

ANSWER KEY

F.I.R.S.T YEAR HIGHER SECONDARY EXAMINATION ..JUNE.. 2022

PART-I/II/III

SUBJECT:Mathematics...(Science.)

CODE NO: ..F.Y...27

VERSION:

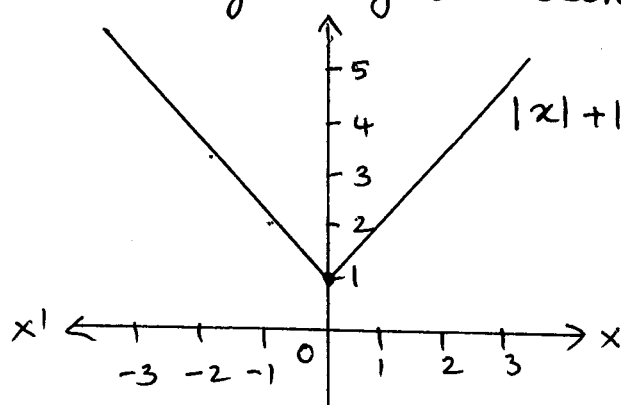
G.O. SCORES

...2... HOURS

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|--------|-------------|--|--|-------------|
| 1 | (i) (ii) | (b) ϕ (a) $A = \{1, 2\}$ (b) $\{1\}, \{2\}, \{1, 2\}, \phi$ Remark (b) For any correct three answer give 1 score. | 1 1 1 | 3 |
| 2 | (i) (ii) | $\frac{25\pi}{180}$ or $\frac{5\pi}{36}$ Remark $1^\circ = \frac{\pi}{180}^c$ give $\frac{1}{2}$ score (ii) $\sin x = \frac{-5}{13}$, $\cos x = \frac{-12}{13}$ Remark $\sin x = \frac{5}{13}$, and $\cos x = \frac{12}{13}$ give $1\frac{1}{2}$ score | 1 1 1 | 3 |
| 3 | (i) (ii) | $x = \pm 1$ Remark: 1 for $b^2 = ac$ give $\frac{1}{2}$ score Remark 2 $x = 1$ or $x = -1$ give 1 score (ii) $a = \sqrt{3}$, $r = \sqrt{3}$ $a_n = a r^{n-1}$ $= \sqrt{3} (\sqrt{3})^{n-1}$ $= \sqrt{3}^n$ | 1 $\frac{1}{2}$ 1 $\frac{1}{2}$ | 3 |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|--------|-------------|--|---|-------------|
| 4 | | $m_1 = \sqrt{3}, m_2 = \frac{1}{\sqrt{3}}$ $\tan \theta = \left \frac{m_1 - m_2}{1 + m_1 m_2} \right $ $= \left \frac{\sqrt{3} - \frac{1}{\sqrt{3}}}{1 + 1} \right $ $= \frac{1}{\sqrt{3}}$ $\theta = 30^\circ \text{ or } \frac{\pi}{6}$ <p>Remark: Slope (m) = $-\frac{a}{b}$ give $\frac{1}{2}$ score</p> | 1 1 $\frac{1}{2}$ $\frac{1}{2}$ | 3 |
| 5 | (i) (ii) | <p>(d) (2, 0)</p> $x^2 + 6x + 3^2 + y^2 - 4y + 2^2 - 9 - 4 - 3 = 0$ $(x+3)^2 + (y-2)^2 - 16 = 0$ $(x+3)^2 + (y-2)^2 = 16$ <p>Centre = (-3, 2)</p> <p>radius = 4</p> <p>Remark: Centre = (-g, -f) give $\frac{1}{2}$ score radius = $\sqrt{g^2 + f^2 - c}$ give $\frac{1}{2}$ score</p> | 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ | 3 |
| 6 | | <p>x-coordinate is zero or $x=0$</p> $\frac{mx_2 + nx_1}{m+n} = 0$ $3m - 2n = 0$ $3m = 2n$ $\frac{m}{n} = \frac{2}{3} \text{ or } m:n = 2:3$ <p>Remark: 1 $m:n=k:1$ and getting correct answer give 3 score.</p> | 1 $\frac{1}{2}$ 1 $\frac{1}{2}$ | 3 |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|--------|---------|---|---|-------------|
| | | <u>Remark 2</u> For $\frac{m}{n} = \frac{-x_1}{x_2} = \frac{2}{3}$, $m:n=2:3$ give 3 score. | | |
| 7 | (i) | $= 2^2 - 4$ $= 0$ | $\frac{1}{2}$ | |
| | (ii) | $\lim_{x \rightarrow 2} (x+2)$ $= 4$ | $\frac{1}{2}$ | |
| | | <u>Remark 1</u> $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = n a^{n-1}$ give $\frac{1}{2}$ score <u>Remark 2</u> $x^2 - 4 = (x-2)(x+2)$ give $\frac{1}{2}$ score | | |
| | (iii) | 4 | 1 | 3 |
