

ANSWER KEY

First YEAR HIGHER SECONDARY EXAMINATION March 2022

PART-I/II/III

SUBJECT: Mathematics (Commerce)

CODE NO: FY-51

VERSION:

60 SCORES

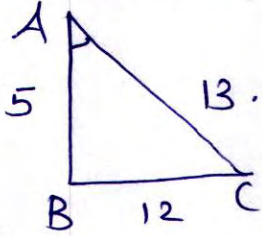
2 HOURS

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
1.		$A \cup B = \{1, 2, 3, 4, 5, 6, 7, 8\}$ $(A \cup B) \cap C = \{1, 2, 3\}$ $A \cap C = \{2\}$ $B \cap C = \{1, 3\}$ $(A \cap C) \cup (B \cap C) = \{1, 2, 3\}$ $\therefore (A \cup B) \cap C = (A \cap C) \cup (B \cap C)$	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3
2.	(i)	$\frac{x}{3} + \frac{y}{4} = 1$ Remark: $\frac{x}{a} + \frac{y}{b} = 1$ (1 score)	1	
	(ii)	The line is $4x + 3y - 12 = 0$ $d = \left \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}} \right $ $= \left \frac{4 \times 0 + 3 \times 0 - 12}{\sqrt{4^2 + 3^2}} \right $ $= \frac{12}{5}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3

(1/12)

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
3	(i)	XY plane	1	
	(ii)	Centroid = $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}, \frac{z_1+z_2+z_3}{3}\right)$ $(2, 1, 3) = \left(\frac{3+4+k}{3}, \frac{0+2+1}{3}, \frac{4+2+3}{3}\right)$ ie $\frac{7+k}{3} = 2$ $\Rightarrow k = -1$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3
4		$a_2 = 2, a_7 = 22$ $a+d = 2, a+6d = 22$ solving $d = 4, a = -2$ Remark: $[a_n = a + (n-1)d: \frac{1}{2} \text{ score}]$	$\frac{1}{2}$ $\frac{1}{2}$	
	ii	$S_n = \frac{n}{2} [2a + (n-1)d]$ $S_{35} = \frac{35}{2} [-4 + 34 \times 4]$ $= 2310$	1 $\frac{1}{2}$ $\frac{1}{2}$	3
5	(i)(c)	$A - B = A \cap B'$	1	
	(ii)	$\phi, \{1\}, \{2\}, \{3\}, \{1, 2\},$ $\{2, 3\}, \{1, 3\}, \{1, 2, 3\}$	2	3

(2/12)

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
6		 <p> $\sin x = -\frac{12}{13}$ $\cos x = -\frac{5}{13}$ $\sin x + \cos x = -\frac{12}{13} + -\frac{5}{13}$ $= -\frac{17}{13}$ </p> <p> <u>Remark:</u> For writing $\sin x = \frac{12}{13}$, $\cos x = \frac{5}{13}$ give $\frac{1}{2}$ score each. </p>	<p>1 1 1</p>	3
7	(i)	<p>$\sqrt{2}$ is not a Complex number.</p> <p>OR</p> <p>It is false that $\sqrt{2}$ is a Complex number</p> <p>OR.</p> <p>It is not the case that $\sqrt{2}$ is a Complex number.</p>	1	3
	(ii)	<p><u>Converse</u>: If n is prime then n is an odd number.</p> <p><u>Contra positive</u>: If n is not prime then n is not an odd number.</p>	1 1	

(3/12)

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
8.		$a^2 = 16, b^2 = 9$ $c^2 = a^2 - b^2$ $= 16 - 9 = 7$ $c = \pm \sqrt{7}$ Focii = $(\pm c, 0)$ $= (\pm \sqrt{7}, 0)$ eccentricity; $e = \frac{c}{a}$ $= \frac{\sqrt{7}}{4}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3
9.		Middle terms are 5 th & 6 th $T_5 = {}^9C_4 (x)^{9-4} \left(-\frac{1}{x}\right)^4$ $= {}^9C_4 x^5 \left(\frac{1}{x^4}\right)$ $= {}^9C_4 \cdot x$ $T_6 = {}^9C_5 (x)^{9-5} \left(-\frac{1}{x}\right)^5$ $= {}^9C_5 x^4 \left(-\frac{1}{x^5}\right)$ $= -{}^9C_5 / x$ <u>Remark:</u> (i) $T_{r+1} = nC_r a^{n-r} b^r$ - $\frac{1}{2}$ score ii) For alternate method give full score.	$\frac{1}{2} + \frac{1}{2}$ 1 $\frac{1}{2}$ 1 $\frac{1}{2}$	4.

P.T.O.

