Some questions (Assertion–Reason type) are given below. Each question contains **Statement – 1 (Assertion)** and **Statement – 2 (Reason)**. Each question has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct. So select the correct choice :***Choices are :***

(A)**Statement – 1** is True, **Statement – 2** is True; **Statement – 2 is** a correct explanation for **Statement – 1**.
(B)**Statement – 1** is True, **Statmnt – 2** is True; **Statement – 2 is NOT** a correct explanation for **Statement – 1**.
(C) **Statement – 1** is True, **Statement – 2** is False.
(D) Statement – 1 is False, Statement – 2 is True.

491. **Statement–1 :** $\Delta = \begin{vmatrix} 1 & 1 & 1 \\ (2^x+2^{-x})^2 & (3^x+3^{-x})^2 & (5^x+5^{-x})^2 \\ (2^x-2^{-x})^2 & (3^x-3^{-x})^2 & (5^x-5^{-x})^2 \end{vmatrix} = 0$

Statement–2 : $\Delta = 4\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ (2^x-2^{-x})^2 & (3^x-3^{-x})^2 & (5^x-5^{-x})^2 \end{vmatrix} = 0$

492. Let $f(x) = \begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & x(x+1) \\ 3x(x-1) & x(x-1)(x-2) & x(x^2-1) \end{vmatrix}$

Statement–1 : $f(100) + f(99) + f(98) + ... + f(1) = \dfrac{100(101)}{2}$ **Statement–2 :** $f(x) = 0$

493. Let $A = \begin{bmatrix} 0 & -4 & 1 \\ 2 & \lambda & -3 \\ 1 & 2 & -1 \end{bmatrix}$

Statement–1 : Inverse of A exists for all $\lambda \in R$ **Statement–2 :** Inverse of A exists if $\lambda \in R - \{8\}$

494. Let $A = \begin{bmatrix} \sin\alpha & -\cos\alpha & 1 \\ \cos\alpha & \sin\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Statement–1 : $A^{-1} = \text{adj}(A)$ **Statement–2 :** $|A| = 1$

495. **Statement–1 :** If $A = \begin{bmatrix} 0 & -4 & 1 \\ 2 & \lambda & -3 \\ 1 & 2 & -1 \end{bmatrix}$ then A^{-1} exist if $\lambda \neq 8$.

Statement–2 : A^{-1} exists if $|A| = 0$.

496. Let there be a system of equations
$6x + 5y + \lambda z = 0$
$3x - y + 4z = 0$
$x + 2y - 3z = 0$

Statement–1 : System of equations has infinite number of nontrivial solution for $\lambda \neq -5$.

Statement–2 : It will have non trivial solution is $\begin{vmatrix} 6 & 5 & \lambda \\ 3 & -1 & 4 \\ 1 & 2 & -3 \end{vmatrix} = 0$.

497. Let α, β, γ be the roots of the equation $x^3 + ax + b = 0$; $a, b \in R$.

Statement–1 : $\begin{vmatrix} \alpha & \beta & \gamma \\ \beta & \gamma & \alpha \\ \gamma & \alpha & \beta \end{vmatrix} = 0$

Statement–2 : Any cubic equation over reals has at least one real root.

498. Let A be a square matrix of order 3 satisfying $AA' = I$.

Statement–1 : $A'A = I$

Statement–2 : $(AB)' = B'A'$

499. **Statement–1** : The determinant of a matrix $\begin{bmatrix} 0 & p-q & p-r \\ q-p & 0 & q-r \\ r-p & r-q & 0 \end{bmatrix}$ is zero.

Statement–2 : The determinant of a skew symmetric matrix of odd order is zero.

500. **Statement–1** : If $A_r = \begin{bmatrix} r & r-1 \\ r-1 & r \end{bmatrix}$, where r is a natural number, then $|A_1| + |A_2| + \ldots |A_{2006}| = (2006)^2$

Statement–2 : If A is a matrix of order 3 and |A| = 2, then $|\text{adj } A| = 2^2$.

501. **Statement–1 :** If matrix A = $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 2 & 1 \\ 2 & 1 & 0 \end{bmatrix}$ then $A^3 - 3A^2 - I = 0$

Statement–2 : If B is a symmetric matrix then B^{-1} will also be symmetric.

502 **Statement–1 :** Adjoint of a diagonal matrix is diagonal matrix

Statement–2 : If |A| = 0 then (adj A) A = A(adjA) = 0

503. **Statement-1:** The inverse of the matrix $\begin{bmatrix} 1 & 3 & 5 \\ 2 & 6 & 10 \\ 9 & 8 & 7 \end{bmatrix}$ does not exist.

Statement-2: The matrix $\begin{bmatrix} 1 & 3 & 5 \\ 2 & 6 & 10 \\ 9 & 8 & 7 \end{bmatrix}$ is singular.