| | | <u>Remark</u> $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ give $\frac{1}{2}$ score | | |
| 8 | | Assume that $\sqrt{3}$ is rational $\sqrt{3} = \frac{a}{b}$, a and b have no common factors $3 = \frac{a^2}{b^2}$, $a^2 = 3b^2 \Rightarrow 3$ divides a Let $a = 3c$, $a^2 = 9c^2$, $b^2 = 3c^2 \Rightarrow 3$ divides b 3 is a common factor of both a and b a contradiction, therefore $\sqrt{3}$ is irrational | 1 $\frac{1}{2}$ 1 $\frac{1}{2}$ | 3 |
| 9 | (i) | (a) $[-4, 5]$ | 1 | |
| | (ii) | $A \cup B = \{2, 3, 4, 5, 6\}$ $(A \cup B)^c = \{1, 7\}$ $A^c = \{1, 5, 7\}$ $B^c = \{1, 2, 6, 7\}$ $A^c \cap B^c = \{1, 7\}$ | 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ | 4 |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|--------|---------|--|-------------------------|-------------|
| | | $(A \cup B)' = A' \cap B'$ <u>Remark</u> $A' = U - A$, give $\frac{1}{2}$ score | | |
| 10 | (i) | $R = \{(1, 2), (2, 4), (3, 6), (4, 8)\}$ Domain = $\{1, 2, 3, 4\}$ Range = $\{2, 4, 6, 8\}$ <u>Remark</u> : For writing $R = \{(1, 2), (2, 4), (3, 6), (4, 8)\}$ or arrow diagram give 1 score. | 1 1 | |
| | (ii) |  | 2 | 4 |
| | | <u>Remark</u> : correct graph of $ x $ or $ x+1 $ give 1 score | | |
| 11 | (i) | $P(1) = \frac{1}{2}$ $P(1)$ is true | 1 | |
| | (ii) | Assume that $P(k)$ is true $P(k) = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots + \frac{1}{2^k} = 1 - \frac{1}{2^k}$ $P(k+1) = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots + \frac{1}{2^k} + \frac{1}{2^{k+1}}$ $= 1 - \frac{1}{2^k} + \frac{1}{2^{k+1}}$ $= 1 - \frac{1}{2^k} \left(1 - \frac{1}{2}\right)$ $= 1 - \frac{1}{2^{k+1}}$ | 1 1 $\frac{1}{2}$ | |
| | | $P(k+1)$ is true whenever $P(k)$ is true. \therefore PMI $P(n)$ is true for every n | $\frac{1}{2}$ | 4 |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|--------|---------|---|---|-------------|
| 12 | (i) | $n=17$ Remark $n=a+b$ give $\frac{1}{2}$ Score | 1 | 4 |
| | (ii) | $nP_r = \frac{n!}{(n-r)!}$ or $\frac{17!}{(17-r)!}$ | 1 | |
| | (iii) | Required permutation = $\frac{11!}{2! \times 2! \times 2!}$ Remark 1 $\frac{n!}{P_1! \times P_2! \times \dots \times P_k!}$ give $\frac{1}{2}$ Score. | 2 | |
| | | Remark 2 : $n=11$, M's-2, A-2, T-2 give 1 Score. | | |
| 13 | (i) | 11 | 1 | 4 |
| | (ii) | $T_{r+1} = {}^nC_r a^{n-r} b^r$ $= {}^{10}C_r x^{10-r} (9y)^r$ | $1\frac{1}{2}$ $\frac{1}{2}$ | |
| | (iii) | $T_5 = {}^{10}C_4 x^{10-4} (9y)^4$ $= {}^{10}C_4 x^6 9^4 y^4$ | 1 | |
| | | Remark: $r=4$, give $\frac{1}{2}$ score. | | |
