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Question NO.1: **Marks 2**

Explain the series that Are identically zero.

Question NO.2: **Marks 2**

In uncoupled differential equations the determinant of linear differential operators may zero or not. If yes then give arguments.

Question NO.3: **Marks 2**

Define eigenvalues of multiplicity m.

Question NO.4: **Marks 2**

$If\ \left(e^x + y\right)dx + \left(2 + x + ye^y\right)dy = 0\ is\ an\ exact\ differential\ equation\ then\ find\ \frac{\partial f}{\partial x}\ and\ \frac{\partial f}{\partial y}.$

Question NO.5: **Marks 3**

Find the eigen vector of the following system

$X' = \begin{pmatrix} -5 & 1 \\ 4 & -2 \end{pmatrix} X$, *for eigenvalue* $\lambda = -1$

Question NO.6: **Marks 3**

if $m_1 = 2 + \sqrt{5}i$ *and* $m_2 = 2 - \sqrt{5}i$ *are the roots of Cauchy Euler differential equation then find the general solution.*

Question NO.7: **Marks 3**

State Frobenius theorem.

Question NO.8: **Marks 3**

Determine whether the following differential equation is exact or not?

$\left(1 + \ln x + \frac{y}{x}\right) dx = (1 - \ln x)\, dy$

Question NO.9: **Marks 5**

Discuss the sum of power series $\sum_{k=0}^{\infty} a_k x^k$ *at* $x = 0$

Question NO.10: **Marks 5**

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

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

Question NO.11: **Marks 5**

Determine X_1 and X_2 are linearly dependent or independent with the help of wronskian. where

$X_1=\begin{pmatrix}2\\-1\end{pmatrix}e^{-6t}, X_2=\begin{pmatrix}5\\3\end{pmatrix}e^{-2t}$

Question NO.12: **Marks 5**

Show that $y=e^x+xe^x$ is a solution of homogenous differential equation

$y''-2y'+y=0$

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2TMSCOCPFFUS2 ON AUGUST 19, 2017 AT 8:13PM

mcqzz bhhhhhhht kam thy past pprzz m s motly coceptual r bhhht confusing thy.... handouts ko a66y s read kar lainaa .....attempt ho jayen gay Inshaa allah.....r subjecttivee bhhht asaan thaaaa.....

- que related to integratin factor concept (5 marx)

- bournallii equation (5marx)

-eigenvalues and eigenvectors(5marx)

-related to power series (5 marx)

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MTH401 CURRENT FINAL TERM SPRING 2011 COMPLETE PAPER WITH MCQ'S

There are all the answers marked about I am confirmed that they are correct, you can find unmarked answers in handouts. And almost 75% MCQs were from this file, and I also add some new questions which were new but easy.

The annihilator operator of the function $y = e^{-6x}$ is

$(D-6)^2$

$(D-6)^3$

$D-6$ **Correct answer**

$D+6$

After converting the given differential equation $4y'' + 64y = \sec 3x$ into standard form, the function f(x) is

(Sec3x)/4 **Correct answer**

(Sec3x)/64

None of them

Secx

Wronskian of the function $y_c = c_1 + c_2 \cos x + c_3 \sin x$ is

0

1 **Correct answer**

2

3

$$\sum_{n=0}^{\infty} c_n (x-a)^n = c_0 + c_1(x-a) + c_2(x-a)^2 + \ldots$$

In the infinite series of (x-a) which can be written as the number **a** is called the

Radius of power series

Centre of power series **Correct answer**

Base of power series

None of them

$$\sum_{n=1}^{\infty} a_n (x-a)^n$$

Suppose that a power series is represented by a function "**f**"whose domain is the interval of the convergence of the power series. That function **"f"** is continuous, differentiable and integrable on

(a + R, a - R)

(R -a, R + a)