504. **Statement-1:** If A = $\begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$, then $A^{-1} = \begin{bmatrix} 1/a & 0 & 0 \\ 0 & 1/b & 0 \\ 0 & 0 & 1/k \end{bmatrix}$

Statement-2 : The inverse of a diagonal matrix is a diagonal matrix.

505. **Statement-1:** The inverse of the matrix A = $\begin{bmatrix} 0 & -2 & 3 \\ 2 & 0 & 4 \\ -3 & -4 & 0 \end{bmatrix}$ does not exist.

Statement-2: The determinant of a skew-symmetric matrix is zero.

506. Consider the following matrix A = $\begin{bmatrix} -5 & -8 & 0 \\ 3 & 5 & 0 \\ 1 & 2 & -1 \end{bmatrix}$

Statement-1: A is involutory matrix **Statement-2:** $A^2 = I$ (identity matrix)

507. Consider the following system of equation

$ax + y + z = 0,\ x + by + z = 0,\ x + y + cz = 0$

Statement-1: Above system of equation will have infinitely many solution if $\frac{a}{1-a}+\frac{b}{1-b}+\frac{c}{1-c}=2$

Statement-2: Above system of equation will have infinitely many solution if D= $\begin{vmatrix} a & 1 & 1 \\ 1 & b & 1 \\ 1 & 1 & c \end{vmatrix} = 0$

508. **Statement-1:** If A is a skew symmetric of order 3 then its determinant should be zero
Statement-2: If A is square matrix than detA = detA′ = det (-A′).

509. **Statement-1:** If A and B are two matrices such that AB = B, BA = A then $A^2 + B^2 = A + B$
Statement-2: A and B are idempotent matrices

510. **Statement-1:** The possible dimensions of a matrix containing 32 elements is 6.
Statement-2: The number of ways of expressing 32 as a product of two positive integers is 6.

511. **Statement-1:** The determinants of a matrix $\begin{bmatrix} 0 & a-b & a-c \\ b-a & 0 & b-c \\ c-a & c-b & 0 \end{bmatrix}$ is zero.
Statement-2: The determinant of a skew symmetric matrix of odd order is zero.

512. **Statement-1:** Every square matrix can be uniquely expressed as the sum of a symmetric matrix and a skew symmetric matrix.
Statement-2: The elements on the main diagonal of a skew symmetric matrix are all different.

513. **Statement-1:** $\Delta = \begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} \geq 27a^2b^2$
Statement-2: A.M. ≥ G.M.

514. **Statement-1:** The value of $\Delta = \begin{vmatrix} 2 & -3 & 5 \\ 3 & 7 & 0 \\ 4 & 1 & 8 \end{vmatrix}$ is 59
Statement-2: The sum of products of elements of a row (column) is zero.

515. **Statement-1:** The system of linear equations $x + y + z = 6$, $x + 2y - 3z = 14$ and $2x + 5y - \lambda z = 9(\lambda \in R)$ half unique solution. If $\lambda \neq 8$.
Statement-2: A homogenous system is always is consistent for homogenous system, x = y = z = 0 is a always a solution where determinant ≠ 0 i.e., $\Delta \neq 0$.

516. **Statement-1:** If ω is a cube root of unity and A = $\begin{bmatrix} \omega & 0 \\ 0 & \omega \end{bmatrix}$, then A^{100} is equal to A
Statement-2: If A, and B are idempotent matrices, then AB is idempotent if A and B commute

517. **Statement-1:** If A = $[a_{ij}]$ is a scalar matrix then trace of A is $\sum_{i}^{n} a_{ii}$
Statement-2: If $\begin{bmatrix} x+y & 8 \\ 0 & x-y \end{bmatrix} = \begin{bmatrix} 2 & 3 \\ -1 & 5 \end{bmatrix} + \begin{bmatrix} 3 & 5 \\ 1 & -2 \end{bmatrix}$ the value of x = y; y = 1

Answer

491. A	492. D	493. D	494. A	495. C	496. D	497. B
498. B	499. A	500. B	501. B	502. B	503. A	504. B
505. A	506. A	507. A	508. C	509. A	510. C	511. A
512. C	513. A	514. B	515. A	516. B	517. A	518. A
519. A	520. D	521. C	522. C	523. C	524. D	525. A
526. A	527. D	528. C	529. C	530. D	531. B	532. A
533. B	534. A	535. A	536. C	537. A	538. A	539. A
540. A	541. D	542. A	543. C	544. A	545. A	546. A
547. A	548. A	549. A	550. B	551. B	552. B	553. D
554. D	555. B	556. B	557. C	558. D	559. D	560. D
561. A	562. A	563. A	564. D	565. D	566. D	567. D
568. A	569. C	570. C	571. A			