Kerala Board

# Answer Key

2024

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# ANSWER KEY

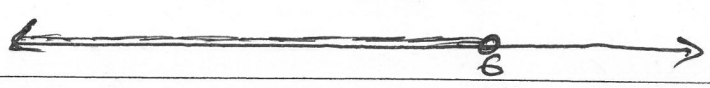
FIRST YEAR HIGHER SECONDARY EXAMINATION ....MARCH... 2024

PART-I/II/III

SUBJECT: .....MATHEMATICS Science (60)

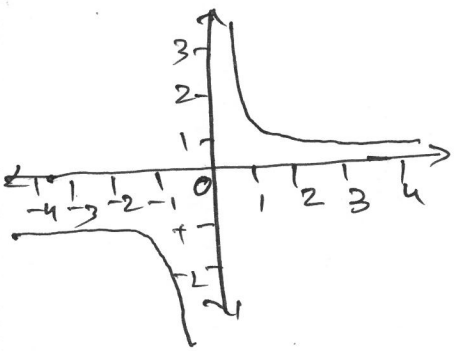
CODE NO: ..FY-427 VERSION:.....

..60... SCORES $\frac{1}{13}$ ...2.... HOURS

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| 1 | (i) | c) $2^6$ | 1 | |
| | (ii) | $\frac{x}{3}+1=-\frac{2}{3}$ | $\frac{1}{2}$ | |
| | | $x=-5$ | $\frac{1}{2}$ | 3 |
| | | $y-\frac{2}{3}=\frac{2}{3}$ | $\frac{1}{2}$ | |
| | | $y=\frac{4}{3}$ | $\frac{1}{2}$ | |
| 2 | (i) | $\cos(x+y)+\cos(x-y)=2\cos x\cos y$ | 1 | |
| | (ii) | $\cos\left(\frac{3\pi}{4}+x\right)+\cos\left(\frac{3\pi}{4}-x\right)$ | | |
| | | $=2\cos\frac{3\pi}{4}\cos x$ | 1 | 3 |
| | | $=2\times\frac{-1}{\sqrt{2}}\times\cos x$ | $\frac{1}{2}$ | |
| | | $=-\sqrt{2}\cos x$ | $\frac{1}{2}$ | |
| 3 | (i) | $x+\frac{x}{2}+\frac{x}{3}\le 10+\frac{x}{6}$ | | |
| | | $6x+3x+2x\le 60+x$ | 1 | |
| | | $11x\le 60+x$ | $\frac{1}{2}$ | 3 |
| | | $10x\le 60$ | | |
| | | $x\le 6$ | $\frac{1}{2}$ | |
| | (ii) |  | 1 | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| | | Remark<br>Using the solution of (i). The graph of (ii) is correct give 1 score | | |
| 4 | (i) | c) $nC_r = \frac{n!}{r!(n-r)!}$ | 1 | |
| | (ii) | Out of 7 men 3 can be selected in $7C_3$ ways | $\frac{1}{2}$ | |
| | | Out of 5 women, 2 can be selected in $5C_2$ ways | $\frac{1}{2}$ | 3 |
| | | $\therefore$ Total number of ways $= 7C_3 \times 5C_2$ | 1 | |
| | | OR<br>Direct answer give '2' score. | | |
| 5 | (i) | $2^n$ | 1 | |
| | (ii) | $\left(\frac{x}{3}+\frac{3}{x}\right)^4 = 4C_0\left(\frac{x}{3}\right)^4 + 4C_1\left(\frac{x}{3}\right)^3\left(\frac{3}{x}\right)^1 + 4C_2\left(\frac{x}{3}\right)^2\left(\frac{3}{x}\right)^2 + 4C_3\left(\frac{x}{3}\right)^1\left(\frac{3}{x}\right)^3 + 4C_4\left(\frac{3}{x}\right)^4$ | $1\frac{1}{2}$ | 3 |
| | | $= \frac{x^4}{81} + 4\cdot\frac{x^2}{9} + 6 + 4\times\frac{9}{x^2} + \frac{81}{x^4}$ | $\frac{1}{2}$ | |
| | | $= \frac{x^4}{81} + \frac{4x^2}{9} + 6 + \frac{36}{x^2} + \frac{81}{x^4}$ | | |
| | | Remarks<br>Correct expansion of $(a+b)^n$ give 1 score | | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| 6 | (i) | Slope $= -A/B = \frac{3}{4}$ | $\frac{1}{2}$ | |
| | | $y - y_1 = m(x - x_1)$ | 1 | |
| | | $y + 3 = \frac{3}{4}(x - 2)$ | $\frac{1}{2}$ | |
| | | $3x - 4y - 18 = 0$ | | |
| | | OR | | 3 |
| | | Alternative method with correct answer give '2' score. | | |
| | (ii) | $D = \left\lvert \frac{Ax_1 + By_1 + C}{\sqrt{A^2 + B^2}} \right\rvert$ | $\frac{1}{2}$ | |
| | | $= \left\lvert \frac{0 - 0 + 12}{\sqrt{3^2 + 4^2}} \right\rvert$ | | |
| | | $= \frac{12}{5}$ | $\frac{1}{2}$ | |
| 7 | | $x^2 = 12y$ | | |
| | | $4a = 12$ | | |
| | | $a = 3$ | $\frac{1}{2}$ | |
| | | Focus $= (0, a)$ | $\frac{1}{2}$ | |
| | | $= (0, 3)$ | | |
| | | Equation of directrix $y = -a$ | $\frac{1}{2}$ | 3 |
| | | $y = -3$ | $\frac{1}{2}$ | |
| | | Length of Latus rectum $= 4a$ | $\frac{1}{2}$ | |
| | | $= 12$ | $\frac{1}{2}$ | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| 8 | (i) | $n\,a^{n-1}$ | 1 | |
| | (ii) | $n \cdot 2^{n-1} = 32$ | 1 | 3 |
| | | $= 2^5$ | $\frac{1}{2}$ | |
| | | $= 4 \cdot 2^3$ | | |
| | | $n = 4$ | $\frac{1}{2}$ | |
| 9 | (i) | $A \cap A' = \phi$ | 1 | |
