

FIRST YEAR HIGHER SECONDARY EXAMINATION - MARCH 2025

PART - III

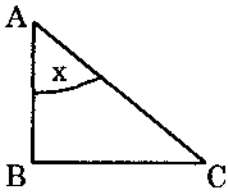
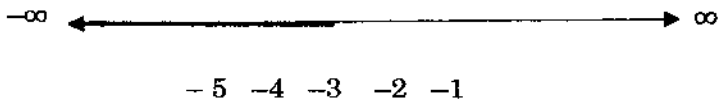
SUBJECT : MATHEMATICS SCIENCE (60)

CODE : FY - 327

VERSION

ANSWER KEY

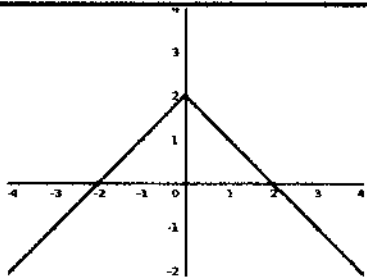
2 : HOURS

Qn. No.	Sub. Qns.	Answer Key / Value Points	Score	Total Score
1	a b	$A = \{x : x = n^2, 1 \leq n \leq 10, n \in \mathbb{N}\}$ Subsets are $\{\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}$ <i>Remark: $x = n^2$, give $\frac{1}{2}$ score</i>	1 2	3
2	a b	240° $BC^2 = AC^2 - AB^2$ $= 5^2 - 3^2$ $= 25 - 9$ $= 16$ $BC = 4$ $\sin x = -\frac{4}{5}, \tan x = \frac{4}{3}$ (Give full score for alternate methods) 	1 1 1	3
3	a b	$3(x - 1) \leq 2(x - 3)$ $3x - 3 \leq 2x - 6$ $3x - 2x \leq -6 + 3$ $x \leq -3, x \in (-\infty, 3]$ 	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1	3

FY - 327 : MATHEMATICS (SCIENCE - 60) - ANSWER KEY

Qn. No.	Sub. Qns.	Answer Key / Value Points	Score	Total Score
4	a	${}^9P_4 = 9 \times 8 \times 7 \times 6$	$\frac{1}{2}$	3
		$= 3024$	$\frac{1}{2}$	
	b	$\frac{n!}{(n-r)!} = \frac{9!}{(9-5)!}$	1	
		$= \frac{9!}{4!} = 15120$	1	
		RK: ${}^9P_4$ give '1' score		
5	a	(D) $(-2, -2, -2)$	1	3
	b	$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2} =$	$\frac{1}{2}$	
		$\sqrt{(7 - -2)^2 + (0 - 3)^2 + (-1 - 5)^2}$	$\frac{1}{2}$	
		$= \sqrt{9^2 + 3^2 + 6^2}$	$\frac{1}{2}$	
		$= \sqrt{81 + 9 + 36}$	$\frac{1}{2}$	
		$= \sqrt{126}$	$\frac{1}{2}$	
		RK: Distance formula give '1' score		
6		$x^2 + y^2 - 4x - 8y - 45 = 0$	$\frac{1}{2}$	3
		$x^2 - 4x + y^2 - 8y = 45$	$\frac{1}{2}$	
		$x^2 - 4x + 4 + y^2 - 8y + 16 = 45 + 4 + 16$	$\frac{1}{2}$	
		$(x-2)^2 + (y-4)^2 = 65$	$\frac{1}{2}$	
		$(x-2)^2 + (y-4)^2 = (\sqrt{65})^2$	$\frac{1}{2}$	
		Centre = $(2, 4)$	$\frac{1}{2}$	
		Radius = $\sqrt{65}$	$\frac{1}{2}$	
		(Give full score for alternate methods) RK: Direct answer ' $\frac{1}{2}$ ' score each		
7	a	$\lim_{x \rightarrow 0} \frac{\tan 2x}{x} = 2 \cdot \lim_{2x \rightarrow 0} \frac{\tan 2x}{2x}$	1	
		$= 2 \cdot 1 = 2$		
	b	$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x} = \lim_{x \rightarrow 0} \frac{2\sin^2(\frac{x}{2})}{x}$		
		$= \lim_{x \rightarrow 0} \frac{\sin(\frac{x}{2})}{\frac{x}{2}} \cdot \sin(\frac{x}{2})$		
		RK: $\lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$ give '1' score		

