



THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Solve the following: (6x5=30)

- (i) Expand the following in ascending power of x: $(1 - x + x^2)^4$
- (ii) If $a_n = (-1)^n(2n - 3)$, then find first four terms of the sequence.
- (iii) Verify the given equation:

$$2 \sin \frac{\pi}{4} + \frac{1}{2} \operatorname{cosec} \frac{\pi}{4} = \frac{3}{\sqrt{2}}$$

- (iv) Solve by completing square: $2x^2 + 12x - 110 = 0$
- (v) If $A = \begin{bmatrix} 1 \\ 1+i \\ i \end{bmatrix}$, then find $A(\bar{A})^t$
- (vi) Express the complex number $z = 1 + i\sqrt{3}$ in polar form.

Solve the following: (3x10=30)

Q.2 Show that

$$\begin{bmatrix} r \cos \Phi & 0 & -\sin \Phi \\ 0 & r & 0 \\ r \sin \Phi & 0 & \cos \Phi \end{bmatrix} \begin{bmatrix} r \cos \Phi & 0 & -\sin \Phi \\ 0 & r & 0 \\ r \sin \Phi & 0 & \cos \Phi \end{bmatrix} = r I_3$$

Q.3 If the matrices $\begin{pmatrix} 3 & -2 & -2 \\ -1 & 1 & 1 \\ 3 & -1 & -2 \end{pmatrix}$ and $\begin{pmatrix} 1 & a & 0 \\ -1 & b & 1 \\ 2 & c & -1 \end{pmatrix}$ are inverses of each other, what is the value of c.

Q.4 Show that the reciprocal of the terms of the geometric sequence $a_1, a_1r^2, a_1r^4 \dots$ form another geometric sequence.