| 14 | | $S_n = 8 + 88 + \dots$ n terms $= 8 [1 + 11 + \dots$ n terms] $= \frac{8}{9} [9 + 99 + \dots$ n terms] $= \frac{8}{9} [(10-1) + (100-1) + \dots + n \text{ terms}]$ $= \frac{8}{9} [(10+100 + \dots + n \text{ terms}) - (1+1 + \dots + n \text{ terms})]$ $= \frac{8}{9} \left[\frac{10(10^n - 1)}{9} - n \right]$ | $\frac{1}{2}$ $\frac{1}{2}$ 1 1 1 | 4 |
| | | Remark : $S_n = a \frac{(r^n - 1)}{r - 1}$ give 1 Score. Remark 2 : For direct answer give 1 Score. | | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|--------|-------------|--|---|-------------|
| 15 | (i) (ii) | <p>Slope = $\frac{1}{7}$</p> <p>Slope of perpendicular line = -7</p> <p>$(x_1, y_1) = (3, 0)$</p> <p>$y - y_1 = m(x - x_1)$ or $y = m(x - d)$</p> <p>$y - 0 = -7(x - 3)$</p> <p>$7x + y - 21 = 0$</p> <p><u>Remark</u> $m_1 \times m_2 = -1$ give $\frac{1}{2}$ score</p> <p><u>Remark 2</u> Alternate method with correct answer give 3 Score.</p> | <p>1</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> | 4 |
| 16 | | <p>$a^2 = 36, b^2 = 16, c^2 = a^2 - b^2 = 20$</p> <p>$c = \sqrt{20}$</p> <p>foci = $(\pm \sqrt{20}, 0)$</p> <p>vertices = $(\pm 6, 0)$</p> <p>Length of major axis = 12</p> <p>Length of latus rectum = $\frac{32}{6}$ or $\frac{16}{3}$</p> <p><u>Remark</u> $a^2 = 36, b^2 = 16, c^2 = 20$ give $\frac{1}{2}$ score each</p> <p><u>Remark</u> For each formula give $\frac{1}{2}$ score</p> | <p>1</p> <p>1</p> <p>1</p> <p>1</p> | 4 |
| 17 | (i) (ii) | <p>$P(A \text{ or } B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)$</p> <p>$= 0.54 + 0.69 - 0.35$</p> <p>$= 0.88$</p> <p>$P(A' \cap B') = P(A \cup B)'$</p> <p>$= 1 - P(A \cup B)$</p> <p>$= 0.12$</p> <p><u>Remark</u> For $P(A' \cap B') = 1 - 0.88 = 0.12$ give 2 Score.</p> | <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> | 4 |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|--------|---------|--|------------------------------|------------------------------|
| 18 | (i) | $\cos x - \cos y = -2 \sin\left(\frac{x+y}{2}\right) \sin\left(\frac{x-y}{2}\right)$ $\sin x - \sin y = 2 \cos\left(\frac{x+y}{2}\right) \sin\left(\frac{x-y}{2}\right)$ $\frac{\cos 9x - \cos 5x}{\sin 17x - \sin 3x} = \frac{-2 \sin 7x \sin 2x}{2 \cos 10x \sin 7x}$ $= -\frac{\sin 2x}{\cos 10x}$ | | |
| | (ii) | $\sin x = -\frac{\sqrt{3}}{2}$ <p>Principal solution = $4\frac{\pi}{3}$ or $5\frac{\pi}{3}$</p> <p>general solution, $x = n\pi + (-1)^n \frac{4\pi}{3}, n \in \mathbb{Z}$</p> <p><u>Remark:</u> $x = n\pi + (-1)^n y, n \in \mathbb{Z}$ give 1 score</p> <p><u>Remark 2</u> $\sin x = \sin\left(-\frac{\pi}{3}\right)$ give $\frac{1}{2}$ score</p> | | |