| | (ii) | $A' = \{1, 5, 6\}$ | $\frac{1}{2}$ | |
| | | $B' = \{1, 5\}$ | $\frac{1}{2}$ | 4 |
| | | $A \cap B = \{2, 3, 4\}$ | 1 | |
| | | $(A \cap B)' = \{1, 5, 6\}$. | $\frac{1}{2}$ | |
| | | $A' \cup B' = \{1, 5, 6\}$ | $\frac{1}{2}$ | |
| 10 | (i) |  | 2 | |
| | | OR Rough sketch | | |
| | (ii) | $9 - x^2 \geq 0$ | $\frac{1}{2}$ | |
| | | $x^2 \leq 9$ | | |
| | | $-3 \leq x \leq 3$ | $\frac{1}{2}$ | |
| | | Domain $= [-3, 3]$ | | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| | | $x = \sqrt{9-y^2}$ | $\frac{1}{2}$ | |
| | | $0 \le y \le 3$ | $\frac{1}{2}$ | 4 |
| | | Range $= [0,3]$ | | |
| | | OR for direct correct Domain and Range give 2 score. | | |
| 11 | i) | $(1-i)^2 = 1-2i+i^2$ | $\frac{1}{2}$ | |
| | | $= 1-2i-1$ | | |
| | | $= -2i$ | $\frac{1}{2}$ | |
| | | $(1-i)^6 = (-2i)^3$ | $\frac{1}{2}$ | |
| | | $= -8i^3$ | | |
| | | $= 8i$ | $\frac{1}{2}$ | |
| | | Using Binomial theorem give '2' score. for correct answer. | | |
| | (ii) | $z = \frac{1-i}{1+i}$ | | 4 |
| | | $= \frac{(1-i)(1-i)}{(1+i)(1-i)}$ | 1 | |
| | | $= \frac{1-2i+i^2}{2}$ | | |
| | | $= -i$ | $\frac{1}{2}$ | |
| | | $= 0-i$ | | |
| | | Coordinate in the argand plane $= (0,-1)$ | $\frac{1}{2}$ | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| 12 | (i) | $nP_r = r!\, nC_r$ | $\frac{1}{2}$ | |
| | | $840 = r! \times 35$ | | |
| | | $r! = \frac{840}{35}$ | | |
| | | $r! = 24$ | 1 | |
| | | $r = 4$ | $\frac{1}{2}$ | |
| | (ii) | A – 1<br>T – 4<br>I – 1<br>U – 1<br>D – 1<br>E – 1<br>9 | 1 | 4 |
| | | Number of permutations $= \frac{9!}{4!}$ | 1 | |
| | | Remarks<br>(i) $nP_r = \frac{n!}{(n-r)!} \rightarrow \frac{1}{2}$<br>$nC_r = \frac{n!}{r!\,(n-r)!} \rightarrow \frac{1}{2}$<br>(ii) Using the word ATTITUDE<br>Answer is correct give 2 score. | | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| 13 | (i) | $y - y_1 = m(x - x_1)$, $m = \frac{y_2 - y_1}{x_2 - x_1}$ | 1 | |
| | | $y - 0 = 1(x - 1)$ | $\frac{1}{2}$ | |
| | | $y = x - 1$ | $\frac{1}{2}$ | |
| | (ii) | Slope of $\perp^r$ line to PQ $= -1$ | $\frac{1}{2}$ | 4 |
| | | $y - y_1 = m(x - x_1)$ | $\frac{1}{2}$ | |
| | | $y - 4 = -1(x + 1)$ | $\frac{1}{2}$ | |
| | | $y - 4 = -x - 1$ | | |
| | | $x + y = 3$ | $\frac{1}{2}$ | |
| | | Alternative method give full score. | | |
| 14 | | $a = 5$ | | |
| | | $c = 4$ | | |
| | | $b^2 = a^2 - c^2$ | | |
| | | $= 25 - 16$ | | |
| | | $= 9$ | | |
| | | $b = 3$ | $\frac{1}{2}$ | |
| | (i) | Length of the minor axis $= 2b$ | | |
| | | $= 6$ | $\frac{1}{2}$ | 4 |
| | (ii) | Length of the Latusrectum $= \frac{2b^2}{a}$ | $\frac{1}{2}$ | |
| | | $= \frac{2 \times 9}{5}$ | $\frac{1}{2}$ | |
| | | $= \frac{18}{5}$ | | |
| | | Eccentricity $= \frac{c}{a}$ | $\frac{1}{2}$ | |
| | | $= \frac{4}{5}$ | $\frac{1}{2}$ | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| | (iii) | Equation of the ellipse. | | |
| | | $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ | $\frac{1}{2}$ | |
| | | $\frac{x^2}{25} + \frac{y^2}{9} = 1$ | $\frac{1}{2}$ | |
| 15 | (i) | Any point with $x$-coordinate -ve, $y$ and $z$ are positive. | | |
| | | eg: $(-2, 3, 4)$ | 1 | |
| | (ii) | $AB = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2+(z_2-z_1)^2}$ | $\frac{1}{2}$ | 4 |
| | | $= \sqrt{1^2+1^2+4^2}$ | | |
| | | $= \sqrt{18}$ | $\frac{1}{2}$ | |
| | | $BC = \sqrt{9+9+0} = \sqrt{18}$ | 1 | |
| | | $AC = \sqrt{16+4+16} = \sqrt{36}$ | 1 | |
| | | $AB^2 + BC^2 = AC^2$ | | |
| | | $\therefore \Delta ABC$ is right angled | | |