(a - R, a + R) **Correct answer**

None of them

The interval of convergence for the function **secx** is

$(-\pi, +\pi)$

$(-\frac{\pi}{2}, \frac{\pi}{2})$ **correct answer**

$(\frac{\pi}{2},\pi)$

None of them

$\frac{dy}{dx}-2xy=0$

The solution of the linear first order differential equation is

$y=e^{x^2}$ **Correct answer**

$y=\sum_{n=0}^{\infty}\frac{x^{2n}}{n!}$

Both $y=e^{x^2}$ & $y=\sum_{n=0}^{\infty}\frac{x^{2n}}{n!}$

None of them

$X=L_{\gamma}-\frac{1}{C_{\gamma}}$

The quantity is called

Reactance of circuit **Correct answer**

Impedance of circuit

Quasi of circuit

None of them

For the equation of free damped motion $\frac{d^2x}{dt^2}+2\lambda\frac{dx}{dt}+\omega^2x=0$ the roots are $m_1=-\lambda+\sqrt{\lambda^2-\omega^2}$ & $m_1=-\lambda-\sqrt{\lambda^2-\omega^2}$ If $\lambda^2-\omega^2>0$ then system is said to be

Under damped

Over damped

Critically damped **Correct answer**

None of them

The time interval between two successive maxima of $x(t)=Ae^{-\lambda t}\sin[\sqrt{\omega^2-\lambda^2}+\phi]$ is called

Phase period **Correct answer**

Quasi-period

Both the period

None of them

The given differential equation $\frac{d^2x}{dt^2}+5\frac{dx}{dt}+4x=0$ is

Over damped

Critically damped

Under damped

None of them

The standard unit for measurement of inductance is

Volt

Ohms

Henry **Correct answer**

None of them

Which of the rule in matrices under multiplication does not hold true?

Commutative law

Associative law

Identity law

None of them

$$A=\begin{bmatrix}1 & 2 & 3\\ 5 & 6 & 7\end{bmatrix} \& B=\begin{bmatrix}x & y & z & a\\ p & q & r & b\\ l & mn & o\end{bmatrix}$$

If then the order of $matirx\ A\times B$ is

2×4 **Correct answer**

2×3

3×3

None of them

$$\frac{d}{dt}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 & -7 \\ 1 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 4 \\ 8 \end{pmatrix}\sin t$$

The given system without the use of matrices is

$\frac{dx}{dt} = 3x - 7y + 4\sin 2t$; $\frac{dy}{dt} = x + y + 8\cos 2t$

$\frac{dx}{dt} = 3x - 7y + 4\sin t$; $\frac{dy}{dt} = x + y + 8\cos t$

$\frac{dx}{dt} = 3x - 7y + 4\sin t$; $\frac{dy}{dt} = x + y + 8\sin t$

Correct answer

None of them

Suppose that $\{X_1, X_2, X_3, \ldots, X_n\}$ is a set of n solutions vectors on an interval I, of a homogeneous system $X^{/}=AX$. The set is said to be a fundamental set of solutions of the system on the interval I if the solution vectors are

Linearly dependent

Linearly independent **Correct answer**

Homogeneous

None of them

$\frac{dx}{dt} = 3x + 2y$, $\frac{dy}{dt} = x + 2y$ *is*

The coefficient matrix of the following homogeneous system of differential equation

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

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

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

Correct answer

None of them

$$A = \begin{bmatrix} 3 & -18 \\ 2 & -9 \end{bmatrix}$$

The matrix has an eigen value of multiplicity

1

2

3

4

$$A = \begin{bmatrix} 1 & -2 & -2 \\ -2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$$

The matrix has eigen values $\lambda = -1, -1, 5 \; where \; \lambda = -1$ is a

Single root of A

triple root of A

double root of A

None of them

$$\begin{vmatrix} 4-\lambda & 1 & 0 \\ 0 & 4-\lambda & 1 \\ 0 & 0 & 4-\lambda \end{vmatrix} = 0 \text{ gives}$$

