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 — 2014

S. S. L. C. EXAMINATION, MARCH/APRIL, 2014

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

ದಿನಾಂಕ : 01. 04. 2014]

Date : 01. 04. 2014]

ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

CODE NO. : 81-E

ವಿಷಯ : **ಗಣಿತ**

Subject : MATHEMATICS

[ಪರಮಾವಧಿ ಅಂಕಗಳು : **100**

[Max. Marks : 100

(English Version)

Qn. Nos.	Letter of the answer	Value Points	Marks Allotted
I. 1.	D	3	1
2.	B	361	1
3.	D	$\frac{a}{1-r}$	1
4.	C	$\frac{1}{a+(n-1)d}$	1
5.	D	$\begin{bmatrix} 4 & 0 \\ -6 & 8 \end{bmatrix}$	1
6.	A	$(a^2-b^2)\ (a-b)$	1
7.	C	$2abc$	1
8.	A	$4s\,(s-a)$	1
9.	A	$\sqrt[6]{32}$	1
10.	B	$x^2 + 1x - 12 = 0$	1

[Turn over

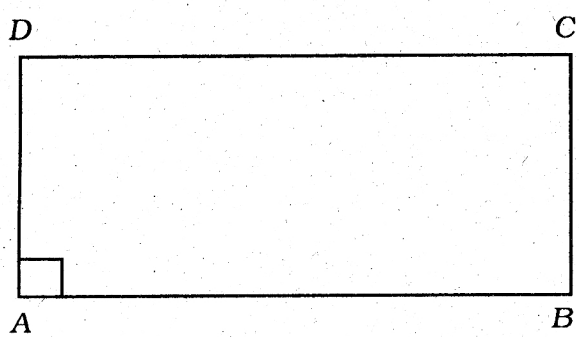
Qn. Nos.	Letter of the answer	Value Points	Marks Allotted
11.	A	$0, -\frac{b}{a}$	1
12.	B	$x + \frac{1}{x} = 0$	1
13.	C	$x^2 - 2x - 1 = 0$	1
14.	A	2	1
15.	A	4	1
16.	B	7·5 cm	1
17.	C	$\frac{CZ}{BC}$	1
18.	B	$\frac{OB}{OA}$	1
19.	C	120°	1
20.	D	130°.	1
II.			
21.	Skew-symmetric matrix		1
22.	1		1
23.	n		1
24.	$\sum_{a, b, c} a^3$		1
25.	$x^2 - 2x + 3 = 0$		1
26.	$-\frac{b}{a}$		1
27.	Diameter		1
28.	2		1
29.	$V = \frac{4}{3}\pi r^3$		1
30.	$N + R = A + 2$		1

Qn. Nos.	Value Points	Marks Allotted	
III.			
31.	Consider		
	$A - B = \{0, 1, 2, 3\} - \{2, 3, 4, 5, 6\}$		
	$= \{0, 1\}$	$\frac{1}{2}$	
	LHS $A - (A - B)$		
	$= \{0, 1, 2, 3\} - \{0, 1\}$	$\frac{1}{2}$	
	$= \{2, 3\}$		
	and RHS $A \cap B$		
	$= \{0, 1, 2, 3\} \cap \{2, 3, 4, 5, 6\}$	$\frac{1}{2}$	
	$= \{2, 3\}$	$\frac{1}{2}$	
	$\Rightarrow$ LHS = RHS.		2
32.	Sum of even natural numbers from 2 to 40 series is		
	$2 + 4 + 6 + \ldots + 40$		
	$= 2[1 + 2 + 3 + \ldots + 20]$	$\frac{1}{2}$	
	$= 2[\Sigma 20]$	$\frac{1}{2}$	
	$= \cancel{2}\left[\frac{20(20+1)}{\cancel{2}}\right]$ $\left[\Sigma n = \frac{n(n+1)}{2}\right]$	$\frac{1}{2}$	
	$= 20 \times 21$		
	$= 420.$	$\frac{1}{2}$	2
	OR		
	$2 + 4 + 6 + \ldots + 40$	$\frac{1}{2}$	
	$a = 2$ $\qquad T_n = a + (n-1)d$		
	$d = 2$ $\qquad 40 = 2 + (n-1)2$	$\frac{1}{2}$	
	$T_n = 40$ $\qquad 40 = \cancel{2} + 2n - \cancel{2}$		
	$n = ?$ $\qquad \Rightarrow \quad 2n = 40$		
	$n = \frac{40}{2}$	$\frac{1}{2}$	
	$n = 20$		
	$a = 2$ $\qquad \therefore \quad S_n = \frac{n}{2}[a + l]$		
	$l = 40$ $\qquad S_{20} = \frac{20}{2}[2 + 40]$	$\frac{1}{2}$	2
	$n = 20$ $\qquad = 10 \times 42$		
	$= 420$		

