CLASS : 10

Register Number

THIRD REVISION EXAMINATION - 2025

Time Allowed : 3.00 Hours] **MATHEMATICS** [Max. 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

Note : Answer all the 14 questions.
Choose the correct answer from the given four alternatives and write the option code and the corresponding answer. 14x1=14

1. $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
   a) 8 b) 20 c) 12 d) 16
2. If $\frac{b+c-a}{a}, \frac{c+a-b}{b}, \frac{a+b-c}{c}$ are in A.P. then which of the following is in A.P?
   a) a, b, c b) a^2, b^2, c^2 c) $1/a, 1/b, 1/c$ d) none of these
3. The sum of the exponents of the prime factors in the prime factorization of 1729 is
   a) 1 b) 2 c) 3 d) 4
4. 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) $x = 1, y = -2, z = 3$
5. If the reciprocal of the gradient of a straight line is $\sqrt{3}$. Then the angle of inclination is
   a) 60° b) 30° c) 45° d) 90°
6. If number of columns and rows are not equal in a matrix then it is said to be a
   a) diagonal matrix b) rectangular matrix
   c) square matrix d) identity matrix
7. If the volume of sphere is 36π cm^3, then its radius is equal to
   a) 3 cm b) 2 cm c) 5 cm d) 10 cm
8. If ΔABC is an isosceles triangle with $\angle C = 90°$ and AC = 5 cm, then AB is
   a) 2.5 cm b) 5 cm c) 10 cm d) $5\sqrt{2}$ cm
9. The point of intersection of $3x - y = 4$ and $x + y = 8$ is
   a) (5, 3) b) (2, 4) c) (3, 5) d) (4, 4)
10. When proving that a quadrilateral is a trapezium, it is necessary to show
    a) Two sides are parallel. b) Two parallel and two non-parallel sides.
    c) Opposite sides are parallel. d) All sides are of equal length.
11. $\tan\theta \operatorname{cosec}^2\theta - \tan\theta$ is equal to
    a) $\sec\theta$ b) $\cot^2\theta$ c) $\sin\theta$ d) $\cot\theta$
12. A shuttle cock used for playing badminton has the shape of the combination of
    a) a cylinder and a sphere b) a hemisphere and a cone
    c) a sphere and a cone d) frustum of a cone and a hemisphere
13. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is
    a) 60π cm^2 b) 68π cm^2 c) 120π cm^2 d) 136π cm^2
14. A fair die is thrown once. The probability of getting a prime (or) composite number is
    a) 1 b) 0 c) $5/6$ d) $1/6$

PART - II

II. Answer any 10 questions. Question No. 28 is compulsory. 10×2=20

15. If $A \times B = \{(3, 2), (3, 4), (5, 2), (5, 4)\}$ then find A and B.
16. A function f is defined by $f(x) = 3 - 2x$. Find x such that $f(x^2) = (f(x))^2$
17. 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$. Find 'a' and 'b'.
18. Find the sum to infinity of $9 + 3 + 1 + \ldots\ldots$
19. Find the excluded values $\frac{t}{t^2 - 5t + 6}$
20. If $A = \begin{pmatrix} 7 & 8 & 6 \\ 1 & 3 & 9 \\ -4 & 3 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 11 & -3 \\ -1 & 2 & 4 \\ 7 & 5 & 0 \end{pmatrix}$ then find 2A + B.
21. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5 cm and radius of the circle is 3 cm.

