ANSWER KEY PREPRATION SHEET

Part -I

1.	(c) {4, 9, 25, 49, 121}
2.	(a) m^n
3.	(c) $0 \le r < b$
4.	(a) 0
5.	(b) 5
6.	(d) row matrix
7.	(b) Point of contact
8.	(c) $3x + 7y = 0$
9.	(b) 1
10.	(d) 60°
11.	(d) 136π cm^2
12.	(a) $4/3\pi$
13.	(a) $P(A) > 1$
14.	(d) $4/5$

Part -II

15. $A = \{1, 3, 3\}$, $B = \{2, 3, 5, 7\}$

$A \times B = \{(1,2), (1,3), (1,5), (1,7), (2,2), (2,3), (2,5), (2,7), (3,2), (3,3), (3,5), (3,7)\}$

$B \times A = \{(2,1), (2,2), (2,3), (3,1), (3,2), (3,3), (5,1), (5,2), (5,3), (7,1), (7,2), (7,3)\}$

16. $f(x) = 2x+1$, $g(x) = x^2 - 2$

$f \circ g = (2x+1) \circ (x^2-2)$

$= 2(x^2-2)+1 = 2x^2 - 4 + 1 = 2x^2 - 3$ — ①

$g \circ f = (x^2-2) \circ (2x+1) = (2x+1)^2 - 2$

$= 4x^2 + 4x + 1 - 2$

$= 4x^2 + 4x - 1$ — ②

① $\neq$ ②

17. $a = bq + r$, $0 \le r < b$

$a = 532$, $b = 21$

$532 = 25 \times 21 + 7$

$21 \overline{)532}\ 25$, 525, 7

Hence the number of completed rows = 25 and 7 flowers pots are left over.

18. $\frac{x^3}{x-y} + \frac{y^3}{y-x} = \frac{x^3}{x-y} - \frac{y^3}{x-y}$

$= \frac{x^3 - y^3}{x-y}$

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

$= x^2 + xy + y^2$

19. $AB = \begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix}\begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix} = \begin{pmatrix} 5 & 3 \\ 5 & 9 \end{pmatrix}$

$BA = \begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix}\begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix} = \begin{pmatrix} 4 & 2 \\ 5 & 10 \end{pmatrix}$

$\therefore AB \neq BA$

20. ΔABC, AD is the bisector of $\angle A$

By Angle bisector theorem.

$\frac{BD}{DC} = \frac{AB}{AC}$

$\frac{4}{3} = \frac{6}{AC} \Rightarrow 4AC = 18$

$AC = \frac{18}{4}$

$AC = 9/2$

$AC = 4.5$ cm.

21. $\frac{x_2 - x_1}{y_2 - y_1} = -1/2$

$\frac{3-a}{9+2} = -1/2$ $\qquad \boxed{\frac{17}{2} = a}$

$\frac{3-a}{11} = -1/2$

$2(3-a) = -1 \times 11$

$6 - 2a = -11$

$6 + 11 = 2a$

22. $m_1 = -1/2 = 1/2$

$m_2 = \frac{-b}{3} = -2$

Now, $m_1 \times m_2 = 1/2 \times -2$

$= -1$

Hence, the two straight lines are perpendicular.

23. $\tan\theta = \frac{opp}{adj}$

$\tan 30° = \frac{50\sqrt{3}}{x}$

$\frac{1}{\sqrt{3}} = \frac{50\sqrt{3}}{x}$

$x = 50\sqrt{3} \times \sqrt{3}$

$= 50 \times 3$

$= 150$ m.

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24. Given $r_1 : r_2 = 4 : 7$

$V_1 : V_2 = \frac{V_1}{V_2}$

$= \frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3}$

$= \frac{4 \times 4 \times 4}{7 \times 7 \times 7}$

$\frac{V_1}{V_2} = \frac{64}{343}$

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

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

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

$= \frac{550}{7}$

CSA $= 78.57$ cm^2

26.

