MODEL QUESTION PAPER 2024

CLASS:X MATHEMATICS MARKS:100

I CHOOSE THE CORRECT ANSWER. 14x1=24

1. If the ordered Paris (a+2,4) and (5,2a+b) equal then (a,b) is a) (2,-2) b) (5,1). C) (2,3). d) (3,-2)
2. If f:A → B is an onto function then the range of f= a) B b) A c) AnB d) AuB
3. 74k= ___(mod 100) a) 1 b) 2 c) 3 d) 4
4. The equation for the roots 1,-1/2 is a) $2x^3+x-1=0$ b) $2x^2-x-1=0$ c) $2x^2-x+1=0$ d) $2x^2-2x-1=0$
5. How many tangents from an external point a) one b) two c) infinite d) zero
6. 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)
7. The inclination of x axis and every line parallel to x axis is _____ a) 90^0 b) 0^0 c) 45^0 d) 60^0
8. If 5x= sec and 5/x=tanθ then $x^2-\frac{1}{x^2}$ is equal to a) 25 b) $\frac{1}{25}$ c) 5 d) 1
9. Height of the cone whose radius is 5 cm and slant height is 13 cm will be ____ a) 12cm b) 10cm c)13cm d)5cm
10. Ratio of the volume of your coal a cylinder and spear if each has the same diameter and same height is a) 1:2:3 b) 2:1:3 c) 1:2:3 d) 3:1:2
11. The standard deviation of a data is 3. If each values multiply by 5 then the new variance is a) 3 b) 15 c)5 d) 225
12. Given F1=1, F2=3 and $F_n-=F_{n-1}+F_{n-2}$ the F_5 is a) 3 b) 5 c) 8 d) 11
13. _____ is the point of concurrence of the medians of a triangle. a) mid point b) centroid c) centre d) cevian
14. Probability of impossible event is ___ a) 1 b) 0 c) 2 d) 5

II ANSWER ANY 10 Q.NO.28 IS COMPULSORY 10X2=20

15. Represent the function f(x)=$\sqrt{2x^2-5x+3}$ Composition of two functions.
16. Solve 5x≡(mod 6)
17. Find the sum of 1+2+3... 40 terms
18. Simplify $\frac{x^3}{x-y}+\frac{y^3}{y-x}$
19. If A=$\begin{bmatrix}1 & 2 & -3\\ 5 & 3 & -2\\ 3 & 5 & 6\end{bmatrix}$, B=$\begin{bmatrix}1 & 8\\ 3 & 4\\ 9 & 6\end{bmatrix}$ find A+B
20. If triangle ABC is similar to triangle DEF search that BC=3cm, EF=4cm under the area of triangle ABC =54 cm^2 find the area of triangle DEF
21. Find the slope of a line joining (-6,1) and (-3,2)
22. Show that the straight line 2x+2y-8=0 and 4x+6y+18=0 are parallel.
23. Prove that $\sqrt{\frac{1+cos\theta}{1-cos\theta}}$ =cosecθ+cotθ
24. A kite is flying at a height of 75 m above the ground the string attached to the kite is temporary tied to a point on the ground with a ground is 60^0 find the length of the string assuming that that is no slack in the string.
25. The slant height of a frustum of a cone is 5 cm and the radii of its ends of 4 cm and 1 cm find its curved surface area
26. The ratio of the volume of two 2:3. Find the ratio of the Radii if the height of the second cone is double the height of the first.

27. The mean of a data 25.6 and it's coefficient of variation is18.75. find the standard deviation.
28. If P(A)=0.37, P(B)=0.42 P(AnB)=0.09 then find P(AuB)