| 19 | (i) | $r = \sqrt{4} = 2$ $\cos \theta = -\frac{1}{2}, \sin \theta = \frac{\sqrt{3}}{2}$ $\theta = \frac{2\pi}{3}$ $z = r [\cos \theta + i \sin \theta]$ $= 2 \left[\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3} \right]$ <p><u>Remark</u></p> <p>$z = r(\cos \theta + i \sin \theta)$ give 1 score</p> <p><u>Remark 2</u> $\tan \theta = \left \frac{b}{a} \right$ give $\frac{1}{2}$ score</p> <p>$r = \sqrt{a^2 + b^2}$ give $\frac{1}{2}$ score.</p> | | |
| | (ii) | $x = \frac{-1 \pm \sqrt{1-20}}{2\sqrt{5}}$ $= \frac{-1 \pm \sqrt{19} i}{2\sqrt{5}}$ <p><u>Remark</u> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ give 1 score</p> | | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score | | | | | | | | | | | | |
|--------|---------|---|--|-------------|---|---|---|---|---|---|---|---|----|---|--|---|
| 20 | (1) | $9(x-2) \leq 25(2-x)$ $9x - 18 \leq 50 - 25x$ $9x + 25x \leq 50 + 18$ $34x \leq 68$ $x \leq 2$ | $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ | 2 | | | | | | | | | | | | |
| | (II) | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> $x + 3y = 9$ <table border="1" style="margin: auto;"> <tr><td>x</td><td>0</td><td>9</td></tr> <tr><td>y</td><td>3</td><td>0</td></tr> </table> </div> <div style="text-align: center;"> $2x + y = 12$ <table border="1" style="margin: auto;"> <tr><td>x</td><td>0</td><td>6</td></tr> <tr><td>y</td><td>12</td><td>0</td></tr> </table> </div> </div> <div style="text-align: center; margin-top: 20px;"> </div> | x | 0 | 9 | y | 3 | 0 | x | 0 | 6 | y | 12 | 0 | 1 3 | 4 |
| x | 0 | 9 | | | | | | | | | | | | | | |
| y | 3 | 0 | | | | | | | | | | | | | | |
| x | 0 | 6 | | | | | | | | | | | | | | |
| y | 12 | 0 | | | | | | | | | | | | | | |
| | | <p><u>Remark 1:</u> 1 correct lines and incorrect feasible region give $3\frac{1}{2}$ score</p> <p><u>Remark 2:</u> Draw separate graphs for each inequality give 4 score (Reason: 'System' of inequalities is not mentioned in the question)</p> | | | | | | | | | | | | | | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|---------|--|--|-------------|-------|-----------|-------------|------|---|---|----|-----|-------|---|----|-----|------|-------|----|----|-----|------|-------|----|----|-----|-------|-------|---|----|-----|------|-------|---|----|-----|------|--|----|--|------|-------|-------------|---|
| 21 | (1) | $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{\cos(x+h) - \cos x}{h}$ $= \lim_{h \rightarrow 0} \frac{-2 \sin x \sin\left(\frac{h}{2}\right)}{h}$ $= -\sin x$ | 1 1 $\frac{1}{2}$ $\frac{1}{2}$ | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (ii) | <p>Remark: For direct answer give 1 score</p> $f'(x) = \frac{(3x-1)(2x) - x^2 \cdot 3}{(3x-1)^2}$ $= \frac{6x^2 - 2x - 3x^2}{(3x-1)^2} = \frac{3x^2 - 2x}{(3x-1)^2}$ <p>Remark Give 1 score for Quotient rule.