ANSWER KEY

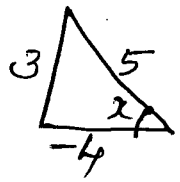
FIRST YEAR HIGHER SECONDARY EXAMINATION JUNE 2022

PART-I/II/III

SUBJECT: MATHEMATICS - SCIENCE (HI)

CODE NO: FY 65 VERSION: D

60 SCORES 2 HOURS

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
1.	a.	$A = \{4, 5, 6\}$	1	3
	b.	$A \cup B = \{4, 5, 6, 7, 8, 9\}$	1	
	c	$A \cap B = \{6\}$	1	
2.	a)	$A \times B = \{(1,3)(1,4)(2,3)(2,4)\}$	1½	3
		$B \times A = \{(3,1)(3,2)(4,1)(4,2)\}$	1½	
3.		$\sin x = \frac{3}{5}$ 		3
		$\cos x = -\frac{4}{5}$	1	
		$\tan x = \frac{-3}{4}$	1	
		$\operatorname{cosec} x = \frac{5}{3}$	1	
4.	a.	$z_1 + z_2 = 7 + 5i$	1½	3
		$z_1 - z_2 = -1 - 1i$	1½	
5.		$5x - 3 < 3x + 1$		3
		$5x - 3x < 1 + 3$	1	
		$2x < 4$	1	
		$x < 2$.	1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
6		$m = \frac{y_2 - y_1}{x_2 - x_1}$	1	3
		$= \frac{4 - -2}{-1 - 3} = \frac{6}{-4} = \frac{-3}{2}$.	2	
7.		$4a = 12$	1	
		$a = \frac{12}{4} = 3$		
	a)	Focus $= (a, 0) = (3, 0)$	1	3
	b)	Length of latus rectum $= 4a = 4 \times 3 = 12$	1	
8	a.	(ii) $(0, y, z)$	1	
	b.	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$	1	3
		$= \sqrt{2^2 + 0^2 + (-4)^2}$		
		$= \sqrt{4 + 16} = \sqrt{20}$	1	
9		$x = 1, y = 2$		
		$x = 2, y = 3$		
		$x = 3 \quad y = 4$	1	4
		$x = 4 \quad y = 5$		
		$x = 5 \quad y = 6$		
		$x = 6 \quad y = 7 \notin A$		
	a)	$R = \{(1,2)(2,3)(3,4)(4,5)(5,6)\}$.	1	
	b)	Domain of $R = \{1, 2, 3, 4, 5\}$	1	
		Range of $R = \{2, 3, 4, 5, 6\}$	1	

