



Date: 22-09-2012

Time: 30 Min

Course: E2Sem1_ECE/ E2Sem1_ABC/E3Sem1_ABC

Max Marks: 10

Answer Any TEN of the Following

$10 \times 1 = 10M$

1. Eigenvalues of Hermitian matrix are
 - A. Complex numbers whose magnitude is 1
 - B. Real
 - C. Purely imaginary
 - D. Purely imaginary or zero

2. Let A be a 3×3 matrix and $\text{tr}(A) = 5$, $\text{tr}(A^2) = 23$, $\text{tr}(A^3) = 80$. Then the characteristic equation of A is
 - A. $\lambda^3 - 5\lambda^2 + \lambda + 10 = 0$
 - B. $\lambda^3 - 5\lambda^2 + 2\lambda - 10 = 0$
 - C. $\lambda^3 + 5\lambda^2 - 2\lambda + 10 = 0$
 - D. $\lambda^3 - 5\lambda^2 + \lambda - 10 = 0$

3. If the characteristic equation of a matrix of order 4 is $\lambda(\lambda + 2)(\lambda - 3)^2$, then the trace of the matrix is _____.

4. The characteristic equation of $\begin{bmatrix} 4 & 1 & -1 \\ 2 & 5 & -2 \\ 1 & 1 & 2 \end{bmatrix}$ is

A. $\lambda^3 - 11\lambda^2 + 39\lambda + 45 = 0$

B. $\lambda^3 - 39\lambda^2 + 11\lambda - 45 = 0$

C. $\lambda^3 - 11\lambda^2 + 39\lambda - 45 = 0$

D. $\lambda^3 - 39\lambda^2 + 11\lambda + 45 = 0$

5. Let \mathbf{A} be a 2×2 matrix whose trace is -3 and determinant is -10 . Then the eigenvalues of \mathbf{A} are _____, _____.

6. The product of the eigenvalues of $\begin{bmatrix} 2 & 2 & -5 \\ 3 & 7 & -15 \\ 1 & 2 & -4 \end{bmatrix}$ is _____.

7. Eigenvalues of $\begin{bmatrix} \frac{1}{2}i & \frac{1}{2}\sqrt{3} \\ \frac{1}{2}\sqrt{3} & \frac{1}{2}i \end{bmatrix}$ are

A. $\frac{i \pm \sqrt{3}}{2}$

B. $\frac{i \pm 1}{2}$

C. $\frac{i \pm 3}{2}$

D. $\frac{i}{2} \pm 1$

8. If $A = \begin{bmatrix} 1 & 3 & 4 \\ 0 & 2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$ and $6A^{-1} = aA^2 + bA + cI$, then the values of a, b , and c respectively are

A. $-6, 11, -6$

B. $\frac{1}{6}, -1, \frac{11}{6}$

C. $-1, \frac{11}{6}, -1$

D. $1, -6, 11$

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

A. $5I$

B. $25I$

C. $125I$

D. $625I$

10. If A and B are similar matrices, then which of the following is not true?

A. Both have same eigenvalues

B. Both have same trace

C. Both have same determinants

D. None of the above

11. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then $2A^5 - 3A^4 + A^2 - 4I$ is equal to

A. $432A - 395I$

B. $138A - 403I$

C. A

D. I

12. The co-efficient of λ^{n-1} in $|\mathbf{A} - \lambda \mathbf{I}|$, where $\mathbf{A} = (a_{ij})_{n \times n}$ is

- A. $(-1)^n \sum_{i=1}^n a_{ij}$
- B. $(-1)^{n-1} \sum_{i=1}^n a_{ij}$
- C. $(-1)^n \prod_{i=1}^n a_{ij}$
- D. $(-1)^{n-1} \prod_{i=1}^n a_{ij}$

KEY

1. B
2. A
3. 4
4. C
5. 2, -5 or $-5, 2$ (if student writes any one, please give one mark)
6. 3
7. A
8. D
9. C
10. D
11. B
12. B