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MID TERM PAST PAPER

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Best of luck!

PAST PAPER

Question No : 1 of 26 Marks: 1 (Budgeted Time 1 Min)

The form of the exact solution to

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

is

Answer (Please select your correct option)

- $Ae^{-1.5x} + Bxe^{-x}$
- $Ae^{1.5x} + Be^{-x}$
- $Ae^{1.5x} + Bxe^{-x}$
- $Ae^{-1.5x} + Be^{-x}$ ⇦ correct answer solve by hadi

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Question No : 2 of 26 Marks: 1 (Budgeted Time 1 Min)

The differential equation $2\frac{dy}{dx} + x^2 y = 2x + 3, y(0) = 5$ is

Answer (Please select your correct option)

- Linear
- Nonlinear
- Linear with fixed constants
- Undeterminable to be linear or nonlinear



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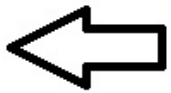
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Question No : 3 of 26 Marks: 1 (Budgeted Time 1 Min)

The value of amplitude in the solution X=40Sin (7t+4) is

Answer (Please select your correct option)

- 7
- 4
- 40
- 20



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Question No : 4 of 26 Marks: 1 (Budgeted Time 1 Min)

The order of the differential equation $(\frac{\partial^2 u}{\partial t^2})^3 + \frac{\partial u}{\partial t} = 0$ is

Answer (Please select your correct option)

- 0
- 1
- 2
- 3



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Question No : 5 of 26 Marks: 1 (Budgeted Time 1 Min)

Which of the following is the linear differential equation?

Answer (Please select your correct option)

- $x\frac{dy}{dx} + y = 0$
- $y\frac{dy}{dx} + x = 0$
- $x\frac{d^2y}{dx^2} + \frac{dy}{dx} + y^2 = 0$
- $\frac{dy}{dx} = e^y$



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Question No : 6 of 26 Marks: 1 (Budgeted Time 1 Min)

A solution obtained by giving particular values to the arbitrary constants in the General Solution of a differential equation is called a ----------

Answer (Please select your correct option)

- Singular solution
- Particular solution
- Explicit Solution
- None of these



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Question No : 7 of 26 Marks: 1 (Budgeted Time 1 Min)

Which of the following equations satisfy the differential equation $\frac{dy}{dx} = x$

Answer (Please select your correct option)

- $2y = x^2 + c$ ⇦ correct answer solve by hadi
- $y = x^2 + c$
- $y = x^2$
- $y = x + c$

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Question No : 8 of 26 Marks: 1 (Budgeted Time 1 Min)

A differential equation $\frac{dy}{dx} + p(x)y = q(x)y^n \quad for\, n \neq 0,1$ is called a/an ----.

Answer (Please select your correct option)

- Non-Exact differential equation
- Linear differential equation
- Bernoulli equation
- Exact differential equation



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Question No : 9 of 26 Marks: 1 (Budgeted Time 1 Min)

In a Bernoulli equation $\frac{dy}{dx}+\frac{1}{x}y = xy^2$, *identify* $p(x), q(x)$ & n respectively.

Answer (Please select your correct option)

- $\frac{1}{x}, x$ & 2 
- y, x^2y & 2
- $y, \frac{1}{x}$ & 2
- $\frac{1}{y}, y$ & 2

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Question No : 10 of 26 Marks: 1 (Budgeted Time 1 Min)

In order to change the Bernoulli Equation

$$\frac{dy}{dx} + p(x)y = q(x)y^n$$

into linear differential equation, we choose ----.

Answer (Please select your correct option)

- $v = y^{n-1}$
- $v = y^{1-n}$ ⇦ correct answer solve by hadi
- $v = y^n$
- $v = y'$

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Question No : 11 of 26 Marks: 1 (Budgeted Time 1 Min)

The differential equation ---------- is separable.

Answer (Please select your correct option)

- $x(x+y)\frac{dy}{dx}=4$
- $\frac{dy}{dx}=\frac{x^2}{x+xy}$ ⇦ correct answer solve by hadi
- $\frac{dy}{dx}=\frac{y}{1+xy^3}$
- $\frac{dy}{dx}=\frac{xy+3}{1+2xy}$

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Question No : 12 of 26 Marks: 1 (Budgeted Time 1 Min)

If $y = x$, then $\frac{dy}{dx} =$ .....

Answer (Please select your correct option)

- 0
- 1
- x
- $x+1$



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Question No : 13 of 26 Marks: 1 (Budgeted Time 1 Min)

If $f(x)$ and $g(x)$ are linearly dependent on I, then-----.

Answer (Please select your correct option)

- $W(f,g)(x) \neq 0$ (Wronskian) for all x in the interval I.
- $W(f,g)(x) = 0$ (Wronskian) for all x in the interval I.



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- $W(f,g)(x)$ *may or may not be* zero for all x in the interval I.
- $W(f,g)(x)$ is not defined for all x in the interval I.

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Question No : 14 of 26 Marks: 1 (Budgeted Time 1 Min)

Wronskian of $Sin\ x, Cos\ x$ is----.