(4/12)

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
10.	(i)	$3x + 7y - 6 = 0$ $7y = -3x + 6$ $y = -\frac{3}{7}x + \frac{6}{7}$ <p>Slope = $-\frac{3}{7}$,</p> <p>y-intercept = $\frac{6}{7}$</p> <p><u>Remark</u> : $y = mx + c$ give $\frac{1}{2}$ score</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	4
	ii	$m_1 = 1$ $m_2 = -\frac{3}{2}$ $\tan \theta = \left \frac{m_1 - m_2}{1 + m_1 m_2} \right $ $= \left \frac{1 - (-\frac{3}{2})}{1 + 1 \cdot (-\frac{3}{2})} \right $ $\tan \theta = 5$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	
11.	i	<p>Equation of the Circle is</p> $(x-h)^2 + (y-k)^2 = r^2$ $(x-1)^2 + (y-\frac{1}{2})^2 = 4^2$ $x^2 - 2x + 1 + y^2 - y + \frac{1}{4} = 16$ $4x^2 + 4y^2 - 8x - 4y - 59 = 0.$	$\frac{1}{2}$ 1 $\frac{1}{2}$	
	ii	$y^2 = 16x$ $4a = 16, a = 4$ <p>focus = (4, 0)</p>	$\frac{1}{2}$ $\frac{1}{2}$	

(5/12)

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
		<p>Equation of directrix is $x = -a$</p> <p><u>Remark</u> For writing the formula focus = $(a, 0)$, equation of directrix $x = -a$; give $\frac{1}{2}$ score each.</p>	1	4.
12	(i)	$\lim_{x \rightarrow 0} \frac{\sin 3x}{\tan 4x} = \lim_{x \rightarrow 0} \frac{\sin 3x}{3x} \times \frac{3x}{\tan 4x}$ $= \lim_{x \rightarrow 0} \frac{1 \times 3x}{1 \times 4x} = \frac{3}{4}$ <p><u>Remark.</u> $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ give 1 score.</p>	1	4
	(ii)	<p>(a) $\frac{dy}{dx} = 2x$</p> $\frac{d(u \cdot v)}{dx} = u \cdot \frac{dv}{dx} + v \cdot \frac{du}{dx}$ $\frac{dy}{dx} = x \cos x + \sin x$ <p>(For writing product rule give $\frac{1}{2}$ score).</p>	1	
13.	(i)	$S = \{1, 3, 5, 2H, 2T, 4H, 4T, 6H, 6T\}$ <p><u>Remark:</u> For writing any correct 5 element give $1\frac{1}{2}$ score.</p>	2.	

(6/12)

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
	(ii)	$S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$ $A = \{HHH, HHT, HTH, HTT, THH, THT, TTH\}$ $P(A) = \frac{7}{8}$ <p>NB: For direct answer give full score.</p>	$\frac{1}{2}$ $\frac{1}{2}$ 1	4.
14.		<p>C - Coffee T - Tea.</p> $n(C \cup T) = 70, n(C) = 37, n(T) = 52$ <p>i</p> $n(C \cup T) = n(C) + n(T) - n(C \cap T)$ $70 = 37 + 52 - n(C \cap T)$ $n(C \cap T) = 19$ <p>ii</p> $n(C \text{ only}) = n(C) - n(C \cap T)$ $= 37 - 19 = 18$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 1	4
15		<p>Domain = \mathbb{R} Range = $[2, \infty)$</p> <p>Remark: For drawing graph like</p> <p>give 1 score.</p>	2 1 1	4.

(7/12)

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
16.	(i)	<p>Given ${}_{10}P_2 = 2 \times {}_9P_2$</p> $\frac{10!}{(10-r)!} = 2 \times \frac{9!}{(9-r)!}$ $\frac{10}{10-r} = 2$ $r = 5$ <p>Remark: ${}_nP_r = \frac{n!}{(n-r)!}$ give $\frac{1}{2}$ score.</p>	1 $\frac{1}{2}$ $\frac{1}{2}$	4.
	ii	<p>Number of ways = ${}_{26}C_4 + {}_{26}C_4$</p> $= \underline{\underline{29900}}$	2	
17.		<p>$P(n) : 1+3+5+\dots+(2n-1) = n^2$</p> <p>$P(1) : 1 = 1^2$</p> <p>$\therefore P(1)$ is true</p> <p>Assume: $P(k) : 1+3+5+\dots+(2k-1) = k^2$ is true</p> <p>$P(k+1) : 1+3+\dots+(2k-1)+(2k+1)$</p> $= k^2 + (2k+1)$ $= (k+1)^2$ <p>Hence $P(k+1)$ is true</p> <p>\therefore By PMI, $P(n)$ is true for all $n \in \mathbb{N}$.</p>	1 1 1 $\frac{1}{2}$ $\frac{1}{2}$	4

