ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

STUDY MATERIAL-2
SUBJECT – MATHEMATICS
Pre-test

Chapter: MATRICES AND DETERMINANTS **Class: XII**

Topic: MATRICES **Date: 09.05.2020**

PART 2

EXERCISE SET 1

1. If $A(\alpha,\beta)=\begin{bmatrix}\cos\alpha & \sin\alpha & 0\\ -\sin\alpha & \cos\alpha & 0\\ 0 & 0 & e^{\beta}\end{bmatrix}$, then $A(\alpha,\beta)^{-1}$ is equal to
(a) $A(-\alpha,-\beta)$ (b) $A(-\alpha,\beta)$
(c) $A(\alpha,-\beta)$ (d) $A(\alpha,\beta)$

2. If $\begin{bmatrix}\alpha & \beta\\ \gamma & -\alpha\end{bmatrix}$ is to be the square root of a two-rowed unit matrix, then α, β and γ should satisfy the relation
(a) $1+\alpha^2+\beta\gamma=0$ (b) $1-\alpha^2-\beta\gamma=0$
(c) $1-\alpha^2+\beta\gamma=0$ (d) $\alpha^2+\beta\gamma-1=0$

3. If $A=\begin{bmatrix}2 & 14 & 7\\ 0 & \sin 2x & \cos 2x\\ 0 & \cos 2x & \sin 2x\end{bmatrix}$, then $|A|$ equals
(a) $\cos 2x$ (b) -2
(c) $-2\cos 4x$ (d) $\sin 4x$

4. If A is a matrix such that $A^2+A+2I=0$, then which of the following is **not** true?
(a) A is symmetric (b) A is non-singular
(c) $A\neq 0$ (d) $A^{-1}=-\frac{1}{2}(A+I)$

5. If $E(\theta)=\begin{bmatrix}\cos^2\theta & \cos\theta\sin\theta\\ \cos\theta\sin\theta & \sin^2\theta\end{bmatrix}$ and θ and ϕ differ by an odd multiple of $\pi/2$, then $E(\theta)E(\phi)$ is
(a) a null matrix (b) a unit matrix
(c) a diagonal matrix (d) none of these

6. If $A=[a_{ij}]$ is a 4×4 matrix and C_{ij} is the cofactor of the element a_{ij} in $|A|$, then the expression $a_{11}C_{11}+a_{12}C_{12}+a_{13}C_{13}+a_{14}C_{14}$ is equal to
(a) 0 (b) -1
(c) 1 (d) $|A|$

7. If $A=\begin{bmatrix}0 & c & -b\\ -c & 0 & a\\ b & -a & 0\end{bmatrix}$ and $B=\begin{bmatrix}a^2 & ab & ac\\ ab & b^2 & bc\\ ac & bc & c^2\end{bmatrix}$, then $|AB|$ equals
(a) A^3 (b) B^2
(c) 1 (d) none of these

8. If A and B are square matrices of the same order such that $A^2=A, B^2=B, AB=BA=O$, then
(a) $(A-B)^2=B-A$ (b) $(A-B)^2=A-B$
(c) $(A+B)^2=A+B$ (d) none of these

9. If $A=\begin{bmatrix}2x & 0\\ x & x\end{bmatrix}$ and $A^{-1}=\begin{bmatrix}1 & 0\\ -1 & 2\end{bmatrix}$, then x equals
(a) 2 (b) $-(1/2)$
(c) 1 (d) 1/2

10. The equations $2x+y=4$, $3x+2y=2$ and $x+y=-2$ have
(a) no solution
(b) one solution
(c) two solutions
(d) infinitely many solutions

11. If $A=\begin{bmatrix}5 & 3\\ 14 & 11\end{bmatrix}$, then $13A^{-1}$ equals

(a) A (b) $2A$
(c) adj A (d) $(1/13)A$

12. If $P=\begin{bmatrix}\frac{\sqrt{3}}{2} & \frac{1}{2}\\ -\frac{1}{2} & \frac{\sqrt{3}}{2}\end{bmatrix}$, $A=\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}$, $Q=PAP^T$ and $x=P^TQ^{2005}P$, then x is equal to

(a) $\begin{bmatrix}1 & 2005\\ 0 & 1\end{bmatrix}$
(b) $\begin{bmatrix}4+2005\sqrt{3} & 6015\\ 2005 & 4-2005\sqrt{3}\end{bmatrix}$
(c) $\frac{1}{4}\begin{bmatrix}2+\sqrt{3} & 1\\ -1 & 2-\sqrt{3}\end{bmatrix}$
(d) $\frac{1}{4}\begin{bmatrix}2005 & 2-\sqrt{3}\\ 2+\sqrt{3} & 2005\end{bmatrix}$

13. If $f(x)=\begin{bmatrix}\sin x & \operatorname{cosec} x & \tan x\\ \sec x & x\sin x & x\tan x\\ x^2-1 & \cos x & x^2+1\end{bmatrix}$, then $\int_{-a}^{a}|f(x)|dx$ equals

(a) 1 (b) –1
(c) $2a$ (d) 0

14. If $A=\begin{bmatrix}\alpha & 0\\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0\\ 5 & 1\end{bmatrix}$ are two matrices, then $A^2=B$ is true for

(a) $\alpha=-1$ (b) $\alpha=1$
(c) $\alpha=4$ (d) no real value of α

15. Let $A=\begin{bmatrix}4 & 0 & 0\\ 0 & 4 & 0\\ 0 & 0 & 4\end{bmatrix}$, then A^n equals

(a) $\begin{bmatrix}4^n & 0 & 0\\ 0 & 4^{n-1} & 0\\ 0 & 0 & 4^{n-2}\end{bmatrix}$ (b) $\begin{bmatrix}2^{2n} & 0 & 0\\ 0 & 2^{2n} & 0\\ 0 & 0 & 2^{2n}\end{bmatrix}$

