

**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 — 2016

S. S. L. C. EXAMINATION, MARCH/APRIL, 2016

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

ದಿನಾಂಕ : 04. 04. 2016]

ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

Date : 04. 04. 2016]

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)

[ಪರಮಾವಧಿ ಅಂಕಗಳು : 100

[Max. Marks : 100

Qn. Nos.	Ans. Key	Value Points	Marks allotted
I. 1.	C	12	1
2.	A	5	1
3.	C	0.7	1
4.	D	3	1
5.	B	5 units	1
6.	D	$\sqrt{3}$	1
7.	B	$\frac{5}{3}$	1
8.	A	12.	1



PF+PR-7022



[Turn over

Qn. Nos.	Value Points	Marks allotted
II.		
9.	$A' = U - A$ $A' = \{1, 2, 3, 4, 5\} - \{2, 4, 5\}$ $\therefore A' = \{1, 3\}$	$\frac{1}{2}$ $\frac{1}{2}$
10.	$(a, b) \text{ L.C.M.} = \frac{a \times b}{(a, b) \text{ H.C.F.}}$ $\text{L.C.M.} = \frac{12 \times 18}{6} = 36$	$\frac{1}{2}$ $\frac{1}{2}$
11.	$f(x) = 2x^2 + 3x + 2$ $f(2) = 2(2)^2 + 3(2) + 2$ $= 8 + 6 + 2$ $= 16$	$\frac{1}{2}$ $\frac{1}{2}$
12.	$d = 10 \text{ cm}$ $R = \frac{10}{2} = 5 \text{ cm}$ Distance between centres $d = R + r$ $d = 5 + 2 = 7 \text{ cm}$	$d = 4 \text{ cm}$ $r = \frac{4}{2} = 2 \text{ cm}$ $\frac{1}{2}$ $\frac{1}{2}$
13.	In a right angled triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.	1
14.	Total surface area of cylinder = $2\pi r(r + h)$ sq.units.	1
III. 15.	$n = 8$ Number of diagonals = ${}^n C_2 - n$ $= {}^8 C_2 - 8$ $= \frac{1}{2} {}^8 P_2 - 8$ $= \frac{8 \times 7}{2} - 8$ $= 28 - 8.$ Number of diagonals = 20	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
	OR	



Qn. Nos.	Value Points	Marks allotted
16.	$n = 8$	
	Number of diagonals = ${}^n C_2 - n$	$\frac{1}{2}$
	$= \frac{n(n-3)}{2}$	$\frac{1}{2}$
	$= \frac{8(8-3)}{2}$	$\frac{1}{2}$
	$= \frac{8 \times 5}{2}$	
	Number of diagonals = 20.	$\frac{1}{2}$
	If possible, let us assume $2 + \sqrt{5}$ is a rational number.	$\frac{1}{2}$
	$2 + \sqrt{5} = \frac{p}{q}$ where $p, q \in \mathbb{Z}, q \neq 0$,	
	$2 - \frac{p}{q} = -\sqrt{5}$	
	$\frac{2q-p}{q} = -\sqrt{5}$.	$\frac{1}{2}$
	$\Rightarrow -\sqrt{5}$ is a rational number	
	$\therefore \frac{2q-p}{q}$ is a rational number	$\frac{1}{2}$
	But $-\sqrt{5}$ is not a rational number.	
	\therefore Our supposition $2 + \sqrt{5}$ is a rational number is wrong.	$\frac{1}{2}$
	$\Rightarrow 2 + \sqrt{5}$ is an irrational number.	2
17.	Total number of watches $n(S) = 500$	$\frac{1}{2}$
	Number of watches defective $n(A) = 50$	$\frac{1}{2}$
	$P(A) = \frac{n(A)}{n(S)}$	$\frac{1}{2}$
	$P(A) = \frac{50}{500} = \frac{1}{10}$	
	Probability of watches	
	to be defective = $\frac{1}{10}$ or $\frac{50}{500}$	$\frac{1}{2}$
		2



Qn. Nos.	Value Points	Marks allotted
18.	$\sqrt{3} \times \sqrt[3]{2}$ <p>L.C.M. of 2 and 3 is 6</p> $\sqrt{3} = 3^{\frac{1}{2} \times \frac{6}{6}} = 3^{3/6} = \sqrt[6]{3^3} = \sqrt[6]{27}$ $\sqrt[3]{2} = 2^{\frac{1}{3} \times \frac{6}{6}} = 2^{2/6} = \sqrt[6]{2^2} = \sqrt[6]{4}$ $\sqrt{3} \times \sqrt[3]{2} = \sqrt[6]{27 \times 4}$ $= \sqrt[6]{108}$	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>2</p>
19.	$\frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \times \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ $\frac{\sqrt{9} + \sqrt{6} + \sqrt{6} + \sqrt{4}}{\sqrt{9} - \sqrt{4}}$ $\frac{3 + 2\sqrt{6} + 2}{3 - 2}$ $\frac{5 + 2\sqrt{6}}{1}$	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>2</p>
OR		
	$\frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \times \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ $\frac{(\sqrt{3} + \sqrt{2})^2}{(\sqrt{3})^2 - (\sqrt{2})^2}$ $\frac{3 + 2\sqrt{6} + 2}{3 - 2}$ $5 + 2\sqrt{6}.$	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>2</p>

