ANSWER KEY

IMPRT

FIRST YEAR HIGHER SECONDARY EXAMINATION OCT 2022

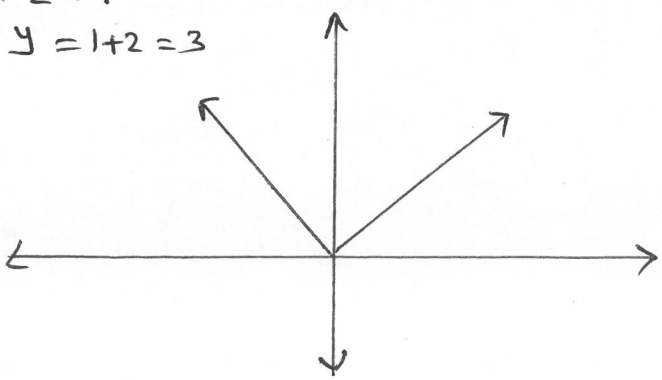
PART-I/II/III

SUBJECT: MATHEMATICS (COMMERCE)

CODE NO: FY 851 VERSION: ____

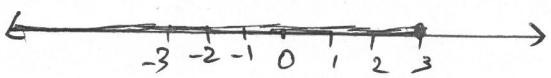
60 SCORES 2 HOURS

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
1	a)	$\{-1, 0, 1, 2, 3, 4\}$	1	3
	b)	$(-4, 6]$	1	
	c)	2^2	1	
2	a)	$A \cap B = \{2\}$	1	3
	b)	$A \cup B = \{1, 2, 3, 4, 5\}$	1	
	c)	$A \cap A' = \phi$	1	
3		$\cos x = -4/5$	1	3
		$\tan x = -3/4$	1	
		$\text{cosec } x = 5/3$	1	
4	a)	10^{th} term $= 5 \cdot 5^9$	1	3
		Remark: Formula for n^{th} term give $\frac{1}{2}$ score		
	b)	$x^2 = -\frac{2}{7} \times -\frac{7}{2}$	1	
		$x^2 = 1$	1/2	
		$x = \pm 1$	1/2	
5	a)	slope $= \tan 30$	1	3
		$= 1/\sqrt{3}$		
	b)	Slope of the line through (2, 2) and (3, 2)		
		$m = \frac{y_2 - y_1}{x_2 - x_1} = 0$	1/2	
		Slope of required line	1/2	
		Equation of required line is $y - y_1 = m(x - x_1)$		
		$y - 1 = 0(x - 1)$	1	
		i.e., $y = 1$		
		Remarks: Formula for slope and equation of line give $\frac{1}{2}$ score each		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
6.	a)	Centre $(R,k) = (2,2)$	½	
		Radius $r = \sqrt{(y_2-y_1)^2+(x_2-x_1)^2}$	½	
		$= \sqrt{3^2+2^2} = \sqrt{13}$		3
		Equation of the circle is $(x-2)^2+(y-2)^2 = 13$	1	
		Remark: Writing the formula $(x-h)^2+(y-k)^2 = r^2$ give ½ score		
	b)	x-axis OR $y=0$	1	
7.	a)	(ii) (2,0,0)	1	
	b)	Distance $= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2+(z_2-z_1)^2}$	1	3
		$= \sqrt{4+0+1} = \sqrt{5}$	1	
8.	a)	$\sqrt{2}$ is a complex number	1	
	b)	Contrapositive: If a triangle is not isosceles, then it is not equilateral	1	3
		Converse: If a triangle is isosceles, then it is equilateral	1	
9.	a)	(i) $A' = \{c,d,f\}$	1	
		(ii) $A-B = \{a,b\}$	1	4
	b)	$n(x \cup y) = n(x)+n(y)-n(x \cap y)$	1	
		$38 = 17+23-n(x \cap y)$		
		$n(x \cap y) = 2$.	1	
10.	a)	$x+1 = 3$	½	
		$x = 3-1 = 2$	½	
		$y-2 = 1$	½	
		$y = 1+2 = 3$	½	4
	b)		2	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
11.		$(x+1)^4+(x-1)^4 = (x^4+4C_1x^3+4C_2x^2+4C_3x+1)+$	1	
		$(x^4-4C_1x^3+4C_2x^2-4C_3x+1)$	1	
		$= 2x^4+12x^2+2.$	1	4
		$(\sqrt{2}+1)^4+(\sqrt{2}-1)^4 = 2(\sqrt{2})^4+12(\sqrt{2})^2+2$	1/2	
		$= 34$	1/2.	
		Remark: For writing Binomial Expansion give 1 score		
12.	a)	Slope of line through (1, 1) and (3, 2) is $m_1 = \frac{y_2-y_1}{x_2-x_1} = \frac{1}{2}$	1	
		Slope of perpendicular line, $m_2 = \frac{-1}{m_1} = -2$	1	4.
