CCE PF
CCE PR

ಕರ್ನಾಟಕ ಪ್ರೌಢ ಶಿಕ್ಷಣ ಪರೀಕ್ಷಾ ಮಂಡಳಿ, ಮಲ್ಲೇಶ್ವರಂ, ಬೆಂಗಳೂರು – 560 003

KARNATAKA SECONDARY EDUCATION EXAMINATION BOARD, MALLESWARAM, BANGALORE – 560 003

ಎಸ್.ಎಸ್.ಎಲ್.ಸಿ. ಪರೀಕ್ಷೆ, ಮಾರ್ಚ್ / ಏಪ್ರಿಲ್ — 2017

S. S. L. C. EXAMINATION, MARCH/APRIL, 2017

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

ದಿನಾಂಕ : 03. 04. 2017] ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

Date : 03. 04. 2017] CODE NO. : **81-E**

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

(ಹೊಸ ಪಠ್ಯಕ್ರಮ / New Syllabus)

(ಖಾಸಗಿ ಅಭ್ಯರ್ಥಿ + ಪುನರಾವರ್ತಿತ ಖಾಸಗಿ ಅಭ್ಯರ್ಥಿ / Private Fresh + Private Repeater)

(ಇಂಗ್ಲಿಷ್ ಭಾಷಾಂತರ / English Version)

[ಗರಿಷ್ಠ ಅಂಕಗಳು : **100**

[Max. Marks : 100

Qn. Nos.	Ans. Key	Value Points	Marks allotted
I. 1.	C	0	1
2.	B	– 2 and 1	1
3.	A	90°	1
4.	D	1540 c.c.	1
5.	B	$\frac{1}{2}$	1
6.	A	Composite number	1
7.	C	$S_\infty = \frac{a}{1-r}$	1
8.	D	$\pi(r_1 + r_2)l$.	1

Qn. Nos.	Value Points	Marks allotted
II.	(Question Nos. from 9 to 14, give full marks to direct answers.)	
9.	$A^{l} = U - A$ ½	
	$= \{1, 2, 3, 4, 5, 6\} - \{2, 3, 4, 5\}$	
	$= \{1, 6\}$ ½	1
10.	Standard deviation = $\sqrt{\text{Variance}}$	
	OR	
	SD^2 = Variance	1
11.	$T_n = n^2 + 4$	
	$T_2 = 2^2 + 4$ ½	
	$= 4 + 4$	
	$= 8$ ½	1
12.	Sample space (S) = $\{H, T\}$ $\therefore$ $n(S) = 2$ ½	
	Event (A) = $\{H\}$ $\therefore$ $n(A) = 1$	
	$\therefore \quad P(A) = \frac{n(A)}{n(S)} = \frac{1}{2}$. ½	1
13.	"In a right angled triangle, the square on the hypotenuse is equal to the sum of the squares on other two sides."	1
14.	General form $p(x) = ax^2 + bx + c$ ½	
	where $a \neq 0$, a, b & $c \in R$. ½	1
III. 15.	$A \cap B = \{3, 4\}$ ½	
	$(A \cap B) \cap C = \{\}$ or ϕ ... (i) ½	
	$B \cap C = \{6\}$	
	$A \cap (B \cap C) = \{\ \}$ or ϕ ... (ii) ½	
	From (i) and (ii)	
	$(A \cap B) \cap C = A \cap (B \cap C)$. ½	2

Qn. Nos.	**Value Points**		**Marks allotted**
16.	Let a and b be two numbers		
	Given $\frac{a+b}{2} = 5$		
	$\therefore \quad a + b = 10$ … (i)	½	
	And $\sqrt{ab} = 4$		
	$ab = 16$ … (ii)	½	
	Harmonic mean (H.M.) $= \frac{2ab}{a+b}$	½	
	$= \frac{\cancel{2} \times 16}{\cancel{10}\ 5}$		
	$= \frac{16}{5}$	½	2
	Alternate Method :		
	$G^2 = AH$	½	
	$\frac{G^2}{A} = H$	½	
	$\frac{(4)^2}{5} = H$	½	
	$\frac{16}{5} = H.$	½	2
	OR		
	Given $T_3 = 1$		
	$\frac{1}{a+2d} = 1$		
	$\therefore \quad a + 2d = 1$		
	$a = 1 - 2d$ … (i)		
	$T_5 = \frac{1}{-5}$		
	$\frac{1}{a+4d} = \frac{1}{-5}$	½	
	$a + 4d = -5$ … (ii)		

Qn. Nos.	**Value Points**		**Marks allotted**
	Substituting (i) in (ii)		
	$1 - 2d + 4d = -5$		
	$1 + 2d = -5$	½	
	$2d = -5 - 1 = -6$		
	$\therefore \quad d = -\frac{6}{2} = -3$		
	If $d = -3$ then $a = 1 - 2(-3) = 1 + 6 = 7$	½	
	Now $T_{10} = \frac{1}{a + 9d}$		
	$= \frac{1}{7 + 9(-3)}$		
	$= \frac{1}{7 - 27}$	½	
	$T_{10} = -\frac{1}{20}.$		2
17.	Let us assume, $5 - \sqrt{3}$ is a rational number		
	i.e. $5 - \sqrt{3} = \frac{p}{q}$ where $p, q \in z, \quad q \neq 0$	½	
	$5 - \frac{p}{q} = \sqrt{3}$	½	
	$\frac{5q - p}{q} = \sqrt{3}$		
	This means $\sqrt{3}$ is a rational number but		
	$\sqrt{3}$ is not a rational number	½	
	This gives us a contradiction. Our assumption is wrong.		
	$\therefore$ $5 - \sqrt{3}$ is an irrational number.	½	2
18.	${}^{n}P_4 = 5 . {}^{n}P_3$		
	$\cancel{n}(\cancel{n-1})(\cancel{n-2})(n-3) = 5\cancel{n}(\cancel{n-1})(\cancel{n-2})$	1	
	$n - 3 = 5$	½	
	$n = 5 + 3$		
	$n = 8.$	½	2

