



MATHEMATICS HSSC-I

36

Time allowed: 2:35 Hours

Total Marks Sections B and C: 80

NOTE: Attempt any twelve parts from Section 'B' and any four questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly. Graph paper will be provided on request.

SECTION - B (Marks 48)

Q. 2 Attempt any TWELVE parts. All parts carry equal marks.

(12 x 4 = 48)

(i) Separate $\frac{(2-3i)^2}{1-i}$ into real and imaginary parts.

(ii) Determine whether $p \rightarrow (q \rightarrow p)$ is a tautology, a contingency or an absurdity.

(iii) If $A = \{1, 2, 3, 4\}$, state the domain and range of the relation $R = \{(x, y) | x + y = 5\}$

(iv) Under the operation "*", complete the following table to obtain a semigroup

*	a	b	c
a	c	a	b
b	c
c	b	c	a

(v) Find the matrix A if $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix} A = \begin{bmatrix} 0 & -3 & 8 \\ 3 & 3 & -7 \end{bmatrix}$

(vi) Find the inverse of matrix $A = \begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$, hence show that $AA^{-1} = I_2$

(vii) If α, β are roots of $3x^2 - 2x + 4 = 0$, then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

(viii) Resolve $\frac{3x-11}{(x+3)(x^2+1)}$ into partial fractions.

(ix) If $y = 1 - \frac{x}{2} + \frac{x^2}{4} - \dots$, then show that $x = 2 \left(\frac{1-y}{y} \right)$

(x) Find values of n and r , when ${}^nC_r = 10$ and ${}^nP_r = 60$.

(xi) There are 9 green and 6 red balls in a box. A ball is drawn (taken out). What is the probability that
(i) the ball is green (ii) the ball is red.

(xii) Expand and simplify $(2+i)^4 - (2-i)^4$

(xiii) Find the remaining trigonometric functions if $\cos \theta = -\frac{1}{2}$ and the terminal arm of angle θ is in quad-III.

(xiv) Show that $\frac{\sin(\alpha - \beta)}{\sin(\alpha + \beta)} = \frac{\tan \alpha - \tan \beta}{\tan \alpha + \tan \beta}$

(xv) Find the measure of smallest angle of the triangle whose sides are 16, 20 and 33

(xvi) Show that $2 \cos^{-1} \frac{4}{5} = \sin^{-1} \frac{24}{25}$

SECTION - C (Marks 32)

Note: Attempt any FOUR questions. All questions carry equal marks.

(4 x 8 = 32)

Q. 3 Find the real and imaginary parts of the complex number $\frac{(\sqrt{3}-i)^5}{(\sqrt{3}+i)^5}$

$$x + y + z = 0$$

Q. 4 Find the value of λ for which the system $2x + y - \lambda z = 0$ has a non-trivial solution. Also solve the system for $x + 2y - 2z = 0$

that value of λ

Q. 5 (a) Resolve $\frac{x^2}{(x^2+4)(x+2)}$ into partial fractions (b) Prove that ${}^nC_k + {}^nC_{k-1} = {}^{n+1}C_k$

Q. 6 Expand $(1-2x)^{\frac{1}{2}}$ to four terms and apply it to evaluate $(0.8)^{\frac{1}{2}}$ correct to three places of decimal.

Q. 7 If $\sin \alpha = \frac{4}{5}$ and $\sin \beta = \frac{12}{13}$, where $\frac{\pi}{2} < \alpha < \pi$ and $\frac{\pi}{2} < \beta < \pi$. Find (i) $\cos(\alpha + \beta)$ (ii) $\sin(\alpha - \beta)$

Q. 8 (a) Show that $R = \frac{abc}{4\Delta}$

(b) Solve the equation: $\sqrt{3} \tan x - \sec x - 1 = 0$ for its general solution