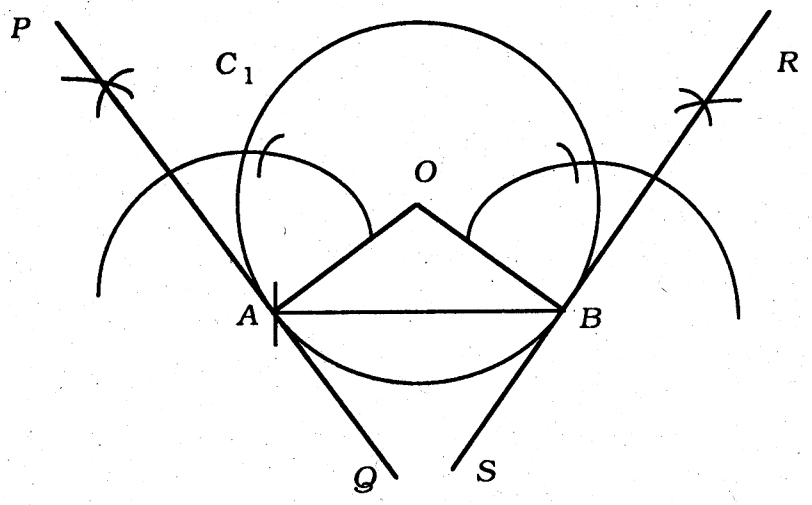
Qn. Nos.	Value Points	Marks Allotted	
33.	a, A, b are in arithmetic progression		
	$\Rightarrow \quad T_2 - T_1 = T_3 - T_2$	$\frac{1}{2}$	
	$\therefore \quad A - a = b - A$		
	$A + A = b + a$	$\frac{1}{2}$	
	$2A = a + b$	$\frac{1}{2}$	
	$A = \frac{a+b}{2}$.	$\frac{1}{2}$	2
	Hence proved.		
34.	If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ $\quad \therefore \quad A' = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$	$\frac{1}{2}$	
	Now $A'A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix} \times \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$		
	$= \begin{bmatrix} 1\times1+3\times3 & 1\times2+3\times4 \\ 2\times1+4\times3 & 2\times2+4\times4 \end{bmatrix}$	$\frac{1}{2}$	
	$= \begin{bmatrix} 1+9 & 2+12 \\ 2+12 & 4+16 \end{bmatrix}$	$\frac{1}{2}$	
	$= \begin{bmatrix} 10 & 14 \\ 14 & 20 \end{bmatrix}$	$\frac{1}{2}$	2
35.	Given,		
	$5 \cdot {}^{n}P_3 = 4 \cdot {}^{n+1}P_3$		
	$5\,n(n-1)(n-2) = 4(n+1)\,n(n-1)$	$\frac{1}{2}$	
	$5(n-2) = \frac{4(n+1)\,n(n-1)}{n(n-1)}$		
	$5(n-2) = 4(n+1)$		
	$5n - 10 = 4n + 4$	$\frac{1}{2}$	
	$5n - 4n = 4 + 10$	$\frac{1}{2}$	
	$n = 14.$	$\frac{1}{2}$	2

Qn. Nos.	Value Points	Marks Allotted	
36.	Consider		
	LHS $^{n}C_{n-r}$		
	$= \frac{\lfloor n}{\lfloor n-(n-r) \cdot \lfloor n-r}$ $\left[\because {}^{n}C_{r} = \frac{\lfloor n}{\lfloor n-r \cdot \lfloor r} \right]$	$\frac{1}{2}$	
	$= \frac{\lfloor n}{\lfloor n - n + r \cdot \lfloor n-r}$	$\frac{1}{2}$	
	$= \frac{\lfloor n}{\lfloor r \cdot \lfloor n-r}$	$\frac{1}{2}$	
	$= \frac{\lfloor n}{\lfloor n-r \cdot \lfloor r}$		
	$= {}^{n}C_{r}$ $\left[\therefore {}^{n}C_{n-r} - {}^{n}C_{r} = 0 \right]$	$\frac{1}{2}$	2
	= RHS		
	$\Rightarrow$ LHS = RHS		
37.	Given		
	$H = x - 3$ $L = x^3 - 5x^2 - 2x + 24$ $A = x^2 - 7x + 12$ $B = ?$		
	$B = \frac{H \times L}{A}$	$\frac{1}{2}$	
	$B = \frac{(x-3) \times (x^3 - 5x^2 - 2x + 24)}{(x^2 - 7x + 12)}$	$\frac{1}{2}$	

Qn. Nos.	Value Points	Marks Allotted	
	$x + 2$		
	$x^2 - 7x + 12 \;\big|\; x^3 - 5x^2 - 2x + 24$		
	$x^3 - 7x^2 + 12x$		
	(–) (+) (–)		
	$2x^2 - 14x + 24$		
	$2x^2 - 14x + 24$	$\frac{1}{2}$	
	(–) (+) (–)		
	0 0 0		
	$\therefore \quad B = (x - 3)(x + 2)$		
	$B = x^2 - x - 6.$	$\frac{1}{2}$	2
38.	The process of multiplying a surd by another surd to get a rational number is called rationalisation of the given surd.	1	
	The rationalising factor of $a\sqrt{x+y}$ is $\sqrt{x+y}$.	1	2
39.	Consider		
	$\sqrt{18} + 5\sqrt{2} - \sqrt{128}$		
	$= \sqrt{9 \times 2} + 5\sqrt{2} - \sqrt{64 \times 2}$	$\frac{1}{2}$	
	$= 3\sqrt{2} + 5\sqrt{2} - 8\sqrt{2}$	$\frac{1}{2}$	
	$= (3 + 5 - 8)\sqrt{2}$	$\frac{1}{2}$	
	$= (8 - 8)\sqrt{2}$		
	$= 0\sqrt{2}$		
	$= 0$	$\frac{1}{2}$	2