III ANSWER ANY 10 (Q.NO.42 IS COMPULSORY) 10X5=50

29. Given A={1,2,3} B={2,3,5} C={3,4} and D={1,3,5} check if (AnC)X(BnD)= (AXB)n(CXD) is true .
30. If f(x)=2x+3, g(x)=1-2x and h(x)=3x prove that fo(gh)=(fog)oh
31. The sum of first n,2n and 3n terms of an arithmetic progression are S_1 S_2 ,S_3 respectively prove that $S_3 = 3(S_2 - S_1)$
32. Product of the consecutive terms of the GP is 343 and their sum is 91/3 find the three terms
33. Find GCD of $3x^4+6x^3- 12x^2-24x$, $4x^4+14x^3+8x^2-8x$
34. Find the value of a and b if the $4x^4-12x^3+37x^2+bx+a$ is a perfect square
35. If A = $\begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$ B=$\begin{bmatrix} 1 & 2 \\ -4 & 2 \end{bmatrix}$ and C=$\begin{bmatrix} -7 & 6 \\ 3 & 2 \end{bmatrix}$ verify that A(B+C) =AB+AC
36. P and Q are the midpoints of the sides CA and CB respectively of triangle ABC right angle at C. Prove that $4(AQ^2+BP^2)=5AB^2$
37. Find the area of a quadrilateral whose vertices are at (-9, 0), (-8,6), (-1,-2), and (-6,-3)
38. A(-3, 0), B(10 ,-2) and C(12,3) are the vertices of triangle ABC find the equation of the altitude through A
39. The angles of elevation and depression of the top and bottom of a lamp post from the top of a 66 m high apartment are 60^0 and 30^0 respectively find (i) the height of the lamp post (ii)the difference between height of the lamp post and apartment (iii)the distance between the lamp post and the apartment
40. A girl wishes to prepare birthday caps in the form of right circular cone of her birthday party using a sheet of paper whose area is $5720cm^2$ how many caps can be made with radius 5cm and height 12 cm
41. A coin is tossed rice find the probability of getting exactly two heads or at least one time or two consecutive heads
42. A solid of right circular cone of diameter 14 cm and height 8 cm is melted to form a hollow sphere if the external diameter of the sphere is 10 cm find the internal diameter

IV ANSWER THE FOLLOWING 2x8=16

43a) Construct a triangle similar to a given triangle PQR with its sides equal 7/4 the corresponding side of the triangle PQR.(scale factor 7/4>1) (or)

b) Draw a circle of diameter 6 cm from a point P which is 8 cm away from its centre draw the two tangents p and PB to the circle and measure the length

45a) A bus traveling a test uniform speed of 50 km hour draw the distance time graph and hints find (i)the constant of variation (ii) how far will it travel in 90 minutes (iii) the time required to cover a distance of 300 km from the graph. (or)

b) Draw the graph $y=2x^2$ and hence solve $2x^2-x-6 =0$

Model Question Paper - I 2024

Class: X Key Answer Mathematics

I Choose 14×1=14

1. d) (3, -2)
2. a) B
3. a) 1
4. b) $2x^2 - x - 1 = 0$
5. b) two
6. c) (3, 5)
7. b) 0°
8. b) $\frac{1}{25}$
9. a) 12cm
10. c) 1 : 3 : 2
11. d) 225
12. d) 11
13. b) Centeriod
14. b) 0

II Answer any 10 10×2=20

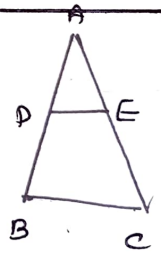
15. $f_2(x) = 2x^2 - 5x + 3$
and $f_1(x) = \sqrt{x}$.
$f(x) = \sqrt{2x^2 - 5x + 3} = \sqrt{f_2(x)}$
$= f_1[f_2(x)] = f_1 f_2(x)$

16. $5x \equiv 4 \pmod 6$
$5x - 4 = 6k$ $x = 2$
$5(2) - 4 = 6k$
$x = 2, 8, 14, \ldots$

17. $1 + 3 + 5 \ldots$ to 40 terms
$n = 40$.
$1 + 3 + 5 + \ldots$ to n terms $= n^2$
$1 + 3 + 5 + \ldots$ to 40 terms $= 40^2$
$= 1600$.

18. $\frac{x^3}{x-y} - \frac{y^3}{x-y} = \frac{x^3 - y^3}{x-y}$
$= \frac{(x-y)(x^2+xy+y^2)}{x-y}$
$= x^2 + xy + y^2$

19. $A_{3\times3} + B_{3\times2}$
AB does not exist
Because order of A ≠ order of B.

20.


$\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle DEF} = \frac{BC^2}{EF^2}$

$\frac{54}{\text{Area of } \triangle DEF} = \frac{32}{42}$

$\frac{54}{\text{Area of } \triangle DEF} = \frac{9}{16} \Rightarrow$ Area of $\triangle DEF$
$= \frac{16}{9} \times \frac{6}{54}$
$= 96\ cm^2$.

21. Slope $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-1}{-3+6} = \frac{1}{3}$
$(-6, 1)$ $(-3, 2)$
$x_1\ y_1$ $x_2\ y_2$
$m = \frac{1}{3}$.

22. $2x+3y-8=0$

$m_1 = \frac{-2}{3}$

$4x+6y+18=0$.