FY – 327 : MATHEMATICS (SCIENCE – 60) – ANSWER KEY

Qn. No.	Sub. Qns.	Answer Key / Value Points	Score	Total Score
7		$= \lim_{\frac{x}{2} \rightarrow 0} \frac{\sin\left(\frac{x}{2}\right)}{\frac{x}{2}} \cdot \lim_{x \rightarrow 0} \sin\left(\frac{x}{2}\right)$ $= 1 \times 0 = 0$ Rk: Direct answer give '1' score	$\frac{1}{2}$ $\frac{1}{2}$	3
8	a b	$x = 0$ Mid - point of PQ = $\left(\frac{0+8}{2}, \frac{-4+0}{2}\right) = (4, -2)$ Slope of the required line is $\frac{-2-0}{4-0} = \frac{-2}{4} = \frac{-1}{2}$ Slope = $\frac{y_2 - y_1}{x_2 - x_1}$, give '1' score	1 1 1	3
9	a b	$(-1, 2) = \{-1 < x < 2, x \in \mathbb{R}\}$ (i) $A \cup B = \{1, 3, 5, 6, 7, 8, 9, 10\}$ (ii) $A' = U - A = \{2, 4, 6, 8, 10\}$ $B' = U - B = \{1, 2, 3, 4\}$ (iii) $(A \cup B)' = U - (A \cup B) = \{2, 4\}$ $A' \cap B' = \{2, 4\}$ $\therefore (A \cup B)' = A' \cap B'$	1 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	4
10	a b	 Domain = $\mathbb{R}$ Range = $(-\infty, 2]$ Rk: For any modulus graph give '1' score	2 1 1	4

FY - 327 : MATHEMATICS (SCIENCE - 60) - ANSWER KEY

Qn. No.	Sub. Qns.	Answer Key / Value Points	Score	Total Score
11	a	$\left(3 + \frac{i}{3}\right)^3 = {}^3C_0(3)^3 + {}^3C_1(3)^2\left(\frac{i}{3}\right) + {}^3C_2(3)\left(\frac{i}{3}\right)^2 + {}^3C_3\left(\frac{i}{3}\right)^3$ $= 1 \cdot 3^3 + 3 \cdot 3^2 \cdot \left(\frac{i}{3}\right) + 3 \cdot 3 \cdot \frac{i^2}{3^2} + 1 \cdot \frac{i^3}{3^3}$ $= 27 + 9i + i^2 + \frac{i^3}{27}$ $= 27 + 9i - 1 - \frac{i}{27}$ $= 26 + i\left(9 - \frac{1}{27}\right)$ $= 26 + i\left(\frac{242}{27}\right)$	1	4
	b	$\text{Multiplicative inverse} = \frac{1}{4-3i}$ $= \frac{1}{4-3i} \cdot \frac{4+3i}{4+3i}$ $= \frac{4+3i}{4^2+3^2}$ $= \frac{4+3i}{16+9} = \frac{4+3i}{25}$	$\frac{1}{2}$	
			$\frac{1}{2}$	
			$\frac{1}{2}$	
			$\frac{1}{2}$	
12	a	48 Non ace cards and 4 ace cards ${}^{48}C_4 \times {}^4C_1 = \frac{48 \cdot 47 \cdot 46 \cdot 45}{1 \cdot 2 \cdot 3 \cdot 4} \times 4$ $= 194580 \times 4 = 778320$	1	4
	b	$n = 9 + 8 = 17$ ${}^nC_{17} = {}^{17}C_{17} = 1$ RK: ${}^{48}C_4$ ($\frac{1}{2}$) Score ${}^4C_1$ ($\frac{1}{2}$) Score	1	
			1	
13	a	Equation of the line is $y - y_1 = m(x - x_1)$ $y - 3 = \frac{1}{4}(x - -2)$ $4(y - 3) = x + 2$ $x - 4y + 14 = 0$	1	4
	b	Distance from (x_1, y_1) to the line $Ax + By + C = 0$ is $D = \left \frac{Ax_1 + By_1 + C}{\sqrt{A^2 + B^2}} \right $ $= \left \frac{3 \times 3 - 4 \times -5 - 26}{\sqrt{3^2 + 4^2}} \right $ $= \left \frac{3}{\sqrt{25}} \right = \frac{3}{5}$	1	
			$\frac{1}{2}$	

