Online Examinations (Even Sem/Part-I/Part-II Examinations 2020 - 2021

Course Name - – Linear Algebra and Differential Equations
Course Code - BSC(CSE)201_BSC(ECE)201

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Answer all the questions. Each question carry one mark.

9. 1.

The value of $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega^2 & 1 & \omega \\ \omega^2 & \omega & 1 \end{vmatrix}$ is .

Mark only one oval.

- 3
- 2
- 1
- 0

10. 2.

If the matrix $\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & \lambda \end{pmatrix}$ is singular then the value of λ is

Mark only one oval.

- 3
- 5
- 2
- 4

11. 3.

The co-factor of x in the determinant $\begin{vmatrix} x & 1 & 1 \\ 2 & -1 & 0 \\ 1 & 3 & 2 \end{vmatrix}$ is

Mark only one oval.

- 2
- -2
- 4
- -4

12. 4.

The adjoint of the determinant $\begin{vmatrix} 2 & 1 \\ 3 & 6 \end{vmatrix}$ is

Mark only one oval.

$$\begin{vmatrix} 1 & 2 \\ 6 & 3 \end{vmatrix}$$

Option 1

$$\begin{vmatrix} 6 & 3 \\ 1 & 2 \end{vmatrix}$$

Option 2

$$\begin{vmatrix} -6 & 3 \\ 1 & -2 \end{vmatrix}$$

Option 3

$$\begin{vmatrix} 6 & -3 \\ -1 & 2 \end{vmatrix}$$

Option 4

13. 5.

The value of the determinant $\begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix}$ is

Mark only one oval.

- 1
- -1
- 0
- 2

14. 6.

If $A=\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$ then $A.A^T =$

Mark only one oval.

- I2
- A
- 2A
- None of these

15. 7.

The rank of the matrix $A=\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$ is

Mark only one oval.

- 2
- 3
- 4
- None of these

16. 8. For what value of μ does the system of equations x+y+z=1; x+2y-z=2; 5x+7y+μz=4 have a unique solution?

Mark only one oval.

- μ≠2
- μ≠1
- μ≠3
- μ≠4

17. 9.

The value of 'a' for which rank of the matrix $\begin{pmatrix} 2 & 0 & 1 \\ 5 & a & 3 \\ 0 & 3 & 1 \end{pmatrix}$ is less than 3?

Mark only one oval.

- 3/4
- 3/5
- 3/2
- 1

18. 10.

The rank of the matrix $\begin{pmatrix} 2 & 2 & 1 \\ 6 & 6 & 3 \end{pmatrix}$is

Mark only one oval.

- 2
- 3
- 1
- 4

19. 11.

The value of 'k' for which rank of the matrix $\begin{pmatrix} 1 & 1 & 1 \\ 1 & k & 1 \\ 10 & 1 & 0 \end{pmatrix}$ is 2 is

Mark only one oval.

- 1
- 0
- -1
- 2

20. 12.

In $\begin{vmatrix} 3 & -2 & 5 \\ -1 & 2 & -3 \\ -5 & 6 & 9 \end{vmatrix}$, the minor and co-factor of -2 are respectively

Mark only one oval.

- 24,-24
- 24,24
- -24,24
- -24,-24

21. 13.

$S=\{(x,y,0)\mid x,y\in R\}$ is a subspace of R^3, then dim(S) is

Mark only one oval.

- 2
- 3
- 4
- 5

22. 14. The expression of the vector (7,11) as a linear combination of the vectors (2,3) and (3,5) is

Mark only one oval.

- 1(2,3)+2(3,5)
- 2(2,3)+1(3,5)
- cannot be expressed
- None of these

23. 15.

If $\{\alpha,\beta,\gamma\}$ is a basis of a vector space V, then $\{\alpha,\beta+\gamma,\gamma\}$

Mark only one oval.

- is a basis of V
- linearly dependent
- linearly independent but not a basis
- None of these

24. 16.

The vectors $(2,1,0),(1,1,0),(4,2,0)$ of R^3 are

Mark only one oval.

- linearly independent but not a basis
- linearly dependent
- basis
- None of these

25. 17.

Let $T: R^3 \to R^3$ be defined by $T(x_1, x_2, x_3) = (x_1+1, x_2+1, x_3+1), (x_1, x_2, x_3) \in R^3$,
then T is a

Mark only one oval.

$$T(\alpha+\beta) = T(\alpha) + T(\beta)$$

- Option
- linear mapping
- is not a linear mapping
- None of these

26. 18.