$m_2 = \frac{-4}{6} = \frac{-2}{3}$

$m_1 = m_2$ ∴ They are parallel

23. $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta$

LHS

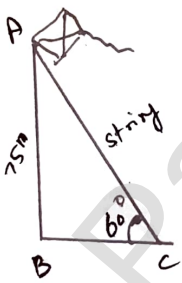
$\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} \times \frac{1+\cos\theta}{1+\cos\theta} = \sqrt{\frac{(1+\cos\theta)^2}{1-\cos^2\theta}}$

$= \sqrt{\frac{(1+\cos\theta)^2}{\sin^2\theta}} = \frac{1+\cos\theta}{\sin\theta} \quad \frac{\cos\theta}{\sin\theta}$

$= \operatorname{cosec}\theta + \cot\theta$ = RHS.

Hence proved

24.



$\sin\theta = \frac{AB}{AC}$

$\sin 60° = \frac{75}{AC}$

$\frac{\sqrt{3}}{2} = \frac{75}{AC}$

$AC = \frac{150}{\sqrt{3}} = 50\sqrt{3}$

The length of string is $50\sqrt{3}$ m.

25. $l = 5$ cm $R = 4$ cm, $r = 1$ cm

CSA of frustum $= \pi(R+r)l$

$= \frac{22}{7} \times (4+1) \times 5 = \frac{550}{7}$

$CSA = 78.57\ cm^2$

26. $V_1 : V_2$ $\quad h_2 = 2h_1$

$\frac{1}{3}\pi r_1^2 h_1 : \frac{1}{3}\pi r_2^2 h_2 = 2:3$

$r_1^2 h_1 : r_2^2 2h_1 = 2:3$

$\frac{r_1^2}{r_2^2} = \frac{4}{3}$ $\quad r_1 : r_2 = 2 : \sqrt{3}$

27. $\bar{x} = 25.6$ $\quad C.V = 18.75$

$\sigma = ?$

$C.V = \frac{\sigma}{\bar{x}} \times 100$

$18.75 = \frac{\sigma}{25.6} \times 100$

$\frac{18.75 \times 25.6}{100} = \sigma = 4.8$.

28. $P(A) = 0.37$ $\quad P(B) = 0.42$

$P(A \cap B) = 0.09$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.37 + 0.42 - 0.09$

$= 0.79 - 0.09 = 0.70$.

III Answer any 10 $\quad 10 \times 5 = 50$

29. LHS

$A \cap C = \{1,2,3\} \cap \{3,4\} = \{3\}$

$B \cap D = \{2,3,5\} \cap \{1,3,5\}$

$= \{3,5\}$

$(A \cap B) \times (B \cap D) = \{3\} \times \{3,5\}$

$= \{(3,3)\ (3,5)\}$

RHS

$A \times B = \{1,2,3\} \times \{2,3,5\}$

$= \{(1,2)\ (1,3)\ (1,5)\ (2,2)\ (2,3)$
$(2,5)\ (3,2)\ (3,3)\ (3,5)\}$

$C \times D = \{3,4\} \times \{1,3,5\}$

$= \{(3,1)\ (3,3)\ (3,5)\ (4,1)$
$(4,3)\ (4,5)\}$

$(A \times B) \cap (C \times D) = \{(3,3)\ (3,5)\}$

LHS = RHS

31. $S_1 = \frac{n}{2}(2a + (n-1)d)$

$S_2 = \frac{2n}{2}(2a + (2n-1)d)$

$S_3 = \frac{3n}{2}(2a + (3n-1)d)$

RHS

$S_3 - S_2 = 3\left[\frac{n}{2}(2a+6n-3d) - \frac{n}{2}(2a+(n-1)d)\right]$

$= 3\left[\frac{n}{2}\left[4a+4nd-2d-2a-nd+d\right]\right]$

$= 3\left[\frac{n}{2}(2a+3nd-d)\right]$

$= \frac{3n}{2}[2a+(3n-1)d]$

$= S_3 = LHS$

RHS = RHS.

32. Three consecutive terms of G.P is $\frac{a}{r}, a, ar$.

Product $\frac{a}{r} \times a \times ar = 343$

$a^3 = 343$

$a = 7$

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

$a\left(\frac{1}{r}+1+r\right) = \frac{91}{3}$

$7\left(\frac{1+r+r^2}{r}\right) = \frac{91}{3}$

$3 + 3r + 3r^2 = 13r$

$3r^2 + 3r - 13r + 3 = 0$.

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

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

$a = 7 \quad r = 3$

$\frac{7}{3}, 7, 21$ or $21, 7, \frac{7}{3}$

33.