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22. If P(r, c) is the midpoint of the line segment between the axes then show that $\frac{x}{r} + \frac{y}{c} = 2$
23. Find the equation of a straight line which has slope $-5/4$ and passing through the point (–1, 2).
24. Prove that $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \text{cosec}\theta + \cot\theta$
25. If the base area of a hemispherical solid is 1386 sq. metres, then find its total surface area.
26. A cone of height 24 cm is made up of modeling clay. A child reshapes it in the form of a cylinder of same radius as cone. Find the height of the cylinder.
27. If the mean and coefficient of variation of a data are 15 and 48 respectively, then find the value of standard deviation.
28. A letter is chosen at random from the word "COVID NINETEEN". Find the probability that the letter is (i) a vowel (ii) a consonant

PART - III

III. **Answer any 10 questions. Question No. 42 is compulsory.** **10×5=50**

29. If A = {5, 6}, B = {4, 5, 6}, C = {5, 6, 7}, Show that $A \times A = (B \times B) \cap (C \times C)$.
30. Consider the functions f (x), g (x), h (x) as given below. Show that (f o g) o h = f o (g o h) in case. f (x) = x - 4, g (x) = x^2 and h (x) = 3x - 5
31. Priya earned ₹ 15,000 in the first month. Thereafter her salary increased by ₹ 1500 per year. Her expenses are ₹ 13,000 during the first year and the expenses increases by ₹ 900 per year. How long will it take for her to save ₹ 20,000 per month.
32. The product of three consecutive terms of a Geometric Progression is 343 and their sum is $91/3$. Find the three terms.
33. Find the square root of $64x^4 - 16x^3 + 17x^2 - 2x + 1$.
34. A passenger train takes 1 hr more than an express train to travel a distance of 240 km from Chennai to Virudhachalam. The speed of passenger train is less than that of an express train by 20 km per hour. Find the average speed of both the trains.
35. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ show that $A^2 - 5A + 7I_2 = 0$
36. Show that the angle bisectors of a triangle are concurrent.
37. Find the area of the quadrilateral formed by the points (8, 6) , (5, 11), (– 5, 12) and (– 4, 3).
38. Find the equation of the median and altitude of ΔABC through A where the vertices are A (6, 2), B (– 5, –1) and C (1, 9).
39. An aeroplane at an altitude of 1800 m finds that two boats are sailing towards it in the same direction. The angles of depression of the boats as observed from the aeroplane are 60° and 30° respectively. Find the distance between the two boats. ($\sqrt{3} = 1.732$)
40. A container open at the top is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of ₹ 40 per litre.
41. The time taken (in minutes) to complete a homework by 8 students in a day are given by 38, 40, 47, 44, 46, 43, 49, 53. Find the coefficient of variation.
42. A conical flask is full of water. The flask has base radius r units and height h units, the water is poured into a cylindrical flask of base radius xr units. Find the height of water in the cylindrical flask.

PART - IV

IV. **Answer all the questions.** **2×8=16**

43. a) Construct a triangle similar to a given triangle PQR with its sides equal to $7/4$ of the corresponding sides of the triangle PQR. (scale factor $7/4 > 1$) **(OR)**
    b) Construct a ΔPQR in which QR = 5 cm, $\angle P = 40°$ and the median PG from P to QR is 4.4 cm. Find the length of the altitude from P to QR.
44. a) 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

    (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 30 days, how many workers are required? **(OR)**
    b) Draw the graph of $y = x^2 + 3x + 2$ and use it to solve $x^2 + 2x + 1 = 0$.

THIRD REVISION EXAMINATION (2024-2025)

Class: 10 MATHEMATICS

PART-I

1. (c) 12
2. (c) $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$
3. (c) 3
4. (a) $x=1, y=2, z=3$
5. (b) 30°
6. Rectangular matrix
7. (a) 3cm
8. (d) $5\sqrt{2}$ cm
9. (c) (3,5)
10. (b) Two parallel and two non-parallel sides
11. (d) $\cot\theta$
12. (d) frustum of a cone and a hemisphere
13. (d) 136π cm^2
14. (c) 5/6

