FIRST YEAR HIGHER SECONDARY IMPROVEMENT EXAMINATION JULY 2019

SUBJECT: MATHEMATICS (COMMERCE) **CODE. NO: FY 51**

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
1.	a)	$A = \{1, 2\}$	1	
		$B = \{2, 3, 4\}$	1	
	b)	$B - A = \{3, 4\}$	1	3
2	a)	$R = \{(1,5), (2,4), (3,3), (4,2), (5,1)\}$	2	
		Remark: For each correct ordered pair give ½ score		
	b)	Domain $= \{1, 2, 3, 4, 5\}$	1	3
3	a)	(ii) $1 + 2i$	1	
	b)	$r = \sqrt{2}$, $\theta = \frac{\pi}{4}$	1+1	
		Remark: $r(\cos\theta + i\sin\theta)$ give 1 score		3
4	a)	(ii) 60	1	
	b)	$\frac{9! - 8!}{8!\,9!} = \frac{x}{10!}$	1	
		$x = 80$	1	3
		Remark: concept of factorial give 1 score		
5	a)	$a + 10d = 53$	½	
		$a + 15d = 78$	½	
		$d = 5$, $a = 3$	1	
		Remark $a_n = a + (n-1)d$ give 1 score		
	b)	$a_{27} = a + 26d = 133$	½ + ½	3
6.	a)	Slope $= 3$	1	
		Remark $m = \frac{y_2 - y_1}{x_2 - x_1}$ give ½ score		
	b)	$m = \frac{k-2}{2-1}$ or $\frac{k+4}{2+1}$	1	
		$k - 2 = 3$, $k = 5$	1	3
		Remark: Concept of slopes give 1 score. Alternate correct method give full score.		

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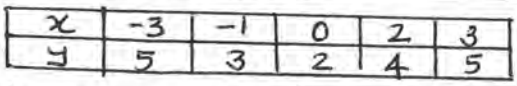
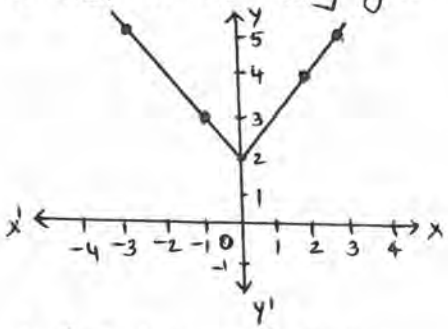
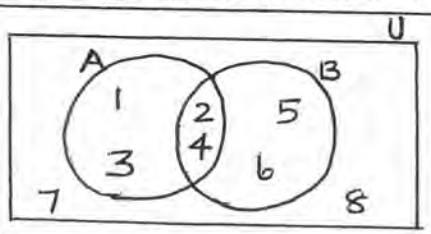
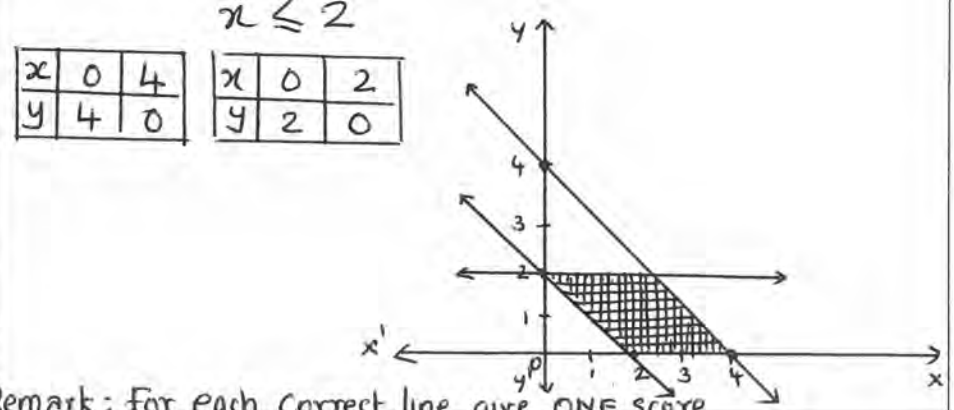
7	a)	$E = \{HT, TH, HH\}$ Remark for writing sample space give ½ Score	1	
	b)	$P(A' \cap B') = 1 - P(A \cup B)$ $= 1 - (P(A) + P(B))$ $= 1 - 0.65 = 0.35$ Remark: $P(A \cap B) = 0$ give ½ Score $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ give ½ Score	½ ½ 1	3
8	a)	 Remark: for each correct entry give ½ each	2	
	b)	 Remark Graph of $\|x\|$ give 1 score	2	4
9	a)	LHS of $P(1) = (1 + \frac{1}{1}) = 2$ RHS of $P(1) = (1 + 1) = 2$ LHS = RHS	½ ½	
	b)	$P(1)$ is true, Assume that $P(k)$ is true $P(k) = (1 + \frac{1}{1})(1 + \frac{1}{2})(1 + \frac{1}{3}) \cdots (1 + \frac{1}{k}) = k+1$ We will show that $P(k+1)$ is true $P(k+1) = (1 + \frac{1}{1})(1 + \frac{1}{2})(1 + \frac{1}{3}) \cdots (1 + \frac{1}{k+1}) = k+2$ $LHS = (1 + \frac{1}{1})(1 + \frac{1}{2})(1 + \frac{1}{3}) \cdots (1 + \frac{1}{k})(1 + \frac{1}{k+1})$ $= (k+1)(1 + \frac{1}{k+1})$ $= k+2$ $P(k+1)$ is true	1 1 ½ ½	4
10	a)	(iii) $-i$	1	

