

**ANSWER KEY**

Code No

FY-427

FIRST YEAR HIGHER SECONDARY EXAMINATION MARCH 2023

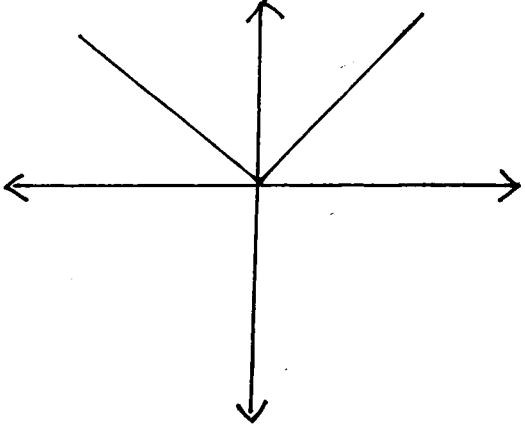
PART-I/II/III

SUBJECT: Mathematics Science 6060 SCORES2 HOURS

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
1	(i)	B	1	3
	(ii)	$\{1, 2, 3, 4, 5, 6\}$	1	
	(iii)	$\phi, \{2\}$	1	
2		$3(1-x) < 2(x+4)$ $3 - 3x < 2x + 8$ $3 - 8 < 2x + 3x$ $-5 < 5x$ $x > -1 \quad \text{or} \quad (-1, \infty)$	1 $\frac{1}{2}$ $\frac{1}{2}$ 1	3
3	(i)	$x+1=3, \quad y-4=7$ $x=2, \quad y=11$	$\frac{1}{2}$ $\frac{1}{2}$	3
	(ii)	$A = \{-a, 0, a\}$ $A \times A = \{(-a, -a), (-a, 0), (-a, a), (0, -a), (0, 0), (0, a), (a, -a), (a, 0), (a, a)\}$	1 1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
4		<p>Total number of letters = 9 (2 I's, 3 T's)</p> $\frac{9!}{2! \times 3!}$ <p>Number of words begin with N</p> $= \frac{8!}{2! \times 3!}$ <p>Remark: formula <math>\frac{n!}{p_1! \times p_2!}</math> only give 1 score</p>	1 1 1	3
5		$\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} 2x + 3 = 3$ $\lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} 3(x+1) = 3$ $\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^+} f(x) = 3$ $\lim_{x \rightarrow 0} f(x) = 3$ <p>Remark: L.H.L = R.H.L = limit exists give 1 score</p>	1 1 1	3
6	(i)	(b) yz-plane	1	
	(ii)	<p>Distance = <math>\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}</math></p> $= \sqrt{(-2 - 2)^2 + (4 - 3)^2 + (3 - 1)^2}$ $= \sqrt{16 + 4 + 4} = \sqrt{24} = 2\sqrt{6}$	1 1	3

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
7		$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $0.6 = 0.35 + P(B) - 0.25$ $P(B) = 0.5$ $P(\text{not } B) = 1 - P(B)$ $= 1 - 0.5 = 0.5$ <p>Remark: (i) P(B) correct give full score (ii) Attempting the question give 1 score.</p>	1 $\frac{1}{2}$ $\frac{1}{2}$ 1	3
8		$x^2 + 8x + y^2 + 10y = 8$ $x^2 + 8x + 16 + y^2 + 10y + 25 = 8 + 16 + 25$ $(x+4)^2 + (y+5)^2 = 49$ $(x-h)^2 + (y-k)^2 = r^2$ $\text{Centre} = (h, k) = (-4, -5)$ $\text{Radius} = r = 7$	$\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$	3
9	(i) (ii) (iii)	$A \cup B = \{2, 3, 4, 5\}$ $A' = \{1, 4, 5, 6\}$ $B' = \{1, 2, 6\}$ $(A \cup B)' = \{1, 6\}$ $A' \cap B' = \{1, 6\}$ $(A \cup B)' = A' \cap B'$	1 $\frac{1}{2}$ $\frac{1}{2}$ 1 1	4

