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Best of luck!



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)

☐ $Ae^{-1.5x} + Bxe^{-x}$

☐ $Ae^{1.5x} + Be^{-x}$

☐ $Ae^{1.5x} + Bxe^{-x}$

☐ $Ae^{-1.5x} + Be^{-x}$



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Question No : 2 of 26

Marks: 1 (Budgeted Time 1 Min)

The Period of oscillator in the solution $X=50\sin(20t+8.5)$ is

Answer (Please select your correct option)

☐ 0.17643

☐ 0.32045

☐ 0.31400

☐ 0.58000

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Question No : 2 of 26

Marks: 1 (Budgeted Time 1 Min)

The Period of oscillator in the solution $X=50\sin(20t+8.5)$ is

Answer (Please select your correct option)

☐ 0.17643

☐ 0.32045

☐ 0.31400

☐ 0.58000

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Question No : 3 of 26

Marks: 1 (Budgeted Time 1 Min)

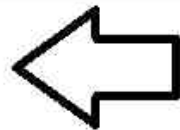
A problem of the differential equation associated with a single value of the unknown function at a given point in the domain of the solution is known as -----

Answer (Please select your correct option)

☐ Boundary Value Problem

☐ Initial Value Problem

☐ None of these



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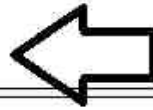
Question No : 4 of 26

Marks: 1 (Budgeted Time 1 Min)

The equation $\frac{dy}{dx} = \frac{x(x+1)}{y(y-1)}$ is a/an -----

Answer (Please select your correct option)

☐ partial differential equation.



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☐ ordinary differential equation.

☐ polynomial equation.

☐ transcendental equation.

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

If $f(x, y) = 0$, then $\frac{dy}{dx} = \dots$

Answer (Please select your correct option)

- ☐ $-\frac{f_x}{f_y}$
- ☐ $-\frac{f_y}{f_x}$
- ☐ $\frac{f_x}{f_y}$
- ☐ $\frac{f_y}{f_x}$

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Question No : 6 of 26

Marks: 1 (Budgeted Time 1 Min)

For $y^2(1-x^2) - \cos^2 x = c$ with $y(0) = 3$, the value of c is-----

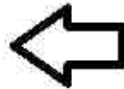
Answer (Please select your correct option)

9

☐

8

☒



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10

☐

5

☐

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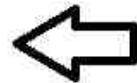
Question No : 7 of 26

Marks: 1 (Budgeted Time 1 Min)

The differential equation $(3x^2y + 2) dx + (x^3 + y) dy = 0$ is -----

Answer (Please select your correct option)

☐ Exact



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☐ Non-exact

☐ Separable

☐ Homogenous

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Question No : 8 of 26

Marks: 1 (Budgeted Time 1 Min)

For a 1st order linear differential equation $\frac{dy}{dt} - \frac{1}{t}y = 2t$; the continuous function, $q(t)$, is.....

Answer (Please select your correct option)

☐ $2t$



☐ $-\frac{1}{t}$

☐ $\frac{1}{t}$

☐ t

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Marks: 1 (Budgeted Time 1 Min)

Question No : 9 of 26

For a 1st order linear differential equation $\frac{dy}{dx}(x + 2y^2) = y$; The continuous function, $q(y)$, is---

Answer (Please select your correct option)

☐ x^2

☒ $2y$

☐ $2y^2$

☐ $-2y$

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Question No : 10 of 26

Marks: 1 (Budgeted Time 1 Min)

A differential equation $\frac{dy}{dx} + p(x)y = q(x)y^n$ 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 : 11 of 26

Marks: 1 (Budgeted Time 1 Min)

The constant solutions of the logistic equation $\frac{dP}{dt} = P(a - bP)$ are-----

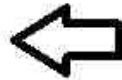
Answer (Please select your correct option)

☐ P=0, P= b/a

☐ P=0, P=a/b

☐ P=a/b, P=b/a

☐ P=0, P=0



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Question No : 12 of 26

Marks: 1 (Budgeted Time 1 Min)

The logistic equation $\frac{dP}{dt} = P(a - bP)$ is a/an-----

Answer (Please select your correct option)

☐ Linear differential equation

☒ Non-linear differential equation



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☐ Homogenous differential equation

☐ Exact differential equation

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Question No : 13 of 26

Marks: 1 (Budgeted Time 1 Min)

Wronskian of $\sin x, \cos x$ is----

Answer (Please select your correct option)

☐ $\sin x$

☐ 1

☒ -1

☐ $\cos x$



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

What is annihilator operator of the function $\frac{dy}{dx} + 4y = e^{2x}$?