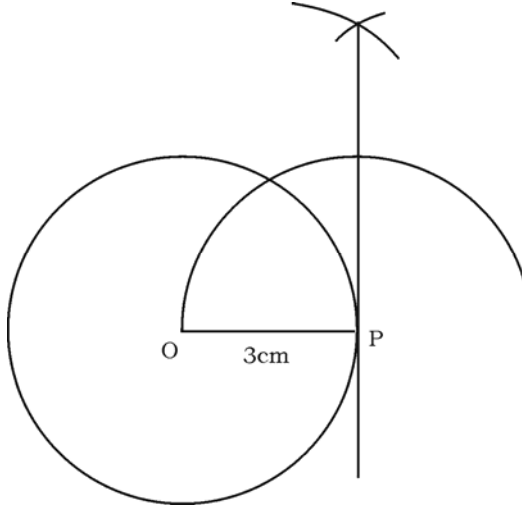
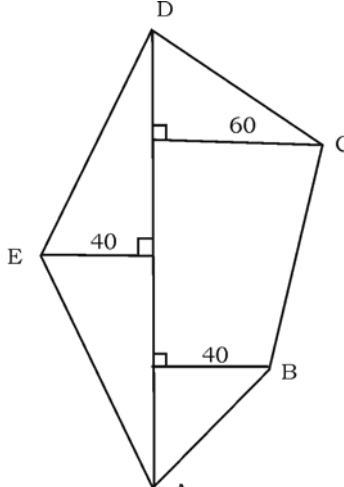


Qn. Nos.	Value Points	Marks allotted
	$x^2 + 2x - 3 \overline{) x^4 + 2x^3 - 2x^2 + x - 1}$ $\begin{array}{r} x^4 + 2x^3 - 3x^2 \\ (-) \quad (-) \quad (+) \\ \hline x^2 + x - 1 \\ x^2 + 2x - 3 \\ (-) \quad (-) \quad (+) \\ \hline -x + 2 \end{array}$	1/2
	$r(x) = -x + 2 \Rightarrow \{-r(x)\} = x - 2$ <p>Hence we should add $(x - 2)$ to $P(x)$ so that the resulting polynomial is exactly divisible by $g(x)$</p>	1/2
21.	<p>In $\triangle ABC$, $DE \parallel AB$</p> $\frac{CD}{CA} = \frac{CE}{CB} \quad (\text{Corollary to B.P.T.})$ $\frac{5}{12} = \frac{CE}{18}$ $12 \times CE = 5 \times 18$ $CE = \frac{5 \times 18}{12} = \frac{15}{2}$ $CE = 7.5 \text{ cm}$	1/2
22.	$\sqrt{3} \tan \theta = 1$ $\tan \theta = \frac{1}{\sqrt{3}}$ <p>We know that $\tan 30^\circ = \frac{1}{\sqrt{3}} \quad \therefore \theta = 30^\circ$</p> $\therefore \sin 30 = \sin 3 (30^\circ)$ $\sin 30 = \sin 90^\circ = 1.$	1/2
		1/2
		2



Qn. Nos.	Value Points	Marks allotted
23.	$(x_1, y_1) = (2, 3)$ and $(x_2, y_2) = (4, 7)$ $\frac{1}{2}$ Mid-point = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ $\frac{1}{2}$ $= \left(\frac{2+4}{2}, \frac{3+7}{2} \right)$ $\frac{1}{2}$ $= \left(\frac{6}{2}, \frac{10}{2} \right)$ $= (3, 5).$ $\frac{1}{2}$	2
24.	$r = 7$ cm $l = 10$ cm C.S.A. of cone = $\pi r l$ $\frac{1}{2}$ $= \frac{22}{7} \times 7 \times 10$ $\frac{1}{2} + \frac{1}{2}$ $= 220$ sq.cm. $\frac{1}{2}$ OR Volume of cylinder = $\pi r^2 h$ $\frac{1}{2}$ $= \frac{22}{7} \times 7 \times 7 \times 10$ $\frac{1}{2}$ $= 22 \times 70$ $\frac{1}{2}$ $= 1540$ c.c. $\frac{1}{2}$	2
25.	$x^2 - 4x + 2 = 0$ $a = 1, b = -4, c = 2$ $\frac{1}{2}$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $\frac{1}{2}$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(2)}}{2(1)}$ $\frac{1}{2}$ $x = \frac{4 \pm \sqrt{16 - 8}}{2}$ $x = \frac{4 \pm \sqrt{8}}{2}$ $x = \frac{4 \pm 2\sqrt{2}}{2}$ $= \frac{2(2 \pm \sqrt{2})}{2}$ $\frac{1}{2}$ $x = 2 \pm \sqrt{2}.$	2



Qn. Nos.	Value Points	Marks allotted
26.	 <p data-bbox="876 819 1282 1008"> Construction of circle $\frac{1}{2}$ Radius OP $\frac{1}{2}$ Arcs $\frac{1}{2}$ Tangent at P $\frac{1}{2}$ </p>	2
27.	<p data-bbox="324 1029 617 1302"> Scale : 20 m = 1 cm 40 m = 2 cm 80 m = 4 cm 120 m = 6 cm 160 m = 8 cm 60 m = 3 cm </p>  <p data-bbox="958 1701 1266 1785"> Calculation $\frac{1}{2}$ Field drawing $1\frac{1}{2}$ </p>	2