Qn. Nos.	Value Points	Marks Allotted	
40.	Given equation is		
	$m^2 - 2m = 2$		
	$m^2 - 2m - 2 = 0$		
	$a = 1$, $b = -2$, $c = -2$		
	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	$\frac{1}{2}$	
	$m = \frac{-(-2) \pm \sqrt{(-2)^2 - 4 \times 1 \times -2}}{2 \times 1}$	$\frac{1}{2}$	
	$= \frac{2 \pm \sqrt{4 + 8}}{2}$		
	$= \frac{2 \pm \sqrt{12}}{2}$	$\frac{1}{2}$	
	$= \frac{2 \pm \sqrt{4 \times 3}}{2}$		
	$= \frac{2 \pm 2\sqrt{3}}{2}$		
	$= \frac{\cancel{2}(1 \pm \sqrt{3})}{\cancel{2}}$		
	$m = 1 \pm \sqrt{3}$.	$\frac{1}{2}$	2
41.			
	Let breadth of rectangular field be b m		
	By given, its length is $3b$ m	$\frac{1}{2}$	
	Now area of the field = 147		
	$l \times b = 147$.	$\frac{1}{2}$	
	$3b \times b = 147$		

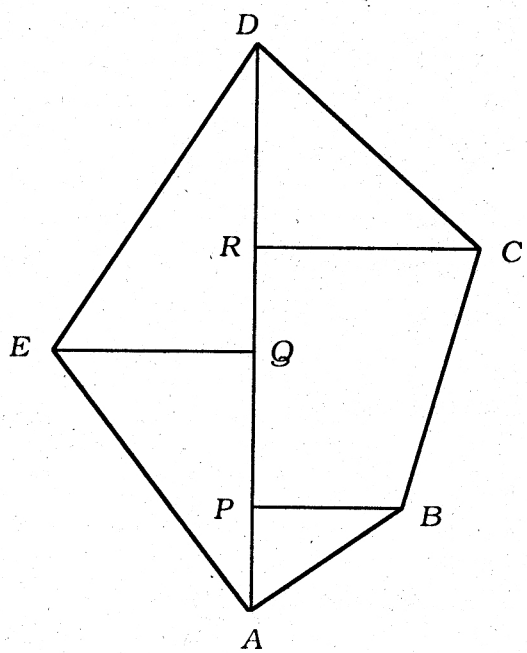
Qn. Nos.	Value Points	Marks Allotted	
	$3b^2 = 147$		
	$b^2 = \frac{147}{3}$		
	$b^2 = 49$		
	$b = \pm\sqrt{49}$		
	$b = \pm 7.$	$\frac{1}{2}$	
	$\therefore$ Length of field $= 3b$		
	$= 3 \times 7$		
	$= 21$ m.	$\frac{1}{2}$	2
42.	i) If $b^2 - 4ac = 0$, then roots are equal	1	
	ii) If $b^2 - 4ac < 0$, then roots are complex or imaginary.	1	2
43.	Given $R = 3$ cm		
	length of chord = 5 cm.		



$\therefore$ PQ and RS are tangents.

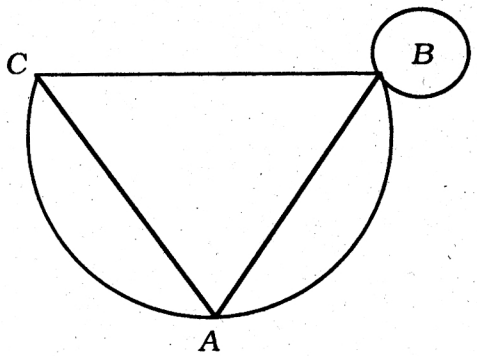
Construction of C_1 circle	$\frac{1}{2}$	
Construction of chord AB	$\frac{1}{2}$	
Tangent at A	$\frac{1}{2}$	
Tangent at B	$\frac{1}{2}$	2

Qn. Nos.	Value Points	Marks Allotted	
44.	Surface area of sphere $= 4\pi r^2$	$\frac{1}{2}$	
	By data		
	$4\pi r^2 = 616$		
	$4 \times \frac{22}{7} \times r^2 = 616$	$\frac{1}{2}$	
	$r^2 = \frac{616 \times 7}{4 \times 22}$ (7)		
	$r^2 = 7 \times 7$		
	$r^2 = 49$		
	$r = 7$ cm.	$\frac{1}{2}$	
	$\therefore$ Diameter of the sphere $= 2r$		
	$= 2 \times 7$		
	$= 14$ cm.	$\frac{1}{2}$	2
45.	In cylinder		
	T.S.A. $= 462\ cm^2$		
	C.S.A. $= \frac{1}{3}$ T.S.A.		
	$r = ?$		
	Now C.S.A. $= \frac{1}{3}$ T.S.A.		
	$2\pi rh = \frac{1}{3} \times 462$		
	$2\pi rh = 154\ cm^2$.	$\frac{1}{2}$	
	Now T.S.A. = C.S.A. + Area of bases	$\frac{1}{2}$	
	T.S.A. $= 2\pi rh + 2\pi r^2$		
	$462 = 154 + 2\pi r^2$		
	$462 - 154 = 2\pi r^2$		

Qn. Nos.	Value Points	Marks Allotted	
	$\Rightarrow \quad 2\pi r^2 = 308$	$\frac{1}{2}$	
	$2 \times \frac{22}{7} \times r^2 = 308$		
	$r^2 = \frac{308 \times 7}{2 \times 22}$		
	$r^2 = 7 \times 7$		
	$r^2 = 49$		
	$r = \sqrt{49} = 7$ cm.	$\frac{1}{2}$	2
	Radius of cylinder = 7 cm.		
46.	i) $\frac{300}{50} = 6$ cm		
	ii) $\frac{200}{50} = 4$ cm		
	iii) $\frac{150}{50} = 3$ cm		
	iv) $\frac{50}{50} = 1$ cm		
	v) $\frac{100}{50} = 2$ cm		
	vi) $\frac{150}{50} = 3$ cm		
	vii) $\frac{100}{50} = 2$ cm	$\frac{1}{2}$	
		$1\frac{1}{2}$	2

Qn. Nos.	Value Points	Marks Allotted	
47.			

