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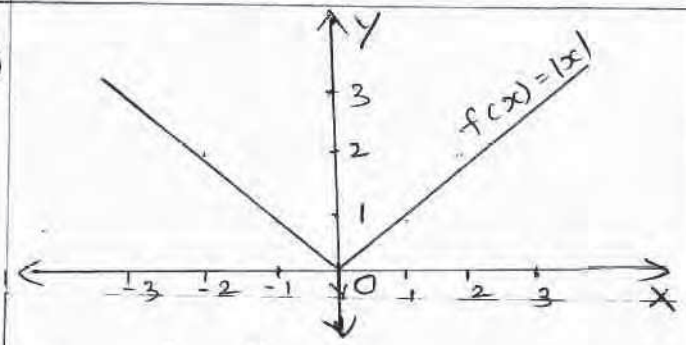
FIRST YEAR HIGHER SECONDARY EXAMINATION SAY/IMP SEPTEMBER 2016

(Scheme of Valuation)

Subject : Mathematics (Commerce) **Code No. 453**

Qn. No		Scoring Indicators	Split Score	Total Score
1.	a)	i) $A - B$	1	
	b)	$B' = \{1,2,3,4,5,8,9,10\}$	1	
		$A \cap B' = \{1,2,5\}$	1	
	c)	$n(M) = 55$, $n(P) = 67$, $n(M \cup P) = 100$		
		ii) $n(M \cap P) = n(M) + n(P) - n(M \cup P)$	1	7
		$= 55 + 67 - 100$	1	
		$= 22$		
		iii) $n(P \text{ only}) = n(P) - n(M \cap P)$	1	
		$= 67 - 22$	1	
		$= 45$		
2.	a)	iii) $(A \times B) \cup (A \times C)$	1	
	b)	$A = \{2,4,6\}$	½	
		$B = \{2,3,5\}$	½	
		$A \times B = \{(2,2),(2,3),(2,5),(4,2),(4,3),(4,5),(6,2),(6,3),(6,5)\}$	1	
		Remark: For any correct 6 elements give 1 score.		
	c)		2	6
		Domain = R	½	
		Range = $\{y : y \geq 0\}$ or $[0, \infty)$	½	
		Remark: For drawing X and Y axes give 1 score		

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3.	a)	iv) Fourth quadrant	1	
	b)	$\tan 3x = \tan(2x+x) = \frac{\tan 2x + \tan x}{1 - \tan 2x \cdot \tan x}$	1	
		$\tan 3x(1 - \tan 2x \cdot \tan x) = \tan 2x + \tan x$	1	
		$\tan 3x - \tan 3x \cdot \tan 2x \cdot \tan x = \tan 2x + \tan x$		4
		$\tan 3x - \tan 2x - \tan x = \tan 3x \cdot \tan 2x \cdot \tan x$	1	
		Remark: For formula $\tan(A+B)$ give 1 score		
		OR		
	a)	i) 1/6	1	
	b)	$\frac{a\sin x + b\cos x}{a\sin x - b\cos x} = \frac{a\tan x + b}{a\tan x - b}$	2	4
		$= \frac{\frac{a^2}{b} + b}{\frac{a^2}{b} - b}$	1	
		$= \frac{a^2 + b^2}{a^2 - b^2}$		
4.		$P(n): 7^n - 3^n$ is divisible by 4		
		$P(1): 7^1 - 3^1 = 4$ is divisible by 4	1	
		$\Rightarrow P(1)$ is true		
		$P(k): 7^k - 3^k = 4p \Rightarrow 7^k = 3^k + 4p$	1	
		$P(k+1): 7^{k+1} - 3^{k+1} = 7 \cdot 7^k - 3 \cdot 3^k$	1	5
		$= 7(3^k + 4p) - 3 \cdot 3^k$		
		$= 4 \cdot 3^k + 28p$	1	
		$= 4 \cdot (3^k + 7p) \Rightarrow P(k+1)$ is true.		
		Thus by PMI, $P(n)$ is true for all natural numbers.	1	

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		OR		
		$P(n): 1^2+2^2+\cdots+n^2=\frac{n(n+1)(2n+1)}{6}$		
		$P(1): 1^2=\frac{1\times2\times3}{6} \Rightarrow 1=1 \Rightarrow P(1)$ is true.	1	
		$P(k): 1^2+2^2+3^2+\cdots+k^2=\frac{k(k+1)(2k+1)}{6}$	1	
		$P(k+1): 1^2+2^2+\cdots+k^2+(k+1)^2=\frac{k(k+1)(2k+1)}{6}$	1	5
		$+(k+1)^2$		
		$=\frac{(k+1)(k+2)(2k+3)}{6}$	1	
		$\Rightarrow P(k+1)$ is true.		
		Thus by PMI, $P(n)$ is true for all $n\in N$	1	
5	a)	ii) $1+i$	1	
	b)	$\frac{1}{1+i}=\frac{1-i}{2}=\frac{1}{2}-\frac{1}{2}i$	1	
		$=r(\cos\theta+i\sin\theta)$	1	
		$r\cos\theta=1/2,\ r\sin\theta=-1/2$		
		$r^2=(1/2)^2+(-1/2)^2=\frac{2}{4}=\frac{1}{2}$		5
		$\therefore r=\frac{1}{\sqrt{2}}$	1	
		$\tan\theta=-1 \Rightarrow \theta=-\pi/4$ or $\frac{7\pi}{4}$	1/2	
		$\therefore \frac{1}{1+i}=\frac{1}{\sqrt{2}}\left(\cos\frac{7\pi}{4}+i\sin\frac{7\pi}{4}\right)$	1/2	
6.		$x+y=5$: x: 0, 5 y: 5, 0 $2x+y=8$: x: 0, 4 y: 8, 0	1+1	

