SECTION 'B'

SHORT ANSWER QUESTIONS (40 Marks)

NOTE: Attempt any *Ten part* questions from this Section. All questions carry equal marks:

Q.2(i) Solve the complex equation $(x + 3i)^2 = 2yi$.

(ii) Prove that $\left(\frac{-1+\sqrt{-3}}{2}\right)^7 + \left(\frac{-1-\sqrt{-3}}{2}\right)^7 + 1 = 0$.

(iii) $\sqrt{\frac{t+16}{t}} + \sqrt{\frac{t}{t+16}} = 2\frac{1}{12}$

(OR) If a, b are the roots of $ax^2 + bx + c = 0$, $a \neq 0$ find the equation whose roots are $\frac{1}{\alpha}, \frac{1}{\beta}$.

(iv) Show by using the properties of determinant:

$$\begin{vmatrix} 1 & 1 & 1 \\ \alpha & \beta & \gamma \\ \beta\gamma & \gamma\alpha & \alpha\beta \end{vmatrix} = (\alpha-\beta)(\beta-\gamma)(\gamma-\alpha).$$

(v) Solve for x:

$$\begin{bmatrix} -2 & 3 \\ 4 & -1 \end{bmatrix}\begin{bmatrix} 1 & x & 5 \\ 2 & 4 & x \end{bmatrix}\begin{bmatrix} -3 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 & -14 \end{bmatrix}^T$$

(vi) Show that multiplication is a binary operation on $S = \{1, -1\}$ but not on $T = \{1, 2\}$.

(vii) Which term of the sequence $-3, 3, 9, 15, \ldots\ldots$ is $6m - 15$?

(viii) Find the sum of n terms of a G.P. whose nth term is $3(3)n - 1$.

(ix) If a die is rolled twice, what is the probability that the sum of the points is 7?

(x) Prove the proposition by mathematical induction:

$$1 + 5 + 9 + \ldots\ldots + (4n - 3) = n(2n - 1)$$

(OR) Find the term independent of x in the expansion of $\left(x - \frac{2}{x}\right)^{10}$.

(xi) How far does a boy on a bicycle travel in 10 revolutions if the diameters of the wheels of his bicycle each equal to 56cm?

(xii) $\csc\theta = \frac{-3}{2}$ and $p(\theta)$ is not in the fourth quadrant then find the remaining trinometric functions, by using radio function.

(xiii) Prove any two of the following:

(a) $\frac{\tan\theta + \sin\theta}{\csc\theta + \cot\theta} = \tan\theta\sin\theta \ (\cos\theta \neq 0, -1)$

(b) $\tan 3\theta = \frac{3\tan\theta - \tan^3\theta}{1 - 3\tan^2\theta}$

(c) $\left(\sin\frac{\theta}{2} - \cos\frac{\theta}{2}\right)^2 = 1 - \sin\theta$

(xiv) Find the area of the triangle ABC, if $\alpha = 30^\circ$, $\beta = 50^\circ$, $c = 90$cm.

(OR) Draw the graph of the function cosq , where $-\pi < \theta < \pi$.

(xv) Solve the trionometric equation $\sqrt{3}\cos\theta + \sin\theta - 2 = 0$ or $\sin^{-1}\theta = \cos^{-1}\sqrt{1 - 0^2}$

SECTION 'C'

DETAILED ANSWER QUESTIONS (20 Marks)

NOTE: Attempt any *TWO* questions from this Section.

Q.3 Solve the equation:

(a) $1 + t - 4t^2 + t^3 + t^4 = 0$

(b) Apply Cramer's rule to solve the system of equations:

$x + 2y + z = 8$

$2x - y + z = 3$

$x + y - z = 0$

Q.4(a) Find the value of n so that $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ may become the G.M. between a and b, $(a \neq b)$.

(b) If 'c' be a quantity, so small that c^3 may be neglected in comparison with 13, prove that:

$$\sqrt{\frac{1}{1+c}} + \sqrt{\frac{1}{1-c}} = 2 + \frac{3c^2}{4!}$$

Q.5(a) The base of a right angled triangle is 9cm and the sides of the triangle are in A.P. Find the hypotenuse.

(b) Show that in $\Delta ABC : r_1 = 4R\sin\frac{\alpha}{2}\cos\frac{\beta}{2}\cos\frac{\gamma}{2}$

(OR) Solve the equations:

$$x + y = 5 \ ; \ x^2 + 2y^2 = 17$$