Qn. Nos.	Value Points	Marks allotted
19.	Given $\frac{P(A)}{P(\overline{A})} = \frac{5}{11}$ $11P(A) = 5P(\overline{A})$ $11P(A) = 5[1 - P(A)]$ ½ $11P(A) = 5 - 5P(A)$ $11P(A) + 5P(A) = 5$ $16P(A) = 5$ ½ $\therefore \quad P(A) = \frac{5}{16}$ $\therefore \quad P(\overline{A}) = 1 - P(A)$ $= 1 - \frac{5}{16}$ $= \frac{16-5}{16}$ 1 $= \frac{11}{16}.$	2
20.	A group of surds having same order and same radicand in their simplest form are called like surds. ½ A group of surds having different orders or different radicands or both in their simplest form are called unlike surds. ½ Set of like surds — $\left\{\sqrt{8}, \sqrt{18}, \sqrt{32}, \sqrt{50}\right\}$ 1	2
21.	$\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} \times \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}}$ ½ $= \frac{(\sqrt{5}+\sqrt{3})^2}{5-3}$ $= \frac{5+3+2\sqrt{15}}{2}$ ½ $= \frac{8+2\sqrt{15}}{2}$ ½ $= \frac{\cancel{2}(4+\sqrt{15})}{\cancel{2}}$ $= 4 + \sqrt{15}.$ ½	2

Qn. Nos.	Value Points		Marks allotted
22.	Let $g(x)$ be divisor $= 2x - 1$		
	$q(x)$ be quotient $= 7x^2 + x + 5$		
	$r(x)$ be remainder $= 4$		
	$\therefore \quad p(x) = [g(x) . q(x)] + r(x)$	½	
	$= [(2x - 1)(7x^2 + x + 5)] + 4$	½	
	$= 14x^3 + 2x^2 + 10x - 7x^2 - x - 5 + 4$	½	
	$= 14x^3 - 5x^2 + 9x - 1.$	½	2
	OR		
	$\begin{array}{r\|rrr\|r} -3 & 3 & -2 & 7 & -5 \\ \hline & 0 & -9 & 33 & -120 \\ \hline & 3 & -11 & 40 & -125 \end{array}$	1	
	$\therefore$ Quotient $= 3x^2 - 11x + 40$	½	
	Remainder $= -125.$	½	2
23.	$A = \frac{\sqrt{3}}{4}a^2$		
	$4A = \sqrt{3}a^2$	1	
	$4 \times 16\cancel{\sqrt{3}} = \cancel{\sqrt{3}}a^2$		
	$a = 8$ cm		
	$\therefore$ Perimeter of triangle $= 3a$	½	
	$= 3 \times 8$		
	$= 24$ cm.	½	2
24.	$x^2 - 2x + 3 = 0$		
	$\therefore \quad a = 1, \quad b = -2, \quad c = 3$	½	
	Consider $b^2 - 4ac = (-2)^2 - 4(1)(3)$		
	$= 4 - 12$	½	
	$= -8$		
	$b^2 - 4ac < 0$	½	
	$\therefore$ roots are imaginary.	½	2

Qn. Nos.	**Value Points**		**Marks allotted**
	Alternate method :		
	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	½	
	$= \dfrac{-(-2) \pm \sqrt{-8}}{2(1)}$	½	
	$= \dfrac{2 \pm \sqrt{4 \times -2}}{2}$		
	$= \dfrac{\cancel{2} \pm \cancel{2}\sqrt{-2}}{\cancel{2}}$		
	$= 1 \pm \sqrt{-2}$	½	
	$\therefore$ Roots are imaginary.	½	2
25.	Consider ΔPXQ and ΔZXY	1	
	$P\hat{Q}X = X\hat{Y}Z = 90°$		
	$P\hat{X}Q = Y\hat{X}Z$ common		
	$\therefore \Delta PXQ \sim \Delta ZXY$		
	$\therefore \dfrac{XP}{XZ} = \dfrac{XQ}{XY}$	½	
	$\dfrac{4}{24} = \dfrac{XQ}{16}$		
	$XQ = \dfrac{4 \times \cancel{16}^{\,2}}{\cancel{24}_{\,3}} = \dfrac{8}{3}$		
	$XQ = 2{\cdot}66 \simeq 2{\cdot}6$ cm.	½	2

Qn. Nos.	Value Points		Marks allotted
26.	LHS $= \dfrac{1-\tan^2 A}{1+\tan^2 A}$		
	$= \dfrac{1-\dfrac{\sin^2 A}{\cos^2 A}}{1+\dfrac{\sin^2 A}{\cos^2 A}}$	½	
	$= \dfrac{\cos^2 A - \sin^2 A}{\cos^2 A + \sin^2 A}$	½	
	$= \dfrac{\cos^2 A - (1-\cos^2 A)}{1}$	½	
	$= \cos^2 A - 1 + \cos^2 A$		
	$= 2\cos^2 A - 1.$	½	2
	Alternate method :		
	L.H.S. $= \dfrac{1-\tan^2 A}{1+\tan^2 A}$		
	$= \dfrac{1-(\sec^2 A - 1)}{1+(\sec^2 A - 1)}$	½	
	$= \dfrac{1-\sec^2 A + 1}{1+\sec^2 A - 1}$	½	
	$= \dfrac{2-\sec^2 A}{\sec^2 A}$		
	$= \dfrac{2}{\sec^2 A} - 1$	½	
	$= 2\cos^2 A - 1.$	½	2
27.	Let $(x_1, y_1) \equiv (4, -8)$ and $(x_2, y_2) \equiv (5, -2)$	½	
	Slope $= \dfrac{y_2 - y_1}{x_2 - x_1}$	½	
	$= \dfrac{-2+8}{5-4}$	½	
	$= 6.$	½	2