PART-II

15. $A=\{3,5\}$, $B=\{2,4\}$

16. $3-2x^2=(3-2x)^2$

$x^2-2x+1=0$

$\boxed{x=1,1}$

17. $800 = 2\times2\times2\times2\times2\times5\times5$

$a^b \times b^a = 2^5 \times 5^2$

$a=2, b=5$ (or) $a=5, b=2$

18. $a=9, r=\frac{1}{3}$, $S_\infty = \frac{a}{1-r}$

$S_\infty = \frac{9}{1-\frac{1}{3}} \Rightarrow \boxed{S_\infty = \frac{27}{2}}$

19. $t^2-5t+6=0$

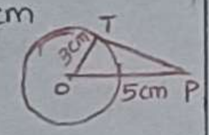
$(t-2)(t-3)=0$

Excluded values = 2, 3

20. $A=\begin{bmatrix}7&8&6\\1&3&9\\-4&3&-1\end{bmatrix}$, $B=\begin{bmatrix}4&11&-3\\-1&2&4\\7&5&0\end{bmatrix}$

$2A+B=\begin{bmatrix}14+4&16+11&12-3\\2-1&6+2&18+4\\-8+7&6+5&-2+0\end{bmatrix}=\begin{bmatrix}18&27&9\\1&8&22\\-1&11&-2\end{bmatrix}$

21. OP = 5cm, OT = 3cm



$PT = \sqrt{OP^2-OT^2}$

$= \sqrt{5^2-3^2}$

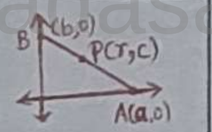
$= \sqrt{25-9} = \sqrt{16} \Rightarrow \boxed{PT=4\text{cm}}$

23. Slope $(m) = -\frac{5}{4}$; $(x_1, y_1) = (-1, 2)$

$y-y_1 = m(x-x_1)$

$y-2 = -\frac{5}{4}(x+1) \Rightarrow \boxed{5x+4y-3=0}$

22. $(r, c) = \left(\frac{a}{2}, \frac{b}{2}\right)$



$a=2r$, $b=2c$

Equation of the line

$\frac{x}{a}+\frac{y}{b}=1 \Rightarrow \frac{x}{2r}+\frac{y}{2c}=1 \Rightarrow \boxed{\frac{x}{r}+\frac{y}{c}=2}$

24. LHS $= \sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \frac{1+\cos\theta}{\sqrt{\sin^2\theta}} = \frac{1+\cos\theta}{\sin\theta}$

$= \frac{1}{\sin\theta}+\frac{\cos\theta}{\sin\theta} = \operatorname{cosec}\theta+\cot\theta$

$=$ RHS.

25. base area $= 1386\ m^2$

T.S.A $= 3\pi r^2$

$= 3\times1386 = 4158\ m^2$

26. $h_1 = 24$cm, $r = 6$cm

Volume of cylinder = Volume of cone

$\pi r^2 h_2 = \frac{1}{3}\pi r^2 h_1$

$h_2 = \frac{1}{3}h_1 \Rightarrow h_2 = \frac{24}{8} \Rightarrow \boxed{h_2 = 8\text{cm}}$

27. Mean $(\bar{x}) = 15$

Coefficient of variation = 48

$\frac{\sigma}{\bar{x}} \times 100 = 48$

$\sigma = \frac{48\times15}{100} \Rightarrow \boxed{\sigma = 7.2}$

28. $n(V)=6$, $n(C)=7$, $n(S)=13$

$P(\text{Vowel}) = \frac{6}{13}$

$P(\text{Consonant}) = \frac{7}{13}$

PART-III

29. $A=\{5,6\}$, $B=\{4,5,6\}$, $C=\{5,6,7\}$

$A\times A = \{(5,5),(5,6),(6,5),(6,6)\} \rightarrow (1)$

$B\times B = \{(4,4)(4,5)(4,6)$
$(5,4)(5,5)(5,6)$
$(6,4)(6,5)(6,6)\}$

$C\times C = \{(5,5)(5,6)(5,7)$
$(6,5)(6,6)(6,7)$
$(7,5)(7,6)(7,7)\}$

$(B\times B)\cap(C\times C) = \{(5,5)(5,6)(6,5)(6,6)\} \rightarrow (2)$

$\therefore A\times A = (B\times B)\cap(C\times C)$

30. $f(x) = x-4$

$g(x) = x^2$

$h(x) = 3x-5$

$fog = x^2-4$

$(fog)oh = (3x-5)^2-4$

$goh = (3x-5)^2$

$fo(goh) = (3x-5)^2-4$

$\therefore (fog)oh = fo(goh)$

31.

