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

Course Name - –Linear Algebra and Differential Equations
Course Code - BSC(CSE)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.

- 0
- 1
- 2
- 3

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. If A is a non-null square matrix, then A+AT is a *

Mark only one oval.

- symmetric matrix
- skew-symmetric matrix
- null matrix
- none of these.

12. 4. *

$$(AB)^T =$$

Mark only one oval.

A^T+B^T

- Option 1

A^TB^T

- Option 2

$B^T A^T$

- Option 3

none of these.

- Option 4

13. 5. *

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
- 4
- 2
- 0

14. 6. *

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

15. 7. *

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
- 2
- 0

16. 8. *

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

Mark only one oval.

I_2

Option 1

A

Option 2

2A

Option 3

none of these.

Option 4

17. 9. *

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

18. 10. 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

19. 11. *

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

20. 12. *

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

Mark only one oval.

- 2
- 3
- 1
- None of these

21. 13. *

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

22. 14. *

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
- none of these.

23. 15. *

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

Mark only one oval.

- 2
- 3
- 5
- none of these

24. 16. 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

25. 17. *

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

26. 18. *

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

Mark only one oval.

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

27. 19. *

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.

linear mapping

- Option 1

not a linear mapping

- Option 2

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

- Option 3

none of these.

- None of these

28. 20. *

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.

$\text{Ker } T = \{\theta\}$

Option 1

$\text{Ker } T = \{0\}$

Option 2

Ker T=V

Option 3

None

Option 4

29. 21. *

Let V and W be two vector spaces and $T: V \rightarrow W$ 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

none of these.

Option 4

30. 22. *

If $T: V \to W$ 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

31. 23. *

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

32. 24. *

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

Option 1

θ

Option 2

2

Option 3

none of these.

Option 4

33. 25. A vector space V is finite dimensional if it has *

Mark only one oval.

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

34. 26. *

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

35. 27. Which of the following is not linear transformation? *

Mark only one oval.

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

Option 1

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

Option 2

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

Option 3

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

Option 4

36. 28. *

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

Mark only one oval.

- 2
- 0
- 1
- 4

37. 29. *

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

38. 30. *

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

39. 31. *

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

40. 32. *

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

Mark only one oval.

λ

Option 1

$-\lambda$

Option 2

2λ

Option 3

0

Option 4

41. 33. *

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

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
- null matrix
- Identity Matrix

43. 35. *

If A is a non-null square matrix then $A\text{-}A^T$ is a

Mark only one oval.

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

44. 36. *

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

45. 37. *

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

0 can't be an Eigen value of A^{-1}

- Option 2

$tr(A) \neq 0$

- Option 3

A is a skew-symmetric matrix

- Option 4

46. 38. *

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

Mark only one oval.

A

Option 1

B

Option 2

B^{-1}

Option 3

A^{T}

Option 4

47. 39. *

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

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 $(V, (.,.))$ 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

49. 41. *

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

Option 3

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

Option 4

50. 42. *

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

51. 43. The diagonalizing matrix is also known as: *

Mark only one oval.

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

52. 44. *

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

53. 45. *

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

54. 46. *

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

55. 47. 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

56. 48. *

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

Option 4

57. 49. *

The differential equation $(a_1 x - b_1 y)dx + (a_2 x - b_2 y)dy = 0$ 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

58. 50. *

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
- 2, 2
- 1, 2

59. 51. *

The integrating factor of $ydx - xdy + 4x^3y^2e^{x^4}dx = 0$ is

Mark only one oval.

$\frac{1}{y}$

Option 1

y^2

Option 2

xy^2

Option 3

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

Option 4

60. 52. *

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

61. 53. *

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

Mark only one oval.

$(y+3x-c)(y-2x-c)=0$

- Option 1

$(y+3x-c_1)(y-2x-c_2)=0$

- Option 2

$(y+3x)(y-2x-c)=0$

- Option 3

none of these.

- Option 4

62. 54. *

The CF of the equation $x^2 \frac{d^2y}{dx^2} - 2x\frac{dy}{dx} = 3x$ is

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.

Option 4

63. 55. *

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

Mark only one oval.

$\tan x$

Option 1

$\cos x$

Option 2

$\sec x$

Option 3

$\sin x$

Option 4

64. 56. *

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

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.

Option 4

65. 57. *

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

Mark only one oval.

$-e^{2x}$

Option 1

xe^{2x}

Option 2

$-xe^{3x}$

Option 3

$-xe^{2x}$

Option 4

66. 58. *

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.

Option 4

67. 59. *

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

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

Option 3

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

Option 4

68. 60. *

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

$x = c_1 e^t + c_2 e^{-t}$

Option 2

$x = (c_1 + c_2 t) e^t$

Option 3

none of these.

Option 4