Qn. Nos. **Value Points** **Marks allotted**

28. Let $(x_1, y_1) = (2, 3)$ and $(x_2, y_2) = (4, 7)$

Mid-point $= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ ½

$= \left(\frac{2+4}{2}, \frac{3+7}{2} \right)$ ½

$= \left(\frac{6}{2}, \frac{10}{2} \right)$ ½

$= (3, 5).$ ½ 2

29. $30 \text{ m} = \frac{1}{20} \times 30 = 1{\cdot}5 \text{ cm}$

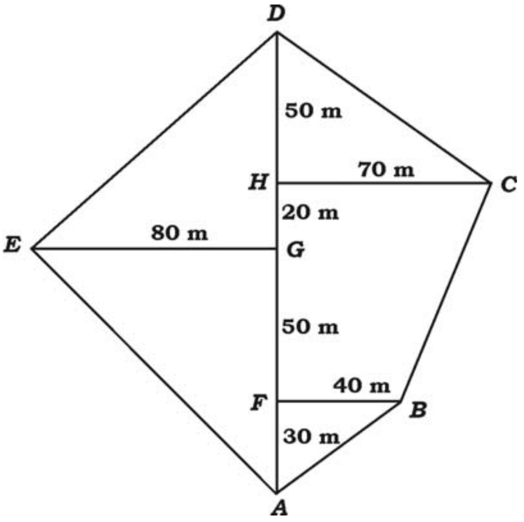
$80 \text{ m} = \frac{80}{20} = 4 \text{ cm}$

$100 \text{ m} = \frac{100}{20} = 5 \text{ cm}$

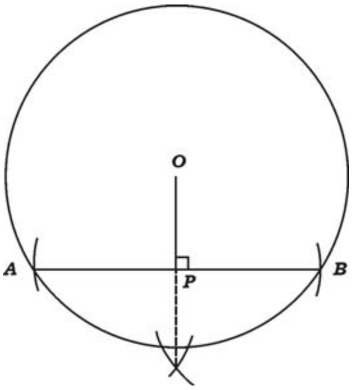
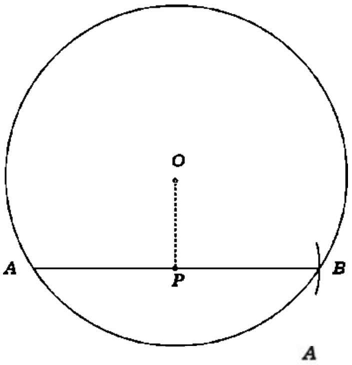
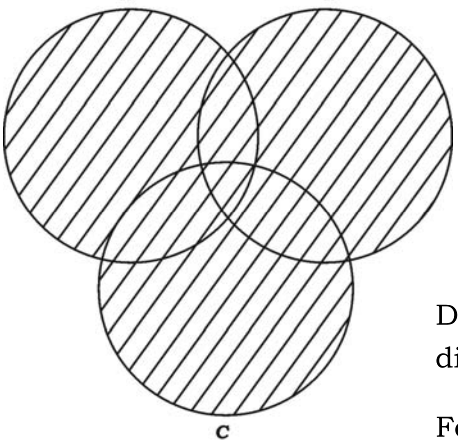
$150 \text{ m} = \frac{150}{20} = 7{\cdot}5 \text{ cm}$

$40 \text{ m} = \frac{40}{20} = 2 \text{ cm}$

$70 \text{ m} = \frac{70}{20} = 3{\cdot}5 \text{ cm.}$ ½



1½ 2

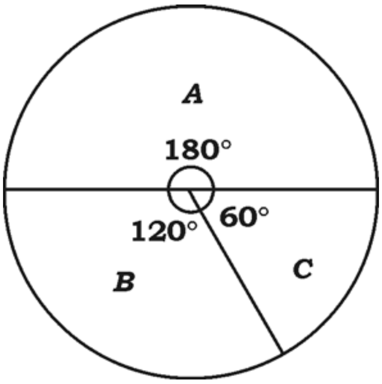
Qn. Nos.	Value Points	Marks allotted
30.	$r = 3{\cdot}5$ cm Chord = 6 cm  Circle — ½ Chord — ½ $OP \perp AB$ — ½ Ans. — ½ Distance $OP = 1{\cdot}8$ cm	2
	Alternate method : $r = 3{\cdot}5$ cm Chord = 6 cm  Circle — ½ Chord — ½ $OP \perp AB$ — ½ Ans. — ½ Distance $\overline{OP} = 1{\cdot}8$ cm	2
31.	 $(A \cup B) \cup C$ Drawing Venn diagram — 1 For shading — 1	2
32.	$a = 1, \quad r = 2 \quad S_{10} = ?$ $S_n = \frac{a(r^n - 1)}{(r-1)}$ ½ $S_{10} = \frac{1(2^{10} - 1)}{2-1}$ ½ $= 1024 - 1$ ½ $= 1023.$ ½	2

Qn. Nos.	Value Points	Marks allotted

33. Total number of people = 12 + 8 + 4 = 24

Brand of soap	No. of people	Central angle
A	12	$\frac{\cancel{12}}{\cancel{24}_{2}} \times \overset{180^\circ}{\cancel{360}} = 180^\circ$
B	8	$\frac{\cancel{08}}{\cancel{24}_{3}} \times \overset{120^\circ}{\cancel{360}} = 120^\circ$
C	4	$\frac{\cancel{04}}{\cancel{24}_{6}} \times \overset{60^\circ}{\cancel{360}} = 60^\circ$

½



1½ 2

34. $= \sqrt{9 \times 2} + \sqrt{64 \times 2} - \sqrt{25 \times 2}$ ½

$= 3\sqrt{2} + 8\sqrt{2} - 5\sqrt{2}$ ½

$= 11\sqrt{2} - 5\sqrt{2}$ ½

$= 6\sqrt{2}$. ½ 2

35. ${}^{5}C_{r} = 10, \quad {}^{5}P_{r} = 60$

${}^{n}C_{r} = \frac{{}^{n}P_{r}}{r\,!}$ ½

${}^{5}C_{r} = \frac{{}^{5}P_{r}}{r\,!}$ ½

$10 = \frac{60}{r\,!}$ ½

$\therefore \quad r\,! = \frac{\cancel{60}^{\,6}}{\cancel{10}} = 3 \times 2 \times 1$ ½