| 16 | (i) | $N(S) = {}^{13}C_3$ | $\frac{1}{2}$ | |
| | | $P(3 \text{ balls are white}) = \frac{{}^5C_3}{{}^{13}C_3}$ | $\frac{1}{2}$ | |
| | (ii) | $P(3 \text{ balls are red}) = \frac{{}^8C_3}{{}^{13}C_3}$ | 1 | 4 |
| | (iii) | $P(1 \text{ ball is red and Two balls are white})$ | | |
| | | $= \frac{{}^8C_1 \times {}^5C_2}{{}^{13}C_3}$ | 2 | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| 17 | (i) | b) $\frac{\sqrt{3}}{2}$ | 1 | |
| | (ii) | $\frac{\sin 3x - \sin x}{\cos^2 x - \sin^2 x} = \frac{2\cos\left(\frac{3x+x}{2}\right)\sin\left(\frac{3x-x}{2}\right)}{\cos 2x}$ | 1 | |
| | | $= \frac{2\cos 2x \sin x}{\cos 2x}$ | $\frac{1}{2}$ | |
| | | $= 2\sin x$ | $\frac{1}{2}$ | |
| | (iii) | $\tan(\theta+\phi) = \frac{\tan\theta + \tan\phi}{1-\tan\theta\tan\phi}$ | 1 | 6 |
| | | $= \frac{\frac{1}{2}+\frac{1}{3}}{1-\frac{1}{2}\times\frac{1}{3}}$ | 1 | |
| | | $= \frac{5/6}{5/6}$ | | |
| | | $= 1$ | $\frac{1}{2}$ | |
| | | $\therefore \theta+\phi = \frac{\pi}{4}$ | $\frac{1}{2}$ | |
| | | Any alternative method to find $\theta+\phi = \pi/4$ give full score. | | |
| | | <u>Remark</u><br>(ii) $\sin C - \sin D = 2\cos\left(\frac{C+D}{2}\right)\sin\left(\frac{C-D}{2}\right)$ give $\frac{1}{2}$ | | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| 18 | (i) | $a = 2$ | $\frac{1}{2}$ | |
| | | $r = 4$ | $\frac{1}{2}$ | |
| | | $ar^{n-1} = 32768$ | $\frac{1}{2}$ | |
| | | $2 \times r^{n-1} = 32768$ | | |
| | | $r^{n-1} = \frac{32768}{2}$ | | |
| | | $= 16384$ | | |
| | | $4^{n-1} = 4^7$ | | |
| | | $n-1 = 7$ | | |
| | | $n = 8$ | $\frac{1}{2}$ | 6 |
| | (ii) | $a + ar + ar^2 = 14$ | 1 | |
| | | $ar^3 + ar^4 + ar^5 = 112$ | 1 | |
| | | $\frac{a + ar + ar^2}{ar^3 + ar^4 + ar^5} = \frac{14}{112}$ | | |
| | | $\frac{a(1 + r + r^2)}{ar^3(1 + r + r^2)} = \frac{1}{8}$ | | |
| | | $\frac{1}{r^3} = \frac{1}{8}$ | | |
| | | $r^3 = 8$ | | |
| | | $r = 2$ | $\frac{1}{2}$ | |
| | | $a(1 + 2 + 2^2) = 14$ | | |
| | | $7a = 14$ | | |
| | | $a = 2$ | $\frac{1}{2}$ | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| | | $S_n = \frac{a(r^n-1)}{r-1}$ | $\frac{1}{2}$ | |
| | | $= \frac{2(2^n-1)}{2-1}$ | | |
| | | $= 2(2^n-1)$ | $\frac{1}{2}$ | |
| 19 | (i) | $f(x) = \frac{1}{x}$ | | |
| | | $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ | 1 | |
| | | $= \lim_{h \to 0} \frac{\frac{1}{x+h} - \frac{1}{x}}{h}$ | 1 | |
| | | $= \lim_{h \to 0} \frac{\left[\frac{x-(x+h)}{(x+h) \times x}\right]}{h}$ | | |
| | | $= \lim_{h \to 0} \frac{-h}{(x+h)x \times h}$ | | 6 |
| | | $= \lim_{h \to 0} \frac{-1}{(x+h)x}$ | $\frac{1}{2}$ | |
| | | $= \frac{-1}{x \times x}$ | | |
| | | $= \frac{-1}{x^2}$ | $\frac{1}{2}$ | |
| | | Remark<br>$f'(x) = -\frac{1}{x^2}$ give 1 score. | | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| | (ii) | $\frac{d}{dx}\left(\frac{x^2+1}{x^2-1}\right)$ | | |
| | | $= \frac{(x^2-1)\frac{d}{dx}(x^2+1) - (x^2+1)\frac{d}{dx}(x^2-1)}{(x^2-1)^2}$ | $1\frac{1}{2}$ | |
| | | $= \frac{(x^2-1)\times 2x - (x^2+1)\times 2x}{(x^2-1)^2}$ | $1\frac{1}{2}$ | |
| | | $= \frac{-4x}{(x^2-1)^2}$ | | |
| | | <u>Remark</u><br>Quotient Rule give 1 score. | | |
| 20. | (i) | $\bar{x} = \frac{\Sigma x_i}{n}$ | $\frac{1}{2}$ | |
| | | $= \frac{80}{8}$ | | |
| | | $= 10$ | $\frac{1}{2}$ | |
| | | M.D about $\bar{x} = \frac{\Sigma \lvert x_i - \bar{x} \rvert}{n}$ | $\frac{1}{2}$ | |
| | | $= \frac{24}{8}$ | $\frac{1}{2}$ | |
| | | $= 3$ | | |