	Salary	Expenses	Savings
1st year	15,000	13000	2000
2nd year	16,500	13900	2600
3rd year	18,000	14800	3200

$a=2000$

$d=600$

$L=20000$

$n = \frac{L-a}{d}+1 \Rightarrow \left[\frac{20000-2000}{600}\right]+1$

$n = \frac{18000}{600}+1$

$n = 30+1 \Rightarrow \boxed{n=31 \text{ years}}$

32. $\frac{a}{r}\times a\times ar = 343$

$a^3 = 343 \Rightarrow \boxed{a=7}$

$\frac{a}{r}+a+ar = \frac{91}{3}$

$3(1+r+r^2) = 13r$

$3r^2-10r+3=0$

$(r-3)(3r-1)=0$

$r=3, \frac{1}{3}$

$a=7, r=3 \Rightarrow \frac{7}{3}, 7, 21$

$a=7, r=\frac{1}{3} \Rightarrow 21, 7, \frac{7}{3}$

33.

$8x^2-x+1$

$8x^2 \;|\; 64x^4-16x^3+17x^2-2x+1$

$64x^4$

$16x^2-x \;|\; -16x^3+17x^2$

$-16x^3+x^2$

$16x^2-2x+1 \;|\; 16x^2-2x+1$

$16x^2-2x+1$

0

$\sqrt{64x^4-16x^3+17x^2-2x+1} = |8x^2-x+1|$

34. Average speed of passenger = x km/hr

Average speed of express = $(x+20)$ km/hr

$\frac{240}{x} = \frac{240}{x+20}+1$

$x^2+20x-4800=0$

$(x+80)(x-60)=0 \Rightarrow \boxed{x=60}$

Average speed of passenger = 60 km/hr

Average speed of express = 80 km/hr

35. $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$

$A^2 = \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix}$, $5A = \begin{bmatrix} 15 & 5 \\ -5 & 10 \end{bmatrix}$, $7I_2 = \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$

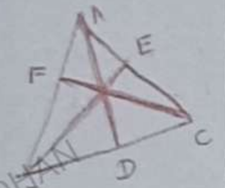
$A^2 - 5A + 7I_2 = \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix} - \begin{bmatrix} 15 & 5 \\ -5 & 10 \end{bmatrix} + \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$

$= \begin{bmatrix} 8-15+7 & 5-5+0 \\ -5+5+0 & 3-10+7 \end{bmatrix}$

$= \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

$\therefore A^2 - 5A + 7I_2 = 0$

36.



AD is the angle bisector of $\angle A$

$\frac{BD}{DC} = \frac{AB}{AC}$ → (1)

BE is the angle bisector of $\angle B$

$\frac{CE}{EA} = \frac{BC}{AB}$ → (2)

CF is the angle bisector of $\angle C$

$\frac{AF}{FB} = \frac{AC}{BC}$ → (3)

$\therefore \frac{BD}{DC} \times \frac{CE}{EA} \times \frac{AF}{FB} = 1$

∴ angle bisectors of a triangle are Concurrent.