$\therefore \quad r = 3$ 2

Qn. Nos.	Value Points		Marks allotted
36.	Comparing with $ax^2 + bx + c = 0$		
	$a = 1, \quad b = -7, \quad c = 12$		
	$\therefore \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	½	
	$= \frac{-(-7) \pm \sqrt{(-7)^2 - 4 \times 1 \times 12}}{2 \times 1}$	½	
	$= \frac{7 \pm \sqrt{49 - 48}}{2}$		
	$= \frac{7 \pm 1}{2}$	½	
	Roots are $\frac{7+1}{2}$ or $\frac{7-1}{2}$		
	$\frac{8}{2}$ or $\frac{6}{2}$		
	Roots are 4 or 3.	½	2
37.	Let the altitudes of two similar triangles *ABC* and *DEF* are 3 cm and 5 cm respectively.	½	
	$\therefore \quad \frac{\Delta ABC}{\Delta DEF} = \frac{3^2}{5^2}$	1	
	$= \frac{9}{25}$.	½	2
38.	i) If $P(x)$ is divided by $(x - a)$ then the remainder is $P(a)$	1	
	ii) If $P(x)$ is divided by $(x + a)$ then the remainder is $P(-a)$.	1	2
39.	$h = 4$ cm, $r = \frac{21}{2}$ cm, $V = ?$		
	Volume of a right circular cone $V = \frac{1}{3}\pi r^2 h$ cubic units	½	
	$= \frac{1}{\cancel{3}} \times \frac{22}{\cancel{7}} \times \frac{\cancel{21}}{\cancel{2}} \times \frac{21}{\cancel{2}} \times \cancel{4}$ cubic cm	½	
	$= 21 \times 22$	½	
	$= 462$ c.c.	½	2

Qn. Nos.	**Value Points**		**Marks allotted**
40.	In the figure		
	$AP = AR$ Tangents drawn from point A to the circle		
	$BP = BQ$ Tangents drawn from point B to the circle		
	$CR = CQ$ Tangents drawn from point C to the circle	½	
	Given $AB = AC$		
	$\therefore \quad AB - AP = AC - AR$	½	
	$BP = CR$	½	
	But $BP = BQ$ and $CR = CQ.$		
	$\therefore \quad BQ = CQ.$	½	2
	Alternate method :		
	In the figure $AB = AC$		
	$AP + BP = AR + CR$	½	
	$AR + BP = AR + CR \qquad \because \quad AP = AR$	½	
	$BP = CR$		
	But $BP = BQ$ and $CR = CQ$	½	
	$\therefore \quad BQ = CQ.$	½	2
IV. 41.	Let the number of persons in the function be n	1	
	Handshakes will be exchanged between two persons		
	$\therefore \quad {}^nC_2 = 45$ (given)		
	$\frac{n(n-1)}{2 \times 1} = 45$	½	
	$n(n-1) = 90$	½	
	$n(n-1) = 10 \times 9$	½	
	$\therefore \quad n = 10$	½	
	Hence the number of persons = 10		
	Note : By applying quadratic equation and finds $n = 10$, give marks.		3
	OR		

Qn. Nos.	Value Points	Marks allotted

Number of diagonals $= {}^{n}C_2 - n$ 1

$= \dfrac{n(n-1)}{2 \times 1} - n$ ½

$= \dfrac{n^2 - n - 2n}{2}$ ½

$= \dfrac{n^2 - 3n}{2}$ ½

$= \dfrac{n(n-3)}{2}.$ ½ 3

42. I. Actual mean method :

X	$d = X - \overline{X}$	d^2
36	– 12	144
40	– 8	64
48	0	0
52	4	16
64	16	256
$\sum X = 240$		$\sum d^2 = 480$

1

Mean $\overline{X} = \dfrac{\sum X}{N} = \dfrac{\cancel{240}}{\cancel{5}} = 48$

Standard deviation $(\sigma) = \sqrt{\dfrac{\sum d^2}{N}}$ ½

$= \sqrt{\dfrac{480}{5}}$

$= \sqrt{96}$

$\simeq 9 \cdot 8$ ½

Coefficient of variation $(\text{C.V.}) = \dfrac{\sigma}{\overline{X}} \times 100$ ½

$= \dfrac{9 \cdot 8}{48} \times 100$

$= \dfrac{980}{48}$

$\simeq 20 \cdot 41.$ ½ 3

Qn. Nos.	Value Points	Marks allotted

II. Step deviation method :

X	$d = X - A$	Step deviation $d = \frac{X - A}{C}$	d^2
36	– 12	– 3	9
40	– 8	– 2	4
48	0	0	0
52	+ 4	1	1
64	+ 16	4	16
$N = 5$		$\Sigma d = 0$	$\Sigma d^2 = 30$

1

Assumed mean = A = 48

Common factor = C = 4

(σ) Standard deviation $= \sqrt{\frac{\Sigma d^2}{N} - \left(\frac{\Sigma d}{N}\right)^2} \times C$ ½

$= \sqrt{\frac{30}{5} - 0^2} \times 4$

$= \sqrt{6} \times 4$ ½

$= 2{\cdot}42 \times 4$

$\sigma \simeq 9{\cdot}8.$

Coefficient of variation (C.V.) $= \frac{\sigma}{\overline{X}} \times 100$ ½

$= \frac{9{\cdot}8}{48} \times 100$

$\simeq 20{\cdot}41.$ ½ 3

Alternate method :

III. Assumed mean method :

X	$d = x - \text{A}$	d^2
36	36 – 48 = – 12	144
40	40 – 48 = – 8	64
48	48 – 48 = 0	0
52	52 – 48 = 4	16
64	64 – 48 = 16	256
$N = 5$	$\Sigma d = 0$	$\Sigma d^2 = 480$