| Qn. No | Sub Qns | Answer Key/Value Points | Score | Total Score |
|---|---|---|---|---|
| | (ii) | | | 6 |

| class | $f_i$ | $x_i$ | $f_i \times x_i$ | $x_i^2$ | $f_i \times x_i^2$ |
|---|---|---|---|---|---|
| 4 - 8 | 3 | 6 | 18 | 36 | 108 |
| 8 - 12 | 6 | 10 | 60 | 100 | 600 |
| 12 - 16 | 4 | 14 | 56 | 196 | 784 |
| 16 - 20 | 7 | 18 | 126 | 324 | 2268 |
| | 20 | | 260 | | 3760 |

(2)

$$\text{Variance} = \frac{\Sigma f_i x_i^2}{N} - \left(\frac{\Sigma f_i x_i}{N}\right)^2 \quad (1)$$

$$= \frac{3760}{20} - \left(\frac{260}{20}\right)^2 \quad \left(\frac{1}{2}\right)$$

$$= 19 \quad \left(\frac{1}{2}\right)$$

Any alternative method give full score.

First Year Mathematics (Science)

| | | | |
|---|---|---|---|
| 1 | Shaji Mathew | | 9400743554 |
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| 3. | SANAL KUMAR. V.P | | 9446852271 |
| 4. | SEENA . A.P. | | 9946967100 |
| 5. | SABEER PUNNOTH | | 9447414339 |
| 6. | SHINY. G.S | | 9495243274 |
| 7. | Resh Paul | | 9495600560 |
| 8 | Prakash. K. | | 9447381485 |
| 9. | B. Jayadev | | 9400555339 |

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