	A	B	C
A	0	2	2
B	2	2	1
C	2	1	0



$\frac{1}{2}$

$1\frac{1}{2}$ 2

48. Dodecahedron

$F = 12$

$V = 20$

$E = 30$ $\frac{1}{2}$

Euler's formula for polyhedron

$F + V = E + 2$ $\frac{1}{2}$

$12 + 20 = 30 + 2$ $\frac{1}{2}$

$32 = 32.$ $\frac{1}{2}$ 2

IV.

49. Number of students in the class = $n(K \cup E) = 60$

Number of students who offer Kannada = $n(K) = 45$

Number of students who offer English = $n(E) = 30$

Number of students who offer both the subjects = $n(K \cap E)$ $\frac{1}{2}$

$n(K \cap E) = n(K) + n(E) - n(K \cup E)$ $\frac{1}{2}$

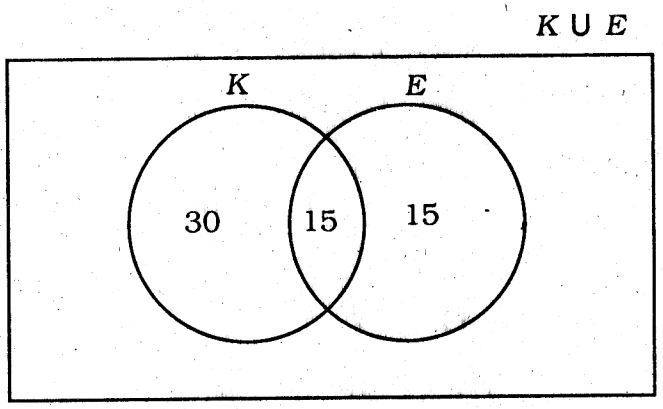
$= 45 + 30 - 60$ $\frac{1}{2}$

$= 75 - 60$

$n(K \cap E) = 15$ $\frac{1}{2}$

$\therefore$ Number of students who offer both the subjects =

$n(K \cap E) = 15$

Qn. Nos.	Value Points	Marks Allotted	
	Venn diagram : 	1	3
50.	Let the 5 terms in geometric progression be $\frac{a}{r^2}, \frac{a}{r}, a, ar, ar^2$.	$\frac{1}{2}$	
	Now by given, Product of these numbers = 1		
	i.e., $\frac{a}{r^2} \times \frac{a}{r} \times a \times ar \times ar^2 = 1$		
	$a^5 = 1$		
	$a^5 = 1^5$		
	$\Rightarrow \boxed{a = 1}$	$\frac{1}{2}$	
	and sum of first 3 terms $= \frac{7}{4}$		
	i.e. $\frac{a}{r^2} + \frac{a}{r} + a = \frac{7}{4}$	$\frac{1}{2}$	
	$\frac{a + ar + ar^2}{r^2} = \frac{7}{4}$		
	$4[a + ar + ar^2] = 7r^2$		
	But $a = 1$		
	$\therefore \quad 4[1 + 1r + 1r^2] = 7r^2$		
	$4 + 4r + 4r^2 = 7r^2$		
	Or, $7r^2 - 4r^2 - 4r - 4 = 0$		
	$3r^2 - 4r - 4 = 0$	$\frac{1}{2}$	

Qn. Nos.	Value Points	Marks Allotted	
	Solve by factorisation method :		
	$-12r^2$ $-6 + 2$		
	$3r^2 - 4r - 4 = 0$		
	$3r^2 - 6r + 2r - 4 = 0$		
	$3r(r-2) + 2(r-2) = 0$		
	$(r-2)(3r+2) = 0$		
	$\Rightarrow$ $r - 2 = 0$ OR $3r + 2 = 0$		
	$r = 2$ $\quad$ $3r = -2$		
	$r = -\frac{2}{3}$.	$\frac{1}{2}$	
	$\therefore$ Common ratio of geometric progression = $r = 2$ or $-\frac{2}{3}$	$\frac{1}{2}$	3
	OR		
	Let five terms in Geometric progression be		
	$a,\ ar,\ ar^2,\ ar^3,\ ar^4$	$\frac{1}{2}$	
	Now by given		
	Product of these terms = 1		
	$a \times ar \times ar^2 \times ar^3 \times ar^4 = 1$		
	$a^5 r^{10} = 1$		
	$(ar^2)^5 = 1^5$		
	$\Rightarrow$ $ar^2 = 1$	$\frac{1}{2}$	
	and sum of first three terms = $\frac{7}{4}$		
	i.e., $a + ar + ar^2 = \frac{7}{4}$	$\frac{1}{2}$	
	But $ar^2 = 1 \Rightarrow a = \frac{1}{r^2}$		
	$\therefore$ $\frac{1}{r^2} + \frac{1}{r^2} \times r + \frac{1}{r^2} \times r^2 = \frac{7}{4}$		
	$\frac{1}{r^2} + \frac{1}{r} + 1 = \frac{7}{4}$		
	$\frac{1 + r + r^2}{r^2} = \frac{7}{4}$		