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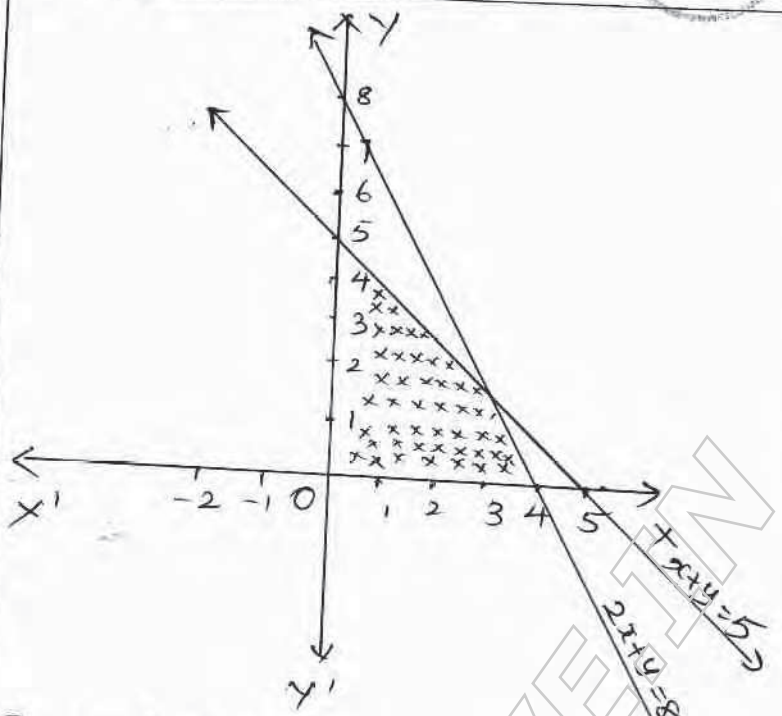
Qn.No	Scoring Indicators	Split Score	Total Score
	 Remark: i) For drawing $x+y=5$ give 1 score. ii) $2x+y=8$ give 1 score. iii) Draw the axis give 1 score.	2	4
7.	a) iii) 1	1	
	b) No. of 4 digit nos $= {}^{6}P_{4}$ $= \frac{6!}{2!}$ $= 360$ Remark: For writing the formula ${}^{n}P_{r}$ give 1 score.	1 1	5
	c) No. of selections $= {}^{4}C_{2}$ $= \frac{4!}{(4-2)!\,2!}$ $= \frac{4 \times 3 \times 2!}{2! \times 2!} = 6$	1 ½ ½	

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Qn.No		Scoring Indicators	Split Score	Total Score
		OR		
	a)	(ii) $n+1C_r$	1	
	b)	No. of committees $= {}^2C_1 \times {}^3C_2$ $= 2 \times 3 = 6$ Remark: For the formula for ${}^nC_r$ give 1 score	1+1	5
	c)	No. of ways $= 5 \times {}^5P_5$ $= 5 \times 5 \times 4 \times 3 \times 2 \times 1$ $= 600$	1 1	
8.	a)	(iii) 11th term	1	
	b)	$T_{r+1} = {}^nC_r a^{n-r} b^r$ $T_{11} = {}^{20}C_{10}\left(\frac{2}{3}x^2\right)^{10}\left(\frac{-3}{2x}\right)^{10}$ $= {}^{20}C_{10}\, x^{10}$	1 2	4
9.	a)	$r = \frac{8}{2} = 4$ $a_n = 2 \times 4^{n-1}$	1 1	
	b)	$S_{10} = \frac{a(r^{10}-1)}{r-1}$ $= \frac{2(4^{10}-1)}{3}$ Remark: For the formula for S_n give 1 score.	1 1	4
		OR		

Qn.No		Scoring Indicators	Split Score	Total Score
	a)	$a+6d = 40$ $S_{13} = \frac{13}{2}[2a+12d]$ $= \frac{13\times 2}{2}[a+6d]$ $= 13\times 40 = 520$	1 ½ ½	
	b)	$r = \frac{t_2}{t_1} = \frac{1/2^2}{1/2} = \frac{1}{2}$ $S_\infty = \frac{1/2}{1-1/2}$ $= 1$ Remark : For the formula S_∞ give 1 score.	1 1	4
10	a)	(ii) $y = 0$	1	
	b)	(i) Slope of AB $= \frac{3-2}{2-1} = 1$ slope of CD $= 1$ Equation of CD is $y-4 = 1(x-5)$ $\Rightarrow x-y = 1$	½ ½ 1	
		(ii) Equation of AB is $\frac{y-3}{1} = \frac{x-2}{1}$ ie. $x-y+1 = 0$ Distance between AB & CD $= \frac{\lvert 1-(-1)\rvert}{\sqrt{1^2+(-1)^2}}$ $= \frac{2}{\sqrt{2}}$ $= \sqrt{2}$ Remark : Formula for writing distance between ll^{el} line give 1 score.	1 1	5