λ = 4 of multiplicity of 1

λ = 4 of multiplicity of 2

λ **= 4 of multiplicity of 3**

None of them

$$\frac{dy}{dt} = 2x \,, \frac{dx}{dt} = 3y$$

For the system of differential equations the independent variable(s) is (are)

x, t

y, t

x, y

t

$$\frac{dy}{dt} = 2x \,, \frac{dx}{dt} = 3y$$

For the system of differential equations the dependent variable(s) is (are)

x, t

y, t

x, y

t

If **L** denote the linear differential operators with constant coefficients, then $L_1L_4 - L_2L_3$ represents the

$\begin{vmatrix} L_1 & L_2 \\ L_4 & L_3 \end{vmatrix}$

$\begin{vmatrix} L_1 & L_3 \\ L_4 & L_2 \end{vmatrix}$

$\begin{vmatrix} L_1 & L_2 \\ L_3 & L_4 \end{vmatrix}$ **Correct answer**

None of them

Wronskian of x, x^2 is

x

x^2

x^3

0

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

The general solution of differential equation .is given by

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

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

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

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

The form of the exact solution to

$$2\frac{dy}{dx} + 3y = e^{-x},\ y(0) = 5$$

is

$Ae^{-1.5x} + Bxe^{-x}$

$Ae^{1.5x} + Be^{-x}$

$Ae^{1.5x} + Bxe^{-x}$

$Ae^{-1.5x} + Be^{-x}$

If m and n are non negative integers and $P_n(x)$ is a Legendre's polynomial then

$\int_{-1}^{1} P_m(x)P_n(x)dx = 0 \quad for\ m \neq n$ **Correct answer**

$\int_{-1}^{1} P_m(x)P_n(x)dx = 0 \quad for\ m = n$

$\int_{-1}^{1} P_m(x)P_n(x)dx = 0 \quad for\ m < 0$

$\int_{-1}^{1} P_m(x)P_n(x)dx = 0 \quad for\ n < 0$

If A is a square matrix and its determinant is zero, then

A is singular matrix. **Correct answer**

A is non singular matrix.

A is scalar matrix.

A is diagonal matrix.

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 correct answer

None of them

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 correct answer

Independent variable

Choice variable

None of them

Any linear differential equation of the form

$a_n x^n \frac{d^n y}{dx^n} + a_{n-1} x^{n-1} \frac{d^{n-1} y}{dx^{n-1}} + \cdots + a_1 x \frac{dy}{dx} + a_0 y = g(x)$ *where* $a_0,\ a_1,\ a_2 ..., a_n$ are constants.

is called

Homogeneous equation

Polar equation

Equi-dimensioanl equation or Cauchy eular **correct answer**

None of them

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

For eigen values $\lambda = 5,5$ of a matirx ,there exists ..... eigen vectors.

infinite

one

two

three

Ordinary points of $(x^2 - 64)(x^2 - 36)y'' + xy' - y = 0$ are

0,1

8,-8

6,-6

None of others.

A singular point $x = x_0$ of the given equation $a_2(x)y'' + a_1(x)y' + a_0(x)y = 0$ is said to be a regular singular point if

$(x - x_0)P(x)$ is analytic at x_0

$(x - x_0)Q(x)$ is analytic at x_0

$(x - x_0)P(x)$ & $(x - x_0)^2 Q(x)$ **are analytic at x_0.** **Correct answer**

None of them

Singular points **of** the equation $(x^2 - 4)^2 y'' + (x - 2)y' + y = 0$ are

x= -2, 2

None of them

x =2

x = - 2

$$A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

The matrix has .....