Let V and W be two vector spaces and $T : V \rightarrow W$ is a linear mapping, then T is injective if and only if

Mark only one oval.

- Ker{T}={theta}
- Ker{T}={0}
- Ker T=V
- none

27. 19.

Let V and W be two vector spaces and $T: V \to W$ is a linear mapping and θ, θ^1 be the null vectors of V and W respectively, then

Mark only one oval.

$Ker\ T = \{\alpha \in V \mid T(\alpha) = \theta\}$

- Option 1

$Ker\ T = \{\alpha \in V \mid T(\alpha) = \theta^1\}$

- Option 2

$Ker\ T = \{\alpha \in V \mid T(\alpha) = \alpha\}$

- Option 3
- All of these

28. 20. If T: V --> W be a linear mapping, then

Mark only one oval.

- dim (Ker T) + dim (Im T) = dim (V)
- dim (Ker T) + dim (Im T) = dim (W)
- dim (Ker T) + dim (Im T) = 3
- None of these

29. 21.

Let $T: R^3 \to R^2$ be a linear transformation defined by $T(x,y,z)=(x-y,x-z)$, then the dimension of the nullspace of T is

Mark only one oval.

- 0
- 1
- 2
- 3

30. 22.

Let V be a vector space over the set of all real numbers R. Let θ be the zero vector of V. Then $2\theta = ?$

Mark only one oval.

- 0
- 1
- 2
- 3

31. 23. A vector space V is finite dimensional if it has

Mark only one oval.

- finite basis
- finite elements
- no basis
- None of these

32. 24.

Which of the following set span the vector space $\left\{\begin{bmatrix} x & 0 \\ 0 & y \end{bmatrix} : x, y \in R\right\}$?

Mark only one oval.

$\left\{\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\right\}$

Option 1

$\left\{\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}\right\}$

Option 2

$\left\{\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & -1 \end{bmatrix}\right\}$

Option 3

$\left\{\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\right\}$

Option 4

33. 25. Which of the following is not linear transformation?

Mark only one oval.

$T: R^2 \to R^2 : T(x,y) = (3x - y, 2x)$

Option 1

$T: R^3 \to R^2 : T(x,y,z) = (3x+1, y-z)$

Option 2

$T: R \to R^2 : T(x) = (5x, 2x)$

Option 3

$T: R^3 \to R^2 : T(x,y,z) = (x, 0, z)$

Option 4

34. 26.

Let $T: R^2 \to R^3$ be a linear transformation given by $T(x,y) = (x+y, x-y, y)$, then rank of T is

Mark only one oval.

- 0
- 1
- 2
- 3

35. 27.

Let $T : V \to W$ be a liner transformation and rank(T)=m, then

Mark only one oval.

- dim(V) = m
- dim(Ker T) = m
- dim(Im T) = m
- dim(W) = m

36. 28.

Let $T : R^n \to R^n$ be a linear transformation. Which one of the following statement implies that T is bijective?

Mark only one oval.

- nullity(T) = n
- rank(T) = nullity(T) = n
- rank(T) + nullity(T) = n
- rank(T) − nullity(T) = n

37. 29.

If A^2=A, then its Eigen values are either

Mark only one oval.

- 0 or 2
- 1 or 2
- 0 or 1
- Only 0

38. 30.

If $\lambda \neq 0$ is an Eigen value of a matrix A then $\det(A - \lambda I) =$

Mark only one oval.

- ( ) λ
- ( ) -λ
- ( ) 2λ
- ( ) 0

39. 31.

If $\lambda \neq 0$ is an Eigen value of a matrix A then the matrix A^T has an Eigen value

Mark only one oval.

- ( ) λ
- ( ) -λ
- ( ) 1/λ
- ( ) None of the options

40. 32.

The sum of the Eigen values of the matrix $A = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$ is

Mark only one oval.

- ( ) 5
- ( ) -5
- ( ) 7
- ( ) -7

41. 33.

If A is a non-null square matrix then $A+A^T$ is a

Mark only one oval.

- symmetric matrix
- skew-symmetric matrix
- null matrix
- Identity Matrix

42. 34.

If A is a non-null square matrix then $A-A^T$ is a

Mark only one oval.

- symmetric matrix
- skew-symmetric matrix
- Identity Matrix
- Orthogonal matrix

43. 35.

If A is an orthogonal Matrix then what can we say about the matrix A

Mark only one oval.