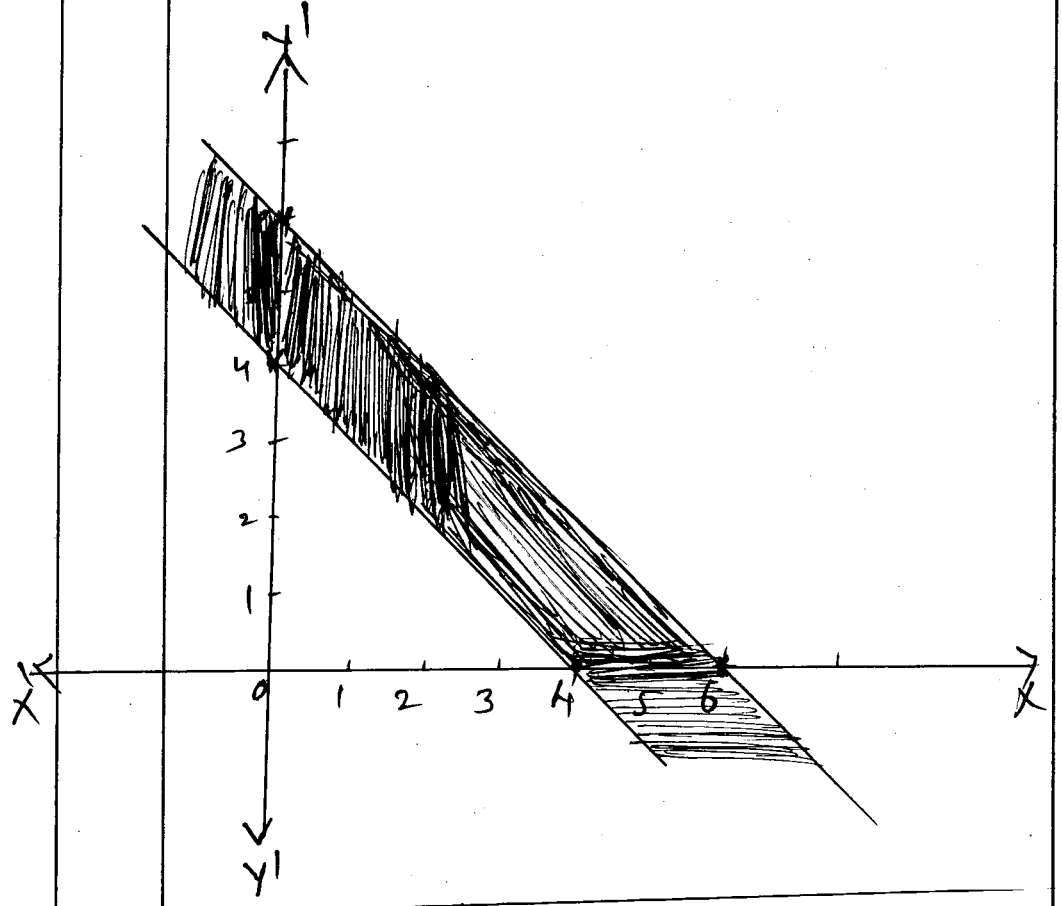
Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
10	a.	$\sin\frac{\pi}{4} = \frac{1}{\sqrt{2}}$	1	
	b	$\frac{\sin x}{\cos x} = \tan x$	1	4
	c.	$\cos(-x) = \cos x$.	1	
	d.	$\sin^2 x + \cos^2 x = 1$	1	
11	a)	$P(1)$ is true		
		$1 = \frac{1(1+1)}{2}$		
		$1 = \frac{1 \times 2}{2}$	1	
		$1 = 1$.		
	b)	$P(k)$ is true.		
		$1+2+3+\cdots+k = \frac{k(k+1)}{2}$.	1	4
		$P(k+1)$ is true.		
		$1+2+3+\cdots+k+k+1 = \frac{(k+1)(k+1+1)}{2}$.		
		$\frac{k(k+1)}{2} + k+1 = \frac{(k+1)(k+2)}{2}$.		
		$(k+1)\left(\frac{k}{2}+1\right) = \frac{(k+1)(k+2)}{2}$.		
		$\frac{(k+1)(k+2)}{2} = \frac{(k+1)(k+2)}{2}$.	2	
		$\therefore P(k+1)$ is True.		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
12	a)	$\bar{z} = -3-4i$	1	4
	b)	$\lvert z\rvert = \sqrt{-3^2+4^2} = \sqrt{9+16} = \sqrt{25} = 5$	1	
	c)	$z^{-1} = \frac{\bar{z}}{\lvert z\rvert^2} = \frac{-3-4i}{5^2} = \frac{-3-4i}{25}$	2	
13	a)	$0! = 1$	1	4
	b)	$\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$		
		$\frac{1}{6!} + \frac{1}{7\times 6!} = \frac{x}{8\times 7\times 6!}$	1	
		$1 + \frac{1}{7} = \frac{x}{8\times 7}$	1	
		$\frac{7+1}{7} = \frac{x}{8\times 7}$		
		$8\times 8 = x \quad \therefore x = 64$	1	
14.	a)	5	1	4
	b)	$(x+2)^4 = x^4 + {}^4C_1 x^3 2^1 + {}^4C_2 x^2 2^2 + {}^4C_3 x^1 2^3 + 2^4$	2	
		$= x^4 + 8x^3 + 24x^2 + 32x + 16.$	1	
15	a.	$\lim_{x\to a} \frac{x^n - a^n}{x-a} = nxa^{n-1}$	1	4
	b.	$\lim_{x\to 2} \frac{x^5 - 2^5}{x-2} = 5\times 2^{5-1} = 5\times 2^4 = 80$	3	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
16	a.	New Delhi is not a city.	1	4
	b.	If n is even, then number n^2 is even.	3	
17.	a.	$S = \{HHH, HTH, HTT, HHT, TTT, TTH, THT, THH\}$.	2	4
	b.	$A = \{HTT, TTH, THT\}$	2	
18.	a.	i) $A \cup B = \{2, 3, 4, 5\}$	1	6
		ii) $A' = U - A = \{1, 4, 5, 6\}$	1	
		$B' = U - B = \{1, 2, 6\}$	1	
	b)	$(A \cup B)' = U - A \cup B$		
		$= \{1, 6\}$	1	
		$A' \cap B' = \{1, 6\}$	1	
		$\therefore (A \cup B)' = A' \cap B'$	1	
19		$x + y = 6$		
			2.	
		$x + y = 4$		

x	0	6
y	6	0

x	0	4
y	4	0

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
			4	6
20.	a.	$a_n = n(n+2)$		
		$a_5 = 5(5+2)$	1	
		$= 5 \times 7$		
		$= \underline{35}$		
		$a_{10} = 10(10+2)$	1	
		$= 10 \times 12 = 120.$		
	b.	$S_n = 7 + 77 + 777 + \cdots + n \text{ terms}$		
		$= 7(1 + 11 + 111 + \cdots + n \text{ terms})$	1	6
		$= \frac{7}{9}(10 - 1 + 100 - 1 + 1000 - 1 - \cdots + n \text{ terms})$	1	
		$= \frac{7}{9}(10 + 10^2 + 10^3 + \cdots + n \text{ term} - n$	1	
		$= \frac{7}{9}\left(10\left(\frac{10^n - 1}{9}\right) - n\right)$	1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
21.	a.	$y - y_1 = m(x - x_1)$	2	
		$y - 3 = -4(x + 2)$		
	b.	$3x - 4y = 12$		6
		$\frac{3x}{12} - \frac{4y}{12} = \frac{12}{12}$		
		$\frac{x}{4} - \frac{y}{3} = 1$	2	
		$\frac{x}{4} + \frac{y}{-3} = 1$		
		x - intercept $= 4$		
		y - intercept $= -3$.	2.	

22.

x_i	f_i	$f_i x_i$	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	$f_i(x_i - \bar{x})^2$
4	3	12	−10	100	300
8	5	40	−6	36	180
11	9	99	−3	9	81
17	5	85	3	9	45
20	4	80	6	36	144
24	3	72	10	100	300
32	1	32	18	324	324
	30	420			1374

4

$\bar{x} = \frac{420}{30} = 14$

$\sigma^2 = \frac{1}{30} \times 1374 = 45.8$

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