(c) $\begin{bmatrix}4^{n-1} & 0 & 0\\ 0 & 4^{n-1} & 0\\ 0 & 0 & 4^{n-1}\end{bmatrix}$ (d) $\begin{bmatrix}|A|^n & 0 & 0\\ 0 & |A|^n & 0\\ 0 & 0 & |A|^n\end{bmatrix}$

16. For any 2×2 matrix A, if $A(\text{adj } A)=\begin{bmatrix}10 & 0\\ 0 & 10\end{bmatrix}$, then $|A|$ is equal to

(a) 20 (b) 100
(c) 10 (d) 0

17. If $\begin{bmatrix}\cos\frac{2\pi}{3} & -\sin\frac{2\pi}{3}\\ \sin\frac{2\pi}{3} & \cos\frac{2\pi}{3}\end{bmatrix}^k=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$, then the least value of k equals $(k\neq 0)$

(a) 1 (b) 2
(c) –1 (d) 3

18. Which of the following is correct?

(a) Every identity matrix is a scalar matrix.
(b) Every scalar matrix is an identity matrix.
(c) Every diagonal matrix is an identity matrix.
(d) A square matrix whose each element is 1 is an identity matrix.

19. The system of homogeneous equations
$tx+(t+1)y+(t-1)z=0$, $(t+1)x+ty+(t+2)z=0$
and $(t-1)x+(t+2)y+tz=0$ has non-trivial solutions for

(a) exactly three real values of t
(b) exactly two real values of t
(c) exactly one real value of t
(d) infinite number of values of t

20. If $A=\begin{bmatrix}\cos x & \sin x\\ -\sin x & \cos x\end{bmatrix}$ and $A(\text{adj}A)=k\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$, then the value of k is

(a) $\sin x\cos x$ (b) 1
(c) 2 (d) 3

21. If $A=\begin{bmatrix}1 & 2 & -1\\ -1 & 1 & 2\\ 2 & -1 & 1\end{bmatrix}$, then $\det[\text{adj}(\text{adj}A)]$ is

(a) $(14)^4$ (b) $(14)^3$
(c) $(14)^2(14)^4$ (d) $(14)^1$

22. If A and B are square matrices and A^{-1} and B^{-1} of the same order exist, then the value of $(AB)^{-1}$ is

(a) AB^{-1} (b) $A^{-1}B$
(c) $A^{-1}B^{-1}$ (d) $B^{-1}A^{-1}$

23. The system of equations $ax+by+cz=q-r$, $bx+cy+az=r-p$ and $cx+ay+bz=p-q$ is

(a) consistent if $p=q=r$
(b) inconsistent if $a=b=c$, and p, q, r are distinct
(c) consistent if a, b, c are distinct and $a+b+c=0$
(d) none of these

24. If a matrix A is such that $3A^3+2A^2+5A+I=0$, then A^{-1} is equal to

(a) $-(3A^2+2A+5I)$ (b) $3A^2+2A+5$
(c) $3A^2-2A-5$ (d) none of these

25. Given $2x-y+2z=2$, $x-2y+z=-4$ and $x+y+\lambda z=4$, then the value of λ such that the given system of equations has no solution is

(a) 3 (b) 1
(c) 0 (d) –3

26. Assuming that the sums and products given below are defined, then which of the following is not true for matrices?

(a) $(AB)'=B'A'$
(b) $A+B=B+A$
(c) $AB=AC$ does not imply $B=C$
(d) $AB=0$ implies $A=0$ or $B=0$

27. Which of the following is **not** true?

(a) $A^2-B^2=(A+B)(A-B)$
(b) $(A^T)^T=A$
(c) $(AB)^n=A^nB^n$, where A and B commute
(d) $(A-I)(I+A)=0 \Leftrightarrow A^2=1$

28. If in a square matrix $A=[a_{ij}]$, we find that $a_{ij}=a_{ji}\forall i,j$ then A is a

(a) symmetric matrix (b) diagonal matrix
(c) transpose matrix (d) skew-symmetric matrix

29. If A is a non-singular square matrix of order n, then the rank of A is

(a) equal to n (b) less than n
(c) greater than n (d) none of these

30. If A and B are square matrices of the order 3, such that $|A|=-1$ and $|B|=3$, then the value of $|3AB|$ is

(a) –9 (b) –81
(c) –27 (d) 81

31. If $A=\begin{bmatrix}1&2&x\\0&1&0\\0&0&1\end{bmatrix}$ and $B=\begin{bmatrix}1&-2&y\\0&1&0\\0&0&1\end{bmatrix}$ and $AB=I_3$, then $x+y$ equals

(a) 0 (b) –1
(c) 2 (d) none of these

32. If $A=\begin{bmatrix}1&2\\2&3\end{bmatrix}$ and $A^2-kA-I_2=0$, then the value of k is

(a) 4 (b) 2
(c) 1 (d) –4

33. If A satisfies the equation $x^3-5x^2+4x+k=0$, then A^{-1} exists if

(a) $k\neq 1$ (b) $k\neq 2$
(c) $k\neq -1$ (d) none of these

34. If matrix $A=\begin{bmatrix}\alpha&2\\2&\alpha\end{bmatrix}$ and $|A^3|=125$, then the value of α is

(a) ±3 (b) ±2
(c) ±5 (d) 0

35. If A is a matrix of order 2×3 and AB is a matrix of order 2×5, then B may be a

(a) 3×5 matrix (b) 5×3 matrix
(c) 3×2 matrix (d) 5×2 matrix

36. Let A and B be two square matrices such that $AB=A$ and $BA=B$, then $A^2=$

(a) B (b) A
(c) I (d) 0

37. If $AB=A$ and $BA=A$, where A and B are square matrices, then

(a) $B^2=B$ and $A^2=A$ (b) $B^2\neq B$ and $A^2=A$
(c) $A^2\neq A$ and $B^2=B$ (d) $A^2\neq A$ and $B^2\neq B$