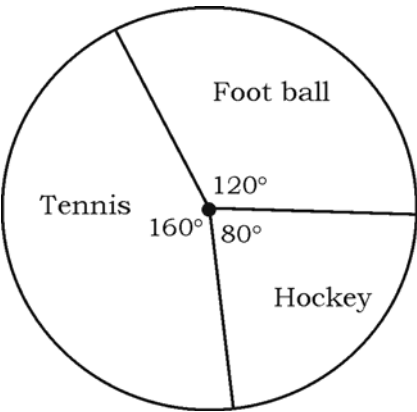


Qn. Nos.	Value Points	Marks allotted
28.	$n(M) = 12, \quad n(D) = 15, \quad n(M \cap D) = 7$ $n(M \cup D) = ?$ $n(M) + n(D) = n(M \cup D) + n(M \cap D)$ OR $n(M \cup D) = n(M) + n(D) - n(M \cap D)$ $= 12 + 15 - 7$ $= 27 - 7$ $n(M \cup D) = 20$ Number of people in the group = 20	 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
29.	Volume of hemisphere = Volume of cylinder $\frac{2}{3} \pi r_1^3 = \pi r_2^2 h$ $\frac{2}{3} \times 12 \times 12 \times 12 = 6 \times 6 \times h$ $32 = h$ $\therefore h = 32 \text{ cm}$	 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
30.	$4 + 7 + 10 + \dots$ $a = 4, \quad d = 7 - 4$ $= 3$ $S_{20} = ?$ $S_n = \frac{n}{2} [2a + (n-1)d]$ $S_{20} = \frac{20}{2} [2 \times 4 + (20-1)3]$ $= 10 [8 + 57]$ $= 10 \times 65$ $S_{20} = 650$ Sum of the first 20 terms of the series = 650	 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
31.	$A \cup (B \cap C) = \{1, 2, 3, 4\} \cup \{5\}$ $= \{1, 2, 3, 4, 5\}$	 1 1 2



Qn. Nos.	Value Points	Marks allotted
32.	$\frac{1}{2}, \frac{1}{4}, \frac{1}{6} \dots \text{H.P.}$ $2, 4, 6 \dots \text{AP.}$ $a = 2, \quad d = 4 - 2 = 2 \quad T_{10} = ? \quad \frac{1}{2}$ $T_n = a + (n - 1) d \quad \frac{1}{2}$ $T_{10} = 2 + (10 - 1) 2 \quad \frac{1}{2}$ $= 2 + 18$ $T_{10} = 20 \text{ AP}$ $\therefore T_{10} = \frac{1}{20} \text{ HP} \quad \frac{1}{2}$ <p style="text-align: center;">OR</p> $a = 2, \quad d = 2, \quad T_{10} = ? \quad \frac{1}{2}$ $T_n = \frac{1}{a + (n - 1) d} \quad \frac{1}{2}$ $T_{10} = \frac{1}{2 + (10 - 1) 2} \quad \frac{1}{2}$ $= \frac{1}{2 + 18}$ $= \frac{1}{20} \quad \frac{1}{2}$	2
33.	$1 + \frac{1}{3} + \frac{1}{9} + \dots \text{ up to } \infty$ $a = 1, \quad r = \frac{1}{3} \quad S_\infty = ? \quad \frac{1}{2}$ $S_\infty = \frac{a}{1 - r} \quad \frac{1}{2}$ $S_\infty = \frac{1}{1 - \frac{1}{3}} \quad \frac{1}{2}$ $S_\infty = \frac{1}{\frac{2}{3}}$ $S_\infty = 1 \times \frac{3}{2}$ $S_\infty = \frac{3}{2} \quad \frac{1}{2}$	2