FY – 327 : MATHEMATICS (SCIENCE – 60) – ANSWER KEY

Qn. No.	Sub. Qns.	Answer Key / Value Points	Score	Total Score
14		Length of major axis, $2a = 26$ $a = 13$ Coordinates of foci $(\pm c, 0) = (\pm 5, 0)$ $c = 5$ For ellipse, $b^2 = a^2 - c^2$ $= 13^2 - 5^2 = 169 - 25 = 144$ $b = 12$ Equation of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ $\frac{x^2}{169} + \frac{y^2}{144} = 1$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	4
15	a b	$(a+b)^4 = {}^4C_0 a^4 + {}^4C_1 a^3 b + {}^4C_2 a^2 b^2 + {}^4C_3 a b^3 + {}^4C_4 b^4 \dots (1)$ $(a-b)^4 = {}^4C_0 a^4 - {}^4C_1 a^3 b + {}^4C_2 a^2 b^2 - {}^4C_3 a b^3 + {}^4C_4 b^4 \dots (2)$ $(1) - (2) \Rightarrow (a+b)^4 - (a-b)^4 = 2 [{}^4C_1 a^3 b + {}^4C_3 a b^3]$ $= 2 [4a^3 b + 4a b^3]$ $= 8ab [a^2 + b^2]$ $\therefore (\sqrt{3} + \sqrt{2})^4 - (\sqrt{3} - \sqrt{2})^4 = 8\sqrt{3}\sqrt{2} [(\sqrt{3})^2 + (\sqrt{2})^2]$ $= 8\sqrt{6} [3 + 2] = 40\sqrt{6}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 1	4
16	(i) (ii) (iii)	P (not A) = P (A') = $1 - P(A) = 1 - 0.42 = 0.58$ P (not B) = P (B') = $1 - P(B) = 1 - 0.48 = 0.52$ P (A or B) = $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $= 0.42 + 0.48 - 0.16 = 0.74$ Complement formula '1' Score	1 1 1 1	4
17	a b	(C) $\frac{1}{\sqrt{2}}$ $\cos 75^\circ = \cos (45^\circ + 30^\circ)$ $= \cos 45^\circ \cos 30^\circ - \sin 45^\circ \sin 30^\circ$ $= \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}} \cdot \frac{1}{2}$ $= \frac{\sqrt{3}-1}{2\sqrt{2}}$ $\cos(x+y) = \cos x \cos y - \sin x \sin y$ (1) Score $\tan(x+y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$ (1) Score	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	

FY - 327 : MATHEMATICS (SCIENCE - 60) - ANSWER KEY

Qn. No.	Sub. Qns.	Answer Key / Value Points	Score	Total Score
17	c	$\tan (3x - 2x) = \frac{\tan 3x - \tan 2x}{1 + \tan 3x \cdot \tan 2x}$ $\tan x (1 + \tan 3x \cdot \tan 2x) = \tan 3x - \tan 2x$ $\tan x + \tan 3x \tan 2x \tan x = \tan 3x - \tan 2x$ $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$ $\tan 3x - \tan 2x - \tan x = \tan 3x \tan 2x \tan x$ (Give full score for alternate methods)	1 1 1	6
18	a	$a = 2, r = \frac{8}{2} = 4, n = ?$ $n^{\text{th}} \text{ term, } a_n = a r^{n-1} = 8192$ $2 \times 4^{n-1} = 8192$ $4^{n-1} = 4096$ $4^{n-1} = 4^6$ $n-1 = 6 \quad \therefore \quad n = 7$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	
	b	$S_n = 8 + 88 + 888 + \dots \text{to } n \text{ terms}$ $= 8 [1 + 11 + 111 + \dots + \text{to } n \text{ terms}]$ $= \frac{8}{9} [9 + 99 + 999 + \dots \text{to } n \text{ terms}]$ $= \frac{8}{9} [(10 - 1) + (100 - 1) + (1000 - 1) + \dots \text{to } n \text{ terms}]$ $= \frac{8}{9} [(10 + 100 + 1000 + \dots \text{to } n \text{ terms}) - n]$ $= \frac{8}{9} \left[\frac{10(10^n - 1)}{10 - 1} - n \right]$ $= \frac{8}{9} \left[\frac{10(10^n - 1)}{9} - n \right]$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	
		Rk: For direct answer give '1' score		