Qn. Nos.	Value Points	Marks Allotted
	$4\left[1 + r + r^2\right] = 7r^2$	
	$4 + 4r + 4r^2 = 7r^2$	
	Or $7r^2 - 4r^2 - 4r - 4 = 0$	$\frac{1}{2}$
	$3r^2 - 4r - 4 = 0$	
	By factorisation method.	
	$-12r^2$  $-6 + 2$	
	$3r^2 - 6r + 2r - 4 = 0$	
	$3r(r-2) + 2(r-2) = 0$	
	$(r-2)(3r+2) = 0$	$\frac{1}{2}$
	$\Rightarrow$ $r - 2 = 0$ OR $3r + 2 = 0$	
	$r = 2$ $3r = -2$	
	$r = -\frac{2}{3}$.	
	$\therefore$ Common ratio of geometric progression = $r = 2$ or $-\frac{2}{3}$	$\frac{1}{2}$ 3
51.		

	A	B	
m	$m^3 + m^2 - 5m + 3$	$m^4 + 3m^3 + 0m^2 - m - 3$	m
	$m^3 + 2m^2 - 3m$	$m^4 + m^3 - 5m^2 + 3m$	
	(−) (−) (+)	(−) (−) (+) (−)	
-1	$-m^2 - 2m + 3$	$2m^3 + 5m^2 - 4m - 3$	2
	$-m^2 - 2m + 3$	$2m^3 + 2m^2 - 10m + 6$	
	(+) (+) (−)	(−) (−) (+) (−)	
	0	$3m^2 + 6m - 9$	
		$3 \mid m^2 + 2m - 3$	
		$m^2 + 2m - 3$	

$\therefore$ H.C.F. $= H = m^2 + 2m - 3$	To find HCF	$1\frac{1}{2}$
$\therefore$ $L = \frac{A \times B}{H}$		$\frac{1}{2}$
$= A \times \frac{B}{H}$ or $\frac{A}{H} \times B$.		

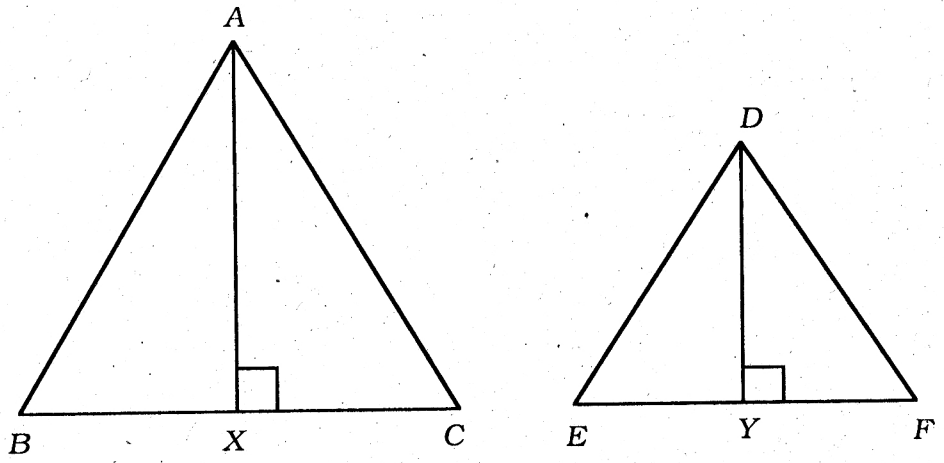
Qn. Nos.	Value Points	Marks Allotted	
	Now $L = \left(m^3 + m^2 - 5m + 3 \right) \times \dfrac{\left(m^4 + 3m^3 + 0m^2 - m - 3 \right)}{\left(m^2 + 2m - 3 \right)}$		
	$m^2 + m + 1$		
	$m^2 + 2m - 3 \;\big|\; m^4 + 3m^3 + 0m^2 - m - 3$		
	$m^4 + 2m^3 - 3m^2$		
	(–) (–) (+)		
	$m^3 + 3m^2 - m - 3$		
	$m^3 + 2m^2 - 3m$		
	(–) (–) (+)		
	$m^2 + 2m - 3$		
	$m^2 + 2m - 3$		
	(–) (–) (+)	$\frac{1}{2}$	
	0		
	$\therefore \quad L = A \times \dfrac{B}{H}$		
	$\boxed{L = \left(m^3 + m^2 - 5m + 3 \right) \left(m^2 + m + 1 \right)}$	$\frac{1}{2}$	3
	OR		
	$L = \dfrac{A}{H} \times B$		
	$= \dfrac{\left(m^3 + m^2 - 5m + 3 \right)}{m^2 + 2m - 3} \times \left(m^4 + 3m^3 - m - 3 \right)$		
	$m - 1$		
	$m^2 + 2m - 3 \;\big|\; m^3 + m^2 - 5m + 3$		
	$m^3 + 2m^2 - 3m$		
	(–) (–) (+)		
	$-m^2 - 2m + 3$		
	$-m^2 - 2m + 3$		
	(+) (+) (–)	$\frac{1}{2}$	
	0 0 0		
	$\therefore \quad L = (m - 1) \left(m^4 + 3m^3 - m - 3 \right)$	$\frac{1}{2}$	