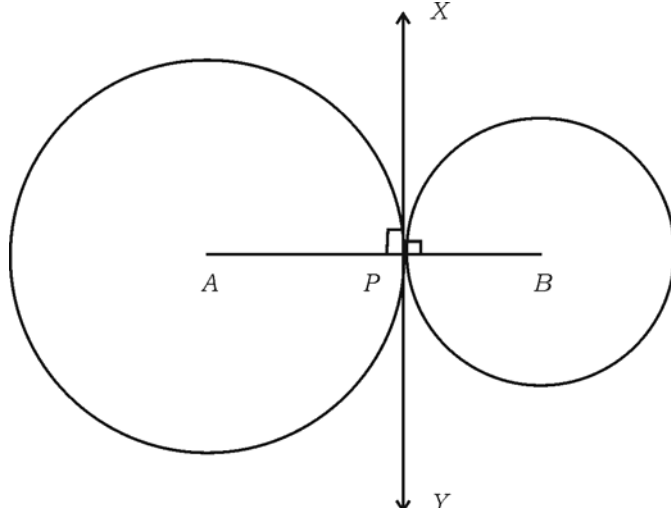


Qn. Nos.	Value Points	Marks allotted
34.	$4\sqrt{63} + 5\sqrt{7} - 8\sqrt{28}$ $= 4\sqrt{9 \times 7} + 5\sqrt{7} - 8\sqrt{4 \times 7}$ $= 12\sqrt{7} + 5\sqrt{7} - 16\sqrt{7}$ $= (12 + 5 - 16)\sqrt{7}$ $= \sqrt{7}.$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
35.	$S = \{(HH)(TT)(HT)(TH)\}$ $n(S) = 4$ <p>Exactly one tail (A) = (HT)(TH)</p> $n(A) = 2$ $P(A) = \frac{n(A)}{n(S)}$ $P(A) = \frac{2^1}{4^2} \text{ or } \frac{1}{2}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 2
36.	<p>Total number of students = 36</p> <p>Football = $\frac{12}{36} \times 360 = 120^\circ$</p> <p>Tennis = $\frac{16}{36} \times 360 = 160^\circ$</p> <p>Hockey = $\frac{8}{36} \times 360 = 80^\circ$</p> <div style="text-align: center;">  </div>	$\frac{1}{2}$ $\frac{1}{2}$ $1\frac{1}{2}$ 2



Qn. Nos.	Value Points	Marks allotted
37.	Let $m = 5, n = 7$ $m + n = 5 + 7 = 12$ $mn = 5 \times 7 = 35$ $x^2 - x(m + n) + mn = 0$ $x^2 - x(12) + 35 = 0$ $x^2 - 12x + 35 = 0$	1/2 1/2 1/2 1/2 2
38.	$k = \frac{1}{2}mv^2$ $mv^2 = 2k$ $v^2 = \frac{2k}{m}$ $v = \pm \sqrt{\frac{2k}{m}}$ $v = \pm \sqrt{\frac{2 \times 100}{2}}$ $= \pm \sqrt{100}$ $v = \pm 10.$	1/2 1/2 1/2 1/2 2
39.	In $\Delta ABC, \angle B = 90^\circ, BD \perp AC$ $BD^2 = AD \times CD$ $8^2 = 4 \times CD$ $4CD = 64$ $CD = \frac{64}{4} = 16 \text{ cm}$	1/2 1/2 1/2 1/2 2
40.	$r = 7 \text{ cm}$ T.S.A. of sphere = $4\pi r^2$ $= 4 \times \frac{22}{7} \times 7 \times 7$ $= 88 \times 7$ $= 616 \text{ sq.cm.}$	1/2 1/2 1/2 1/2 2



Qn. Nos.	Value Points	Marks allotted																																										
IV. 41.	<div style="text-align: center;">  </div> <p style="text-align: right; margin-right: 20px;">$\frac{1}{2}$</p> <p><i>Data</i> : A and B are the centres of touching circles. P is point of contact. $\frac{1}{2}$</p> <p><i>To prove</i> : A, P and B are collinear $\frac{1}{2}$</p> <p><i>Construction</i> : Draw the common tangent XPY $\frac{1}{2}$</p> <p><i>Proof</i> :</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-bottom: 1px solid black;">$\angle APX$</td> <td style="border-bottom: 1px solid black;">$= 90^\circ$</td> <td style="border-bottom: 1px solid black;">(i)</td> <td style="border-bottom: 1px solid black;">($AP \perp XY$)</td> <td style="border-bottom: 1px solid black;">$\frac{1}{2}$</td> </tr> <tr> <td style="border-bottom: 1px solid black;">$\angle BPX$</td> <td style="border-bottom: 1px solid black;">$= 90^\circ$</td> <td style="border-bottom: 1px solid black;">(ii)</td> <td style="border-bottom: 1px solid black;">($BP \perp XY$)</td> <td style="border-bottom: 1px solid black;">$\frac{1}{2}$</td> </tr> </table> <p>Add (i) and (ii)</p> $\angle APX + \angle BPX = 180^\circ$ $\angle APB = 180^\circ$ <p>APB is a straight line</p> <p>\therefore A, P, B are collinear. $\frac{1}{2}$</p>	$\angle APX$	$= 90^\circ$	(i)	($AP \perp XY$)	$\frac{1}{2}$	$\angle BPX$	$= 90^\circ$	(ii)	($BP \perp XY$)	$\frac{1}{2}$	3																																
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42.	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>C.I.</th> <th>f</th> <th>x</th> <th>fx</th> <th>$x - \bar{x} = D$</th> <th>D^2</th> <th>$f D^2$</th> </tr> </thead> <tbody> <tr> <td>1 – 5</td> <td>4</td> <td>3</td> <td>12</td> <td>- 5</td> <td>25</td> <td>100</td> </tr> <tr> <td>6 – 10</td> <td>3</td> <td>8</td> <td>24</td> <td>0</td> <td>00</td> <td>00</td> </tr> <tr> <td>11 – 15</td> <td>2</td> <td>13</td> <td>26</td> <td>5</td> <td>25</td> <td>50</td> </tr> <tr> <td>16 – 20</td> <td>1</td> <td>18</td> <td>18</td> <td>10</td> <td>100</td> <td>100</td> </tr> <tr> <td colspan="2">$N = 10$</td> <td colspan="2">$\sum fx = 80$</td> <td colspan="3">$\sum f D^2 = 250$</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">$\frac{1}{2}$</p>	C.I.	f	x	fx	$x - \bar{x} = D$	D^2	$f D^2$	1 – 5	4	3	12	- 5	25	100	6 – 10	3	8	24	0	00	00	11 – 15	2	13	26	5	25	50	16 – 20	1	18	18	10	100	100	$N = 10$		$\sum fx = 80$		$\sum f D^2 = 250$			
C.I.	f	x	fx	$x - \bar{x} = D$	D^2	$f D^2$																																						
1 – 5	4	3	12	- 5	25	100																																						
6 – 10	3	8	24	0	00	00																																						
11 – 15	2	13	26	5	25	50																																						
16 – 20	1	18	18	10	100	100																																						
$N = 10$		$\sum fx = 80$		$\sum f D^2 = 250$																																								