Answer (Please select your correct option)

- Sinx
- 1
- -1
- Cosx



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Question No : 15 of 26 Marks: 1 (Budgeted Time 1 Min)

The orthogonal trajectory to the family of curves $3x + 4y = c$ is------.

Answer (Please select your correct option)

- $y = 2x$
- $y - x = c$
- $4x - 3y = c$ ⇦
- $4x + 3y = c$

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Question No : 16 of 26 Marks: 1 (Budgeted Time 1 Min)

If T denotes the half life and the initial amount of the substance be A_0 , then the amount of radioactive substance at time T is given by--------.

Answer (Please select your correct option)

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

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Question No : 17 of 26 Marks: 1 (Budgeted Time 1 Min)

If the auxiliary equation has roots $-2, -2$, then the general solution of the differential equation is_____

Answer (Please select your correct option)

- $y = c_1 e^{-2x} + c_2 e^{-2x}$
- $y = c_1 e^{-2+2x}$
- $y = c_1 e^{2x} + c_2 e^{-2x}$
- $y = (c_1 + c_2 x) e^{-2x}$  correct answer solve by hadi

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Question No : 18 of 26 Marks: 1 (Budgeted Time 1 Min)

If the auxiliary equation has complex roots $-2 \pm 3i$, then the general solution of the differential equation is_____

Answer (Please select your correct option)

- $y = ce^{2x}(\cos 10x + \sin 10x)$
- $y = e^{-2x}(c_1 \cos 3x + c_2 \sin 3x)$ ⇦ correct answer solve by hadi
- $y = e^{ix}(c_1 \cos 2x + c_2 \sin 2x)$
- $y = e^{2x}(c_1 \cos x - c_2 \sin x)$

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Question No : 19 of 26 Marks: 1 (Budgeted Time 1 Min)

If $y = e^{-6x}$, then which of the following is the most accurate option?

Answer (Please select your correct option)

- The annihilator operator of $y = e^{-6x}$ is $(D - 6)^2$.
- The annihilator operator of $y = e^{-6x}$ is $(D - 6)^3$.
- The annihilator operator of $y = e^{-6x}$ is $(D - 6)$.
- The annihilator operator of $y = e^{-6x}$ is $(D + 6)$. ⇦ correct answer solve by hadi

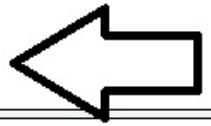
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Question No : 20 of 26 Marks: 1 (Budgeted Time 1 Min)

If the complementary solution of $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 3\sin x$ is $c_1 e^{-x} + c_2 e^{2x}$, then which of the following is the most accurate option for it?

Answer (Please select your correct option)

- The general form of the particular solution will be $(A\sin x + B\cos x)e^{x}$.
- The general form of the particular solution will be $Ax\sin x + Bx\cos x$.
- The general form of the particular solution will be $(Ax\sin x + Bx\cos x)e^{-x}$.
- The general form of the particular solution will be $A\sin x + B\cos x$.



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Question No : 21 of 26 Marks: 2 (Budgeted Time 4 Min)

Evaluate $e^{-\int p(x)\,dx}$ using the differential equation $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + \left(x^2 - \frac{1}{4}\right)y = 0$ by writing it in the standard form $\frac{d^2y}{dx^2} + P(x)\frac{dy}{dx} + Q(x)y = 0$.

Answer (Please click here to Add Answer)

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Question No : 22 of 26 Marks: 2 (Budgeted Time 4 Min)

If the complementary solution of the following differential equation is $c_1 \sin 2x + c_2 \cos 2x$, then what will be the general form of its particular solution:

$$\frac{d^2y}{dx^2} + 4y = \cos 2x$$

Answer (Please click here to Add Answer)

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Question No : 23 of 26 Marks: 3 (Budgeted Time 6 Min)

If a mass weighing $8lb$ and $k = 40\ lb/ft$ then find the amount of elongation 's'.

Answer (Please click here to Add Answer)

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Question No : 24 of 26 Marks: 3 (Budgeted Time 6 Min)

If $y_1(x) = e^{-4x}$ is the first solution of $\frac{d^2y}{dx^2} + 6\frac{dy}{dx} + 8y = 0$, then construct its second solution using $y_2(x) = y_1(x)\int \frac{e^{-\int P(x)dx}}{y_1^2(x)}dx$.

Note: where $P(x)$ is a coefficient of the first derivative involving in the above given differential equation.

Answer (Please click here to Add Answer)

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Question No : 25 of 26 Marks: 5 (Budgeted Time 10 Min)

A mass weighing 2*lb* stretches a spring 6 inches. Determine the equation of simple harmonic motion.

Answer (Please click here to Add Answer)

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Question No : 26 of 26 Marks: 5 (Budgeted Time 10 Min)

A radioactive isotope has a half-life of 16 days. We have 45 g at the end of 32 days. How much radioisotope was initially present?

Answer (Please click here to Add Answer)

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