Real and unequal value

Repeated & real eigen value

Complex eigen value

None of them

Let λ be an eigen value of a non zero square matrix A. Then the equation $\det(A-\lambda I)=0$ is called

Trivial equation

Characteristics equation

Non-trivial equation **correct answer**

None of them

If $y_1=x^2$ is solution of the differential equation, then formula for finding Second solution of $x^2y''-2y=0$ is

$$y_2 = x^2\int \frac{e^{-2x}}{x^2}dx$$

$$y_2 = x\int \frac{e^{-2x}}{x^2}dx$$

$$y_2 = x^2\int \frac{e^{\frac{-2}{x}}}{x^4}dx$$

$$y_2 = x^2\int \frac{2}{x^4}dx$$

For $y\sin^2 x - y^2\cos x = c \;\; where \;\; y(0)=3; \; the\; value\; of\; c\; is$ ------.

9

-9

10

-10

A differential equation $M(x, y)\,dx + N(x, y)\,dy = 0$ is said to be an exact if -----.

$\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$

$\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x}$

$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ **Correct answer**

$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial y}$

Logistics equation is an Example of

Linear

Non linear

Bernoullis

One more name was there I forgot it.

The integrating factor of the differential equation $\frac{dy}{dx} + (Cotx)\,y = \cos^2(x)$ is ----------

$\mu = \ln|Sinx|$

$\mu = \ln|Cosx|$

$\mu = Sinx$

$\mu = Cosx$

2 Marks

Give two examples of Bessel's Differential Equation?

What is wronskian?

Give principle of superposition to find out any homogeneous equation

Define general linear equation of order n?

Marks 3

$$\frac{d^3y}{dx^3} - 4\frac{d^2y}{dx^2} + 5\frac{dy}{dx} = 4x$$

Write the differential equation in the form L(y) = g(x) where L is a differential operator with constant coefficients

Marks 5

Deduce the Special Case of Logistic Equation "Epidemic spread"?

Write down the system of differential equations

$$\frac{dx}{dt} = 6x + y \ , \ \frac{dy}{dt} = x + 3y - 9t - 9$$

in form of $X' = AX + F(t)$

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Q1) Write the general solution of x(t)=(4/3)cos3t-(5/3)sin3t in the form of $x(t) = A\sin(wt + \phi)$

Q2)Find the wronskian of the two vectors $X_1 = \begin{bmatrix} 1 \\ -1 \end{bmatrix} e^{-2t}, X_2 = \begin{bmatrix} 3 \\ 5 \end{bmatrix} e^{6t}$

Q3)WHAT is the center of the series $\sum_{n=1}^{\infty} \frac{1}{n^2} x^n$

Q4)IF $y = e^{mx}$ is the solution of $\frac{d^2y}{dx^2} + 8\frac{dy}{dx} + 15y = 0$ then find the roots of the auxiliary equation.

Q4)write $\frac{dx}{dt} = 6x + y \qquad \frac{dy}{dt} = x + 3y - 9t - 9$ in the form of $X' = AX + F(t)$

Q5)Find the eigun values of

$$A = \begin{bmatrix} 1 & -1 \\ 4/9 & -1/3 \end{bmatrix}$$

Q6)$X = \begin{bmatrix} e^{4t} & \sin 2t^2 \\ 5t + 4 & \ln(1 + t^3) \end{bmatrix}$ then find Dx?

Q7)find the general solution of

X'=3x-y-1 , $y' = y + x + 4e^t$ in y

Q8) what are regular and irregular singular points?

Q9)Write the differential equation $(xy + y^2)\frac{dy}{dx} = 4$ in linear differential form

Q10) IF the roots of the equation(cauchey's equation) are m1=4+I , m2=4-I then find the general solution

MCQ'S were mostly similar, related to each other.. mostly were about linearly dependence and independence.. mostly were about finding the eigen values and auxiliary equations and roots types(real or repeated or distinct) some were about solving equations.. super easy ☺