	b)	Distance $= \left\lvert \frac{ax_1+by_1+c}{\sqrt{a^2+b^2}} \right\rvert$	1	
		$= \left\lvert \frac{1+1-3}{\sqrt{1^2+1^2}} \right\rvert$	1	
		$= 1/\sqrt{2}$		
13		$a^2=16$, $a=4$	1/2	
		$b^2=9$, $b=3$	1/2	
		$c^2 = a^2-b^2$	1/2	
		$= 16-9 = 7$	1/2	4
		$c = \sqrt{7}$		
		$e = \frac{c}{a}$	1/2	
		$= \sqrt{7}/4$	1/2	
		Length of latus rectum $= \frac{2b^2}{a}$	1/2	
		$= 2 \times 9/4$	1/2	
		$= \frac{9}{2}$		
14	a)	(i) $\lim_{x\to 1} x(x+1) = 1(1+1) = 2$	1	
		(ii) $\lim_{x\to 2} \frac{x^3-2^3}{x-2} = 3 \times 2^2 = 12$	1	4.
	b)	(i) $\frac{d}{dx}(x^5) = 5x^4$	1	
		(ii) $\frac{d}{dx}(\cos x) = -\sin x$	1.	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
15	a)	$P(\text{not } A) = 1 - P(A)$ $= 1 - 0.42 = 0.58$	½ ½	
	b)	$P(A \text{ or } B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $= 0.42 + 0.48 - 0.16$ $= 0.74$	½ ½	4.
	c)	$P(\text{not } A \text{ and not } B) = P(A' \cap B')$ $= P[(A \cup B)']$ $= 1 - P(A \cup B)$ $= 1 - 0.74 = 0.26$	½ ½ ½ ½	
16.		$P(n): 1+2+3+\cdots+n = \frac{n(n+1)}{2}$		
	a)	When $n=1$, $1 = \frac{1(1+1)}{2}$ $1 = 1$ $\therefore P(1)$ is true	1	
	b.)	Assume that $P(k)$ is true ie, $1+2+3+\cdots+k = \frac{k(k+1)}{2}$ We have to prove that $P(k+1)$ is true. ie, we have to prove $1+2+3+\cdots+(k+1) = \frac{(k+1)(k+2)}{2}$ $LHS = (1+2+3+\cdots+k)+(k+1)$ $= \frac{k(k+1)}{2} + (k+1)$ $= \frac{(k+1)((k+1)+1)}{2} = RHS$ ie, $P(k+1)$ is true. $\therefore$ By PMI, $P(n)$ is true for $n \in N$	1 1 ½ ½	4.
17.	a)	$5! - 4! = 96$	1.	
	b)	$4P_2 = 12$	2.	4.
	c)	(i) n	1.	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
18	a)	$i^8 = 1$	1	
	b)	$3(7+i7)+i(7+i7) = 21+21i+7i+7i^2$	1	
		$= 14+28i$	1	
	c)	Let $1+i\sqrt{3} = r(\cos\theta + i\sin\theta)$	½	6
		$r\cos\theta = 1$ $\quad r\sin\theta = \sqrt{3}$	½	
		Squaring and adding, we get $r^2 = 4$,	1	
		$r = 2$		
		$\therefore \cos\theta = \frac{1}{r} = \frac{1}{2}$ and $\sin\theta = \frac{\sqrt{3}}{r} = \frac{\sqrt{3}}{2}$	1	
		$\therefore \theta = \pi/3$		
		$1+i\sqrt{3} = 2(\cos\pi/3 + i\sin\pi/3)$		
19.	a)	$\sin(x-y) = \sin x\cos y - \cos x\sin y$	1	
	b)	$\sin 15^\circ = \sin(45-30)$	1	
		$= \sin 45\cos 30 - \cos 45\sin 30$	1	
		$= \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}} \times \frac{1}{2}$	1	6
		$= \frac{\sqrt{3}-1}{2\sqrt{2}}$		
	c)	$LHS = \cos\left[\left(\frac{\pi}{4}-x\right)+\left(\frac{\pi}{4}-y\right)\right]$	1	
		$= \cos\left[\frac{\pi}{2}-(x+y)\right]$	1	
		$= \sin(x+y)$		
20.	a)	$7x-5x < 9-3$	½	
		$2x < 6$	½	
		$x < 3$	1	
				
