

ANSWER KEYFIRST YEAR HIGHER SECONDARY ^{IMPVT} EXAMINATION OCT 2022

PART-I/II/III

SUBJECT: MATHEMATICS (COMMERCE)CODE NO: F4 851

VERSION: _____

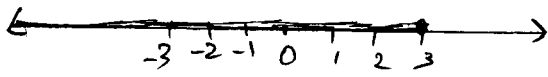
60 SCORES2 HOURS

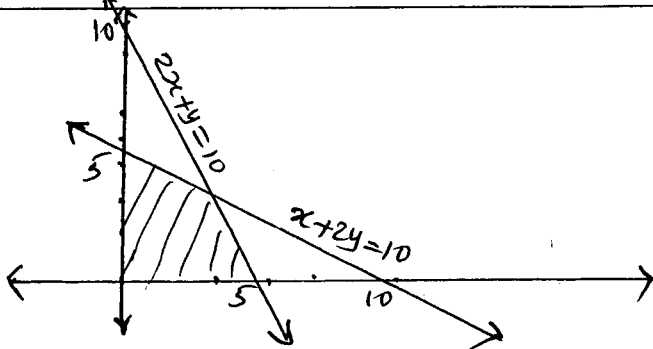
Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
1	a) b) c)	$\{-1, 0, 1, 2, 3, 4\}$ $(-4, 6]$ 2^2	1 1 1	3
2	a) b) c)	$A \cap B = \{2\}$ $A \cup B = \{1, 2, 3, 4, 5\}$ $A \cap A' = \phi$	1 1 1	3
3		$\cos x = -4/5$ $\tan x = -3/4$ $\operatorname{cosec} x = 5/3$	1 1 1	3
4	a) b)	10 th term = $5 \cdot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

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

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
11.		$(x+1)^4 + (x-1)^4 = (x^4 + 4C_1 x^3 + 4C_2 x^2 + 4C_3 x + 1) +$ $(x^4 - 4C_1 x^3 + 4C_2 x^2 - 4C_3 x + 1)$ $= 2x^4 + 12x^2 + 2.$ $(\sqrt{2}+1)^4 + (\sqrt{2}-1)^4 = 2(\sqrt{2})^4 + 12(\sqrt{2})^2 + 2$ $= 34$ <p>Remark: For writing Binomial Expansion give 1 score</p>	<p>1</p> <p>1</p> <p>1</p> <p>1/2</p> <p>1/2.</p>	4
12.	a)	<p>Slope of line through (1, 1) and (3, 2) is</p> $m_1 = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1}{2}$ <p>Slope of perpendicular line, $m_2 = -\frac{1}{m_1} = -2$</p>	<p>1</p> <p>1</p>	4.
	b)	<p>Distance = $\left \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}} \right$</p> $= \left \frac{1+1-3}{\sqrt{1^2+1^2}} \right $ $= \frac{1}{\sqrt{2}}$	<p>1</p> <p>1</p>	
13		$a^2 = 16, \quad a = 4$ $b^2 = 9, \quad b = 3$ $c^2 = a^2 - b^2$ $= 16 - 9 = 7$ $c = \sqrt{7}$ $e = \frac{c}{a}$ $= \frac{\sqrt{7}}{4}$ <p>Length of latus rectum = $\frac{2b^2}{a}$</p> $= 2 \times \frac{9}{4}$ $= \frac{9}{2}$	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p>	4
14	a)	<p>(i) Lt $x(x+1) = 1(1+1) = 2$ $x \rightarrow 1$</p> <p>(ii) Lt $\frac{x^3 - 2^3}{x - 2} = 3 \times 2^2 = 12$ $x \rightarrow 2$</p>	<p>1</p> <p>1</p>	4.
	b)	<p>(i) $\frac{d}{dx}(x^5) = 5x^4$</p> <p>(ii) $\frac{d}{dx}(\cos x) = -\sin x$</p>	<p>1</p> <p>1</p>	

