EXERCISE – II MULTIPLE CORRECT (OBJECTIVE QUESTIONS)

1. Matrix $\begin{bmatrix} a & b & (a\alpha - b) \\ b & c & (b\alpha - c) \\ 2 & 1 & 0 \end{bmatrix}$ is non invertible if

(A) $\alpha = 1/2$ (B) a, b, c are in A.P.
(C) a, b, c are in G.P. (D) a, b, c are in H.P.

2. If A is a square matrix, then
(A) AA' is symmetric (B) AA' is skew – symmetric
(C) $A'A$ is symmetric (D) $A'A$ is skew – symmetric

3. If D is a determinant of order three and Δ is a determinant formed by the cofactors of determinant D then
(A) $\Delta = D^2$ (B) D = 0 implies $\Delta = 0$
(C) if D = 27, then Δ is perfect cube
(D) None of these

4. If B is an idempotent matrix, and $A = I - B$, then
(A) $A^2 = A$ (B) $A^2 = I$ (C) $AB = 0$ (D) $BA = 0$

5. A square matrix A with elements from the set of real numbers is said to be orthogonal if $A' = A^{-1}$. If A is an orthogonal matrix, then
(A) A' is orthogonal (B) A^{-1} is orthogonal
(C) Adj A = A' (D) $|A^{-1}| = 1$

6. If $A^{-1} = \begin{bmatrix} 1 & -1 & 0 \\ 0 & -2 & 1 \\ 0 & 0 & -1 \end{bmatrix}$, then

(A) $|A| = 2$ (B) A is non-singular

(C) Adj. A = $\begin{bmatrix} 1/2 & -1/2 & 0 \\ 0 & -1 & 1/2 \\ 0 & 0 & -1/2 \end{bmatrix}$

(D) A is skew symmetric matrix

7. Which of the following is true for matrix A = $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$

(A) A + 4I is a symmetric matrix
(B) $A^2 - 4A + 5I_2 = 0$

(C) A – B is a diagonal matrix for any value of α if B = $\begin{bmatrix} \alpha & -1 \\ 2 & 5 \end{bmatrix}$

(D) A – 4I is a skew symmetric matrix

8. Which of the following statement is always true
(A) Adjoint of a symmetric matrix is symmetric matrix
(B) Adjoint of a unit matrix is unit matrix
(C) A (adj A) = (adj A) A
(D) Adjoint of a diagonal matrix is diagonal matrix

9. If A = $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ (where $bc \neq 0$) satisfies the equations $x^2 + k = 0$, then
(A) a + d = 0 (B) k = –|A|
(C) k = |A| (D) None of these

10. Let $\phi_1(x) = x + a_1$, $\phi_2(x) = x^2 + b_1x + b_2$ and

$\Delta = \begin{vmatrix} 1 & 1 & 1 \\ \phi_1(x_1) & \phi_1(x_2) & \phi_1(x_3) \\ \phi_2(x_1) & \phi_2(x_2) & \phi_2(x_3) \end{vmatrix}$, then

(A) Δ is independent of a_1
(B) Δ is independent of b_1 and b_2
(C) Δ is independent of x_1, x_2 and x_3
(D) None of these

11. Suppose a_1, a_2, a_3 are in A.P. and b_1, b_2, b_3 are in H.P.

and let $\Delta = \begin{vmatrix} a_1 - b_1 & a_1 - b_2 & a_1 - b_3 \\ a_2 - b_1 & a_2 - b_2 & a_2 - b_3 \\ a_3 - b_1 & a_3 - b_2 & a_3 - b_3 \end{vmatrix}$, then prove that

(A) Δ is independent of a_1, a_2, a_3
(B) $A_1 - \Delta$, $a_2 - 2\Delta$, $a_3 - 3\Delta$ are in A.P.
(C) $b_1 + \Delta$, $b_2 + \Delta^2$, $b_3 + \Delta$ are in H.P.
(D) Δ is independent of b_1, b_2, b_3

12. If $\Delta = \begin{vmatrix} x & 2y - z & -z \\ y & 2x - z & -z \\ y & 2y - z & 2x - 2y - z \end{vmatrix}$, then

(A) x–y is a factor of Δ (B) $(x-y)^2$ is a factor of Δ
(C) $(x - y)^3$ is a factor of Δ (D) Δ is independent of z

13. Let $\Delta = \begin{vmatrix} a & a^2 & 0 \\ 1 & 2a+b & (a+b)^2 \\ 0 & 1 & 2a+3b \end{vmatrix}$ then

(A) a + b is a factor of Δ (B) a + 2b is a factor of Δ
(C) 2a + 3b is a factor of Δ (D) a^2 is a factor of Δ

14. Let a, b, > 0 and $\Delta = \begin{vmatrix} -x & a & b \\ b & -x & a \\ a & b & -x \end{vmatrix}$, then

(A) $a + b - x$ is a factor of Δ
(B) $x^2 + (a + b)x + a^2 + b^2 - ab$ is a factor of Δ
(C) $\Delta = 0$ has three real roots if $a = b$
(D) None of these