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
	b)	$\sqrt{3+4i} = x+iy$	½	
		$3+4i = x^2-y^2+i\,2xy$	½	
		$x^2-y^2 = 3$ —①	½	
		$2xy = 4$ —②	½	
		$(x^2+y^2)^2 = (x^2-y^2)^2+(2xy)^2$		
		$= 9+16$		
		$x^2+y^2 = 5$ —③		
		$x^2-y^2 = 3$ —①		
		$2x^2 = 8$	½+½	3+1
		$x = \pm 2$, $y = \pm 1$		
		Roots are $2+i$ and $-2-i$		
		Remark: For alternate method give full score		
11	a	$(x^2+\frac{3}{x})^4 = {}^4C_0(x^2)^4(\frac{3}{x})^0 + {}^4C_1(x^2)^3(\frac{3}{x})^1 + {}^4C_2(x^2)^2(\frac{3}{x})^2 +$		
		${}^4C_3(x^2)^1(\frac{3}{x})^3 + {}^4C_4(x^2)^0(\frac{3}{x})^4$	2	
		$= x^8+12x^5+54x^2+\frac{108}{x}+\frac{81}{x^4}$	1	
		Remark: Expansion of $(a+b)^n$ give 1 score		
	b.	$T_{r+1} = (-1)^r {}^nC_r\, a^{n-r} b^r$	½	
		$= {}^4C_2\, 3^2$	½	4
		$= 54$		
		Remark: Expansion of $(x-\frac{3}{x})^4$ give ½ score		
12	a	(ii) 2	1	
	b	Terms are $\frac{a}{r}, a, ar$	1	
		$a^3 = 8 \Rightarrow a = 2$	½	
		$\frac{2}{r}+2+2r = \frac{21}{2}$	½	
		$4r^2-17r+4 = 0$	½	
		$r = \frac{17 \pm \sqrt{289-64}}{8} = \frac{17 \pm 15}{8}$		
		$= 4$ or $\frac{1}{4}$	½	4
		GP = ½, 2, 8 or 8, 2, ½		

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
13	a.	Slope $= -1$	1	
		Remark $m = -\frac{a}{b}$ give ½ Score		
	b.	Slope of perpendicular line $= 1$	½	
		equation of perpendicular line $y-1=1(x-5)$	½	
		$x-y=4$		
		Remark Concept of slopes of perpendicular lines give ½ Score		
		$y-y_1=m(x-x_1)$ give ½ Score		
	c.	Solving $x+y=2$	1	
		$x-y=4$	1	4
		$x=3,\ y=-1,\ (x,y)=(3,-1)$		
14	a.	$a^2=25,\quad b^2=9$	1	
		$c^2=16,\quad c=\pm 4$	½	
		foci $=(0,\pm 4)$	½	
		Remark $c=\sqrt{a^2-b^2}$ give ½ Score		
		foci $=(0,\pm c)$ give ½ Score		
	b	radius $=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$	½	
		$=\sqrt{3^2+4^2}=5$	½	
		Equation of a circle: $(x-h)^2+(y-k)^2=r^2$	½	
		$(x-3)^2+(y-0)^2=5^2$	½	4
		$x^2+y^2-6x-16=0$		
15	a	(ii) Z-axis	1	
	b	$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2+(z_2-z_1)^2}$		
		Each sides $=\sqrt{18}=3\sqrt{2}$	1+1+1	
		Perimeter $=9\sqrt{2}$ Remark: Distance formula give ½ Score		4
16	a.	(i) 4	1	
	b	$f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$	1	

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
		$= \lim_{h\to 0} \frac{(x+h)^2 - x^2}{h}$	½	
		$= \lim_{h\to 0} \frac{2xh + h^2}{h}$	½	
		$= \lim_{h\to 0} (2x+h)$	½	
		$= 2x$	½	4
		Remark: for direct answer give 1 score		
17	a.	'If I will come then it is not raining'	1	
	b.	Assume that $\sqrt{6}$ is not irrational	½	
		$\Rightarrow \sqrt{6} = \frac{a}{b}$ where a and b are integers with no common factors other than 1	½	
		Squaring, $6 = \frac{a^2}{b^2}$	½	
		$\Rightarrow a^2 = 6b^2$	½	
		$\Rightarrow$ 6 divides a		
		$a = 6c \Rightarrow (6c)^2 = 6b^2$		
		$b^2 = 6c^2$	½	
		$\Rightarrow$ 6 divides b		
		$\Rightarrow$ 6 divides both a and b, which is a contradiction to our assumption	½	4
		$\Rightarrow \sqrt{6}$ is an irrational number		
18	a		2	
	b	$A = \{1, 2, 3, 4\}$	1	
		$B = \{2, 4, 5, 6\}$	1	
		Remark For two correct elements give 1 score each in A and B		