$l = 28$

$s = 18$

Range $= l - s$

$= 28 - 18$

$= 10$ years

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27. Total number of flowers

$n(S) = 80 + 70 + 50 = 200$

No. of the yellow flowers $n(y) = 80$

$P(y) = \frac{n(y)}{n(S)} = \frac{80}{200}$

$= \frac{2}{5}$

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28. $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \sqrt{50}$

$d = t_2 - t_1$

$= \sqrt{8} - \sqrt{2}$

$= \sqrt{4 \times 2} - \sqrt{2}$

$= 2\sqrt{2} - \sqrt{2}$

$= \sqrt{2}$

$d = t_3 - t_1$

$= \sqrt{18} - \sqrt{8}$

$= \sqrt{9 \times 2} - \sqrt{4 \times 2}$

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

$= \sqrt{2}$

∴ The sequence is A.P

Common difference $= \sqrt{2}$

Part - III

29. $A = \{1, 2, 3, 4, 5, 6, 7\}$, $B = \{2, 3, 5, 7\}$

$C = \{2\}$

$A \cap B = \{2, 3, 5, 7\}$

$(A \cap B) \times C = \{(2,2), (3,2), (5,2), (7,2)\}$ — ①

$A \times C = \{(1,2), (2,2), (3,2), (4,2), (5,2), (6,2), (7,2)\}$

$B \times C = \{(2,2), (3,2), (5,2), (7,2)\}$

$(A \times B) \cap (B \times C) = \{(2,2), (3,2), (5,2), (7,2)\}$ — ②

LHS = RHS.

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30. $f(x) = \frac{x}{2} - 1$

$f(2) = 0$, $f(4) = 1$, $f(6) = 2$, $f(10) = 4$

$f(12) = 5$ — ①

(i) set of ordered pairs — ①

(ii) a table — ①

(iii) an arrow diagram — ①

(iv) a graph — ①

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31. $13824 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 7$

$= 2^3 \times 3^4 \times 5^2 \times 7^1$

$= p_1^{n_1} \times p_2^{n_2} \times p_3^{n_3} \times p_4^{n_4}$

$P_1 = 2,\ P_2 = 3,\ P_3 = 5,\ P_4 = 7$

$x_1 = 3,\ x_2 = 4,\ x_3 = 2,\ x_4 = 1$

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32. $6^2 + 7^2 + 8^2 + \cdots + 21^2$

$= (1^2 + 2^2 + 3^2 + \cdots 21^2) - (1^2 + 2^3 + 3^2 + \cdots + 5^2)$

$= \frac{n(n+1)(2n+1)}{6} - \frac{n(n+1)(2n+1)}{6}$

$= \frac{21 \times 22 \times 43}{6} - \frac{5 \times 6 \times 11}{6}$

$= 3311 - 55$

$= 3256$

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33. $AB = \begin{pmatrix} 0 & 9 \\ 5 & -4 \end{pmatrix}$

$(AB)^T = \begin{pmatrix} 0 & 5 \\ 9 & -4 \end{pmatrix}$ — ①

$B^T = \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} 2 & -1 & 0 \\ -1 & 4 & 2 \end{pmatrix}$

$A^T = \begin{pmatrix} 1 & 2 \\ 2 & 4 \\ 1 & 1 \end{pmatrix}$

$B^T A^T = \begin{pmatrix} 0 & 5 \\ 9 & -4 \end{pmatrix}$ — ②

$(AB)^T = B^T A^T$

34.

statement, diagram } ② } ⑤

proof — ③ } marks.

Area of quadrilateral = 28 sq. units

$\frac{1}{2} \begin{vmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{vmatrix} = 28$

35.

$\frac{1}{2} \begin{Bmatrix} -4 & -3 & 3 & 2 & -4 \\ -2 & k & -2 & 3 & -2 \end{Bmatrix} = 28$

$(-4k + 6 + 9 - 4) - (6 + 3k - 4 - 12) = 56$

$(11 - 4k) - (3k - 10) = 56$

$11 - 4k - 3k + 10 = 56$

$21 - 7k = 56$

$7k = -35$

$\boxed{k = -5}$

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36. $a + b = 7$ or $b = 7 - a$