Qn. Nos.	Value Points	Marks allotted								
	Mean $\bar{x} = \frac{\sum fx}{N} = \frac{80}{10} = 8$	1/2								
	$\sigma = \sqrt{\frac{\sum f D^2}{N}} = \sqrt{\frac{250}{10}} = \sqrt{25} = 5$	1								
	For any other correct method full marks is to be given.	3								
43.	Given digits : 1, 2, 3, 4, 5, 6									
	a) 4-digit number can be formed in 6P_4 ways	1/2								
	${}^6P_4 = 6 \times 5 \times 4 \times 3$	1/2								
	${}^6P_4 = 360.$	1/2								
	b) Less than 5000 :									
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Th</th> <th>H</th> <th>Ten</th> <th>U</th> </tr> </thead> <tbody> <tr> <td>4P_1 ways</td> <td>5P_1 ways</td> <td>4P_1 ways</td> <td>3P_1 ways</td> </tr> </tbody> </table>	Th	H	Ten	U	4P_1 ways	5P_1 ways	4P_1 ways	3P_1 ways	1/2
Th	H	Ten	U							
4P_1 ways	5P_1 ways	4P_1 ways	3P_1 ways							
	Unit's place can be filled in 3P_1 ways									
	Ten's place can be filled in 4P_1 ways									
	Hundred's place can be filled in 5P_1 ways									
	Thousand's place can be filled in 4P_1 ways									
	Total number of ways = ${}^3P_1 \times {}^4P_1 \times {}^5P_1 \times {}^4P_1$	1/2								
	$= 3 \times 4 \times 5 \times 4$									
	The number less than 5000 = 240.	1/2								
	OR									
	$16 {}^nP_3 = 13 {}^{n+1}P_3$									
	$16 \cdot n(n-1)(n-2) = 13(n+1)n(n-1)$	1/2								
	$16(n-2) = 13(n+1)$	1/2								
	$16n - 32 = 13n + 13$	1/2								
	$16n - 13n = 13 + 32$	1/2								
	$3n = 45$	1/2								
	$n = \frac{45}{3}$									
	$n = 15.$	1/2								



Qn. Nos.	Value Points	Marks allotted
44.	$\text{LHS} = \frac{\sin(90^\circ - \theta)}{1 + \sin \theta} + \frac{\cos \theta}{1 - \cos(90^\circ - \theta)}$ $= \frac{\cos \theta}{1 + \sin \theta} + \frac{\cos \theta}{1 - \sin \theta} \quad \frac{1}{2}$ $= \frac{\cos \theta(1 - \sin \theta) + \cos \theta(1 + \sin \theta)}{1 - \sin^2 \theta} \quad \frac{1}{2}$ $= \frac{\cos \theta - \cos \theta \cdot \sin \theta + \cos \theta + \cos \theta \cdot \sin \theta}{1 - \sin^2 \theta} \quad \frac{1}{2}$ $= \frac{2 \cos \theta}{\cos^2 \theta} \quad \frac{1}{2}$ $= \frac{2}{\cos \theta} \quad \frac{1}{2}$ $= 2 \sec \theta \quad \frac{1}{2}$ <p>LHS = RHS</p> <p style="text-align: center;">OR</p> $\text{LHS} = \cos(A + B)$ $= \cos(60^\circ + 30^\circ) \quad \frac{1}{2}$ $= \cos 90^\circ$ $= 0 \quad \frac{1}{2}$ $\text{RHS} = \cos A \cdot \cos B - \sin A \cdot \sin B$ $= \cos 60^\circ \cdot \cos 30^\circ - \sin 60^\circ \cdot \sin 30^\circ \quad \frac{1}{2}$ $= \left(\frac{1}{2} \times \frac{\sqrt{3}}{2} \right) - \left(\frac{\sqrt{3}}{2} \times \frac{1}{2} \right) \quad \frac{1}{2}$ $= \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} \quad \frac{1}{2}$ $= 0 \quad \frac{1}{2}$ <p>LHS = RHS.</p>	3

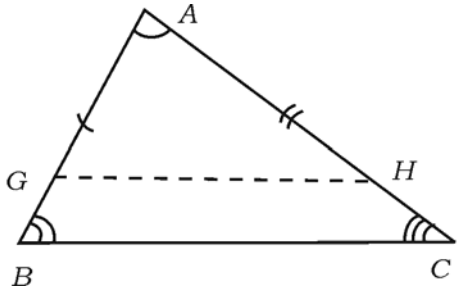
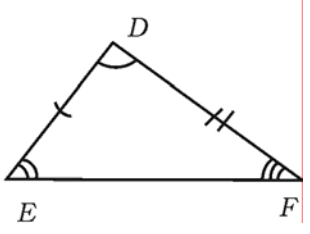