FY - 327 : MATHEMATICS (SCIENCE - 60) - ANSWER KEY

Qn. No.	Sub. Qns.	Answer Key / Value Points	Score	Total Score
18	c	Let a_2, a_3, a_4 be the three numbers Then, a, a_2, a_3, a_4, a_5 are in G.P $a = 1$ and $a_5 = 256$ $a_5 = a r^4 = 256$ $r^4 = 256 = 4^4 \quad \therefore r = 4$ $a_2 = a \times r = 1 \times 4 = 4$ $a_3 = a_2 \times r = 4 \times 4 = 16$ $a_4 = a_3 \times r = 16 \times 4 = 64$ $\therefore$ Numbers are 4, 16, 64 <i>For direct answer give '1' score</i>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	6
19	a	$f(x) = \tan x$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{\tan(x+h) - \tan(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{1}{h} \left[\frac{\sin(x+h)}{\cos(x+h)} - \frac{\sin x}{\cos x} \right]$ $= \lim_{h \rightarrow 0} \frac{1}{h} \left[\frac{\sin(x+h)\cos x - \cos(x+h)\sin x}{\cos(x+h)\cos x} \right]$ $= \lim_{h \rightarrow 0} \left[\frac{\sin(x+h-x)}{h \cdot \cos(x+h)\cos x} \right]$ $= \lim_{h \rightarrow 0} \left[\frac{\sin h}{h \cdot \cos(x+h)\cos x} \right]$ $= \lim_{h \rightarrow 0} \frac{\sin h}{h} \cdot \lim_{h \rightarrow 0} \frac{1}{\cos(x+h)\cos x}$ $= 1 \cdot \frac{1}{\cos^2 x} \quad \therefore f'(x) = \sec^2 x$ <i>RK: For direct answer give '1' score</i>	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	

FY – 327 : MATHEMATICS (SCIENCE – 60) – ANSWER KEY

Qn. No.	Sub. Qns.	Answer Key / Value Points	Score	Total Score																																																						
19	b	$y = \sin x \cos x$ $\frac{dy}{dx} = \sin x \frac{d(\cos x)}{dx} + \cos x \frac{d(\sin x)}{dx}$ $= \sin x (-\sin x) + \cos x \cos x$ $= \cos^2 x - \sin^2 x = \cos 2x$	1	6																																																						
20		<table><tr><th>Class</th><th>Frequ ency</th><th>Mid- point</th><th>$f_i x_i$</th><th>$(x_i - \bar{x})^2$</th><th>$f_i(x_i - \bar{x})^2$</th></tr><tr><td>30-40</td><td>3</td><td>35</td><td>105</td><td>729</td><td>2187</td></tr><tr><td>40-50</td><td>7</td><td>45</td><td>315</td><td>289</td><td>2023</td></tr><tr><td>50-60</td><td>12</td><td>55</td><td>660</td><td>49</td><td>588</td></tr><tr><td>60-70</td><td>15</td><td>65</td><td>975</td><td>9</td><td>135</td></tr><tr><td>70-80</td><td>8</td><td>75</td><td>600</td><td>169</td><td>1352</td></tr><tr><td>80-90</td><td>3</td><td>85</td><td>255</td><td>529</td><td>1587</td></tr><tr><td>90-100</td><td>2</td><td>95</td><td>190</td><td>1089</td><td>2178</td></tr><tr><td></td><td>50</td><td></td><td>3100</td><td></td><td>10050</td></tr></table> Mean, $\bar{x} = \frac{1}{N} \sum f_i x_i = \frac{3100}{50} = 62$ Variance, $\sigma^2 = \frac{1}{N} \sum f_i(x_i - \bar{x})^2$ $= \frac{1}{50} 10050 = 201$ Standard Deviation, $\sigma = \sqrt{201} = 14.18$ For formula give '1/2' score each	Class	Frequ ency	Mid- point	$f_i x_i$	$(x_i - \bar{x})^2$	$f_i(x_i - \bar{x})^2$	30-40	3	35	105	729	2187	40-50	7	45	315	289	2023	50-60	12	55	660	49	588	60-70	15	65	975	9	135	70-80	8	75	600	169	1352	80-90	3	85	255	529	1587	90-100	2	95	190	1089	2178		50		3100		10050	3 1 1 1	6
Class	Frequ ency	Mid- point	$f_i x_i$	$(x_i - \bar{x})^2$	$f_i(x_i - \bar{x})^2$																																																					
30-40	3	35	105	729	2187																																																					
40-50	7	45	315	289	2023																																																					
50-60	12	55	660	49	588																																																					
60-70	15	65	975	9	135																																																					
70-80	8	75	600	169	1352																																																					
80-90	3	85	255	529	1587																																																					
90-100	2	95	190	1089	2178																																																					
	50		3100		10050																																																					