- Singular Matrix
- Non-Singular Matrix
- Symmetric Matrix
- Skew-Symmetric matrix

44. 36.

If $\det(A) \neq 0$ then what can we say about the matrix A

Mark only one oval.

0 is an eigen value of A^{-1}

- Option 1

$tr(A) \neq 0$

- Option 2

0 cannot be eigen value of A^{-1}

- Option 3
- A is a skew symmetric matrix

45. 37.

If A is similar to the matrix B then A^{-1} is similar to the matrix

Mark only one oval.

- A
- B
- Inv(B)
- tr(A)

46. 38.

If A has an Eigen vector v and $A = P^{-1}BP$ then B has an Eigen vector

Mark only one oval.

Pv

Option 1

$P^{-1} v$

Option 2

v

Option 3

v^{-1}

Option 4

47. 39.

If $V = R^3$ be equipped with inner product $(x, y) = x_1y_1 + 2x_2y_2 + 3x_3y_3$, In this inner product space $(V, (.,.))$ which of the following pairs of vectors is orthonormal?

Mark only one oval.

$$u = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, v = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

Option 1

$$u = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, v = \begin{bmatrix} 0 \\ \frac{1}{\sqrt{2}} \\ 0 \end{bmatrix}$$

Option 2

$$u = \begin{bmatrix} \frac{1}{\sqrt{3}} \\ 0 \\ 0 \end{bmatrix}, v = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

Option 3

$$u = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}, v = \begin{bmatrix} 0 \\ \frac{1}{2} \\ 0 \end{bmatrix}$$

Option 4

48. 40.

If $V = R^3$ be equipped with inner product $(x, y) = x_1y_1 + 2x_2y_2 + 3x_3y_3$, In this inner product space $(V, (.,.))$ then the value of the inner product of $u = \begin{bmatrix} 1 \\ 1 \\ \frac{1}{\sqrt{3}} \end{bmatrix}, v = \begin{bmatrix} 0 \\ \frac{1}{2} \\ \frac{1}{\sqrt{3}} \end{bmatrix}$

Mark only one oval.

$\frac{2}{\sqrt{2}}$

- Option 1

$2\sqrt{2}$

- Option 2

- 2

$\frac{\sqrt{3}}{2}$

- Option 4

49. 41.

If $V = R^3$ be equipped with inner product $(x, y) = x_1y_1 + x_2y_2 + x_3y_3$, In this inner product space $(V, (.,.))$ which of the following pairs of vectors is orthonormal?

Mark only one oval.

$$u = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, v = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

Option 1

$$u = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, v = \begin{bmatrix} 0 \\ \frac{1}{2} \\ 0 \end{bmatrix}$$

Option 2

$$u = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, v = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$$

Option 3

$$u = \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}, v = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$$

Option 4

50. 42. The diagonalizing matrix is also known as

Mark only one oval.

- Eigen Matrix
- Constant Matrix
- Modal Matrix
- State Matrix

51. 43.

If $\lambda = 1$ is an Eigen value of the matrix $\begin{bmatrix} \frac{3}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{3}{2} \end{bmatrix}$ then the corresponding Eigen vector is

Mark only one oval.

$\begin{bmatrix} -1 \\ 1 \end{bmatrix}$

- Option 1

$\begin{bmatrix} 1 \\ -1 \end{bmatrix}$

- Option 2

$\begin{bmatrix} 1 \\ 1 \end{bmatrix}$

- Option 3

$\begin{bmatrix} -1 \\ -1 \end{bmatrix}$

- Option 4

52. 44.

If $V = R^3$ be equipped with inner product $(x, y) = x_1y_1 + x_2y_2 + x_3y_3$. Then which of the following set of vectors are linearly independent.

Mark only one oval.

$\{(0,1,0),(0,0,1),(-1,0,1)\}$

Option 1

$\{(0,1,0),(0,-1,0),(0,0,1)\}$

Option 2

$\{(0,1,0),(0,0,1),(-1,0,1)\}$

Option 3

$\{(1,0,1),(0,1,0),(-1,0,1)\}$

Option 4

53. 45.

What is the value of k so that the vectors $(1,-2,-3)$ and $(2,k,4)$ are orthogonal

Mark only one oval.