$\frac{x}{a} + \frac{y}{b} = 1$

$\frac{x}{a} + \frac{y}{7-a} = 1$

$\frac{-3}{a} + \frac{8}{7-a} = 1$

$\Rightarrow -3(7-a) + 8a = a(7-a)$

$-21 + 3a + 8a = 7a - a^2$

$a^2 + 4a - 21 = 0$

$(a-3)(a+7) = 0$

$a = 3$ or $a = -7$

$a = 3$, and $b = 7 - a = 7 - 3 = 4$

$\frac{x}{3} + \frac{y}{4} = 1$

$\therefore\ 4x + 3y - 12 = 0$

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37. $LHS = \frac{\sin^3 A + \cos^3 A}{\sin A + \cos A} + \frac{\sin^3 A - \cos^3 A}{\sin A - \cos A}$

$= \frac{(\sin A + \cos A)(\sin^2 A - \sin A \cos A + \cos^2 A)}{\sin A + \cos A} +$

$\frac{(\sin A - \cos A)(\sin^2 A + \sin A \cos A + \cos^2 A)}{(\sin A - \cos A)}$

$= (\sin^2 A - \sin A \cos A + \cos^2 A) + (\sin^2 A + \sin A \cos A + \cos^2 A)$

$= 1 - \sin A \cos A + 1 + \sin A \cos A$

$= 2 = RHS$

38. Cylinder: $R = \frac{3}{2}$ cm, $H = 8$ cm; Cone: $r = \frac{3}{2}$ cm, $h = 2$ cm

Metal Model $= \pi R^2 H + 2 \times \frac{1}{3}\pi r^2 h$

$= \pi\left[R^2 H + \frac{2}{3} r^2 h\right]$

$= \pi\left[\frac{3}{2} \times \frac{3}{2} \times 8 + \frac{2}{3} \times \frac{3}{2} \times \frac{3}{2} \times 2\right]$

$= \frac{22}{7}[18 + 3]$

$= \frac{22}{7}[18+3]$

$= \frac{22}{7} \times 21$

$= 66$ sq. cm

Cube Em.

39. $R = 16$cm, $r = 2$cm

$n \times$ (Volume of a small sphere) = Volume of big metallic sphere

$n\left(\frac{4}{3}\pi r^3\right) = \frac{4}{3}\pi R^3$

$n\left(\frac{4}{3}\pi \times 2^3\right) = \frac{4}{3}\pi \times 16^3$

$8n = 4096$

$n = \frac{4096}{8}$

$n = 512$

∴ There will be 512 small spheres

40.

SATHYA

Total marks $\Sigma x = 460$

$\sigma = 4.6$

$\bar{x} = \frac{\Sigma x}{n} = \frac{460}{5} = 92$

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

$= \frac{4.6}{92} \times 100$

$= 5$

VIDHYA

$\Sigma x = 480$

$\bar{x} = \frac{\Sigma x}{n} = \frac{480}{5}$

$= 96$

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

$= \frac{2.4}{96} \times 100$

$= 2.5$

Vidhya is more Consistent in Performance.

41. $n(S) = 5+6+7+8 = 26$

(i) $P(A) = \frac{6}{26} = \frac{3}{13}$

(ii) $P(B) = \frac{13}{26} = \frac{1}{2}$

(iii) $P(C) = \frac{20}{26} = \frac{10}{13}$

(iv) $P(D) = \frac{12}{36} = \frac{6}{13}$

42. $(x-1)^2 + (x-2)^2 + (x-3)^2 = 0$

$x^2 + 1 - 2x + x^2 + 4 - 4x + x^2 + 9 - 6x = 0$

$3x^2 - 12x + 14 = 0$

$a = 3,\ b = -12,\ c = 14$

$\Delta = b^2 - 4ac$

$= (-12)^2 - 4(3)(14)$

$= 144 - 168$

$= -24 < 0$

$\Delta = -24 < 0$

∴ No Real roots.

Part -IV

43.

a) Rough diagram — (2)

Fair diagram - (6)

Total marks — (8)

(OR)

b)

Rough diagram – (1)

Fair diagram – (5)

Length of tangent = (1)

(8) marks.

(OR)

b) Solution – (4)

graph – (3)

(i) $y = \frac{5}{6}x$

(ii) 75 cm

(iii) 360 minutes

} (1) mark

44.

a) Solution – (4)

graph – (3)

Nature of solutions – (1)

8 marks.

M. GANGAI AMARAN
B.T ASST IN MATHS
GHS, PAITHUR
SALEM DISTRICT
9751435853