Qn.No		Scoring Indicators	Split Score	Total Score
11	a)	(iii) $(4,-5)$	1	4
	b)	$a=5,\ b=3,\ c=\sqrt{a^2-b^2}=4$	1	
		Foci $=(\pm c, 0)=(\pm 4, 0)$	½	
		Length of latus rectum $=\frac{2b^2}{a}$	½	
		$=\frac{2\times 9}{5}=\frac{18}{5}$		
		Eccentricity $e=\frac{c}{a}=\frac{4}{5}$	1	
12	a)	iv) 8th octant	1	3
	b)	Distance $=\sqrt{(-2-2)^2+(1-(-1))^2+(3-3)^2}$	1	
		$=\sqrt{20}=2\sqrt{5}$ units	1	
		Remark: For distance formula give 1 score		
13	a)		3	5
	b)	$f(x)=\sin x\cdot\cos x$		
		$f'(x)=\sin x(-\sin x)+\cos x\cdot\cos x$	1	
		$=-\sin^2 x+\cos^2 x$	1	
		Remark: For writing product formula give 1 score		

A		B	
i)	$\lim_{x\to 3}(x+3)$	2)	6
ii)	$\lim_{x\to 0}\frac{\sin x}{x}$	1)	1
iii)	$\lim_{x\to 0}\frac{\sin ax}{\sin bx}$	4)	$\frac{a}{b}$

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Qn.No		Scoring Indicators	Split Score	Total Score
14	a)	$\sqrt{7}$ is not rational or $\sqrt{7}$ is irrational or It is false that $\sqrt{7}$ is rational	1	4
	b)	Component statement p: A number is divisible by 9 q: A number is divisible by 3 Converse If a number is divisible by 3 then it is divisible by 9 Contrapositive If a number is not divisible by 3 then it is not divisible by 9.	1 1 1	
15.	a)	Arranging numbers in ascending or decending order 36, 42, 45, 46, 46, 49, 51, 53, 60, 72 Median $= \frac{46+49}{2}$ $= 47.5$	1 1	4
	b)	x_i | $x_i - M$ | $\lvert x_i - M \rvert$ 36 | −11.5 | 11.5 42 | −5.5 | 5.5 45 | −2.5 | 2.5 46 | −1.5 | 1.5 46 | −1.5 | 1.5 49 | 1.5 | 1.5 51 | 3.5 | 3.5 53 | 5.5 | 5.5 60 | 12.5 | 12.5 72 | 24.5 | 24.5	1	
		$\Sigma \lvert x_i - M \rvert = 70$ $M.D = \frac{1}{N}\Sigma \lvert x_i - M \rvert = \frac{1}{10} \times 70 = 7$ Remark: ~~Without drawing~~ Table is not necessary	1	

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Qn.No		Scoring Indicators	Split Score	Total Score

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class	f_i	Mid x_i	$f_i x_i$	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	$f_i(x_i - \bar{x})^2$
30–40	3	35	105	−27	729	2187
40–50	7	45	315	−17	289	2023
50–60	12	55	660	−7	49	588
60–70	15	65	975	3	9	135
70–80	8	75	600	13	169	1352
80–90	3	85	255	23	529	1587
90–100	2	95	190	33	1089	2178

$\Sigma f_i = 50$ $\Sigma f_i x_i = 3100$ $\Sigma f_i(x_i - \bar{x})^2 = 10050$

Split Score: 2

Total Score: 4

$$\text{Mean}(\bar{x}) = \frac{\Sigma f_i x_i}{N}$$

$$= \frac{3100}{50}$$

Split Score: 1

$$= 62$$

$$SD(\sigma^2) = \sqrt{\frac{\Sigma f_i (x_i - \bar{x})^2}{N}}$$

$$= \sqrt{\frac{10050}{50}}$$

Split Score: 1

$$= 14.18$$

Remark: For using short cut method give full score

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Qn.No		Scoring Indicators	Split Score	Total Score
17	a)	i) $1/2$	1	7
	b)	$P(A') = 1 - P(A)$	1	
		$= 1 - 2/3$	1	
		$= 1/3$		
	c)	$P(E \text{ or } F) = P(E) + P(F) - P(E \cap F)$	1	
		$= \frac{1}{4} + \frac{1}{2} - \frac{1}{8}$	1	
		$= \frac{5}{8}$		
		$P(\text{not } E \text{ and not } F) = P(E' \cap F')$	1	
		$= 1 - P(E \cup F)$	1/2	
		$= 1 - 5/8$	1/2	
		$= 3/8$		