1

Assumed mean = 48

Qn. Nos.	Value Points		Marks allotted
	S.D. $(\sigma) = \sqrt{\dfrac{\Sigma d^2}{N} - \left(\dfrac{\Sigma d}{N}\right)^2}$	½	
	$\sigma = \sqrt{\dfrac{480}{5} - \left(\dfrac{0}{5}\right)^2}$		
	$\sigma = \sqrt{96 - 0}$		
	$\sigma = \sqrt{96}$		
	$\sigma = 9{\cdot}8$	½	
	C.V. = $\dfrac{\sigma}{\overline{x}} \times 100 = \dfrac{9 \cdot 8}{48} \times 100 = \dfrac{980}{48}$	½	
	C.V. = 20·41.	½	
	Alternate method :		
	IV. Direct method :		

X	X^2
36	1296
40	1600
48	2304
52	2704
64	4096
$\Sigma x = 240$	$\Sigma x^2 = 12000$
$N = 5$	

$\overline{x} = \dfrac{\Sigma x}{N} = \dfrac{240}{5} = 48$ 1

S.D. $(\sigma) = \sqrt{\dfrac{\Sigma x^2}{N} - \left(\dfrac{\Sigma x}{N}\right)^2}$ ½

$\sigma = \sqrt{\dfrac{12000}{5} - \left(\dfrac{240}{5}\right)^2}$

$\sigma = \sqrt{2400 - 2304}$

$\sigma = \sqrt{96}$

$\sigma = 9{\cdot}8$ ½

C.V. $= \dfrac{\sigma}{\overline{x}} \times 100$ ½

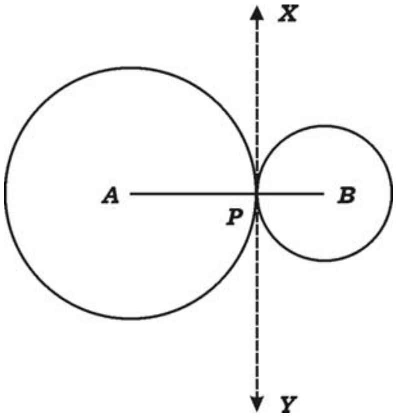
$= \dfrac{9 \cdot 8}{48} \times 100$

$= \dfrac{980}{48} \times 100$

$= 20{\cdot}41.$ ½ 3

Qn. Nos.	Value Points	Marks allotted

43.



½

Data : A and B are the centres of touching circles. P is the point of contact. ½

To prove : A, P and B are collinear. ½

Construction : Tangent XY is drawn at P. ½

Proof : In the figure

$A\hat{P}X = 90°$ ... (i)

$B\hat{P}X = 90°$ ... (ii)

} Radius drawn at the point of contact is perpendicular to the tangent ½

$A\hat{P}X + B\hat{P}X = 90° + 90°$ by adding (i) and (ii)

$A\hat{P}B = 180°$ $A\hat{P}B$ is a straight angle.

∴ APB is a straight line 3

∴ A, P and B are collinear. ½

44. In $\triangle$ LAN, $L\hat{N}A = 90°$

∴ $LA^2 = LN^2 + NA^2$ ½

$= 6^2 + 8^2$

$= 36 + 64$ ½

$= 100$

∴ $LA = \sqrt{100} = 10$ cm ½ 3

Qn. Nos.	**Value Points**	**Marks allotted**
	In $\triangle\, LAW,\quad L\hat{A}W = 90°$	
	$\therefore\quad LW^2 = LA^2 + WA^2$ ½	
	$WA^2 = LW^2 - LA^2$	
	$= 26^2 - 10^2$ ½	
	$= (26 + 10)(26 - 10)$	
	$WA = \sqrt{36 \times 16}$	
	$= 6 \times 4$	
	$WA = 24$ cm. ½	
	OR	
	In $\triangle\, MPG,\quad M\hat{P}G = 90°$	
	$\therefore\quad MG^2 = MP^2 + GP^2$ ½	
	$\therefore\quad MP^2 = MG^2 - GP^2$	
	$= a^2 - c^2$ (i) ½	
	In $\triangle\, MPN,\quad M\hat{P}N = 90°$	
	$\therefore\quad MN^2 = MP^2 + PN^2$ ½	
	$\therefore\quad MP^2 = MN^2 - PN^2$	
	$= b^2 - d^2$ (ii) ½	
	From (i) and (ii)	
	$a^2 - c^2 = b^2 - d^2$	
	$a^2 - b^2 = c^2 - d^2$ ½	
	$(a + b)(a - b) = (c + d)(c - d)$	
	$\therefore\quad \dfrac{a - b}{c - d} = \dfrac{c + d}{a + b}$ ½	
	Proved.	3

Qn. Nos.	Value Points	Marks allotted

45. In $\triangle ABC$, $A\hat{B}C = 90°$ and $A\hat{C}B = 30°$

$\therefore \quad \tan 30° = \dfrac{AB}{BC}$ ½

$\dfrac{1}{\sqrt{3}} = \dfrac{AB}{BX + 6}$

$\therefore \quad AB = \dfrac{BX + 6}{\sqrt{3}} \quad \ldots \text{(i)}$ ½

In $\triangle ABX$, $A\hat{B}X = 90°$ and $A\hat{X}B = 60°$

$\therefore \quad \tan 60° = \dfrac{AB}{BX}$ ½

$\sqrt{3} = \dfrac{AB}{BX}$

$\therefore \quad AB = \sqrt{3} \,.\, BX \quad \ldots \text{(ii)}$ ½

Substituting (ii) in (i)