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

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score												
18	a) b) c)	$i^8 = 1$ $3(7+i^8) + i(7+i^8) = 21 + 21i + 7i + 7i^2$ $= 14 + 28i$ Let $1+i\sqrt{3} = r(\cos\theta + i\sin\theta)$ $r\cos\theta = 1$ $r\sin\theta = \sqrt{3}$ Squaring and adding, we get $r^2 = 4$, $r = 2$ $\therefore \cos\theta = \frac{1}{r} = \frac{1}{2}$ and $\sin\theta = \frac{\sqrt{3}}{r} = \frac{\sqrt{3}}{2}$ $\therefore \theta = \pi/3$ $1+i\sqrt{3} = 2(\cos\pi/3 + i\sin\pi/3)$	1 1 1 1/2 1/2 1 1	6												
19.	a) b) c)	$\sin(x-y) = \sin x \cos y - \cos x \sin y$ $\sin 15^\circ = \sin(45-30)$ $= \sin 45 \cos 30 - \cos 45 \sin 30$ $= \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}} \times \frac{1}{2}$ $= \frac{\sqrt{3}-1}{2\sqrt{2}}$ $\text{LHS} = \cos\left[\left(\frac{\pi}{4}-x\right) + \left(\frac{\pi}{4}-y\right)\right]$ $= \cos\left[\frac{\pi}{2} - (x+y)\right]$ $= \sin(x+y)$	1 1 1 1 1	6												
20.	a) b)	$7x - 5x < 9 - 3$ $2x < 6$ $x < 3$  $x+2y=10$ $2x+y=10$ <table border="1" data-bbox="371 1921 619 2027"> <tr><td>x</td><td>0</td><td>10</td></tr> <tr><td>y</td><td>5</td><td>0</td></tr> </table> <table border="1" data-bbox="818 1933 1034 2027"> <tr><td>x</td><td>0</td><td>5</td></tr> <tr><td>y</td><td>10</td><td>0</td></tr> </table>	x	0	10	y	5	0	x	0	5	y	10	0	1/2 1/2 1	
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Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score																												
		 <p data-bbox="303 515 1204 593"><u>Remark</u>: Graph of each correct line give 2 score.</p>	4	6																												
21.	<p>a)</p> <p>b)</p>	$a_n = 2n + 5$ $a_1 = 7, a_2 = 9, a_3 = 11, a_4 = 13$ $1, 3, 5, 7, \dots, 2001$ $a = 1, d = 2$ $n^{\text{th}} \text{ term} = 2001 \quad \therefore a + (n-1)d = 2001$ $1 + (n-1)2 = 2001$ $\therefore n = 1001$ $S_n = \frac{n}{2} [2a + (n-1)d]$ $= \frac{1001}{2} [2 \times 1 + 1000 \times 2]$ $= 1002001$	<p>2.</p> <p>1</p> <p>1</p> <p>1/2</p> <p>1/2.</p> <p>1</p>	6																												
22.	a)	<table border="1" data-bbox="367 1344 925 1758"> <thead> <tr> <th>x_i</th> <th>f_i</th> <th>$f_i x_i$</th> <th>$f_i x_i^2$</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>3</td> <td>30</td> <td>300</td> </tr> <tr> <td>30</td> <td>7</td> <td>210</td> <td>6300</td> </tr> <tr> <td>50</td> <td>12</td> <td>600</td> <td>30000</td> </tr> <tr> <td>70</td> <td>15</td> <td>1050</td> <td>73500</td> </tr> <tr> <td>90</td> <td>3</td> <td>270</td> <td>24300</td> </tr> <tr> <td></td> <td>40</td> <td>2160</td> <td>134400</td> </tr> </tbody> </table> $\text{Mean } \bar{x} = \frac{\sum f_i x_i}{\sum f_i}$ $= \frac{2160}{40} = 54$	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	<p>1</p> <p>1</p>	
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	b)	<p>Variance, $\sigma^2 = \frac{\sum f_i x_i^2}{\sum f_i} - \left(\frac{\sum f_i x_i}{\sum f_i} \right)^2$</p> <p>$= \frac{134400}{40} - \left(\frac{2160}{40} \right)^2$</p> <p>$= 444$</p> <p>Standard Deviation = $\sqrt{\text{Variance}}$</p> <p>$= \sqrt{444}$</p> <p>$= 21.071$</p> <p><u>Remark</u>: For correct table give 2 score</p>	1 1 1 1	6
	1. 1. 2. 1	<p>J. John Victor : 9446171248</p> <p>HAREESH.S : 9447451517</p>	