Qn. Nos.	Value Points	Marks Allotted
52.	Given condition $a + b + c = 0$ Squaring on both sides $(a + b + c)^2 = 0^2$ $a^2 + b^2 + c^2 + 2ab + 2bc + 2ca = 0$	$\frac{1}{2}$
	$2(ab + bc + ca) = -a^2 - b^2 - c^2$ $2(ab + bc + ca) = -(a^2 + b^2 + c^2)$ $ab + bc + ca = -\frac{(a^2 + b^2 + c^2)}{2}$ ... (i)	$\frac{1}{2}$
	Now consider LHS $= a^2 - bc$ $= a \cdot a - bc$ $= a[-b - c] - bc$ $\left[\because a + b + c = 0 \Rightarrow a = -b - c\right]$	$\frac{1}{2}$
	$= -ab - ac - bc$	$\frac{1}{2}$
	$= -[ab + bc + ca]$ But from (i)	
	$\therefore = -\left[-\frac{(a^2 + b^2 + c^2)}{2}\right]$	$\frac{1}{2}$
	$= +\frac{(a^2 + b^2 + c^2)}{2}$ $=$ RHS.	$\frac{1}{2}$ 3
	OR	

Qn. Nos.	Value Points	Marks Allotted	
	Given condition		
	$a + b + c = 0$		
	Squaring on both sides		
	$(a + b + c)^2 = 0^2$		
	$a^2 + b^2 + c^2 + 2ab + 2bc + 2ca = 0$	$\frac{1}{2}$	
	$\Rightarrow \quad 2(ab + bc + ca) = -a^2 - b^2 - c^2$		
	$ab + ac + bc = -\frac{(a^2 + b^2 + c^2)}{2}$	$\frac{1}{2}$	
	$a[b + c] + bc = -\frac{(a^2 + b^2 + c^2)}{2}$	$\frac{1}{2}$	
	But $a + b + c = 0$		
	$\Rightarrow \quad b + c = -a$		
	$\therefore \quad a[-a] + bc = -\frac{(a^2 + b^2 + c^2)}{2}$	$\frac{1}{2}$	
	$-a^2 + bc = -\frac{(a^2 + b^2 + c^2)}{2}$		
	$-[a^2 - bc] = -\frac{(a^2 + b^2 + c^2)}{2}$	$\frac{1}{2}$	
	$\Rightarrow \quad a^2 - bc = \frac{a^2 + b^2 + c^2}{2}$	$\frac{1}{2}$	3
	Note : Any other correct method may be considered and for correct answer full marks may be given.		

Qn. Nos.	Value Points	Marks Allotted

53.



$\frac{1}{2}$

Data : $\Delta ABC \sim \Delta DEF$

AX and DY are altitudes drawn in ΔABC and ΔDEF $\frac{1}{2}$

respectively.

To prove : $\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta DEF} = \frac{AX^2}{DY^2}$ $\frac{1}{2}$

Proof : In ΔABX and ΔDEY

$\angle AXB = \angle DYE = 90°$ (Given)

$\angle B = \angle E$ ($\because \Delta ABC \sim \Delta DEF$ given)

$\therefore \quad \angle BAX = \angle EDY$ ... (Third angle) $\frac{1}{2}$

$\therefore \quad \Delta ABX \sim \Delta DEY$ ... (Theorem – 1)

$\Rightarrow \quad \frac{AB}{DE} = \frac{AX}{DY}$ ... (i)

Now, $\Delta ABC \sim \Delta DEF$

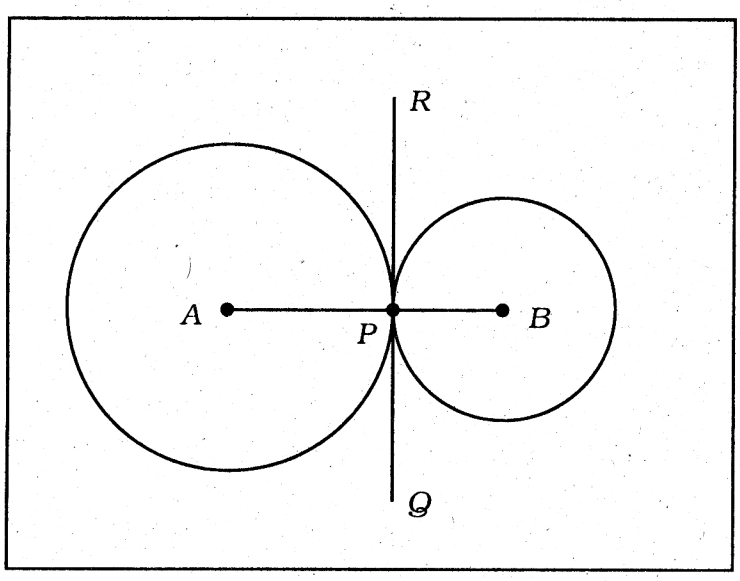
By theorem – 2

$\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta DEF} = \frac{AB^2}{DE^2}$ $\frac{1}{2}$

$= \left(\frac{AB}{DE}\right)^2$

$= \left(\frac{AX}{DY}\right)^2$ ($\because$ from – (i)) $\frac{1}{2}$ 3

$= \frac{AX^2}{DY^2}$ Hence proved.