$\sqrt{3} \,.\, BX = \dfrac{BX + 6}{\sqrt{3}}$ ½

$\therefore \quad BX + 6 = 3BX$

$3BX - BX = 6$

$2BX = 6$

$\therefore \quad BX = 3 \text{ m}$

If $BX = 3$ then $AB = BX\sqrt{3}$

$= 3\sqrt{3}$ m

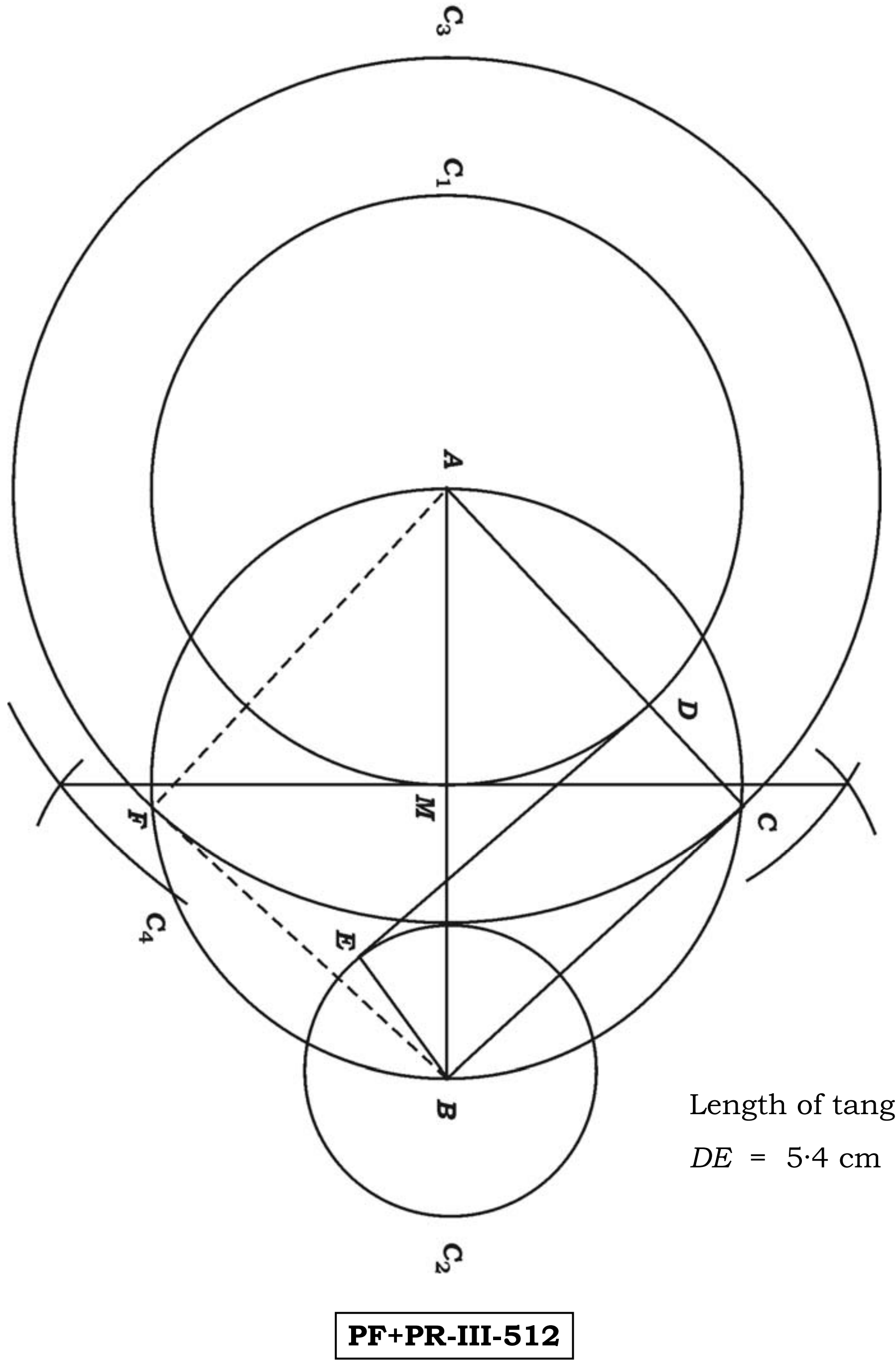
$\therefore$ Height of the flag post $= 3\sqrt{3}$ m. ½ 3

OR

Qn. Nos.	Value Points		Marks allotted
	$\sin(90° - \theta) = \cos\theta$		
	$\operatorname{cosec}(90° - \theta) = \sec\theta$		
	$\cot(90° - \theta) = \tan\theta$		
	$\text{LHS} = \dfrac{\cos\theta}{\sec\theta - \tan\theta}$	½	
	$= \dfrac{\cos\theta}{\dfrac{1}{\cos\theta} - \dfrac{\sin\theta}{\cos\theta}}$	½	
	$= \dfrac{\cos\theta}{\dfrac{1-\sin\theta}{\cos\theta}}$		
	$= \cos\theta \times \dfrac{\cos\theta}{1-\sin\theta}$		
	$= \dfrac{\cos^2\theta}{1-\sin\theta}$	½	
	$= \dfrac{1-\sin^2\theta}{1-\sin\theta}$	½	
	$= \dfrac{(1-\sin\theta)(1+\sin\theta)}{(1-\sin\theta)}$	½	
	$= 1 + \sin\theta.$	½	
	$\therefore$ LHS = RHS.		3

Qn. Nos.	Value Points		Marks allotted
46.	Radius = $r = \frac{7}{2}$ cm		
	Height of the cone = h = 5 cm		
	Volume of the toy = Volume of the cone + Volume of the hemi-sphere	½	
	$= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$	1	
	$= \frac{\pi r^2}{3}(h + 2r)$	½	
	$= \frac{\cancel{22}^{11}}{\cancel{7}} \times \frac{1}{3} \times \frac{\cancel{7}}{\cancel{2}} \times \frac{7}{2}\left(5 + \cancel{2} \cdot \frac{7}{\cancel{2}}\right)$	½	
	$= \frac{77}{\cancel{6}} \times \cancel{12}^{2}$		
	= 154 c.c.	½	3
	OR		
	Radius = r = 7 cm		
	Slant height of the cone = height of the cylinder = 4 cm	½	
	Total surface area of the solid = Lateral surface area of (cone + cylinder + hemisphere)	½	
	$T.S.A. = \pi rl + 2\pi rh + 2\pi r^2$	1	
	$= \pi r(l + 2h + 2r)$		
	$= \frac{22}{\cancel{7}} \times \cancel{7}\,(4 + 2 \times 4 + 2 \times 7)$	½	
	$= 22 \times (4 + 8 + 14)$		
	$= 22 \times 26$ = 572 sq.cm	½	3