FY – 327 : MATHEMATICS (SCIENCE – 60) – ANSWER KEY

Qn. No.	Sub. Qns.	Answer Key / Value Points	Score	Total Score																																																															
20		OR Let A = 65 be the assumed mean and h = 10, the width of the class interval <table border="1"><thead><tr><th>Class</th><th>Freque ncy</th><th>Mid point</th><th>$y_i = \frac{x_i - 65}{10}$</th><th>$y_i^2$</th><th>$f_i y_i$</th><th>$f_i y_i^2$</th></tr></thead><tbody><tr><td>30 - 40</td><td>3</td><td>35</td><td>-3</td><td>9</td><td>-9</td><td>27</td></tr><tr><td>40 - 50</td><td>7</td><td>45</td><td>-2</td><td>4</td><td>-14</td><td>28</td></tr><tr><td>50 - 60</td><td>12</td><td>55</td><td>-1</td><td>1</td><td>-12</td><td>12</td></tr><tr><td>60 - 70</td><td>15</td><td>65</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>70 - 80</td><td>8</td><td>75</td><td>1</td><td>1</td><td>8</td><td>8</td></tr><tr><td>80 - 90</td><td>3</td><td>85</td><td>2</td><td>4</td><td>6</td><td>12</td></tr><tr><td>90 - 100</td><td>2</td><td>95</td><td>3</td><td>9</td><td>6</td><td>18</td></tr><tr><td></td><td>50</td><td></td><td></td><td></td><td>-15</td><td>105</td></tr></tbody></table> Mean, $\bar{x} = A + \frac{\sum f_i y_i}{N} \times h$ $= 65 + \frac{-15}{50} \times 10$ $= 62$ Variance, $\sigma^2 = \frac{h^2}{N^2} [N \sum f_i y_i^2 - (\sum f_i y_i)^2]$ $= \frac{10^2}{50^2} [50 \times 105 - (-15)^2]$ $= \frac{1}{25} [5250 - 225] = 201$ Standard Deviation, $\sigma = \sqrt{201} = 14.18$ For for mula , give '1/2' score	Class	Freque ncy	Mid point	$y_i = \frac{x_i - 65}{10}$	y_i^2	$f_i y_i$	$f_i y_i^2$	30 - 40	3	35	-3	9	-9	27	40 - 50	7	45	-2	4	-14	28	50 - 60	12	55	-1	1	-12	12	60 - 70	15	65	0	0	0	0	70 - 80	8	75	1	1	8	8	80 - 90	3	85	2	4	6	12	90 - 100	2	95	3	9	6	18		50				-15	105	3	6
		Class	Freque ncy	Mid point	$y_i = \frac{x_i - 65}{10}$	y_i^2	$f_i y_i$	$f_i y_i^2$																																																											
		30 - 40	3	35	-3	9	-9	27																																																											
		40 - 50	7	45	-2	4	-14	28																																																											
		50 - 60	12	55	-1	1	-12	12																																																											
		60 - 70	15	65	0	0	0	0																																																											
		70 - 80	8	75	1	1	8	8																																																											
		80 - 90	3	85	2	4	6	12																																																											
		90 - 100	2	95	3	9	6	18																																																											
			50				-15	105																																																											
1																																																																			
1																																																																			
1																																																																			