- -5
- 5
- -10
- 10

54. 46. Which of the following matrix is orthogonally diagonalizable

Mark only one oval.

$$\begin{bmatrix} 0 & 2 & 3 \\ 2 & 0 & 4 \\ -3 & 4 & 0 \end{bmatrix}$$

Option 1

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 4 \\ 3 & 4 & 3 \end{bmatrix}$$

Option 2

$$\begin{bmatrix} 1 & 2 & 3 \\ -2 & 4 & 4 \\ -3 & -4 & 3 \end{bmatrix}$$

Option 3

$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 4 \\ 0 & 0 & 3 \end{bmatrix}$$

Option 4

55. 47.

If λ is an Eigen value of an orthogonal matrix A the which of the following statement is false

Mark only one oval.

$\det(A-\lambda I)=0$

Option 1

$\det(A-\frac{1}{\lambda}I)=0$

Option 2

$\det(A^{-1}-\lambda I)=0$

Option 3

One of a, b and c is false

56. 48.

The differential equation $(a_1x-b_1y)dx+(a_2x-b_2y)dy=0$ is exact if

Mark only one oval.

$a_1=b_2$

Option 1

$b_1=b_2$

Option 2

$a_1=-b_2$

Option 3

$a_2=-b_1$

Option 4

57. 49.

If $x^m y^n$ be the IF of the equation $(2ydx+3xdy)+2xy(3ydx+4xdy)=0$ then the value of m and n are respectively

Mark only one oval.

- 1,3
- 2,1
- 1,2
- 2,2

58. 50.

The general form of a first order linear equation in x is $\frac{dy}{dx}+Px=Q$ where

Mark only one oval.

- P and Q are both functions of x
- P and Q are both functions of y
- P and Q are the functions of x and y, respectively
- P and Q are the functions of y and x, respectively

59. 51.

The general solution of $\left(\frac{dy}{dx}\right)^2+\frac{dy}{dx}-6=0$ is

Mark only one oval.

- (y+3x-c)(y-2x-c)=0
- (y+3x-c1)(y-2x-c2)=0
- (y+3x)(y-2x-c)=0
- None of these

60. 52.

$a_2 = -b_1$

Mark only one oval.

$c_1 x + c_2 e^{3x}$

Option 1

$c_1 e^{x} + c_2 e^{3x}$

Option 2

$c_1 + c_2 e^{3x}$

Option 3

None of these

61. 53.

The integrating factor of $\cos x \frac{dy}{dx} + y \sin x = 1$ is

Mark only one oval.

- tan x
- cos x
- sec x
- sin x

62. 54.

$$\frac{1}{D^2+4}\sin 2x =$$

Mark only one oval.

$$\frac{1}{4}x\cos 2x$$

Option 1

$$\frac{\cos 2x}{2}$$

Option 2

$$-\frac{1}{4}x\cos 2x$$

Option 3

None of these

63. 55.

$$\frac{1}{(D-2)(D-3)}e^{2x} =$$

Mark only one oval.

$-e^{2x}$

Option 1

xe^{2x}

Option 2

$-xe^{3x}$

Option 3

$-xe^{2x}$

Option 4

64. 56.

The Wronskian for the differential equation $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 9e^x$ is

Mark only one oval.

e^{2x}

( ) Option 1

e^{x}

( ) Option 2

e^{3x}

( ) Option 3

( ) None of these

65. 57.

The P.I. of the equation $2x\frac{d^2y}{dx^2}+2\frac{dy}{dx}=\frac{1}{x}$ is

Mark only one oval.

$\frac{1}{4}x^2$

Option 1

$\frac{1}{2}x^2$

Option 2

$\frac{1}{4}(\log x)^2$

Option 3

$\frac{1}{2}(\log x)^2$

Option 4

66. 58.

For the simultaneous equation $\frac{dx}{dt}+y=\sin t$, $\frac{dy}{dt}+x=\cos t$, which of the following is true?

Mark only one oval.

$x=c_1\cos t+c_2\sin t$

- Option 1

$x=c_1e^{t}+c_2e^{-t}$

- Option 2

$x=(c_1+c_2t)e^{t}$

- Option 3
- None of these

67. 59.

For $a, b, c \in \mathbb{R}$, if the differential equation
$\left(ax^2 + bxy + y^2\right)dx + \left(2x^2 + cxy + y^2\right)dy = 0$ is exact, then

Mark only one oval.

- a=2, c=2a
- b=4, c=2
- b=2, c=4
- b=2, a=2c

68. 60.

The PDE $r^2 + 2s - t^2 = 0$ is of order

Mark only only one oval.

- 1
- 2
- 3
- 4