

Note: It is compulsory to attempt any (8-8) Parts each from Q.No. 2 and Q.No.3 while attempt any (9) Parts from Q.No.4. Attempt any (3) Questions from Part - II. Write same Question No. and its Part No. as given in the Question Paper.

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Part - I

25 x 2 = 50

Q.No.2	(i)	Show that $\forall z \in \mathbb{C}, z \bar{z} = z ^2$		
	(ii)	Show that $\forall z_1, z_2 \in \mathbb{C}, \overline{z_1 z_2} = \bar{z}_1 \bar{z}_2$		
	(iii)	Define Polar form of a Complex Number .		
	(iv)	Prove that $\bar{z} = z$ iff z is real .		
	(v)	Write down the Power set of $\{a, \{b, c\}\}$		
	(vi)	Show that $(p \wedge q) \rightarrow p$ is a tautology .		
	(vii)	Solve the system of linear equations : $4x_1 + 3x_2 = 5, 3x_1 - x_2 = 7$	(viii)	Write any two Properties of Determinant .
	(ix)	Define Hermitian Matrix .	(x)	Solve the equation by Completing Square $x^2 + 4x - 1085 = 0$
	(xi)	Solve the equation by using quadratic formula, $16x^2 + 8x + 1 = 0$	(xii)	Prove that : $(-1 + \sqrt{-3})^4 + (-1 - \sqrt{-3})^4 = -16$
Q.No.3	(i)	Define Conditional equation and give example .		
	(ii)	Resolve $\frac{1}{x^2 - 1}$ into Partial Fraction .		
	(iii)	If $a_{n-2} = 3n - 11$, find the n th term of the Sequence .		
	(iv)	Find A.M between $3\sqrt{5}$ and $5\sqrt{5}$		
	(v)	If $S_n = n(2n - 1)$, then find the series .		
	(vi)	With usual notation, show that $G^2 = AH$		
	(vii)	Write $n(n-1)(n-2) \dots (n-r+1)$ in the factorial form.	(viii)	What is the Fundamental Principle of Counting?
	(ix)	Two Coins are tossed twice each. Find the Probability that the head appears on the first toss and the same faces appear in the two tosses.	(x)	Calculate $(0.97)^3$ by means of Binomial Theorem.
	(xi)	Find the term involving x^4 in the expression of $(3 - 2x)^7$	(xii)	Expand upto 4 terms, taking the values of x such that the expansion in case is valid for $(1 - x)^{\frac{1}{2}}$
Q.No.4	(i)	Convert $\frac{9\pi}{5}$ into the measure of Sexagesimal System .		
	(ii)	If $\tan \theta = \frac{8}{15}$ and $\theta \in \text{III}$ then find $\sin \theta$ and $\cos \theta$.		
	(iii)	If α, β, γ be the angles of a triangle, then prove $\tan(\alpha + \beta) + \tan \gamma = 0$		

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(iv)	Find the Value of $\tan(105^\circ)$.
(v)	Write Triple angle identity for $\cos 3\alpha$.
(vi)	Find the Period of $\tan \theta$.
(vii)	Find the Period of $\sin\left(\frac{x}{3}\right)$.
(viii)	Draw the graph of $y = 2\cos x, x \in [0, 2\pi]$
(ix)	Solve the right triangle ABC in which $\gamma = 90^\circ, \alpha = 37^\circ 20', a = 243$
(x)	Define Angle of Depression.
(xi)	By using Law of Cosine find the value of c if $a = \sqrt{3} - 1, b = \sqrt{3} + 1, \gamma = 60^\circ$
(xii)	Find the value of $\cos\left(\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)\right)$
(xiii)	Solve the equation $1 + \cos x = 0$

Part - II

3 x 10 = 30

Q.No.5	(a)	Show that $\begin{vmatrix} a+l & a & a \\ a & a+l & a \\ a & a & a+l \end{vmatrix} = l^2(3a+l)$	(5)
	(b)	Solve the Equation : $\sqrt{5x^2 + 7x + 2} - \sqrt{4x^2 + 7x + 18} = x - 4$	(5)
Q.No.6	(a)	Resolve $\frac{x^2 + 1}{x^3 + 1}$ into Partial Fractions.	(5)
	(b)	If the numbers 1, 4 and 3 are Subtracted from three Consecutive terms of an A.P, the resulting numbers are in G.P. Find the numbers if their Sum is 21.	(5)
Q.No.7	(a)	Find the values of n and r When ${}^nC_r = 35$, and ${}^nP_r = 210$	(5)
	(b)	Use Binomial Theorem to show that $1 + \frac{1}{4} + \frac{1 \cdot 3}{4 \cdot 8} + \frac{1 \cdot 3 \cdot 5}{4 \cdot 8 \cdot 12} + \dots = \sqrt{2}$	(5)
Q.No.8	(a)	Prove that $\sin^6 \theta - \cos^6 \theta = (\sin^2 \theta - \cos^2 \theta)(1 - 3\sin^2 \theta \cos^2 \theta)$	(5)
	(b)	Prove that: $\sin^{-1} \frac{1}{\sqrt{5}} + \cot^{-1} 3 = \frac{\pi}{4}$	(5)
Q.No.9	(a)	Reduce $\sin^4 \theta$ to an expression involving only function of multiples of θ , raised to the first power.	(5)
	(b)	The Sides of a triangle are $x^2 + x + 1, 2x + 1$ and $x^2 - 1$. Prove that the greatest angle of the triangle is 120° .	(5)

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