FY - 327 : MATHEMATICS (SCIENCE - 60) - ANSWER KEY

1. LAL. E.V : 9497894089
2. BINDHU ARAVIND : 9446202571
3. REJUTHOMAS : 9446485892
4. SMITHA CV : 9495890541
5. RESH PAUL : 9495600560
6. SHINI P FRANCIS : 9388143173

[Handwritten signatures and marks in the right margin]

ANSWER KEY

FIRST YEAR HIGHER SECONDARY EXAMINATION MARCH 2025

PART-I/II/III

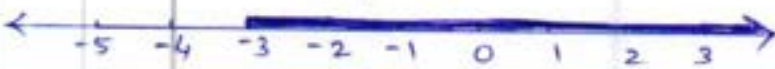
SUBJECT: MATHEMATICS - SCIENCE

CODE NO: FY 354

VERSION: C

80 SCORES

2½ HOURS

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
①	(i)	(c) ϕ	1	3
	(ii)	$B = \{2, 3\}$	1	
	(iii)	$\{2, 3\}, \{2\}, \{3\}, \phi$	1	
②	(i)	(A) $\frac{2\pi}{3}$	1	3
	(ii)	$\cos 15^\circ = \cos (60^\circ - 45^\circ)$ $= \cos 60^\circ \cdot \cos 45^\circ + \sin 60^\circ \cdot \sin 45^\circ$ $= \frac{1}{2} \times \frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{2}}$ $= \frac{\sqrt{3} + 1}{2\sqrt{2}}$	$\frac{1}{2}$ 1 $\frac{1}{2}$	
③	(i)	(B) 0	1	3
	(ii)	$(2+i)^2 = 4 + 4i + i^2$ $= 3 + 4i$	1 1	
④	(i)	$5x - 5 \leq 8x + 4$	$\frac{1}{2}$	3
		$5x - 8x \leq 4 + 5$	$\frac{1}{2}$	
		$-3x \leq 9$	$\frac{1}{2}$	
		$x \geq -3$	$\frac{1}{2}$	
			1	

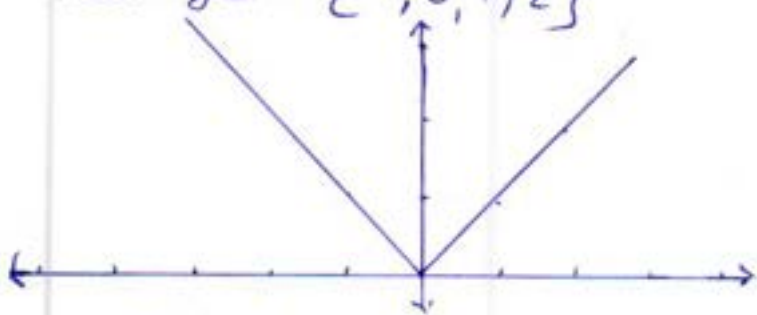
Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
⑤	(i) (D) 6 (ii) $n = 6, r = 4$ number of words $= {}^n P_r$ $= {}^6 P_4$ $= 360$	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3	
⑥	(i) (D) $\frac{1}{2}$ (ii) slope of $\perp^r$ line $= -2$ Equation of line is $y - y_0 = m(x - x_0)$ $y - 4 = -2(x + 3)$ $2x + y + 2 = 0$	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3	
⑦	(i) (B) $(-2, 3)$ (ii) Equation of parabola is $y^2 = 4ax$ Passes through $(-2, 4)$ $16 = -8a$ $a = -2$ Equation of parabola is $y^2 = -8x$	1 1 $\frac{1}{2}$ $\frac{1}{2}$	3	
⑧	(i) (C) a (ii) $LHL = \lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2} (x^3 - 3) = 5$ $RHL = \lim_{x \rightarrow 2^+} f(x) = \lim_{x \rightarrow 2} (x^2 + 1) = 5$ $LHL = RHL$ $\therefore \lim_{x \rightarrow 2} f(x) = 5$	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
9	(i)	$2 - x = 4$ $x = -2$ $3 - y = 3$ $y = 0$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	4
	(ii)	$A \times B = \{3, 4\} \times \{-1, -2\}$ $= \{(3, -1), (3, -2), (4, -1), (4, -2)\}$	2	
10		P(n): $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$ P(1): $1 = \frac{1(1+1)}{2} = 1$ $\therefore$ P(1) is true Assume that P(k) is true P(k): $1 + 2 + 3 + \dots + k = \frac{k(k+1)}{2}$ P(k+1): $1 + 2 + 3 + \dots + k + (k+1)$ $= \frac{k(k+1)}{2} + (k+1)$ $= \frac{(k+1)(k+2)}{2}$ $\therefore$ P(k+1) is true. $\therefore$ P(n) is true for all $n \in \mathbb{N}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	4
11	(i)	$\bar{z} = -8 - 6i$	1	
	(ii)	$ z = \sqrt{64 + 36} = \sqrt{100} = 10$	1	
	(iii)	$\bar{z}^{-1} = \frac{\bar{z}}{ z ^2}$ $= \frac{-8 - 6i}{100}$ $= -\frac{8}{100} - \frac{6}{100}i$ $= -\frac{2}{25} - \frac{3}{50}i$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	4