38. If A is an $m\times n$ matrix such that AB and BA are both defined, then B is an

(a) $m\times n$ matrix (b) $n\times m$ matrix
(c) $n\times n$ matrix (d) $m\times m$ matrix

39. If the matrix $\begin{bmatrix}(x-a)^2&(x-b)^2&(x-c)^2\\(y-a)^2&(y-b)^2&(y-c)^2\\(z-a)^2&(z-b)^2&(z-c)^2\end{bmatrix}$ is a zero matrix, then a, b, c, x, y, z are connected by

(a) $a+b+c=0,\ x+y+z=0$
(b) $a+b+c=0,\ x=y=z$
(c) $a=b=c,\ x+y+z=0$
(d) none of these

40. The value of x for which the matrix $A=\begin{bmatrix}6&x-2\\3&x\end{bmatrix}$ has no inverse is

(a) –2 (b) 2
(c) 0 (d) 3

41. If $\begin{bmatrix}x+y&8\\0&x-y\end{bmatrix}=\begin{bmatrix}2&3\\-1&5\end{bmatrix}+\begin{bmatrix}3&5\\1&-2\end{bmatrix}$, then (x,y) equals

(a) (4, 1) (b) (1, 4)
(c) (–4,–1) (d) (1,–4)

42. If $A=\begin{bmatrix}1&0\\1&1\end{bmatrix}$ and $I=\begin{bmatrix}1&0\\0&1\end{bmatrix}$, then which one of the following holds for all $n\geq 1$, by the principle of mathematical induction?

(a) $A^n=2^{n-1}A-(n-1)I$ (b) $A^n=nA-(n-1)I$
(c) $A^n=2^{n-1}A+(n-1)I$ (d) $A^n=nA+(n-1)I$

43. If $A=\begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$, $n\in N$, then A^{4n} equals

(a) $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$

44. If A and B are symmetric matrices, then ABA is

(a) symmetric (b) skew-symmetric
(c) diagonal (d) triangular

45. If a, b, c are distinct and $\begin{vmatrix} a & a^2 & a^3-1 \\ b & b^2 & b^3-1 \\ c & c^2 & c^3-1 \end{vmatrix}=0$, then

(a) $abc=1$ (b) $a+b+c=0$
(c) $a+b+c=1$ (d) $ab+bc+ca=0$

46. If $A=\begin{bmatrix} 2 & 3 & 1 \\ 4 & -2 & 6 \end{bmatrix}$, $B=\begin{bmatrix} 0 & 3 & 2 \\ -2 & 1 & 4 \end{bmatrix}$ and $C=\begin{bmatrix} 7 & 8 \\ 9 & 0 \\ 6 & 5 \end{bmatrix}$,

then $2A+3B-C^T$ equals

(a) $\begin{bmatrix} -3 & 6 & 2 \\ -6 & -1 & 19 \end{bmatrix}$ (b) $\begin{bmatrix} 3 & 6 & 2 \\ 6 & 1 & 19 \end{bmatrix}$

(c) $\begin{bmatrix} 11 & 24 & 14 \\ 10 & 7 & 31 \end{bmatrix}$ (d) none of these

47. If $A^2-A+I=0$, then the inverse of A is

(a) A (b) $A+I$
(c) $I-A$ (d) $A-I$

48. If ω is a complex cube root of unity, and $A=\begin{bmatrix} \omega & 0 \\ 0 & \omega \end{bmatrix}$,
then A^{100} is equal to

(a) A (b) $-A$
(c) 0 (d) none of these

49. If A = diagonal $(d_1, d_2, \ldots, d_n)$, then A^n is

(a) diag. $(d_1^{n-1}, d_2^{n-1}, \ldots, d_n^{n-1})$
(b) A
(c) diag. $(d_1^n, d_2^n, \ldots, d_n^n)$
(d) none of these

50. If $\begin{bmatrix} 1 & x & 1 \end{bmatrix}\begin{bmatrix} 2 & 3 & 2 \\ 0 & 5 & 1 \\ 0 & 3 & 2 \end{bmatrix}\begin{bmatrix} 1 \\ 1 \\ x \end{bmatrix}=0$, then the values of x are

(a) 1, 8 (b) –1, 8
(c) –1, –8 (d) 1, –8

51. Let $A=\begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ and $(10)B=\begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{bmatrix}$. If B is the inverse of A, then α is

(a) –2 (b) –1
(c) 2 (d) 5

52. If $A^3=0$, then $I+A+A^2$ equals

(a) $I-A$ (b) $(I-A)^{-1}$
(c) $(I+A)^{-1}$ (d) none of these

53. The inverse of a symmetric matrix is

(a) symmetric (b) skew-symmetric
(c) diagonal (d) none of these

54. If $\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix}A=\begin{bmatrix} -1 & -8 & -10 \\ 1 & -2 & -5 \\ 9 & 22 & 15 \end{bmatrix}$, then the matrix A is

(a) $\begin{bmatrix} 1 & -2 & -5 \\ 3 & 4 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 3 \\ -2 & 4 \\ -5 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} -1 & 2 & 5 \\ 3 & 4 & 0 \end{bmatrix}$ (d) none of these

55. If $A=\begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $A^2=\begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix}$, then

(a) $\alpha=2ab, \beta=a^2+b^2$ (b) $\alpha=a^2+b^2, \beta=ab$
(c) $\alpha=a^2+b^2, \beta=2ab$ (d) $\alpha=a^2+b^2, \beta=a^2-b^2$