Qn. Nos.	Value Points	Marks Allotted
54.		$\frac{1}{2}$
	Data : Two circles with centres *A* and *B* touch each other at *P* externally.	$\frac{1}{2}$
	To prove : *A*, *B* and *P* are collinear.	
	Construction : Draw the common tangent at *P*. Join *AP* and *BP*.	$\frac{1}{2}$
	Proof : $\angle APQ = 90°$ ..... (i)	
	(Radius is perpendicular to the tangent)	$\frac{1}{2}$
	$\angle BPQ = 90°$ ..... (ii)	
	(Radius is perpendicular to the tangent)	
	Additing (i) and (ii)	
	$\angle APQ + \angle BPQ = 90° + 90°$	$\frac{1}{2}$
	$\angle APB = 180°$	
	$\Rightarrow$ *APB* is a straight line	
	$\therefore$ *A*, *B* and *P* are collinear.	$\frac{1}{2}$ 3
	Hence proved.	

Qn. Nos.	Value Points	Marks Allotted

V.

55.

C.I.	f	Mid-point x	fx	$D = X - \bar{X}$	D^2	fD^2
1 – 5	1	3	3	– 10	100	100
6 – 10	2	8	16	– 5	25	50
11 – 15	3	13	39	0	0	0
16 – 20	4	18	72	+ 5	25	100

$N = 10$ $\quad \Sigma fx = 130$ $\quad \Sigma fD^2 = 250$

i) Mid-point of (1 – 5) $= \frac{1+5}{2} = \frac{6}{2} = 3$

ii) Arithmetic mean $\overline{x} = \frac{\Sigma fx}{N}$ — To find $\overline{x}$ — 1

$= \frac{130}{10}$ — To find D^2 — $\frac{1}{2}$

$\boxed{\overline{x} = 13}$ — To find ΣfD^2 — $\frac{1}{2}$

iii) Standard Deviation $= \sigma = \sqrt{\frac{\Sigma fD^2}{N}}$ — $\frac{1}{2}$

$= \sqrt{\frac{250}{10}}$

$= \sqrt{25}$

$\boxed{\sigma = 5}$ — $\frac{1}{2}$

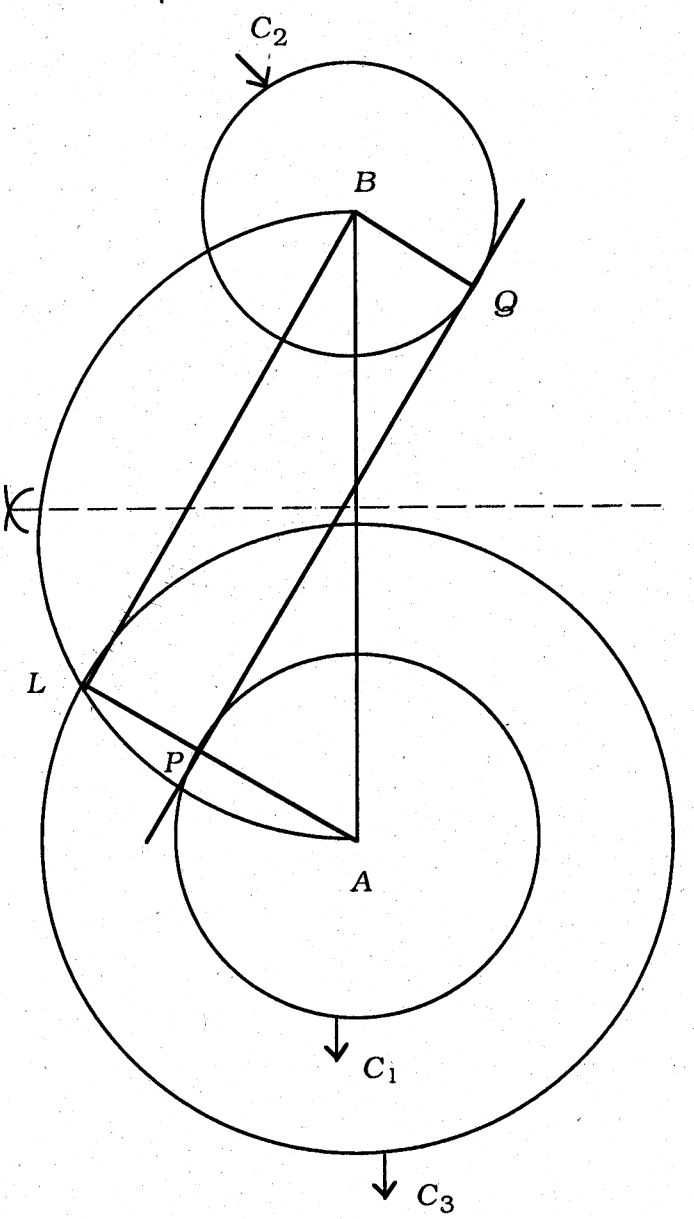
iv) Coefficient of variation, C.V. $= \frac{\sigma}{\bar{x}} \times 100$ — $\frac{1}{2}$