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
	c	$(A \cup B) - (A \cap B) = \{1,2,3,4,5,6\} - \{2,4\}$ $= \{1,3,5,6\}$ Remark : For any A and B, Correct $(A \cup B) - (A \cap B)$ give full score	1 1	6
19	a.	(i) $\frac{\pi}{8}$	1	
	b.	$\sin 75^\circ = \sin(45+30)$ $= \sin x \cos y + \cos x \sin y$ $= \sin 45 \cos 30 + \cos 45 \sin 30$ $= \frac{\sqrt{3}}{2\sqrt{2}} + \frac{1}{2\sqrt{2}}$ $= \frac{\sqrt{3}+1}{2\sqrt{2}}$	½ ½ ½ ½	
	c.	LHS $= \frac{\cos 5x + \cos 3x}{\sin 5x - \sin 3x}$ $= \frac{2\cos 4x \cos x}{2\cos 4x \sin x}$ $= \cot x$ Remark formula for $\cos x + \cos y$ and $\sin x - \sin y$ give ½ each	2 1	6
20.	a.	$9(x-2) \leq 25(2-x)$ $9x - 18 \leq 50 - 25x$ $9x + 25x \leq 50 + 18$ $34x \leq 68$ $x \leq 2$	½ ½ ½ ½	
	b.	 Remark : For each correct line give ONE score For Drawing x, y axis give ½ score,	1 3	6

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
21	a.	Total number of arrangements $= 8!$ $= 40320$	1	
		UE10 can be arranged in to 4! ways	½	
		UE10 QSTN can be arranged in 5! ways	½	
		Total $= 4! \times 5!$ ways $= 2880$	1	
	b	(i) For attempting give **ONE** Score	1	
		(ii) Number of chords $= {}^{21}C_2$ $= 210$	2	6
22				

Class	x_i	f_i	$x_i f_i$	$x_i^2 f_i$
0–10	5	5	25	125
10–20	15	10	150	2250
20–30	25	20	500	12500
30–40	35	5	175	6125
40–50	45	10	450	20250
		50	1300	41250

a. Mean $= \frac{1300}{50} = 26$ — 2

b. SD $= \sqrt{\frac{41250}{50} - (26)^2} = \sqrt{825 - 676}$ — 2

$= \sqrt{149} = 12.21$ — 1

c. CV $= \frac{\sigma}{\bar{x}} \times 100$ — ½

$= \frac{12.21}{26} \times 100$ — ½

$= 46.9$ — 6

Remark: For correct table entries give 2 score
Formula for mean and standard deviation give 1 score each

PTO

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
23				

Class	f_i	cf	x_i	$\lvert x_i - 45\rvert$	$f_i \lvert x_i - 45\rvert$
10 – 20	4	4	15	30	120
20 – 30	6	10	25	20	120
30 – 40	10	20	35	10	100
40 – 50	20	40	45	0	0
50 – 60	10	50	55	10	100
60 – 70	6	56	65	20	120
70 – 80	4	60	75	30	120
	60				680

2

a. $N = 60, \ \frac{N}{2} = 30$

$M = l + \left(\frac{\frac{N}{2} - c}{f}\right) h$ — 1

$= 40 + \left(\frac{30 - 20}{20}\right) 10$ — 1

$= 45$

b $MD(\text{Median}) = \frac{\sum f_i \lvert x_i - M \rvert}{N}$ — 1

$= \frac{680}{60}$ — 1

$= 11.33$ — 6

24	a(i)	$S = \{(1,2)(1,3)(1,4)(2,2)(2,3)(2,4)(3,2)(3,3)(3,4)\}$	1	
	(ii)	$A = \{(1,4)(2,3)(3,2)\}$	1	
		$P(A) = \frac{3}{9} = \frac{1}{3}$	1	
		Remark: Concept of probability give 1 score		
	b.	$P(A) = \frac{63}{100} \quad P(B) = \frac{62}{100} \quad P(A \cap B) = \frac{45}{100}$	1	
	(i)	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$	1	
		$= \frac{80}{100}$		
	(ii)	$P(A' \cap B') = 1 - P(A \cup B)$	$\frac{1}{2}$	
		$= \frac{20}{100}$	$\frac{1}{2}$	6

1. Subhash. K.K 9496418185
2. RESMI .K 9447841535
3. J. Johnvicki 9446171748
4. Asha. C.N. 9495966094
5. JASMIN MARTIN 9447343716
6. Mini.O 9946646681
7. GIRIJA DEVI.K 9497853974
8. Rekha.M.R 9946457036
9. PRASEENA.C.K 9526898641.
10 Mini Abraham 8238436116
11 Rajesh.C 9744651467.