56. If A is a non-singular matrix of order 3 × 3, then adj (adj A) is equal to

(a) $|A|A$ (b) $|A|^2 A$
(c) $|A|^{-1} A$ (d) none of these

57. If A and B are two square matrices such that $AB = A$ and $BA = B$ then

(a) A, B are idempotent (b) only A is idempotent
(c) only B is idempotent (d) none of these

58. The matrices

$$P=\begin{bmatrix} u_1 & v_1 & w_1 \\ u_2 & v_2 & w_2 \\ u_3 & v_3 & w_3 \end{bmatrix} \text{ and } Q=\frac{1}{9}\begin{bmatrix} 2 & 2 & 1 \\ 12 & -5 & m \\ -8 & 1 & 5 \end{bmatrix}$$

are such that $PQ = I$ (an identity matrix). Solving the equations $\begin{bmatrix} u_1 & v_1 & w_1 \\ u_2 & v_2 & w_2 \\ u_3 & v_3 & w_3 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix}=\begin{bmatrix} 1 \\ 1 \\ 5 \end{bmatrix}$ the value of y comes out to be –3. Then the value of m is equal to

(a) 27 (b) 7
(c) –27 (d) –7

59. If A is a square matrix such that $A^2 = A$ and $(I + A)^n = I + \lambda A$, then $\lambda = ?$
(a) $(2n - 1)$ (b) $2^n - 1$
(c) $2n+1$ (d) none of these

60. If A is skew-symmetric, then A^n for $n \in N$ is
(a) symmetric (b) skew-symmetric
(c) diagonal (d) none of these

61. If ω is the cube root of unity, then
$$\begin{bmatrix} \omega & \omega^2 \\ 1 & \omega \\ \omega^2 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \end{bmatrix} \times \begin{bmatrix} 1 \\ \omega \\ \omega^2 \end{bmatrix} \text{ equals}$$
(a) $\begin{bmatrix} \omega-\omega^2 \\ \omega-\omega^2 \\ \omega-2\omega^2 \end{bmatrix}$ (b) $\begin{bmatrix} 1 \\ \omega \\ \omega^2 \end{bmatrix}$
(c) $(\omega-\omega^2)\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ (d) none of these

62. Consider the system of equations in x, y, z as $x \sin 3\theta - y + z = 0$, $x\cos 2\theta + 4y + 3z = 0$ and $2x + 7y + 7z = 0$. If this system has a non-trivial solution, then for any integer n, the values of θ are given by
(a) $\left[n + \frac{(-1)^n}{3}\right]\pi$ (b) $\left[n + \frac{(-1)^n}{4}\right]\pi$
(c) $\left[n + \frac{(-1)^n}{6}\right]\pi$ (d) $\frac{n\pi}{2}$

63. If a matrix A is symmetric as well as skew-symmtric, then
(a) A is a diagonal matrix (b) A is a null matrix
(c) A is a unit matrix (d) A is a triangular matrix

64. If $A = \begin{bmatrix} 3 & 4 \\ 4 & 4 \end{bmatrix}$, and $B = \begin{bmatrix} -2 & -2 \\ 0 & -2 \end{bmatrix}$, then $(A+B)^{-1}$ is
(a) is a skew-symmetric matrix
(b) $A^{-1} + B^{-1}$
(c) does not exist
(d) none of these

65. Let p be an odd prime number and T_p be the following set of matrices
$$T_p = \left\{ A = \begin{bmatrix} a & b \\ c & a \end{bmatrix} : a, b, c \in \{0, 1, 2, \ldots, p-1\} \right\}$$
The number of A in T_p such that the trace of A is not divisible by p but $\det(A)$ is divisible by p is
(a) $(p-1)(p^2-p+1)$ (b) $p^3-(p-1)^2$
(c) $(p-1)^2$ (d) $(p-1)(p^2-2)$

EXERCISE SET 2

1. A and B are two non-zero square matrices such that $AB = 0$. Then,
(a) both A and B are singular
(b) either of them is singular
(c) neither matrix is singular
(d) none of these

2. If $A\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 0 & -4 \\ 10 & 3 \end{bmatrix}$, then A equals
(a) $\begin{bmatrix} \frac{-11}{2} & 4 \\ -19 & 12 \end{bmatrix}$ (b) $\begin{bmatrix} \frac{-11}{2} & \frac{11}{2} \\ -19 & -12 \end{bmatrix}$
(c) $\begin{bmatrix} -8 & 4 \\ -19 & 12 \end{bmatrix}$ (d) $\begin{bmatrix} -16 & 8 \\ -38 & 24 \end{bmatrix}$

3. If A is an n-rowed non-singular square matrix, then $|\text{adj}A|$ is equal to
(a) $|A|^n$ (b) $|A|^{n-1}$
(c) $|A|^{n-2}$ (d) $|A|$

4. The inverse of the matrix $A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$ is equal to
(a) adj A (b) 2 adj A
(c) A (d) A^T

5. The values of x for which the matrix
$$A = \begin{bmatrix} 3-x & 2 & 2 \\ 2 & 4-x & 1 \\ -2 & -4 & -1-x \end{bmatrix}$$
is singular are
(a) 0, 3 (b) 1, 3
(c) 2, 3 (d) 3, 3

6. If $A = \begin{bmatrix} 1 & \log_b a \\ \log_a b & 1 \end{bmatrix}$, then $|A|$ is equal to
(a) 1 (b) 0
(c) $\log_a b$ (d) $\log_b a$

7. If A is an invertible matrix, then det (A^{-1}) is equal to
(a) 1 (b) $|A|$
(c) $1/|A|$ (d) none of these

8. If $|A|$ denotes the determinant of matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ -1 & 1 & 1 \\ -1 & -1 & 1 \end{bmatrix}$, then $|5A|$ equals
(a) 4 (b) 0
(c) 20 (d) 500

9. If $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$, then A^n is equal to
(a) $2^{n-1}A - (n-1)I$ (b) $nA - (n-1)I$
(c) $2^{n-1}A + (n-1)I$ (d) $nA + (n-1)I$