Remark: For formula of nCr , give 1 score.

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
(14)	(i)	(A) $2n+1$	1	4
	(ii)	$(x+1)^4 = {}^4C_0 x^4 + {}^4C_1 x^3 + {}^4C_2 x^2 + {}^4C_3 x + {}^4C_4$ $= x^4 + 4x^3 + 6x^2 + 4x + 1$ $(x-1)^4 = x^4 - 4x^3 + 6x^2 - 4x + 1$ $(x+1)^4 + (x-1)^4 = 2x^4 + 12x^2 + 2$ Remark: For the expansion of $(a+b)^n$ give 1 score.	1	
			1	
			1	
			1	
(15)	(i)	(D) -3	1	4
	(ii)	Given $a=b$	1/2	
		Equation of line is $\frac{x}{a} + \frac{y}{b} = 1$	1	
		$\frac{x}{a} + \frac{y}{a} = 1$ $x+y=a$ This line passes through $(-1, 3)$ $-1+3=a$ $a=2$ $\therefore$ Equation is $x+y=2$	1/2	
			1/2	
(16)		$a=13, b=5$	1	4
		$c = \sqrt{a^2 - b^2} = \sqrt{144} = 12$	1	
		Foci = $(\pm c, 0) = (\pm 12, 0)$	1	
		Vertices = $(\pm a, 0) = (\pm 13, 0)$	1	
		Eccentricity = $\frac{c}{a} = \frac{12}{13}$ Length of latus rectum = $\frac{2b^2}{a}$ $= \frac{2 \times 25}{13} = \frac{50}{13}$	1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
(17)	(i)	(D) $(-2, -1, -3)$	1	4
	(ii)	$AB = \sqrt{(1+2)^2 + (2-3)^2 + (3-5)^2} = \sqrt{14}$	1	
		$BC = \sqrt{(7-1)^2 + (0-2)^2 + (-1-3)^2} = \sqrt{56} = 2\sqrt{14}$	1	
		$AC = \sqrt{(7+2)^2 + (0-3)^2 + (-1-5)^2} = \sqrt{126} = 3\sqrt{14}$	1	
		$AB + BC = AC$ $\therefore A, B, C$ are collinear. Remark: For distance formula, give 1 score.		
(18)	(i)	Today is not Monday	1	4
	(ii)	Assume that $\sqrt{5}$ is rational $\frac{p}{q} = \sqrt{5}$		
		p, q have no common factors other than 1	1/2	
		$p^2 = 5q^2$		
		p^2 is a multiple of 5		
		$\therefore p$ is a multiple of 5	1/2	
		$p = 5k$		
		$25k^2 = 5q^2$		
		$q^2 = 5k^2$		
		q^2 is a multiple of 5		
		$\therefore q$ is a multiple of 5	1/2	
		$\therefore p, q$ have common factor 5.	1/2	
		This is a contradiction.	1/2	
		$\therefore \sqrt{5}$ is not rational.		
		$\therefore \sqrt{5}$ is irrational.	1/2	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
(19)	(i)	$A \cup B = \{0, 1, 2, 3, 4\}$	1/2	6
		$(A \cup B)' = \{5, 6\}$	1/2	
		$A' = \{1, 3, 5, 6\}$	1/2	
		$B' = \{4, 5, 6\}$	1/2	
		$A' \cap B' = \{5, 6\}$	1/2	
		$\therefore (A \cup B)' = A' \cap B'$	1/2	
	(ii)	F → students playing football		
		V → Students playing volleyball		
		$n(F \cup V) = 60$		