Qn. Nos.	Value Points	Marks allotted
45.	<p>Let the number of pupils = x</p> <p>Total cost = Rs. 1000</p> <p>Each share = Rs. $\frac{1000}{x}$</p> <p>If 10 of them are failed to join the function then number of pupils joined = $x - 10$</p> <p>Total cost = Rs. 1000</p> <p>Each share = Rs. $\frac{1000}{x - 10}$</p> <p>Each would have to pay Rs. 5 more</p> $\frac{1000}{x - 10} - \frac{1000}{x} = 5$ $\frac{1000x - 1000(x - 10)}{x(x - 10)} = 5$ $1000x - 1000x + 10000 = 5x^2 - 50x$ $5x^2 - 50x - 10000 = 0$ <p style="text-align: center;">÷ by 5</p> $x^2 - 10x - 2000 = 0$ $x^2 - 50x + 40x - 2000 = 0$ $x(x - 50) + 40(x - 50) = 0$ $(x - 50)(x + 40) = 0$ $x = 50, -40$ <p>∴ $x = 50$</p> <p>Number of pupils of the class = 50.</p> <p style="text-align: center;">OR</p> $x^2 - 5x + 3 = 0$ $a = 1, \quad b = -5, \quad c = 3$ $m + n = \frac{-b}{a} = \frac{-(-5)}{1} = 5$ $m + n = \frac{c}{a} = \frac{3}{1} = 3$	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>3</p>

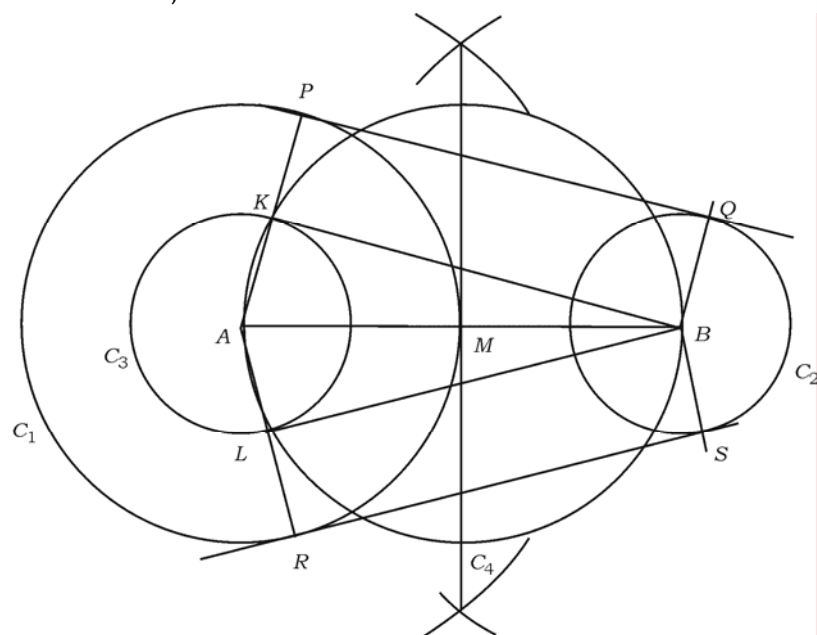


Qn. Nos.	Value Points	Marks allotted	
46.	i) $(m+n)^2 + (m-n)^2 = (m+n)^2 + [(m+n)^2 - 4mn]$ $\frac{1}{2}$ $= 5^2 + 5^2 - 4(3)$ $= 25 + 25 - 12$ $= 50 - 12$ $= 38$ $\frac{1}{2}$	3	
	ii) $(m+n)^3 + 4mn = (5)^3 + 4(3)$ $\frac{1}{2}$ $= 125 + 12$ $\frac{1}{2}$ $= 137.$ $\frac{1}{2}$		
	$AM^2 + CN^2 = AB^2 + BM^2 + BN^2 + BC^2$ $(AB^2 + BC^2 = AC^2)$ $\frac{1}{2}$		
	$AM^2 + CN^2 = AC^2 + BM^2 + BN^2$ $\frac{1}{2}$ $= AC^2 + \left(\frac{BC}{2}\right)^2 + \left(\frac{AB}{2}\right)^2$ $\frac{1}{2}$		
	$AM^2 + CN^2 = AC^2 + \frac{BC^2}{4} + \frac{AB^2}{4}$ $= \frac{4AC^2 + BC^2 + AB^2}{4}$ $\frac{1}{2}$		
	$4(AM^2 + CN^2) = 4AC^2 + BC^2 + AB^2$ $\frac{1}{2}$ $(BC^2 + AB^2 = AC^2)$		
	$4(AM^2 + CN^2) = 4AC^2 + AC^2$ $\frac{1}{2}$		
	$4(AM^2 + CN^2) = 5AC^2.$ $\frac{1}{2}$	3	
	OR		
	In $\triangle AOB$ $\angle O = 90^\circ$ $\frac{1}{2}$		
	$AB^2 = OA^2 + OB^2$ $\frac{1}{2}$		
	$= \left(\frac{AC}{2}\right)^2 + \left(\frac{BD}{2}\right)^2$ $\frac{1}{2}$		
	$= \frac{AC^2}{4} + \frac{BD^2}{4}$ $\frac{1}{2}$		
	$AB^2 = \frac{AC^2 + BD^2}{4}$ $\frac{1}{2}$		
$\therefore 4AB^2 = AC^2 + BD^2.$ $\frac{1}{2}$	3		