10. If $A = \begin{bmatrix} 1 & -2 & 1 \\ 2 & 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 3 & 2 \\ 1 & 1 \end{bmatrix}$, then $(AB)^T$ is equal to
(a) $\begin{bmatrix} -3 & -2 \\ 10 & 7 \end{bmatrix}$ (b) $\begin{bmatrix} -3 & 10 \\ -2 & 7 \end{bmatrix}$
(c) $\begin{bmatrix} -3 & 7 \\ 10 & 2 \end{bmatrix}$ (d) none of these

11. If A is an orthogonal matrix, then
(a) $|A| = 0$ (b) $|A| = \pm 1$
(c) $|A| = \pm 2$ (d) none of these

12. If A is skew-symmetric and $B = (I - A)^{-1}(I + A)$, then B is
(a) singular (b) symmetric
(c) skew-symmetric (d) orthogonal

13. A square matrix P satisfies $P^2 = I - P$, where I is the identity matrix. If $P^n = 5I - 8P$, then n is equal to
(a) 4 (b) 5
(c) 6 (d) 7

14. If A is invertible, then which of the following is not true?
(a) $A^{-1} = |A|^{-1}$ (b) $(A^2)^{-1} = (A^{-1})^2$
(c) $(A^T)^{-1} = (A^{-1})^T$ (d) none of these

15. If $A^2 - 3A + 2I = 0$, then
(a) A is singular (b) $A^{-1} = \dfrac{3I + A}{2}$
(c) $A^{-1} = \dfrac{I - 3A}{2}$ (d) $A^{-1} = \dfrac{3I - A}{2}$

16. If a square matrix A is such that $AA^T = I = A^TA$, then $|A|$ is equal to
(a) 0 (b) ± 1
(c) ± 2 (d) none of these

17. If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$, then the value of $|\text{adj}A|$ is
(a) a^3 (b) a^6
(c) a^9 (d) a^{27}

18. The value of λ such that the system of equations $x - 2y + z = -4$, $2x - y + 2z = 2$, $x + y + \lambda z = 4$ has no solution, is
(a) 0 (b) 1
(c) −1 (d) 3

19. Let $M = [a_{uv}]_{n \times n}$ be a matrix, where $a_{uv} = \sin(\theta_u - \theta_v) + i\cos(\theta_u - \theta_v)$, then M is equal to
(a) $\bar{M}$ (b) $-\bar{M}$
(c) $(\bar{M})^T$ (d) $(-\bar{M})^T$

20. If $\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is to be the square root of a two-rowed unit matrix, then α, β and γ should satisfy the relation
(a) $1 + \alpha^2 + \beta\gamma = 0$ (b) $1 - \alpha^2 - \beta\gamma = 0$
(c) $1 - \alpha^2 + \beta\gamma = 0$ (d) $1 + \alpha^2 - \beta\gamma = 0$

21. If the system of equations $x - ky - z = 0$, $kx - y - z = 0$ and $x + y - z = 0$ has a non-zero solution, then k is equal to
(a) 0, 1 (b) 1, −1
(c) −1, 2 (d) 2, −2

22. For any square matrix A, AA^T is a
(a) unit matrix
(b) symmetric matrix
(c) skew-symmetric matrix
(d) diagonal matrix

23. If A is a square matrix such that $|A| = 2$, then for any positive integer n, $|A^n|$ is equal to
(a) 0 (b) $2n$
(c) 2^n (d) n^2

24. If $A = \begin{bmatrix} \dfrac{-1 + i\sqrt{3}}{2i} & \dfrac{-1 - i\sqrt{3}}{2i} \\ \dfrac{1 + i\sqrt{3}}{2i} & \dfrac{1 - i\sqrt{3}}{2i} \end{bmatrix}$, $i = \sqrt{-1}$ and $f(x) = x^2 + 2$, then $f(A)$ is equal to
(a) $\left(\dfrac{5 - i\sqrt{3}}{2}\right)\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (b) $\left(\dfrac{3 - i\sqrt{3}}{2}\right)\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
(c) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (d) $(2 + i\sqrt{3})\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

25. Which of the following matrices is not invertible?
(a) $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 3 & 3 \\ 5 & 5 \end{bmatrix}$
(c) $\begin{bmatrix} -1 & -1 \\ -1 & 2 \end{bmatrix}$ (d) $\begin{bmatrix} 2 & -2 \\ 1 & 1 \end{bmatrix}$

26. $A=\begin{bmatrix}0 & 3\\ 2 & 0\end{bmatrix}$ and $A^{-1}=\lambda(\text{adj}\,A)$, then λ is equal to

(a) $-\frac{1}{6}$ (b) $\frac{1}{3}$

(c) $-\frac{1}{3}$ (d) $\frac{1}{6}$

27. If A and B are two matrices such that $A + B$ and AB are both defined, then

(a) A and B can be any matrices

(b) A and B are square matrices not necessarily of same order

(c) A and B are square matrices of same order

(d) number of columns of A = number of rows of B

28. If $\begin{bmatrix}\cos^2\theta & \cos\theta\sin\theta\\ \cos\theta\sin\theta & \sin^2\theta\end{bmatrix}\begin{bmatrix}\cos^2\phi & \cos\phi\sin\phi\\ \cos\phi\sin\phi & \sin^2\phi\end{bmatrix}$ is a zero matrix, then θ and ϕ differ by an

(a) even multiple of $\pi/2$ (b) odd multiple of $\pi/2$

(c) even multiple of π (d) odd multiple of π

29. If $A=\begin{bmatrix}i & 0\\ 0 & i\end{bmatrix}$, then $A^{4n}\,(n\in N)$ equals

(a) $\begin{bmatrix}0 & i\\ i & 0\end{bmatrix}$ (b) $\begin{bmatrix}i & 0\\ 0 & i\end{bmatrix}$