(8/12)

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
18.	(i)	$a_n = n(n+1)$ $S_n = \sum a_n$ $= \sum n(n+1)$ $= \sum n^2 + \sum n$ $= \frac{n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2}$ $= \frac{n(n+1)(n+2)}{3}$ <p>Remark: For writing $\sum n = \frac{n(n+1)}{2}$ $\sum n^2 = \frac{n(n+1)(2n+1)}{6}$ give $\frac{1}{2}$ score each.</p>	$\frac{1}{2}$ 1 $\frac{1}{2}$ 1	
	(ii) ^(a)	$a = 5, r = 2, S_n = 315$ $S_n = a \frac{(r^n - 1)}{r - 1}$ $315 = \frac{5(2^n - 1)}{1}$ <p>ie $n = 6$</p>	$\frac{1}{2}$ 1 $\frac{1}{2}$	
	(b)	<p>Last term $a_n = ar^{n-1}$ $a_6 = 5 \times 2^5$ $= \underline{\underline{160}}$</p>	$\frac{1}{2}$ $\frac{1}{2}$	
19.	(i)	$\cos 4x - \cos 2x = 0$ $-2 \sin 3x \cdot \sin x = 0$ $\sin 3x = 0$ OR $\sin x = 0$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
		$\Rightarrow 3x = n\pi \quad \text{or} \quad x = \frac{n\pi}{3}$ $n \in \mathbb{Z}$ $x = \frac{n\pi}{3} \quad \text{or} \quad n\pi.$ <p>Remark: $\cos x - \cos y = -2 \sin\left(\frac{x+y}{2}\right) \cdot \sin\left(\frac{x-y}{2}\right)$ give $\frac{1}{2}$ score.</p>	$\frac{1}{2} + \frac{1}{2}$	
	(ii)	$\text{LHS} = \frac{2 \cos 6x \cdot \cos x}{2 \cos 6x \cdot \sin x}$ $= \frac{\cos x}{\sin x}$ $= \cot x.$ <p>Remark: $\cos x + \cos y = 2 \cos\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right)$ $\sin x - \sin y = 2 \cos\left(\frac{x+y}{2}\right) \sin\left(\frac{x-y}{2}\right)$ give $\frac{1}{2}$ score each.</p>	1+1 1	6
20	(i)	$(2+3i)(1-i) = 2-2i+3i-3i^2$ $= 5+i$	1 1	
	ii)	$\sqrt{7+24i} = x+iy$ $7+24i = x^2 - y^2 + i(2xy)$ $x^2 - y^2 = 7$ $2xy = 24$ $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ $= 49 + 576 = 625$ $x^2 + y^2 = 25$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	

(10/12)

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score												
		<p>Solving</p> $x^2 = 16$ $\Rightarrow x = \pm 4$ $y^2 = 9$ $\Rightarrow y = \pm 3$ $\sqrt{7+24i} = 4+3i, -4-3i$ <p>NB: Any alternate method give full score.</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p>	<p>6</p>												
21.		<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> $x+2y=8$ <table border="1" style="margin: 0 auto;"> <tr><td>x</td><td>0</td><td>8</td></tr> <tr><td>y</td><td>4</td><td>0</td></tr> </table> </div> <div style="text-align: center;"> $2x+y=8$ <table border="1" style="margin: 0 auto;"> <tr><td>x</td><td>0</td><td>4</td></tr> <tr><td>y</td><td>8</td><td>0</td></tr> </table> </div> </div> <div style="text-align: center; margin-top: 20px;"> </div> <p>Remark: i) Drawing axis give $\frac{1}{2}$ score ii) For each correct line give 2 score</p>	x	0	8	y	4	0	x	0	4	y	8	0	<p>1+1</p> <p>4</p>	<p>6</p>
x	0	8														
y	4	0														
x	0	4														
y	8	0														

Qn. No	Sub Qns	Answer Key/Value Points						Score	Total Score
22.		class	f_i	Mid x_i	$f_i x_i$	$ x_i - \bar{x} $	$f_i x_i - \bar{x} $		
		10-20	2	15	30	30	60		
		20-30	3	25	75	20	60		
		30-40	8	35	280	10	80		
		40-50	14	45	630	0	0	2	
		50-60	8	55	440	10	80		
		60-70	3	65	195	20	60		
		70-80	2	75	150	30	60		
			40		1800		400		
		$\bar{x} = \frac{\sum f_i x_i}{N}$ $= \frac{1800}{40} = 45$						1	6
		$M.D(\bar{x}) = \frac{\sum f_i x_i - \bar{x} }{N}$						1	
		$= \frac{400}{40} = 10$						1	

(12/12)

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