1) When the eigen values are real and repeated then the determinant corresponding to the equation is
a)always zero

b)greater than zero
c)less than zero

2)when the eigen values are distinct then the determinant corresponding to the equation is

a)always zero

b)greater than zero

c)less than zero

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Total 54 questions

40 mcqs 14 subjective

Mcqs were not difficult but tricky

Solve the following D.E 5 marks

$$x^2\frac{d^2y}{dx^2}+11x\frac{dy}{dx}+24y=0$$

Find auxiliary equation for y 5 marks

$$x'=3x-y-1$$
$$y'=y+x+4e^t$$

2 more questions of auxiliary equation of 3+3 marks

1 question about matrices 2 marks

Cauchy Euler differential equation by substitution method 3 marks

Dif b/w eigenvalue of multiplicity m 2marks

Uncoupled D.E 2 marks

Weather or not all singular points have real numbers If not then give an example

Sorry for late upload

Remember in prayers

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ASH ON MARCH 7, 2017 AT 11:49AM

long.
1. write the procedure of method of frobenius.
2. ans is on page 388 . example no 1. same question but in my paper values are different.
3. solve the differential equation dy/dx-3y=xe^3x
4. he give me two equations and said to represent in the folllowing form
Asin(wt+angle)
shorts.
Define the wronksian of y1 and y2 if these are the function of x.
define the wronksian of the set {1,-x,x}
Define regular singular points.
solve the differntail equation. equation yad nhi but ez thi.
eigenvalues di thi and kha tha k eigenvector find kro
aik equation di thi and pocha tha exact h k nhi.
and aik question exact k solve krne ko bhi tha. he says that this is exact and now solve further.
aik equation ka annihilator operator find krna tha.

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ASH ON MARCH 9, 2017 AT 2:54PM

another paper

another paper of my friend.
1.An object weight 4LB streches a spring to 12 inches then calculate its mass.
2. an equation given and said , if dy/dx = (-x+y+9)/(x+y-3) then determines the value of h and k using substitution . x=X+h and y = Y+k
3. transform the following homogenous DE into a separable form
(x^2 + xy + y^2)dx- x^2 dy
(D^2 + Dy + y^2)x - x^2 y = 0
4. dy/dx + xy = 2xy^2. change it to BERnoulli DE
5. aik matrix diya tha us ki eignvalue bhi di thi and aik eignvector btana tha.
6.Write EQ of Free un-damped motion.

7. find general solution of differential EQ [(dy/dx)-6y=0]
8. Which method is often use to solve linear DE with variable cofficient.
yhi yad hn.

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ASH ON MARCH 9, 2017 AT 2:55PM

aoa mra aj exam mai decoupled ka aik 3 marks ka tha
aik statement wala queation tha ivp find krni thi
aik homogeneous ka second sol find krna tha y2 ki value find krni thi y2 wala formula dia hua tha
aik long 5 marks ka particular integral find krna tha complementary dia hua tha baki mcqs kafi conceptual thy past sy nai thy itnyziada wronksian L.I aur anhilator waly mcqs thy
mujy aik 3 marks ka q aya tha k eq check kro exact hai ya nai
aur power series ki form likhni thi 2 marks
superposition principle ki def ae thi 3 marks
ratio test in power series 5 marks
mujy ziada paper power series sy aya tha
eigen value mai sy mujy bas aik mcq aya tha it was quite tough but alhamdulilah i have done all the queations but i do not know how many will be right

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ON AUGUST 29, 2015 AT 10:29PM

some MCQs are from past paper and other are easy n conceptual

subjective:

subjective are mostly from past n related to the past Question
linear homogenous power series ka formula likhna tha.
2 3 Question linear equation thi unhy solved krna tha genral form ma likhna tha
2 3 Question differential equation ma given thy unhy matrix form ma likhna tha.
ik ma simple differential equation thi usy solved krnna tha.
coplementry form ma likhna tha DE ko .
bas yahi yaad hy

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2 3 Question differential equation ma given thy unhy matrix form ma likhna tha.
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coplementry form ma likhna tha DE ko .
bas yahi yaad hy