(c) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ (d) $\begin{bmatrix}0 & 0\\ 0 & 0\end{bmatrix}$

30. A is a matrix such that $A^2=2A-I$, where I is the identity matrix. Then, for $n\geq 2, A^n$ is equal to

(a) $nA-(n-1)I$ (b) $nA-I$

(c) $2^{n-1}A-(n-1)I$ (d) $2^{n-1}A-I$

31. If A and B are any 2 × 2 matrices, then $|A+B|=0$ implies

(a) $|A|+|B|=0$ (b) $|A|=0$ or $|B|=0$

(c) $|A|=0$ and $|B|=0$ (d) none of these

32. If A and P are 3×3 matrices with integral entries such that $P^TAP = A$, then det. P is

(a) –1

(b) 1

(c) ±1

(d) ±1 provided A is non-singular

33. If the matrix $A=\begin{bmatrix}8 & -6 & 2\\ -6 & 7 & -4\\ 2 & -4 & \lambda\end{bmatrix}$ is singular, then λ is equal to

(a) 3 (b) 4

(c) 2 (d) 5

34. If 1, ω, ω^2 are the cube roots of unity, then

$$\Delta=\begin{vmatrix}1 & \omega^n & \omega^{2n}\\ \omega^{2n} & 1 & \omega^n\\ \omega^n & \omega^{2n} & 1\end{vmatrix}$$

has the value

(a) 0 (b) ω

(c) ω^2 (d) 1

35. If each element of a 3 × 3 matrix A is multiplied by 3, then the determinant of the newly formed matrix is

(a) 3 det A (b) 9 det A

(c) $(\det A)^3$ (d) 27 det A

36. The inverse matrix of $\begin{bmatrix}0 & 1 & 2\\ 1 & 2 & 3\\ 3 & 1 & 1\end{bmatrix}$ is

(a) $\begin{bmatrix}\frac{1}{2} & -\frac{1}{2} & \frac{1}{2}\\ -4 & 3 & -1\\ \frac{5}{2} & -\frac{3}{2} & \frac{1}{2}\end{bmatrix}$ (b) $\begin{bmatrix}\frac{1}{2} & -4 & \frac{5}{2}\\ 1 & -6 & 3\\ 1 & 2 & -1\end{bmatrix}$

(c) $\frac{1}{2}\begin{bmatrix}1 & 2 & 3\\ 3 & 2 & 1\\ 4 & 2 & 3\end{bmatrix}$ (d) $\frac{1}{2}\begin{bmatrix}1 & -1 & -1\\ -8 & 6 & -2\\ 5 & -3 & 1\end{bmatrix}$

37. If A is a 3 × 3 non-singular matrix, then det [adj A] is equal to

(a) $(\det A)^2$ (b) $(\det A)^3$

(c) det A (d) $(\det A)^{-1}$

38. The inverse of the matrix $\begin{bmatrix}\cos 2\theta & -\sin 2\theta\\ \sin 2\theta & \cos 2\theta\end{bmatrix}$ is

(a) $\begin{bmatrix}\cos 2\theta & -\sin 2\theta\\ \sin 2\theta & \cos 2\theta\end{bmatrix}$ (b) $\begin{bmatrix}\cos 2\theta & \sin 2\theta\\ \sin 2\theta & -\cos 2\theta\end{bmatrix}$

(c) $\begin{bmatrix}\cos 2\theta & \sin 2\theta\\ \sin 2\theta & \cos 2\theta\end{bmatrix}$ (d) $\begin{bmatrix}\cos 2\theta & \sin 2\theta\\ -\sin 2\theta & \cos 2\theta\end{bmatrix}$

39. If α, β and γ are the roots of the equation $x^3+px+q=0$, then the value of det $\begin{bmatrix}\alpha & \beta & \gamma\\ \beta & \gamma & \alpha\\ \gamma & \alpha & \beta\end{bmatrix}$ is

(a) p (b) q

(c) $p^2 - 2q$ (d) 0

40. Let $F(\alpha)=\begin{bmatrix}\cos\alpha & -\sin\alpha & 0\\ \sin\alpha & \cos\alpha & 0\\ 0 & 0 & 1\end{bmatrix}$, then $[F(\alpha)]^{-1}$ is equal to

(a) $F(-\alpha)$ (b) $F(\alpha^{-1})$

(c) $F(2\alpha)$ (d) none of these

41. Let p be a non-singular matrix such that $1 + p + p^2 + \ldots + p^n = O$ (O denotes the null matrix), then p^{-1} is
(a) p^n (b) $-p^n$
(c) $-(1+p+\cdots+p^n)$ (d) none of these

Assertion-Reason Type Questions

Each of these questions contains two statements: Statement 1 (Assertion) and Statement 2 (Reason). Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes (a), (b), (c), or (d) given below:

(a) Statement 1 is true, Statement 2 is true; Statement 2 is a correct explanation for Statement 1
(b) Statement 1 is true, Statement 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

42. Statement 1: The matrix $A = \frac{1}{3}\begin{bmatrix} 1 & -2 & 2 \\ -2 & 1 & 2 \\ -2 & -2 & -1 \end{bmatrix}$ is an orthogonal matrix.
Statement 2: If A and B are orthogonal, then AB is also orthogonal.

43. Statement 1: If A is a skew-symmetric matrix of order 3×3, then $\det(A) = 0$ or $|A| = 0$.
Statement 2: If A is a square matrix, then $\det(A) = \det(A^T) = \det(-A^T)$.

44. Statement 1: The inverse of $A = \begin{bmatrix} 3 & 4 \\ 3 & 5 \end{bmatrix}$ does not exist.
Statement 2: The matrix A is non-singular.