Qn. Nos.	Value Points	Marks allotted
V. 47.	$R = 4$ cm, $r = 2$ cm, $d = 8$ cm $R + r = 4 + 2 = 6$ cm Drawing AB and marking mid-point — 1 Drawing C_1, C_2, C_3 — 1½ Joining CB, DE — 1 Measuring and writing the length of the tangent — ½	4



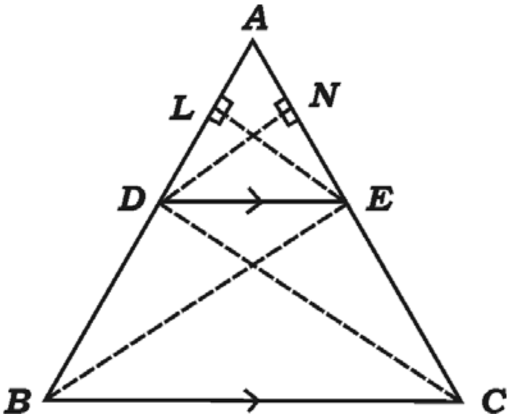
Length of tangent

$DE = 5{\cdot}4$ cm

Qn. Nos.	**Value Points**	**Marks allotted**

48. Thales theorem or Basic Proportionality theorem.

"If a straight line is drawn parallel to a side of a triangle, then it divides the other two sides proportionally." 1



½

Data : In ΔABC, $DE \parallel BC$

To Prove : $\frac{AD}{DB} = \frac{AE}{EC}$ ½

Construction : D, C and E, B joined

$EL \perp AB$ and $DN \perp AC$ drawn. ½

Proof : Statement Reason

$$\frac{\text{Area of } \Delta ADE}{\text{Area of } \Delta BDE} = \frac{\cancel{\frac{1}{2}} \times AD \times \cancel{EL}}{\cancel{\frac{1}{2}} \times DB \times \cancel{EL}}$$ $\because A = \frac{1}{2} \times b \times h$ ½

Qn. Nos.	**Value Points**	**Marks allotted**
	$\therefore \quad \frac{\Delta\ ADE}{\Delta\ BDE} = \frac{AD}{DB}$ ... (i)	
	$\frac{\text{Area of } \Delta\, ADE}{\text{Area of } \Delta\, CDE} = \frac{\frac{1}{\cancel{2}} \times AE \times \cancel{DN}}{\frac{1}{\cancel{2}} \times EC \times \cancel{DN}}$ $\because \ A = \frac{1}{2} \times b \times h$ ½	
	$\therefore \quad \frac{\Delta\ ADE}{\Delta\ CDE} = \frac{AE}{EC}$ ... (ii)	
	$\Rightarrow \quad \frac{AD}{DB} = \frac{AE}{CE}$ $\because$ [Area $\Delta\ BDE$ = area of $\Delta\ CDE$ and Axiom-1] ½	4
49.	$T_3 = T_1^{\ 2}$	
	$ar^2 = a^2$	
	$\therefore \quad a = r^2$ ... (i) ½	
	$T_5 = 64$	
	$ar^4 = 64$ ... (ii) ½	
	Substituting (i) in (ii)	
	$r^2 r^4 = 64 \qquad r^6 = 64$	
	$\therefore \quad r = 2$ ½	

