

INTERMEDIATE PART-I (11th CLASS)**MATHEMATICS PAPER-I GROUP-II**

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) Find the multiplicative inverse of $(-4, 7)$
- (ii) Separate $\frac{2 - 7i}{4 + 5i}$ into real and imaginary parts.
- (iii) Write the power set of $\{a, \{b, c\}\}$.
- (iv) State the De. Morgan's Laws.
- (v) For $A = \{1, 2, 3, 4\}$, find the relation in A satisfying $\{(x, y) \mid x + y < 5\}$
- (vi) Define Semi-group.
- (vii) Find the inverse of $A = \begin{bmatrix} -2 & 3 \\ -4 & 5 \end{bmatrix}$
- (viii) Without expansion show that $\begin{vmatrix} bc & ca & ab \\ \frac{1}{a} & \frac{1}{b} & \frac{1}{c} \\ a & b & c \end{vmatrix} = 0$
- (ix) If 'A' is skew-symmetric, show that A^2 is symmetric.
- (x) Solve the equation $5x^2 - 13x + 6 = 0$
- (xi) Show that $x^3 - y^3 = (x - y)(x - \omega y)(x - \omega^2 y)$
- (xii) If α, β are roots of $3x^2 - 2x + 4 = 0$, find the values of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

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

- (i) Define Improper Rational Fraction.
- (ii) Which term of an A.P 5, 2, -1, ----- is -85 ?
- (iii) Find vulgar fraction equivalent to the recurring decimals $0.\dot{7}$.
- (iv) If 5 is the harmonic mean between 2 and b find b .
- (v) Insert two G. Ms between 2 and 16.
- (vi) How many signals can be given by 5 flags of different colours, using 3 flags at a time.
- (vii) Find the value of n when ${}^nC_{10} = \frac{12 \times 11}{2!}$
- (viii) A natural number is chosen out of first fifty natural numbers, what is the probability that the chosen number is multiple of 3.
- (ix) Find the number of the diagonals of 6 - sided figure.
- (x) Calculate $(0.97)^3$ by means of Binomial Theorem.
- (xi) If x is so small that its square and higher powers can be neglected then show that $\frac{\sqrt{1+2x}}{\sqrt{1-x}} \approx 1 + \frac{3}{2}x$
- (xii) Expand up to 4 terms $(1+x)^{-1}$

P.T.O.

4. Attempt any nine parts.

 $9 \times 2 = 18$

- (i) Convert $3''$ into radians.
- (ii) Verify $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ = \sin 30^\circ$
- (iii) Prove that $\sin(180^\circ + \alpha) \sin(90^\circ - \alpha) = -\sin \alpha \cos \alpha$
- (iv) Prove that $\sin\left(\theta + \frac{\pi}{6}\right) + \cos\left(\theta + \frac{\pi}{3}\right) = \cos \theta$
- (v) Find $\cos 2\alpha$ when $\cos \alpha = \frac{3}{5}$, $0 < \alpha < \frac{\pi}{2}$
- (vi) Express $\sin 5x + \sin 7x$ as a product.
- (vii) Find the period of $\tan \frac{x}{7}$
- (viii) Solve the right triangle ABC , in which $\gamma = 90^\circ$, $\beta = 50^\circ 10'$, $c = 0.832$
- (ix) Define the Angle of Elevation and Depression.
- (x) Find the area of the triangle ABC , in which $a = 4.33$, $b = 9.25$, $r = 56^\circ 44'$
- (xi) Without using tables/calculator show that $\tan^{-1} \frac{5}{12} = \sin^{-1} \frac{5}{13}$
- (xii) Find the solution of equation which lies in $[0, 2\pi]$ when $1 + \cos x = 0$
- (xiii) Find solution of equation which lies in $[0, 2\pi]$ when $\cos x = -\frac{\sqrt{3}}{2}$

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

- 5.(a) Use Cramer's rule to solve the system. 5
 $3x_1 + x_2 - x_3 = -4$, $x_1 + x_2 - 2x_3 = -4$, $-x_1 + 2x_2 - x_3 = 1$
- (b) Solve the equation $x^{-2} - 10 = 3x^{-1}$ 5
- 6.(a) Resolve into Partial Fractions. $\frac{x^2}{(x^2 + 4)(x + 2)}$ 5
- (b) If the 7th and 10th terms of an H.P. are $\frac{1}{3}$ and $\frac{5}{21}$ respectively, find its 14th term. 5
- 7.(a) Prove that ${}^{n-1}C_r + {}^{n-1}C_{r-1} = {}^nC_r$ 5
- (b) Identify the series: $1 + \frac{1}{3} + \frac{1.3}{3.6} + \frac{1.3.5}{3.6.9} + \dots$ as a binomial expansion and find its sum. 5
- 8.(a) If $\tan \theta = \frac{1}{\sqrt{7}}$ and the Terminal arm of the angle is not in the 3rd quad,
 find the values of $\frac{\csc^2 \theta - \sec^2 \theta}{\csc^2 \theta + \sec^2 \theta}$ 5
- (b) Prove without using calculator $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$ 5
- 9.(a) Solve the triangle in which $a = 4584$, $b = 5140$, $c = 3624$ 5
- (b) Prove that $\sin^{-1} \frac{1}{\sqrt{5}} + \cot^{-1} 3 = \frac{\pi}{4}$ 5