$= \frac{5}{13} \times 10$

$= \frac{500}{13}$

$\boxed{\text{C.V.} = 38{\cdot}46}$ — $\frac{1}{2}$ — 4

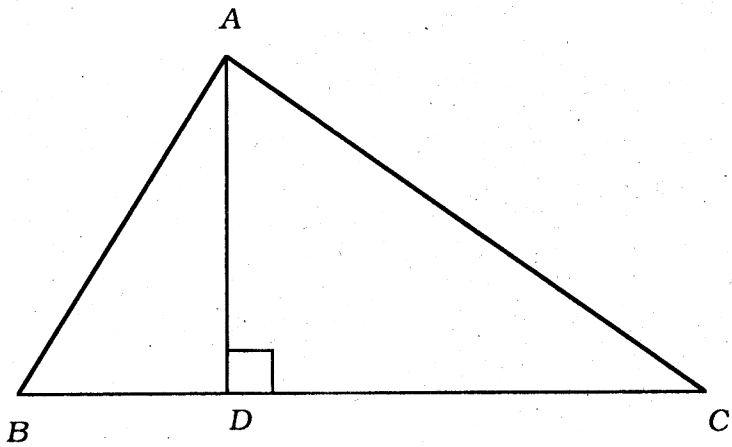
Qn. Nos.	Value Points	Marks Allotted
56.		
	$R = 3$ cm (C_1)	For C_1 , C_2 , C_3 circles — $1\frac{1}{2}$
	$r = 2$ cm (C_2)	Distance between two centres of circles AB — $\frac{1}{2}$
	$R + r = 5$ cm (C_3)	To find mid-point X — $\frac{1}{2}$
	$d = 9$ cm	Construction of tangent LB — $\frac{1}{2}$
	T.C.T.	Construction of tangent PQ — $\frac{1}{2}$



$\therefore$ Length of T.C.T. = PQ = 7·5 cm. — $\frac{1}{2}$ — 4

Qn. Nos.	Value Points	Marks Allotted

57.



$\frac{1}{2}$

Data : In ΔABC, $\angle BAC = 90°$ $\frac{1}{2}$

To prove : $BC^2 = AB^2 + AC^2$ $\frac{1}{2}$

Construction : Draw $AD \perp BC$. $\frac{1}{2}$

Proof :

Statement	Reasons	
In ΔABC and ΔDBA,		
$\angle BAC = \angle BDA = 90°$	(Data and Construction)	
$\angle ABC = \angle ABD$	(Common angle)	
$\therefore \Delta ABC \vert\vert\vert \Delta DBA$	Triangles are equiangular	$\frac{1}{2}$
$\therefore \frac{AB}{DB} = \frac{BC}{AB}$		
$BC \cdot DB = AB^2$ ..... (i)		$\frac{1}{2}$
In ΔABC and ΔDAC		
$\angle BAC = \angle ADC = 90°$	Data and construction	
$\angle ACB = \angle ACD$	Common angle	
$\therefore \Delta ABC \vert\vert\vert \Delta DAC$	Triangles are equiangular	
$\frac{BC}{AC} = \frac{AC}{DC}$		
$BC \cdot DC = AC^2$ ..... (ii)		$\frac{1}{2}$
$BC \cdot DB + BC \cdot DC = AB^2 + AC^2$	Adding (i) and (ii)	
$BC (DB + DC) = AB^2 + AC^2$	From fig. $DB + DC = BC$	
$BC \cdot BC = AB^2 + AC^2$		
i.e., $BC^2 = AB^2 + AC^2$		$\frac{1}{2}$
Hence proved.		

4

Qn. Nos.	Value Points	Marks Allotted
58.	i) To draw the graph of $y = x^2$	

x	0	+ 1	– 1	2	– 2	3	– 3
y	0	1	1	4	4	9	9

1

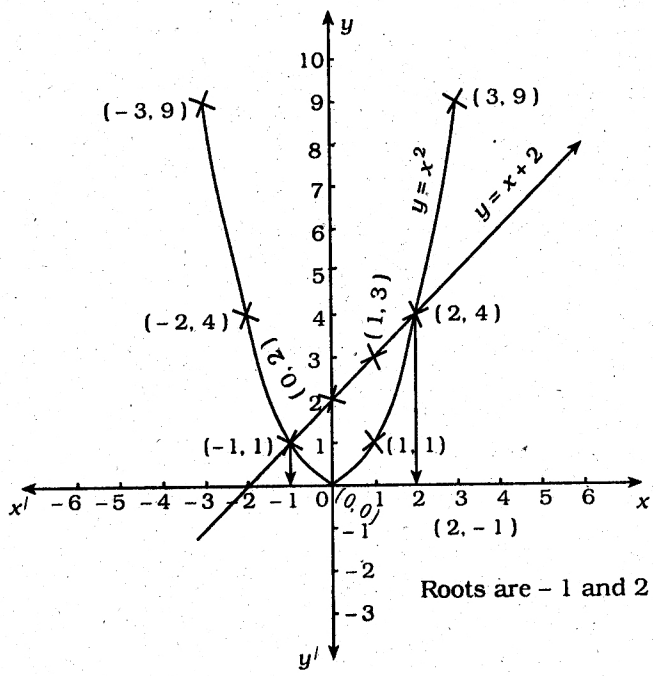
ii) To draw the graph of $y = x + 2$

x	0	1	– 1	2
y	2	3	1	4

1

Scale : x-axis : 1 cm = 1 unit

y-axis : 1 cm = 1 unit



Roots are – 1 and 2

To draw parabola $\frac{1}{2}$

To draw straight line $\frac{1}{2}$

To draw perpendicular $\frac{1}{2}$

To write the roots $\frac{1}{2}$ 4