45. Statement 1: If a matrix of order 2×2 commutes with every matrix of order 2×2, then it is a scalar matrix.
Statement 2: A scalar matrix of order 2×2 commutes with every 2×2 matrix.

46. Statement 1: $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 7 \end{bmatrix}$ is a diagonal matrix.
Statement 2: If $A = [a_{ij}]$ is a square matrix such that $a_{ij} = 0, \forall i \neq j$, then A is called a diagonal matrix.

Previous Years' Questions

47. If $a > 0$ and discriminant of $ax^2 + 2bx + c < 0$ is greater than zero, then $\begin{vmatrix} a & b & ax+b \\ b & c & bx+c \\ ax+b & bx+c & 0 \end{vmatrix}$ is
(a) positive
(b) $(ac-b^2)(ax^2+2bx+c)$
(c) negative
(d) 0

48. If l, m, n are the pth, qth, rth terms of a G.P., all positive, then $\begin{bmatrix} \log l & p & 1 \\ \log m & q & 1 \\ \log n & r & 1 \end{bmatrix}$ equals
(a) -1 (b) 2
(c) 1 (d) 0

49. Let $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} a & 0 \\ 0 & b \end{pmatrix}$, $a, b \in N$. Then
(a) there cannot exist any B such that $AB = BA$
(b) there exists more than one but a finite number of B's such that $AB = BA$
(c) there exists exactly one B such that $AB = BA$
(d) there exist infinitely many B's such that $AB = BA$

50. If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $A^2 = \begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix}$, then
(a) $\alpha = 2ab, \beta = a^2 + b^2$
(b) $\alpha = a^2 + b^2, \beta = ab$
(c) $\alpha = a^2 + b^2, \beta = 2ab$
(d) $\alpha = a^2 = b^2, \beta = a^2 - b^2$

51. If the system of equations $x + 2ay + az = 0$, $x + 3by + bz = 0$ and $x + 4cz + cz = 0$ has a non-zero solution, then a, b, c
(a) are in G.P.
(b) are in H.P.
(c) satisfy $a + 2b + 3c = 0$
(d) are in A.P.

52. If $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix} = 0$ and vectors $(1, a, a^2), (1, b, b^2)$ and $(1, c, c^2)$ are non-coplanar, then abc equals
(a) -1 (b) 1
(c) 0 (d) 2

53. Let $A = \begin{bmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{bmatrix}$. The only correct statement about the matrix A is
(a) A^{-1} does not exist (b) $A = (-1)I$
(c) A is a zero matrix (d) $A^2 = I$

54. Let $A\begin{bmatrix}1 & -1 & 1\\ 2 & 1 & -3\\ 1 & 1 & 1\end{bmatrix}$ and (10) $B=\begin{bmatrix}4 & 2 & 2\\ -5 & 0 & \alpha\\ 1 & -2 & 3\end{bmatrix}$. If B is the inverse of A, then α is

(a) –2 (b) –1 (c) 2 (d) 5

55. If $A^2 - A + I = 0$, then the inverse of A is

(a) A (b) $A + I$ (c) $I - A$ (d) $A - I$

56. If $A=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}$ and $I=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$, then which one of the following holds for all $n \geq 1$, by the principle of mathematical induction?

(a) $A^n = 2^{n-1}A-(n-1)I$ (b) $A^n = nA-(n-1)I$

(c) $A^n = 2^{n-1}A+(n-1)I$ (d) $A^n = nA+(n-1)I$

57. If $a^2+b^2+c^2=-2$ and

$$f(x)=\begin{vmatrix}1+a^2x & (1+b^2)x & (1+c^2)x\\ (1+a^2)x & 1+b^2x & (1+c^2)x\\ (1+a^2)x & (1+b^2)x & 1+c^2x\end{vmatrix}$$

then $f(x)$ is a polynomial of degree

(a) 0 (b) 1 (c) 2 (d) 3

58. The system of equations

$$\alpha x+y+z=\alpha-1$$
$$x+\alpha y+z=\alpha-1$$
$$x+y+\alpha z=\alpha-1$$

has no solution if α is

(a) –2 or 1 (b) –2 (c) 1 (d) –1

59. If A and B are square matrices of size $n \times n$ such that $A^2-B^2=(A-B)(A+B)$, then which of the following will always be true?

(a) $A = B$
(b) $AB = BA$
(c) either A or B is a zero matrix
(d) either A or B is an identity matrix

60. If $A=\begin{vmatrix}5 & 5\alpha & \alpha\\ 0 & \alpha & 5\alpha\\ 0 & 0 & 5\end{vmatrix}$ and $|A^2|=25$, then $|\alpha|$ equals

(a) 1 (b) 1/5 (c) 5 (d) 5^2

61. If $D=\begin{bmatrix}1 & 1 & 1\\ 1 & 1+x & 1\\ 1 & 1 & 1+y\end{bmatrix}$ for $x\neq 0, y\neq 0$, then D is

(a) divisible by x but not by y
(b) divisible by y but not by x
(c) divisible by neither x nor y
(d) divisible by both x and y

62. Let a, b, c be any real numbers. Suppose that there are real numbers x, y, z not all zero such that $x=cy+bz$, $y=az+cx, z=bx+ay$, then $a^2+b^2+c^2+2abc$ equals to

(a) –1 (b) 1 (c) 0 (d) 2

63. Let A be a square matrix all of whose entries are integers, then which of the following is true?

(a) If $|A|\neq\pm1$, then A^{-1} exist, and all its entries are non-integers
(b) If $|A|=\pm1$, then A^{-1} exists and all its entries are integers
(c) If $|A|=\pm1$, then A^{-1} need not exist
(d) If $|A|=\pm1$, then A^{-1} exists but all its entries are not necessarily integers

64. If $A=\begin{bmatrix}\alpha & 0\\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0\\ 5 & 1\end{bmatrix}$, then the value of α for which $A^2 = B$ is