$3x^4+16x^3-12x^2-24x$ | $4x^4+14x^3+8x^2-8x$ | 1

$4x^4+16x^3-12x^2-24x$

$-2x^3+20x^2+16x$

$-2(x^3-8x^2-10x)$

x^3-8x^2-10x | $x^4+8x^3+20x^2+16x$ | $x+8$

$x^4-8x^3-10x^2$

$16x^3+30x^2+16x$

$16x^3-128x^2-160x$

$158x^2+176x$

$158x^2-1264x-1580$

$1440x+1580$

GCD x^3-8x^2-10x

34.

	4	−12	−37	+6	−9
2 (×2)		4	−4	−45	−6
	4	−8	−41	−51	−15

$4x^3 - 8x^2 - 41x - 51$ | $4x^4 - 12x^3 - 37x^2 + 6x - 9$ | $x - 3 + 7$

$4x^4 - 16x^3 + 7x^2$

$4x^3 - 44x^2 + 6x$

$4x^3 - 16x^2 + 28x$

$-28x^2 - 22x - 9$

$-28x^2 + 112x - 196$

$-134x + 187$

$4 - 6 + 7$

$a = 49$

$b = -42$

35. LHS

$B+C = \begin{bmatrix} 1 & 2 \\ -4 & 2 \end{bmatrix} + \begin{bmatrix} -7 & 6 \\ 3 & 2 \end{bmatrix}$

$= \begin{bmatrix} -6 & 8 \\ -1 & 4 \end{bmatrix}$

$A(B+C) = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} -6 & 8 \\ -1 & 4 \end{bmatrix}$

$= \begin{bmatrix} -6-1 & 8+4 \\ 6-3 & -8+12 \end{bmatrix} = \begin{bmatrix} -7 & 12 \\ 3 & 4 \end{bmatrix}$

RHS

$$AB = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ -4 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 1-4 & 2+2 \\ -1-12 & -2+6 \end{bmatrix} = \begin{bmatrix} -3 & 4 \\ -13 & 4 \end{bmatrix}$$

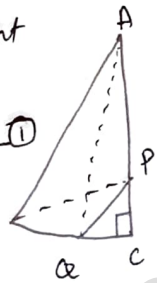
$$AC = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}\begin{bmatrix} -7 & 6 \\ 3 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} -7+3 & 6+2 \\ 7+9 & -6+6 \end{bmatrix} = \begin{bmatrix} -4 & 8 \\ 16 & 0 \end{bmatrix}$$

$$AB+AC = \begin{bmatrix} -3 & 4 \\ -13 & 4 \end{bmatrix} + \begin{bmatrix} -4 & 8 \\ 16 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} -7 & 12 \\ 3 & 4 \end{bmatrix}$$ LHS = RHS

36.



ΔAQC is right angle Δ at C,

$AQ^2 = AC^2 + QC^2$ — (1)

ΔBPC is right angled Δ at C,

$BP^2 = BC^2 + CP^2$ — (2)

ΔABC is right angle Δ at C $AB^2 = AC^2 + BC^2$ — (3)

From (1) and (2)

$AQ^2 + BP^2 = AC^2 + QC^2 + BC^2 + CP^2$

$4(AQ^2 + BP^2) = 4AC^2 + 4QC^2 + 4BC^2 + 4CP^2$

$= 4AC^2 + (2QC)^2 + 4BC^2 + (2CP)^2$

$= 4AC^2 + BC^2 + 4BC^2 + AC^2$

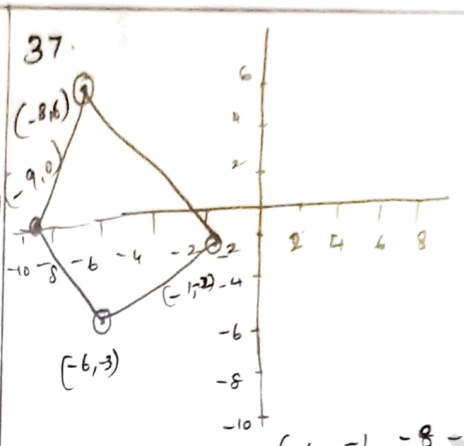
$= 5AC^2 + 5BC^2$

$= 5(AC^2 + BC^2)$

$= 5\ AB^2$ (From (3))

$4(AQ^2 + BP^2) = 5AB^2$.

37.



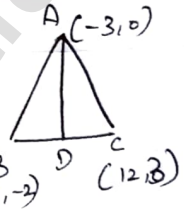
Area of $\square = \frac{1}{2}\begin{pmatrix} -6 & -1 & -8 & -9 & -6 \\ -3 & -2 & 6 & 0 & -3 \end{pmatrix}$

$= \frac{1}{2}(12 - 6 + 0 + 27) - (3 + 16 - 54 + 0)$

$= \frac{1}{2}(33) - (-35) = \frac{1}{2}(33+35)$

$= \frac{1}{2}(68) = 34$ sq. units

38.