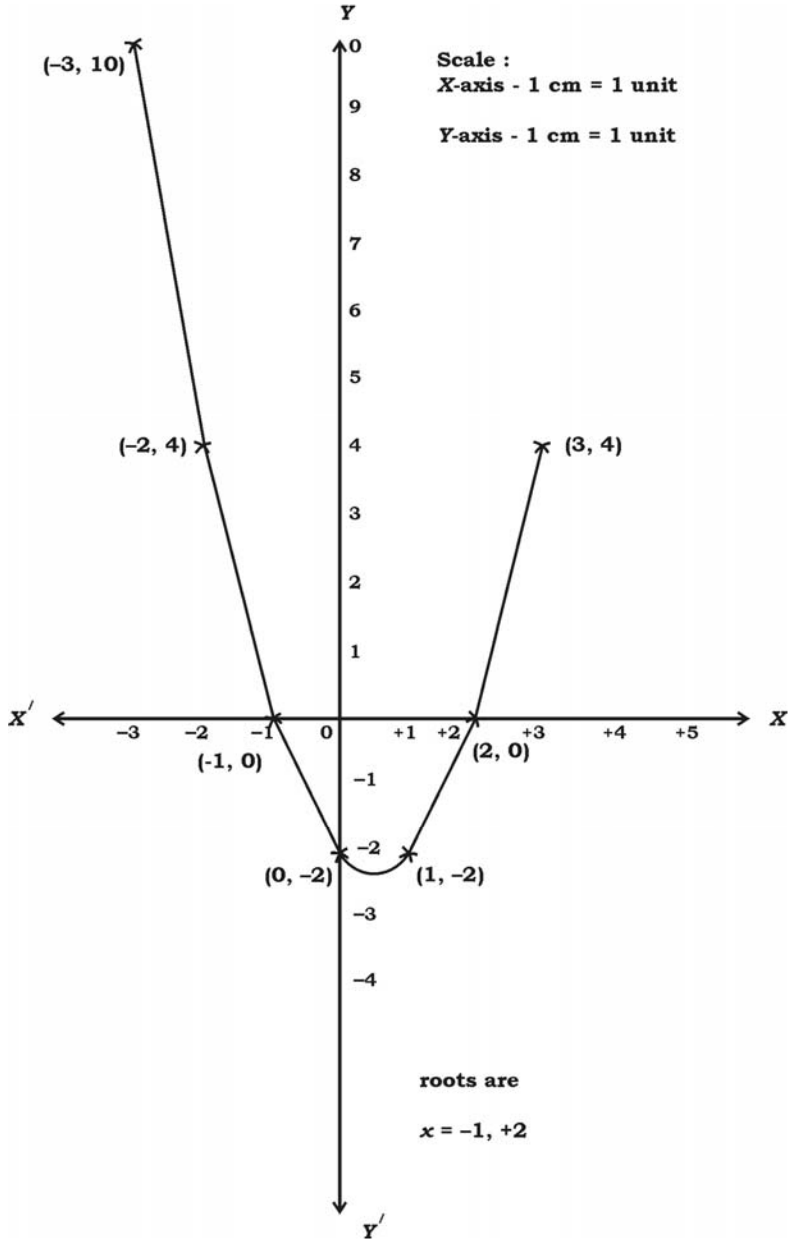
Qn. Nos.	**Value Points**		**Marks allotted**
	If $r = 2$ then $a = 2^2 = 4$	½	
	If $r = 2$ and $a = 4$ then		
	$S_n = \dfrac{a(r^n - 1)}{r-1}$	½	
	$S_6 = \dfrac{4(2^6 - 1)}{2-1}$	½	
	$= 4(64 - 1)$	½	
	$= 4 \times 63$		
	$= 252.$	½	4
	OR		
	$T_4 = 10$		
	$a + 3d = 10$ … (i)	½	
	$T_{11} = 3T_4 + 1$	½	
	$a + 10d = 3(10) + 1$		
	$a + 10d = 31$ … (ii)	½	
	By solving (i) and (ii)		
	$\cancel{a} + 10d = 31$		
	$(-)\ \cancel{a} + 3d = 10$		
	$7d = 21 \quad \therefore \quad d = 3$	½	

Qn. Nos.	Value Points		Marks allotted
	If $d = 3$ then $a + 3(3) = 10$		
	$a + 9 = 10$		
	$\therefore \quad a = 10 - 9 = 1$	½	
	If $a = 1$ and $d = 3$ and $n = 20$		
	$S_n = \frac{n}{2}[2a + (n-1)d]$	½	
	$S_{20} = \frac{20}{2}[2 \times 1 + (20-1)3]$	½	
	$= 10[2 + 57]$		
	$= 10 \times 59$		
	$= 590.$	½	4

Qn. Nos.	Value Points	Marks allotted
50.	$x^2 - x - 2 = 0$ $\therefore \quad y = x^2 - x - 2$	

x	0	1	2	3	– 1	– 2	– 3
y	– 2	– 2	0	4	0	4	10

Table —	2	
Drawing parabola —	1	
Identifying roots —	1	4



Alternate method give full marks.

Qn. Nos.	**Value Points**	**Marks allotted**

Alternate method :

$$x^2 - x - 2 = 0$$

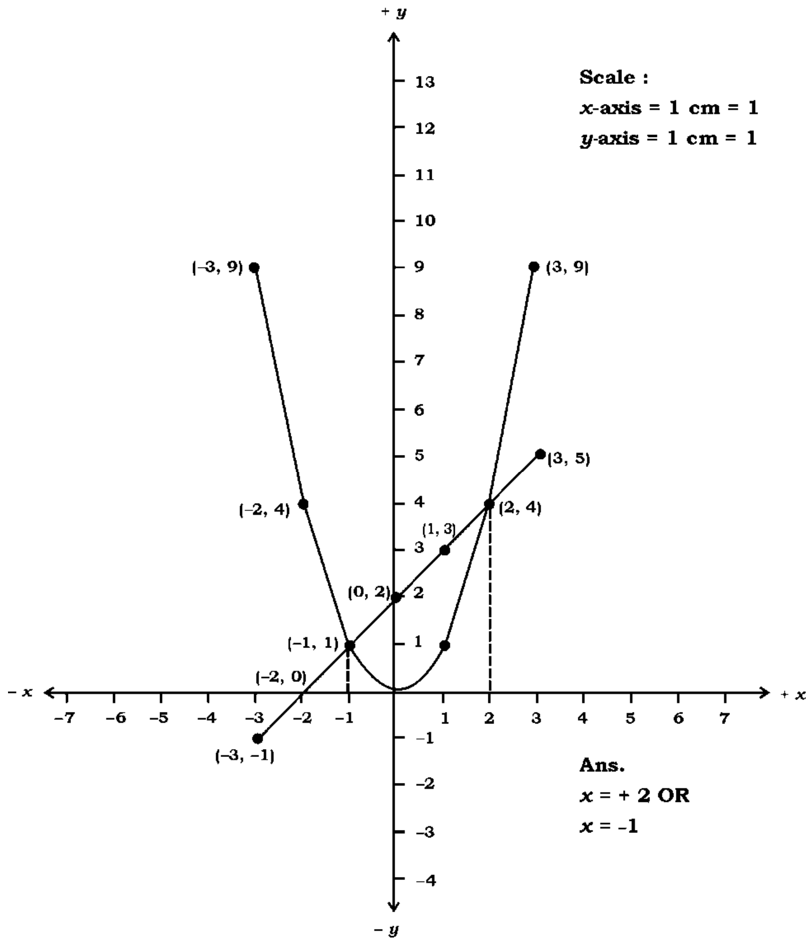
$$y = x^2$$

x	-3	-2	-1	0	1	2	3
y	9	4	1	0	1	4	9

$$y = x + 2$$

x	-3	-2	-1	0	1	2	3
y	-1	0	1	2	3	4	5

Table —	2	
Drawing parabola —	1	
Identifying roots —	1	4



Alternate method give full marks.