2015 (A) Roll No: _____

INTERMEDIATE PART-I (11th CLASS)

MATHEMATICS PAPER-I GROUP-I TIME ALLOWED: 2.30 Hours

SUBJECTIVE MAXIMUM MARKS: 80

NOTE: - Write same question number and its part number on answer book, as given in the question paper.

SECTION-I

2. Attempt any eight parts. **8 × 2 = 16**

(i) Simplify by justifying each step $\dfrac{\frac{a}{b}+\frac{c}{d}}{\frac{a}{b}-\frac{c}{d}}$.

(ii) Find modulus of $1-i\sqrt{3}$

(iii) Define Tautology and Absurdity.

(iv) Find inverse and range of $f=\{(2,1),(3,2),(4,3)\}$

(v) Show that $\sim(p\to q)\to p$ is a tautology.

(vi) If a and b are elements of a group 'G' then show that $(ab)^{-1}=b^{-1}a^{-1}$

(vii) Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix}=\begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$

(viii) Find the inverse of $\begin{bmatrix} 2 & 1 \\ 6 & 3 \end{bmatrix}$

(ix) Define Symmetric and Skew Symmetric Matrix.

(x) Evaluate $\left(-1+\sqrt{-3}\right)^5+\left(-1-\sqrt{-3}\right)^5$

(xi) Sum of a positive number and its reciprocal is $\frac{26}{5}$. Find the number.

(xii) Find four Fourth Roots of Unity.

3. Attempt any eight parts. **8 × 2 = 16**

(i) Resolve into Partial Fraction of $\dfrac{1}{x^2-1}$

(ii) If a, b, c, d are in G.P, prove that a^2-b^2, b^2-c^2, c^2-d^2 are in G.P.

(iii) Sum the series $\frac{3}{\sqrt{2}}+2\sqrt{2}+\frac{5}{\sqrt{2}}+------+a_{13}$.

(iv) Which term of the A.P. -2, 4, 10, ------- is 148?

(v) If 5 is the H.M. between 2 and b, find b.

(vi) Find the number of diagonals of 12 – sided figure.

(vii) How many arrangements of the letter of the word MATHEMATICS can be made?

(viii) Define Circular Permutation.

(ix) Prove that ${}^nC_r={}^nC_{n-r}$.

(x) Expand $(1-x)^{\frac{1}{2}}$ up to three terms.

(xi) State the Binomial Theorem.

(xii) Write the formula for finding The Middle Term in the expansion of $(a+x)^n$, if n is even.

P.T.O.

4. Attempt any nine parts. **$9 \times 2 = 18$**

(i) With usual notations if $\theta = 65^o\ 20'$ $r = 18\,mm$, $\ell = ?$

(ii) Prove that $Cot^2\theta - Cos^2\theta = Cot^2\theta\, Cos^2\theta$

(iii) Write the Fundamental Law of Trigonometry.

(iv) Prove that $Sin\left(\theta + \frac{\pi}{6}\right) + Cos\left(\theta + \frac{\pi}{3}\right) = Cos\,\theta$

(v) Prove that $\frac{1 - Cos\,\alpha}{Sin\,\alpha} = \tan\frac{\alpha}{2}$

(vi) Express $Cos\,12^o + Cos\,48^o$ as product.

(vii) Write the domain and range of $y = Cos\,x$

(viii) Define the Angle of Elevation.

(ix) Solve ΔABC if $\beta = 60^o$, $\gamma = 15^o$, $b = \sqrt{6}$

(x) Find the smallest angle of ΔABC when $a = 37.34$, $b = 3.24$, $c = 35.06$

(xi) Show that $Cos^{-1}\frac{12}{13} = Sin^{-1}\frac{5}{13}$

(xii) Solve $Sin\,x = \frac{1}{2}$ in $[0, 2\pi]$

(xiii) Solve $Sec^2\theta = \frac{4}{3}$ in $[0, 2\pi]$

SECTION-II

NOTE: - Attempt any three questions. **$3 \times 10 = 30$**

5.(a) Solve by Crammer's Rule $2x + 2y + z = 3$, $3x - 2y - 2z = 1$, $5x + y - 3z = 2$ 5

(b) Show that $(1+w)(1+w^2)(1+w^4)(1+w^8)$ ----- $2n$ factors $= 1$ 5

6.(a) Resolve into Partial Fractions. $\frac{1}{(1-ax)(1-bx)(1-cx)}$ 5

(b) Sum the series $3 + 5 - 7 + 9 + 11 - 13 + 15 + 17 - 19 +$ ------- up to $3n$ terms. 5

7.(a) How many numbers greater than 1000,000 can be formed from the digits 0, 2, 2, 2, 3, 4, 4? 5

(b) If $y = \frac{1}{3} + \frac{1.3}{2!}\left(\frac{1}{3}\right)^2 + \frac{1.3.5}{3!}\left(\frac{1}{3}\right)^3 + -----$ then prove that $y^2 + 2y - 2 = 0$ 5

8.(a) Prove that $Sin^3\theta - Cos^3\theta = (Sin\theta - Cos\theta)(1 + Sin\theta\, Cos\theta)$ 5

(b) Prove that $\frac{Sin\theta + Sin3\theta + Sin5\theta + Sin7\theta}{Cos\theta + Cos3\theta + Cos5\theta + Cos7\theta} = Tan\,4\theta$ 5

9.(a) Solve the triangle in which $a = 7$, $b = 7$, $c = 9$ 5

(b) Prove $Sin^{-1}\frac{5}{13} + Sin^{-1}\frac{7}{25} = Cos^{-1}\frac{253}{325}$ 5