Qn. Nos.	Value Points	Marks allotted
V. 47.	<div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: right; margin-right: 20px;">$\frac{1}{2}$</p> <p><i>Data</i> : In $\triangle ABC$ and $\triangle DEF$</p> $\angle BAC = \angle EDF$ $\angle ABC = \angle DEF$ <p><i>To prove</i> : $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$</p> <p><i>Construction</i> : Mark points G and H on AB and AC such that $AG = DE$ and $AH = DF$. Join G and H.</p> <p><i>Proof</i> : In $\triangle AGH$ and $\triangle DEF$</p> $AG = DE \quad \therefore \text{Construction}$ $\angle GAH = \angle EDF \quad \therefore \text{Data} \quad \frac{1}{2}$ $AH = DF \quad \therefore \text{Construction}$ <p>$\therefore \triangle AGH \cong \triangle DEF \quad \therefore \text{SAS}$</p> $\angle AGH = \angle DEF \quad \frac{1}{2}$ <p>But, $\angle ABC = \angle DEF$</p> $\Rightarrow \angle AGH = \angle ABC$ <p>$\therefore GH \parallel BC. \quad \frac{1}{2}$</p> <p>In $\triangle ABC$ $\frac{AB}{AG} = \frac{BC}{GH} = \frac{CA}{HA}$</p> <p>Hence $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}.$</p>	$\frac{1}{2}$



Qn. Nos.	Value Points	Marks allotted
48.	<p>$d = 8 \text{ cm}, \quad R = 4 \text{ cm} \quad r = 2 \text{ cm}$ $R - r = 4 - 2 = 2 \text{ cm}$</p> <p>Drawing AB and marking mid-point M</p> <p>Drawing circles C_1, C_2, C_3</p> <p>Joining BK, BL, PQ, RS</p> <p>Measuring and writing the length of tangents $PQ = RS$ ($PQ = RS = 7.8 \text{ cm}$)</p> 	<p>1</p> <p>1½</p> <p>1</p> <p>½</p> <p>4</p>
49.	<p>$a, a + d, a + 2d \dots$ A.P.</p> <p>$a + a + 2d + a + 4d = 39$</p> <p>$3a + 6d = 39$</p> <p>$3(a + 2d) = 39$</p> <p>$a + 2d = \frac{39}{3} = 13 \dots (i)$</p> <p>$a + d + a + 3d + a + 5d = 51$</p> <p>$3a + 9d = 51$</p> <p>$3(a + 3d) = 51$</p>	<p>½</p> <p>½</p> <p>½</p>



Qn. Nos.	Value Points	Marks allotted
	$a + 3d = \frac{51}{3} = 17 \quad \dots (ii)$	1/2
	From eq. (i) and (ii)	
	$a + 2d = 13$	
	$a + 3d = 17$	1/2
	$\begin{array}{r} (-) \quad (-) \quad (-) \\ - d = -4 \end{array}$	
	$\therefore d = 4$	
	From eq. (i)	1/2
	$a + 2d = 13$	
	$a + 2(4) = 13$	
	$a = 13 - 8$	
	$a = 5$	
	Now $a = 5, \quad d = 4$	
	$T_n = a + (n - 1)d$	
	$T_{10} = 5 + (10 - 1)4$	1/2
	$T_{10} = 5 + 36$	
	$T_{10} = 41.$	1/2
	OR	
	$a, ar, ar^2 \dots$ G.P.	
	$a + ar + ar^2 = 7$	1/2
	$a(1 + r + r^2) = 7$	
	$1 + r + r^2 = \frac{7}{a} \quad (i)$	1/2
	$ar^3 + ar^4 + ar^5 = 56$	
	$ar^3(1 + r + r^2) = 56$	1/2
	$ar^3 \times \frac{7}{a} = 56$	
	$r^3 = \frac{56}{7} = 8$	1/2
	$r^3 = 2^3$	
	$r = 2$	1/2



