersection of the lines $8x+3y=18$, $4x+5y=9$ and bisecting the line segment joining the points (5, -4) and (-7,6). (Ex. 5.4-12)

40. If $\cot \theta + \tan \theta = x$ and $\sec \theta - \cos \theta = y$, then prove that (Ex. 6.1-8(ii))

$$(x^2 y)^{\frac{2}{3}} - (xy^2)^{\frac{2}{3}} = 1$$

41. If $\operatorname{cosec} \theta + \cot \theta = p$, then prove that $\cos \theta = \frac{p^2-1}{p^2+1}$ (Eg. 6.11)

42. The hypotenuse of a right angled triangle is 25 cm and its perimeter 56 cm. Find the length of the smallest side. (Ex. 3.12-9)

PART – IV (Marks: 16)

IV. Answer both questions.

2×8=16

43. 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 $\frac{3}{5} < 1$) (Eg. 4.10) (OR)

Construct a ΔPQR in which $PQ = 5$ cm, $\angle P = 40^\circ$ and the median PG from P to QR is 4.4 cm. Find the length of the altitude from P to QR . (Ex. 4.2-12)

44. 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. (Eg-3.49)

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

(i) Graph the above data and identify the type of variation.

(ii) From the graph, find the number of days required to complete the work if the company decides to opt for 120 workers?

(iii) If the work has to be completed by 200 days, how many workers are required? (OR) Draw the graph of $y = x^2 + 3x - 4$ and use it to solve $x^2 + 3x - 4 = 0$ (Ex 3.16-5)

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P.G – ASST IN MATHS



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