Slope of BC

(10,-2) (12,3)

x_1, y_1 x_2, y_2

$= \frac{3+2}{12-10} = \frac{5}{2}$

Slope of AD $m = \frac{-2}{5}$ $[BC \perp AD]$

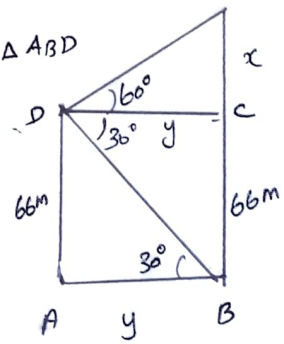
Eq of altitude AD $y - y_1 = m(x - x_1)$

(-3,0)

$y - 0 = \frac{-2}{5}(x+5) \Rightarrow 5y = -2x - 10$

$2x + 5y + 10 = 0$

39.



In Right angle ΔABD

$\tan 30^\circ = \frac{66}{y}$

$\frac{1}{\sqrt{3}} = \frac{66}{y}$

$y = 66\sqrt{3}$

$y = 114.312$

In right angle ΔCDE

$\tan 60^\circ = \frac{x}{y} \Rightarrow \sqrt{3} = \frac{x}{66\sqrt{3}}$

$x = 66\sqrt{3} \times \sqrt{3} = 198$ $x = 198$

i) The height of lamp post

$66 + x = 66 + 198 = 264$ m

ii) The difference between height of the lamp post and apartment

$264 - 66 = 198$ m

iii) The distance between lamp post and apartment

$y = 66\sqrt{3} = 66 \times 1.732$

$= 114.31$ m.

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40. Cone $r = 5$cm $h = 12$cm.

$l = \sqrt{5^2+12^2} = 13$ cm.

No. of caps $= \frac{\text{Area of paper}}{\text{CSA of cone}}$

$= \frac{5720}{\pi r l} = \frac{5720}{\frac{22}{7} \times 5 \times 13}$

$= \frac{5720 \times 7}{22 \times 5 \times 13} = 4 \times 7$

$= 28.$

41.

$S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$

$n(S) = 8$

Getting exactly two heads A

$= \{HHT, HTH, THH\}$

$n(A) = 3 \quad P(A) = \frac{3}{8}$

getting at least one tail B

$= \{HHT, HTH, HTT, THH, THT, TTH, TTT\}$

$n(B) = 7 \quad P(B) = \frac{7}{8}$

Getting two consecutive heads C

$= \{HHH, HHT, THH\}$

$P(C) = 3 \quad P(C) = \frac{3}{8}$

$A \cap B = \{HHT, HTH, THH\}$

$n(A \cap B) = 3 \quad P(A \cap B) = \frac{3}{8}$

$B \cap C = \{HHT, THH\}$

$n(B \cap C) = 2 \quad P(B \cap C) = \frac{2}{8}$

$A \cap C = \{HHT, THH\}$

$n(A \cap C) = 2 \quad P(A \cap C) = \frac{2}{8}$

$A \cap B \cap C = \{HHT, THH\}$

$n(A \cap B \cap C) = 2 \quad P(A \cap B \cap C) = \frac{2}{8}$

$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(A \cap C) + P(A \cap B \cap C)$

$= \frac{3}{8} + \frac{7}{8} + \frac{3}{8} - \frac{3}{8} - \frac{2}{8} + \frac{2}{8} - \frac{2}{8} + \frac{2}{8}$

$= \frac{8}{8} = 1.$

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42. Cone

$D = 14$ cm

$r_1 = 7$ cm.

$h_1 = 8$ m.

H. Sphere.

E.D $= 10$cm $R = 5$cm

$r = ?$

vol of cone = vol of H. sphere.

$\frac{1}{3}\pi r_1^2 h_1 = \frac{4}{3}\pi (R^3 - r^3)$

$7 \times 7 \times 8 = 4(5^3 - r^3)$

$98 = 125 - r^3$

$r^3 = 125 - 98$

$r^3 = 27$ $\quad r = 3$ cm

Internal Diameter $= 2r = 2 \times 3$

$= 6$ cm.

IV

H3 a) Example 4.11 (P.No. 169)

b) Example 4.31 (P.No. 194)

H4 a) Example 3.48 (P.No. 125)

b) Example 3.52 (P.No. 134)