</p> | 3 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | | <table border="1"> <thead> <tr> <th>Class</th> <th>f_i</th> <th>x_i</th> <th>$f_i x_i$</th> <th>$f_i x_i^2$</th> </tr> </thead> <tbody> <tr> <td>0-10</td> <td>6</td> <td>5</td> <td>30</td> <td>150</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>14</td> <td>25</td> <td>350</td> <td>8750</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>4</td> <td>45</td> <td>180</td> <td>8100</td> </tr> <tr> <td>50-60</td> <td>2</td> <td>55</td> <td>110</td> <td>6050</td> </tr> <tr> <td></td> <td>50</td> <td></td> <td>1350</td> <td>44450</td> </tr> </tbody> </table> <p>(i) Mean = $\bar{x} = \frac{\sum f_i x_i}{N} = \frac{1350}{50} = 27$</p> <p>(ii) Variance ($\sigma^2$) = $\frac{\sum f_i x_i^2}{N} - (\bar{x})^2 = 160$</p> <p>(iii) Standard deviation (σ) = $\sqrt{160}$</p> <p>Remark 1 For correct table give 3 score Remark 2 Give $\frac{1}{2}$ score for each formula Remark 3 Give 6 score for alternate method</p> | Class | f_i | x_i | $f_i x_i$ | $f_i x_i^2$ | 0-10 | 6 | 5 | 30 | 150 | 10-20 | 8 | 15 | 120 | 1800 | 20-30 | 14 | 25 | 350 | 8750 | 30-40 | 16 | 35 | 560 | 19600 | 40-50 | 4 | 45 | 180 | 8100 | 50-60 | 2 | 55 | 110 | 6050 | | 50 | | 1350 | 44450 | 2 3 1 | 6 |
| Class | f_i | x_i | $f_i x_i$ | $f_i x_i^2$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0-10 | 6 | 5 | 30 | 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-20 | 8 | 15 | 120 | 1800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-30 | 14 | 25 | 350 | 8750 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30-40 | 16 | 35 | 560 | 19600 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40-50 | 4 | 45 | 180 | 8100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50-60 | 2 | 55 | 110 | 6050 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 50 | | 1350 | 44450 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

SCHEME FINALISATION (PLUS ONE-2022)
MATHEMATICS (SCIENCE-60)

- 1) MARY EHRISTALDA — 9497008561
TRIVANDRUM Melida
- 2) SANAL KUMAR V.P. — 9446852271 Sanal
KOLLAM
- 3) REJU THOMAS — 9446485892 Reju
PATHANAMTHITTA
4. SHAJI . A . U . — 9446645117 A
MEMUNDA HSS - KOZHIKODE
- 5 MANOHARAN - K — 6238329811 Manoran
KOZHIKODE
6. SONIA . P . K — 9495035408 Sonia
KOTTAYAM
7. BABITHA . K — 9495228371 Babitha
PALAKKAD
- 8 GEEETHA M — 9495941484 Geetha
THRISSUR
9. SUBHASH K.K . — 9496418185 Subash
THRISSUR
10. MANOJ KUMAR . P . — 9447236288 Manoj
THRISSUR
11. SHIBU VARGHESE — 9447278852 Shibu
KOTTAYAM
12. B. JAYADEV — 9400535339 Jay
ALAPPUZHA