	b)	$x+2y = 10$		
		$2x+y = 10$		

x	0	10
y	5	0

x	0	5
y	10	0

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		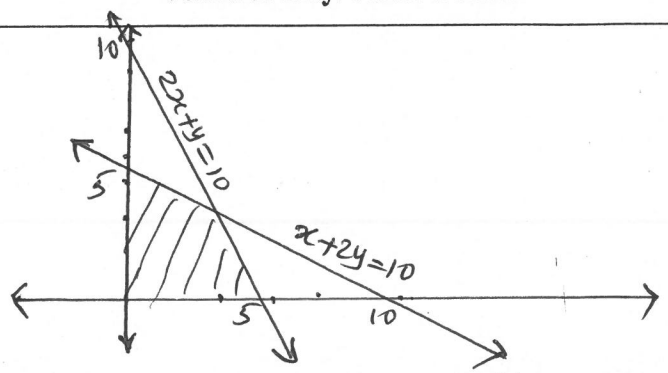 Remark: Graph of each correct line give 2 score.	4	6
21.	a)	$a_n = 2n+5$ $a_1=7,\ a_2=9,\ a_3=11,\ a_4=13$	2.	
	b)	$1, 3, 5, 7, \ldots, 2001$ $a=1, \quad d=2$	1	
		n^{th} term $= 2001$ i.e, $a+(n-1)d = 2001$ $1+(n-1)2 = 2001$ $\therefore n = 1001$	1	6
		$S_n = \frac{n}{2}[2a+(n-1)d]$	1/2	
		$= \frac{1001}{2}[2\times1 + 1000\times2]$	1/2.	
		$= 1002001$	1	
22.		x_i | f_i | $f_i x_i$ | $f_i x_i^2$ 10 | 3 | 30 | 300 30 | 7 | 210 | 6300 50 | 12 | 600 | 30000 70 | 15 | 1050 | 73500 90 | 3 | 270 | 24300 40 | 2160 | 134400		
	a)	Mean $\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$	1	
		$= \frac{2160}{40} = 54$	1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
	b)	Variance, $\sigma^2 = \frac{\Sigma f_i x_i^2}{\Sigma f_i} - \left(\frac{\Sigma f_i x_i}{\Sigma f_i}\right)^2$	1	
		$= \frac{134400}{40} - \left(\frac{2160}{40}\right)^2$	1	6
		$= 444$		
		Standard Deviation = $\sqrt{\text{Variance}}$	1	
		$= \sqrt{444}$	1	
		$= 21.071$		
		Remark: For correct table give 2 score		
	1.	2		
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