

MTH401-Differential Equations
Spring 2012 final term Paper 27 July
~~*Libriansmine*~~

Q: An electronic component of an electronic circuit that has the ability to store charge and opposes any change of voltage in the circuit is called

Inductor

Resistor

Capacitor

None of them

Q: If A_0 is initial value and T denotes the half-life of the radioactive substance than

$$T = \frac{1}{2A}$$

$$\frac{dA}{dt} = KA$$

$$A(T) = \frac{A_0}{2}$$

None of the above

Q: integrating factor of the given equation $x \cos x \frac{dy}{dx} + y(x \sin x + \cos x)$ is

Xsecx

Cosx

Cotx

Xsinx

Q: Operator method is the method of the solution of a system of linear homogeneous or linear non-homogeneous differential equations which is based on the process of systematic elimination of the

Dependent variables

Independent variable

Choice variable
None of them

Q: If $E(t) = 0$, $R = 0$ Electric vibration of the circuit is called _____

Free damped oscillation
Un-damped oscillation
Over damped oscillation
None of the given

Q: Eigen value of a matrix $\begin{pmatrix} 3 & 4 \\ -1 & 7 \end{pmatrix}$

5, 5

10, 5

25, 5

None

Q: Eigen value of a matrix $\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$

2,0

1,1

1,2

None

$$A = \begin{pmatrix} 3 & 4 \\ -1 & 7 \end{pmatrix}$$

Q: For Eigen values $\lambda = 5, 5$ of a matrix _____, there exists..... Eigen vectors.

infinite

one

two

three

Q: If a matrix has 1 row and 3 columns then the given matrix is called _____

Column matrix

Row matrix

Rectangular matrix

None

$$\frac{dy}{dx} = \frac{x+y}{x}$$

Q: The general solution of differential equation .is given by

$$e^{\frac{y}{x}} = cx$$

$$e^x = cy$$

$$e^{\frac{x}{y}} = cx$$

$$e^{-\frac{x}{y}} = cx$$

Q: The integrating factor of the D.E $\frac{dy}{dx} + y \ln y = ye^x$ is

$$e^x$$

$$e^y$$

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

$$e^{\frac{x}{y}}$$

Q: For the equation of free damped motion $\frac{dx^2}{dt^2} + 2\lambda \frac{dx}{dt} + \omega^2 x = 0$ the roots are

$m_1 = -\lambda + \sqrt{\lambda^2 + \omega^2}$ & $m_2 = -\lambda - \sqrt{\lambda^2 + \omega^2}$ if $\lambda^2 - \omega^2 > 0$ Then the equations said to be:

Under damped

Over damped

Critically damped

None of them

Q: For the system of differential equations $\frac{dy}{dt} = 2x, \frac{dx}{dt} = 3y$ the independent variable is **(Are)**

X,t

Y,t

X,y

t

Q: For the system of differential equations $\frac{dy}{dt} = 2x, \frac{dx}{dt} = 3y$ the dependent variable is **(Are)**

X,t

Y,t

X,y

t

$$\text{Q: } \begin{pmatrix} 4-\lambda & 1 & 0 \\ 0 & 4-\lambda & 1 \\ 0 & 0 & 4-\lambda \end{pmatrix} = 0 \text{ gives}$$

$\lambda = 4$ of multiplicity of 1

$\lambda = 4$ of multiplicity of 2

$\lambda = 4$ of multiplicity of 3

None of the given.

Q: wronksin of x, x^2 is

x^2

X

O

None of the above

Q1: Why we use $C \neq 0$ in forbenious theorem? (2 MARKS)

Q2: Find order of homogenous equation obtained from non homogenous differential equation:

$$y'' + 4y' + 3y = 4x^2 + 5?? \text{ (2 MARKS)}$$

Q3: solve of differential equation $y'' + 16y = 0$ (2 MARKS)

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Q4: write Legendre's equation? (2 MARKS)

Q5: Write co efficient matrix for $\frac{dx}{dt} = 6x + y + 6t$, $\frac{dy}{dt} = 4x + 3y - 10t + 4$ (3 MARKS)

Q6: write system of equations in matrix form $\frac{dy}{dx} = 3x - 7y + 4e^t \sin t$ (3 MARKS)
 $\frac{dy}{dx} = x + y + 4e^{-4t} \cos t$

Q7: find the eigen values for a matrix $\begin{pmatrix} 3 & 9 \\ 4 & -3 \end{pmatrix}$? (3 MARKS)

Q8: Find a differential operator that annihilates the function $f(x) = 7 - x + 6\sin 3x$? (3 MARKS)

Q9: Find Eigen vector of (5MARKS)

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

A= , corresponding Eigen value $\lambda = -2$

Q10: Find a series solution for the differential equation $y'' + y = 0$ about $x_0 = 0$ such that

$$a_{n+2} = -\frac{a_n}{(n+2)(n+1)} \quad n = 0, 1, 2, \dots \quad y(x) = \sum_{n=0}^{\infty} a_n x^n$$

Q11: find the eigen vector for a matrix $\begin{pmatrix} 3 & 9 \\ 4 & -3 \end{pmatrix}$? **(5 MARKS)**
Corresponding Eigen value

$$\lambda = 3 + \sqrt{3}i .$$

(5 MARKS)

Q12. write following equations: (5 MARKS)

- 1). 1st order partial differential equation
- 2). 2nd order partial differential equation
- 3). Linear differential equation.