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
10	(i)	$(f+g)(x) = f(x) + g(x)$ $= (x+1) + (2x-3)$ $= 3x-2$	$\frac{1}{2}$	
	(ii)	$(fg)(x) = f(x) \cdot g(x)$ $= (x+1)(2x-3)$  <p>Domain = <math>\mathbb{R}</math></p> <p>Range = Non negative Real numbers</p> <p>Remark: Drawing axis or drawing V shape give 1 score</p>	$\frac{1}{2}$ $\frac{1}{2}$	4
11	(i)	$i^{-35} = \frac{1}{i^{35}}$ $= i$	$\frac{1}{2}$ $\frac{1}{2}$	
	(ii)	$z = \frac{1+i}{1-i} \times \frac{1+i}{1+i} = i$ $\bar{z} = -i$ $z^{-1} = \frac{1}{z} = \frac{1}{i} = -i$ <p>Remark: (i) <math>\bar{z} = \frac{1-i}{1+i}</math> give 1 score (ii) formula only <math>z^{-1} = \frac{\bar{z}}{ z ^2}</math> give 1 score</p>	$\frac{1}{2} + \frac{1}{2}$ 1 $\frac{1}{2} + \frac{1}{2}$	4

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
12	(i) (ii)	$52C_4$ Getting 2 red cards = $26C_2$ " 2 black cards = $26C_2$ 2 red cards and 2 black cards $= 26C_2 \times 26C_2$ $= \left(\frac{26 \times 25}{1 \times 2}\right)^2$ $= 105625$	1 1 1 1	4
13	(i) (ii)	5 $(x - \frac{1}{x})^4 = x^4 - 4C_1 x^3 \cdot \frac{1}{x} +$ $4C_2 x^2 \cdot \frac{1}{x^2} - 4C_3 x \cdot \frac{1}{x^3} + 4C_4 \frac{1}{x^4}$ $= x^4 - 4x^2 + 6 - \frac{4}{x^2} + \frac{1}{x^4}$ Remark: Writing the expansion $(a+b)^n$ or $(a-b)^n$ give 1 score	1 2 1	4
14		$1, a_2, a_3, a_4, 256$ are in GP $a_1 = 1, a_5 = 256$ $a_1 r^4 = 256$ $r^4 = 256$ $r = \pm 4$ $a_2 = a_1 r = 4, a_3 = 16, a_4 = 64$ Numbers are 4, 16, 64 Remark: $a_n = ar^{n-1}$ give 1 score formula only	1 1 $\frac{1}{2}$ $\frac{1}{2}$ 1	4



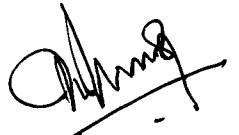

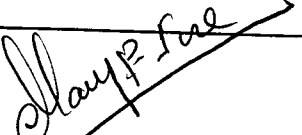

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
15		$a^2 = 9, b^2 = 16$ $c = \sqrt{a^2 + b^2}$ $= 5$ focii = $(\pm c, 0) = (\pm 5, 0)$ Vertices = $(\pm a, 0) = (\pm 3, 0)$ $e = \frac{c}{a} = \frac{5}{3}$ Length of latus rectum = $\frac{2b^2}{a}$ $= \frac{32}{3}$ Remark: (i) <sup>only</sup> standard equation of hyperbola give $\frac{1}{2}$ score (ii) $a=3, b=4$ give $\frac{1}{2}$ score	$\frac{1}{2}$ $\frac{1}{2}$ 1 1 $\frac{1}{2}$ $\frac{1}{2}$	4
16	(i) (ii) (iii) (iv)	$\frac{4}{9}$ $\frac{2}{9}$ $\frac{3}{9} = \frac{1}{3}$ $\frac{6}{9} = \frac{2}{3}$	1 1 1 1	4
17	(i) (ii)	$25^\circ = 25 \times \frac{\pi}{180}$ $= \frac{5\pi}{36}$ $\sin 15^\circ = \sin(45^\circ - 30^\circ)$ $= \sin 45^\circ \cos 30^\circ - \cos 45^\circ \sin 30^\circ$ $= \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}} \times \frac{1}{2}$ $= \frac{\sqrt{3} - 1}{2\sqrt{2}}$	1 $\frac{1}{2}$ 1 $\frac{1}{2}$	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
	(ii)	$\text{L.H.S} = \frac{2 \sin\left(\frac{3x+x}{2}\right) \cos\left(\frac{3x-x}{2}\right)}{2 \cos\left(\frac{3x+x}{2}\right) \cos\left(\frac{3x-x}{2}\right)}$ $= \frac{\sin 2x}{\cos 2x}$ $= \tan 2x = \text{R.H.S}$ <p>Remark: (i) <math>\sin(x-y) = \sin x \cos y - \cos x \sin y</math> only formula give 1 score</p> <p>(ii) <math>\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}</math> (1 score) formula only <math>\cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2}</math> (1 score)</p>	2 1	6
18	(i)	$y - y_1 = m(x - x_1)$ $y - 3 = \frac{1}{2}(x + 4)$	1 1	6
	(ii)	$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1} (x - x_1)$ $y - -1 = \frac{5 - -1}{3 - -1} (x - -1)$ $y + 1 = \frac{6}{2} (x - -1)$ $= 3(x - -1)$	1 1	
	(iii)	$\tan \theta = \left  \frac{m_2 - m_1}{1 + m_1 m_2} \right $ $m_1 = \frac{1}{2} \quad m_2 = 3$ $\tan \theta = \left  \frac{3 - \frac{1}{2}}{1 + \frac{3}{2}} \right $ $\tan \theta = 1$ $\theta = 45^\circ = \frac{\pi}{4} \text{ only}$	1 $\frac{1}{2}$	
		<p>Remark: (ii) Finding slope <math>m = 3</math> give 1 score</p>	$\frac{1}{2}$	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
19	(i)	<p>Let <math>f(x) = \tan x</math></p> $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{\tan(x+h) - \tan x}{h}$ $= \lim_{h \rightarrow 0} \frac{\frac{\sin(x+h)}{\cos(x+h)} - \frac{\sin x}{\cos x}}{h}$ $= \lim_{h \rightarrow 0} \frac{\sin(x+h) \cos x - \cos(x+h) \sin x}{\cos(x+h) \cos x \cdot h}$ $= \lim_{h \rightarrow 0} \frac{\sin(x+h-x)}{\cos(x+h) \cos x \cdot h}$ $= \lim_{h \rightarrow 0} \frac{\sin h}{\cos(x+h) \cos x \cdot h}$ $= \lim_{h \rightarrow 0} \frac{\sin h}{h} \times \frac{1}{\cos(x+h) \cos x}$ $= \frac{1}{\cos^2 x} = \sec^2 x$	1 1 1 1 1 1	6
	(ii)	<p><math>y = x \sin x</math></p> $\frac{dy}{dx} = x \cdot \frac{d}{dx}(\sin x) + \sin x \cdot \frac{d}{dx}(x)$ $= x \cos x + \sin x \times 1$ $= x \cos x + \sin x$ <p>Remark (i) <sup>only</sup> Direct answer give 1 score  (ii) <sup>only for</sup> Writing product rule give 1 score  <math>\nearrow</math></p>	1 1	



Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score																																			
20		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>class</th> <th><math>f_i</math></th> <th>Mid <math>x_i</math></th> <th><math>x_i f_i</math></th> <th><math>x_i^2 f_i</math></th> </tr> </thead> <tbody> <tr> <td>0-10</td> <td>5</td> <td>5</td> <td>25</td> <td>125</td> </tr> <tr> <td>10-20</td> <td>8</td> <td>15</td> <td>120</td> <td>1800</td> </tr> <tr> <td>20-30</td> <td>15</td> <td>25</td> <td>375</td> <td>9375</td> </tr> <tr> <td>30-40</td> <td>16</td> <td>35</td> <td>560</td> <td>19600</td> </tr> <tr> <td>40-50</td> <td>6</td> <td>45</td> <td>270</td> <td>12150</td> </tr> <tr> <td></td> <td><math>\Sigma f_i = 50</math></td> <td></td> <td><math>\Sigma x_i f_i = 1350</math></td> <td>43050</td> </tr> </tbody> </table> <p>(i) Mean <math>\bar{x} = \frac{\Sigma x_i f_i}{\Sigma f_i} = \frac{1350}{50} = 27</math>      1+1</p> <p>(ii) Variance <math>\sigma^2 = \frac{1}{N} \Sigma x_i^2 f_i - \left( \frac{\Sigma x_i f_i}{N} \right)^2</math>      1  <math>= \frac{1}{50} \times 43050 - (27)^2</math>      1  <math>= 861 - 729</math>      1  <math>= 132</math></p> <p>(iii) S.D = <math>\sqrt{\text{Variance}}</math>      <math>\frac{1}{2}</math>  <math>= \sqrt{132}</math>      <math>\frac{1}{2}</math>  <math>= 11.49</math></p> <p>Correct table - 2 score only</p>	class	$f_i$	Mid $x_i$	$x_i f_i$	$x_i^2 f_i$	0-10	5	5	25	125	10-20	8	15	120	1800	20-30	15	25	375	9375	30-40	16	35	560	19600	40-50	6	45	270	12150		$\Sigma f_i = 50$		$\Sigma x_i f_i = 1350$	43050		6
class	$f_i$	Mid $x_i$	$x_i f_i$	$x_i^2 f_i$																																			
0-10	5	5	25	125																																			
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	$\Sigma f_i = 50$		$\Sigma x_i f_i = 1350$	43050																																			

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