		$n(F) = 35$	1/2	
		$n(F \cap V) = 15$		
		$n(F \cup V) = n(F) + n(V) - n(F \cap V)$	1	
(20)	(i)	$R = \{(0, -1), (1, 0), (2, 1), (3, 2)\}$	1	6
		Domain = $\{0, 1, 2, 3\}$	1	
		Codomain = A	1	
	(ii)	Range = $\{-1, 0, 1, 2\}$	1	
			2	
		Domain = R	1/2	
		Range = $[0, \infty)$	1/2	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
21	(i)	$\frac{\cos 8x + \cos 6x}{\sin 8x - \sin 6x} = \frac{2 \cos 7x \cdot \cos x}{2 \cos 7x \cdot \sin x}$ $= \cot x$	1+1	6
	(ii)	$\cos 4x - \cos 2x = 0$ $-2 \sin 3x \cdot \sin x = 0$ $\sin 3x = 0 \text{ or } \sin x = 0$ $3x = n\pi \text{ or } x = n\pi, n \in \mathbb{Z}$ $x = \frac{n\pi}{3} \text{ or } x = n\pi, n \in \mathbb{Z}$	1 1/2 1/2 1/2 1 1/2	
		Remark: In 21(i), for the formulae of $\cos x + \cos y$, $\sin x - \sin y$ give 1/2 score each.		
22	(i)	$a = 10, d = 4$ $S_n = 960$ $\frac{n}{2} [2a + (n-1)d] = 960$ $\frac{n}{2} [20 + (n-1)4] = 960$ $n(8 + 2n) = 960$ $n^2 + 4n - 480 = 0$ $n = 20, -24$	1/2 1 1/2 1/2 1/2	
	(ii)	$\therefore \text{Number of terms} = 20.$ $4 + 44 + 444 + \dots \text{ } n \text{ terms}$ $= 4(1 + 11 + 111 + \dots \text{ } n \text{ terms})$ $= \frac{4}{9}(9 + 99 + 999 + \dots \text{ } n \text{ terms})$ $= \frac{4}{9}(10 - 1 + 100 - 1 + 1000 - 1 + \dots \text{ } n \text{ terms})$ $= \frac{4}{9} \left[\frac{10(10^n - 1)}{9} - n \right]$	1/2 1/2 1 1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
(23)	(i)	$\frac{dy}{dx} = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \left(\frac{\frac{1}{x+h} - \frac{1}{x}}{h} \right)$ $= \lim_{h \rightarrow 0} \frac{1}{h} \left(\frac{x - (x+h)}{(x+h)x} \right)$ $= \lim_{h \rightarrow 0} \frac{-1}{(x+h)x}$ $= \frac{-1}{x \cdot x} = \underline{\underline{\frac{-1}{x^2}}}$ Remark: For direct answer $\frac{d}{dx}(\frac{1}{x}) = \frac{-1}{x^2}$ give 1 score	1 1 1 1/2 1/2	6
	(ii)	$\frac{dy}{dx} = \frac{(1+\tan x) \cdot 1 - x \cdot \sec^2 x}{(1+\tan x)^2}$ $= \frac{1+\tan x - x \cdot \sec^2 x}{(1+\tan x)^2}$ Remark: For the formula of Quotient rule. give 1/2 score.	2	
(24)	(i)	(A) 0	1	
	(ii)	$P(A') = 1 - P(A)$ $= 1 - 0.42 = 0.58$ $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $= 0.42 + 0.48 - 0.16$ $= 0.74$	1/2 1/2 1 1/2 1/2	