37. A(8,6), B(5,11), C(-5,12) and D(-4,3)

$\text{Area} = \frac{1}{2}\begin{Bmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{Bmatrix}$

$= \frac{1}{2}\begin{Bmatrix} 8 & 5 & -5 & -4 & 8 \\ 6 & 11 & 12 & 3 & 6 \end{Bmatrix}$

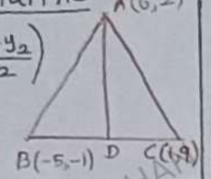
$= \frac{1}{2}\{[88+60-15-24] - [30-55-48+24]\}$

$= \frac{1}{2}\{[109] - [-49]\}$

$= \frac{1}{2}\{158\}$

$= 79$ Sq.units.

38. Equation of median AD



Midpoint of $BC = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$= (-2, 4)$

$\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$

$\frac{y-2}{4-2} = \frac{x-6}{-2-6} \Rightarrow x+4y-14=0$

Equation of the altitude.

Slope of $BC = \frac{y_2-y_1}{x_2-x_1} = \frac{9+1}{1+5} = \frac{5}{3}$

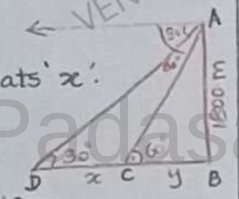
Slope of $AD = -\frac{3}{5}$

$y - y_1 = m(x - x_1)$

$y - 2 = -\frac{3}{5}(x-6)$

$3x + 5y - 28 = 0$

39.



distance between two boats 'x'.

$BC = y$

$AB = 1800$ m

$\tan 30° = \frac{AB}{BD} \Rightarrow \frac{1}{\sqrt{3}} = \frac{1800}{x+y}$

$x + y = 1800\sqrt{3}$ → (1)

$\tan 60° = \frac{AB}{BC} \Rightarrow \sqrt{3} = \frac{1800}{y} \Rightarrow y = \frac{1800}{\sqrt{3}}$

(1) ⇒ $x + \frac{1800}{\sqrt{3}} = 1800\sqrt{3}$

$\sqrt{3}x + 1800 = 5400$

$\sqrt{3}x = 3600$

$x = \frac{3600}{\sqrt{3}}$

$x = 2078.4$ m

40. Height (h) = 16cm, R = 20cm, r = 8cm

Volume of the frustum $= \frac{1}{3}\pi h\left[R^2 + Rr + r^2\right]$

$= \frac{1}{3} \times \frac{22}{7} \times 16\left[20^2 + 20\times 8 + 8^2\right]$

$= 10459.43$ cm^3

$= 10.459$ litres.

Cost of milk $= 10.459 \times ₹40$

$= ₹418.36$

41. Ascending order

38, 40, 43, 44, 46, 47, 49, 53

Assumed mean = 44, n = 8

x_i	$d = x_i - A$	d_i^2
38	−6	36
40	−4	16
43	−1	1
44	0	0
46	2	4
47	3	9
49	5	25
53	9	81
$\Sigma x_i = 360$	$\Sigma d_i = 8$	$\Sigma d_i^2 = 172$

$\bar{x} = \frac{\Sigma x_i}{n} = \frac{360}{8} = 45$

$\sigma = \sqrt{\frac{\Sigma d_i^2}{n} - \left(\frac{\Sigma d_i}{n}\right)^2} = \sqrt{\frac{172}{8} - \left(\frac{8}{8}\right)^2} = 4.53$

Coefficient of variation

$= \frac{\sigma}{\bar{x}} \times 100\%$

$= \frac{4.53}{45} \times 100$

$= \frac{453}{45}$

$= 10.07\ \%$

Coefficient of variation = 10.07%

42. Conical flask

Radius = r units

Height = h units

Volume $= \frac{1}{3}\pi r^2 h$ cu.units

Cylinderical flask

Radius = xr units

Height = H

Volume $= \pi x^2 r^2 H$

Volume of cylinder = Volume of cone

$\pi x^2 r^2 H = \frac{1}{3}\pi r^2 h$

$H = \frac{h}{3x^2}$

Height of the cylinderical flask is $\frac{h}{3x^2}$ units

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