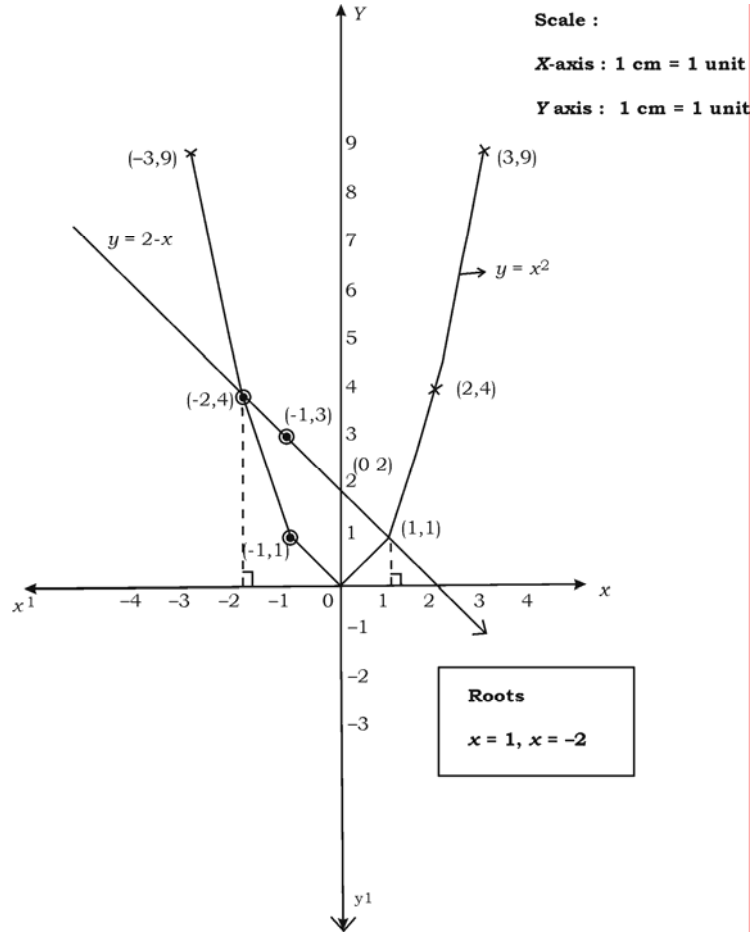
Qn. Nos.	Value Points	Marks allotted
	$1 + r + r^2 = \frac{7}{a}$	
	$1 + 2 + 4 = \frac{7}{a}$	$\frac{1}{2}$
	$a = \frac{7}{7} = 1$	
	$T_1 = a = 1, \quad T_2 = 1 \times 2 = 2, \quad T_3 = 2 \times 2 = 4$	$\frac{1}{2}$
	$\therefore 1, 2, 4, 8 \dots \text{G.P.}$	$\frac{1}{2}$
	<p><i>Alternate method :</i></p>	
	$S_3 = 7$	
	$a \left(\frac{r^3 - 1}{r - 1} \right) = 7$	$\frac{1}{2}$
	$\frac{r^3 - 1}{r - 1} = \frac{7}{a} \quad \dots \text{(i)}$	$\frac{1}{2}$
	$S_6 - S_3 = a \left(\frac{r^6 - 1}{r - 1} \right) - 7 = 56$	$\frac{1}{2}$
	$\frac{a(r^3 + 1)(r^3 - 1)}{(r - 1)} = 56 + 7 = 63$	$\frac{1}{2}$
	$a(r^3 + 1) \frac{7}{a} = 63$	
	$r^3 + 1 = \frac{63}{7} = 9$	
	$r^3 = 9 - 1 = 8$	
	$r^3 = 2^3$	
	$r = 2$	$\frac{1}{2}$
	$\frac{7}{a} = \frac{r^3 - 1}{r - 1} = \frac{2^3 - 1}{2 - 1}$	$\frac{1}{2}$
	$\frac{7}{a} = \frac{7}{1}$	
	$a = \frac{7}{7} = 1$	$\frac{1}{2}$
	$T_1 = a = 1, \quad T_2 = 1 \times 2 = 2, \quad T_3 = 2 \times 2 = 4$	



Qn. Nos.	Value Points	Marks allotted																														
50.	<p>1, 2, 4 G.P.</p> $x^2 + x - 2 = 0$ $x^2 = 2 - x$ $y = x^2 ; \quad y = 2 - x$ $y = x^2$ <table border="1"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>-1</td> <td>-2</td> <td>-3</td> </tr> <tr> <td>y</td> <td>0</td> <td>1</td> <td>4</td> <td>9</td> <td>1</td> <td>4</td> <td>9</td> </tr> </table> $y = 2 - x$ <table border="1"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>-1</td> <td>2</td> <td>-2</td> <td>3</td> </tr> <tr> <td>y</td> <td>2</td> <td>1</td> <td>3</td> <td>0</td> <td>4</td> <td>-1</td> </tr> </table> <p style="text-align: right;">Table — (1 + 1) = 2 Parabola — $\frac{1}{2}$ Straight line — $\frac{1}{2}$</p> <p style="text-align: center;">Drawing perpendiculars and identifying roots —</p>	x	0	1	2	3	-1	-2	-3	y	0	1	4	9	1	4	9	x	0	1	-1	2	-2	3	y	2	1	3	0	4	-1	<p>$\frac{1}{2}$</p> <p>4</p> <p>4</p>
x	0	1	2	3	-1	-2	-3																									
y	0	1	4	9	1	4	9																									
x	0	1	-1	2	-2	3																										
y	2	1	3	0	4	-1																										



Qn. Nos.	Value Points	Marks allotted
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Alternate Method :

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

$$y = x^2 + x - 2$$

<i>x</i>	0	1	2	3	-1	-2	-3
<i>y</i>	-2	0	4	10	-2	0	4

Table —	2
Drawing parabola —	1
Identifying roots —	1

4