(a) 1 (b) –1 (c) 4
(d) no real values

65. If A is a 3×4 matrix and B is a matrix such that A^TB and B^TA are both defined, then the order of B is

(a) 3×4 (b) 3×3 (c) 4×4 (d) 4×3

66. If $A=\begin{bmatrix}ab & b^2\\ -a^2 & -ab\end{bmatrix}$, then A is

(a) idempotent (b) involutory
(c) nilpotent (d) scalar

67. For 2×2 matrices A, B and I, if $A + B = I$ and $2A - 2B = I$, then A equals

(a) $\begin{bmatrix}1/4 & 0\\ 0 & 1/4\end{bmatrix}$ (b) $\begin{bmatrix}1/2 & 0\\ 0 & 1/2\end{bmatrix}$

(c) $\begin{bmatrix}3/4 & 0\\ 0 & 3/4\end{bmatrix}$ (d) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

68. The value of x for which the matrix product

$$\begin{bmatrix}2 & 0 & 7\\ 0 & 1 & 0\\ 1 & -2 & 1\end{bmatrix}\begin{bmatrix}-x & 14x & 7x\\ 0 & 1 & 0\\ x & -4x & -2x\end{bmatrix}$$

equals an identity matrix is

(a) 1/2 (b) 1/3 (c) 1/4 (d) 1/5

69. If A and B are square matrices of the same order and A is non-singular, then for a positive integer n, $(A^{-1}BA)^n$ is equal to

(a) $A^{-n}B^nA^n$ (b) $A^nB^nA^{-n}$ (c) $A^{-1}B^nA$ (d) $n(A^{-1}BA)$

70. If A is a singular matrix, then adj A is

(a) singular (b) non-singular
(c) symmetric (d) not defined

71. If $\omega \neq 1$ is the complex cube root of unity and matrix $H = \begin{bmatrix} \omega & 0 \\ 0 & \omega \end{bmatrix}$, then H^{70} is equal to

(a) 0 (b) $-H$ (c) H^2 (d) H

72. If the trivial solution is the only solution of the system of equations $x - ky + z = 0$, $kx + 3y - kz = 0$ and $3x + y - z = 0$, then the set of all values of k is

(a) $\mathbb{R} - \{2, -3\}$ (b) $\mathbb{R} - \{2\}$
(c) $\mathbb{R} - \{-3\}$ (d) $\{2, -3\}$

73. Let $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$. If u_1 and u_2 are column matrices such that $Au_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ and $Au_2 = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$, then $u_1 + u_2$ is equal to

(a) $\begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$ (b) $\begin{bmatrix} -1 \\ 1 \\ -1 \end{bmatrix}$ (c) $\begin{bmatrix} -1 \\ -1 \\ 0 \end{bmatrix}$ (d) $\begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix}$

74. Let P and Q be 3×3 matrices $P \neq Q$. If $P^3 = Q^3$ and $P^2Q = Q^2P$, then determinant of $(P^2 + Q^2)$ is equal to

(a) -2 (b) 2 (c) 0 (d) -1

ANSWERS

Exercise Set 1

1. (a)	**2.** (b)	**3.** (c)	**4.** (a)	**5.** (a)	**6.** (d)	**7.** (d)	**8.** (c)	**9.** (d)	**10.** (b)
11. (c)	**12.** (a)	**13.** (d)	**14.** (d)	**15.** (b)	**16.** (c)	**17.** (d)	**18.** (a)	**19.** (c)	**20.** (b)
21. (a)	**22.** (d)	**23.** (a)	**24.** (a)	**25.** (b)	**26.** (c)	**27.** (a)	**28.** (a)	**29.** (a)	**30.** (b)
31. (a)	**32.** (a)	**33.** (d)	**34.** (a)	**35.** (a)	**36.** (b)	**37.** (a)	**38.** (b)	**39.** (d)	**40.** (a)
41. (a)	**42.** (b)	**43.** (c)	**44.** (a)	**45.** (a)	**46.** (a)	**47.** (c)	**48.** (a)	**49.** (c)	**50.** (c)
51. (d)	**52.** (b)	**53.** (a)	**54.** (a)	**55.** (c)	**56.** (a)	**57.** (a)	**58.** (d)	**59.** (b)	**60.** (d)
61. (d)	**62.** (c)	**63.** (b)	**64.** (d)	**65.** (c)					

Exercise Set 2

1. (b)	**2.** (c)	**3.** (b)	**4.** (a)	**5.** (a)	**6.** (b)	**7.** (c)	**8.** (d)	**9.** (b)	**10.** (b)
11. (b)	**12.** (d)	**13.** (c)	**14.** (a)	**15.** (d)	**16.** (b)	**17.** (b)	**18.** (b)	**19.** (d)	**20.** (b)
21. (b)	**22.** (b)	**23.** (c)	**24.** (d)	**25.** (b)	**26.** (a)	**27.** (c)	**28.** (b)	**29.** (c)	**30.** (a)
31. (d)	**32.** (d)	**33.** (a)	**34.** (a)	**35.** (d)	**36.** (a)	**37.** (a)	**38.** (d)	**39.** (d)	**40.** (a)
41. (a)	**42.** (b)	**43.** (c)	**44.** (d)	**45.** (a)	**46.** (b)	**47.** (c)	**48.** (d)	**49.** (d)	**50.** (c)
51. (b)	**52.** (a)	**53.** (d)	**54.** (d)	**55.** (c)	**56.** (b)	**57.** (c)	**58.** (b)	**59.** (b)	**60.** (b)
61. (d)	**62.** (b)	**63.** (b)	**64.** (d)	**65.** (a)	**66.** (c)	**67.** (c)	**68.** (d)	**69.** (c)	**70.** (a)
71. (d)	**72.** (a)	**73.** (d)	**74.** (c)						

To be continued ...

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