Answer (Please select your correct option)

- ☐ $(D+4)(D-2)$
- ☐ $(D-2)$
- ☐ $(D+2)$
- ☐ $D(D^2-2)$

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Question No : 15 of 26

Marks: 1 (Budgeted Time 1 Min)

What is the annihilator operator of the function $g(x) = \cos 2x$?

Answer (Please select your correct option)

☐ $(D - 4)$

☐ $(D + 4)$

☐ $(D^2 + 4)$

☐ $(D^3 - 4)$

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Question No : 16 of 26

Marks: 1 (Budgeted Time 1 Min)

The differential equation of the orthogonal trajectory to the family of curves $y = cx$ is-----

Answer (Please select your correct option)

☐ $\frac{dy}{dx} = -\frac{x}{y}$

☐ $\frac{dy}{dx} = \frac{x}{y}$

☐ $\frac{dy}{dx} = -\frac{y}{x}$

☐ $\frac{dy}{dx} = \frac{y}{x}$



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Question No : 17 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 : 18 of 26

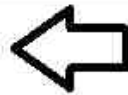
Marks: 1 (Budgeted Time 1 Min)

In the population growth model, the solution of the differential equation is given by

Answer (Please select your correct option)

☐ $A(t) = ke^{kt}$

☒ $A(t) = A_0 e^{kt}$



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☐ $A(t) = A_0 / 2$

☐ $A(t) = ke^{4t}$

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

If $y_2 = x^3$ is the second solution of $x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} - 3y = 0$, then which of the following is the most accurate option?

Answer (Please select your correct option)

- ☐ The first solution say y_1 must be non-trivial on the indicated interval.
- ☐ The first solution say y_1 can be trivial on the indicated interval.
- ☐ The first solution say y_1 must be discontinuous on the indicated interval.
- ☐ The first solution say y_1 may or may not be continuous on the indicated interval.

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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)

If a mass weighing $20lb$ stretches a spring by $\frac{1}{2}ft$ then find k using the Hooke's Law.

Answer (Please [click here](#) to Add Answer)

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Question No : 21 of 26

Marks: 2 (Budgeted Time 4 Min)

If a mass weighing $20lb$ stretches a spring by $\frac{1}{2}ft$ then find k using the Hooke's Law.

Answer (Please [click here to Add Answer](#))



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

Show that $y = x^2$ is a solution of the following differential equation:

$$x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 4y = 0$$

Answer (Please [click here](#) to Add Answer)

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Show that $y = x^2$ is a solution of the following differential equation:

$$x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 4y = 0$$

Answer (Please [click here to Add Answer](#))



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

What is Logistic equation, write it mathematically?

Answer (Please [click here](#) to Add Answer)

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Question No : 23 of 26

Marks: 3 (Budgeted Time 6 Min)

What is Logistic equation, write it mathematically?

Answer (Please [click here to Add Answer](#))



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

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

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 5y = 2\sin y$$

Answer (Please [click here](#) to Add Answer)

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Question No : 24 of 26

Marks: 3 (Budgeted Time 6 Min)

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

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 5y = 2 \sin y$$

Answer (Please [click here to Add Answer](#))



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

Find the wronskian of the Differential equation $y''' - 2y'' - 21y' - 18y = 3 + 4e^{-x}$ using variation of parameter and the root of the auxiliary equation is $m_1 = -3, m_2 = -1, m_3 = 6$?

Answer (Please [click here](#) to Add Answer)

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Question No : 25 of 26

Marks: 5 (Budgeted Time 10 Min)

Find the wronskian of the Differential equation $y''' - 2y'' - 21y' - 18y = 3 + 4e^{-x}$ using variation of parameter and the root of the auxiliary equation is $m_1 = -3, m_2 = -1, m_3 = 6$?

Answer (Please [click here to Add Answer](#))



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

Solve the boundary value problem $\frac{d^2y}{dx^2} + 25y = 0$ subject to the boundary conditions $y(0) = 0, y\left(\frac{\pi}{10}\right) = 0$

Answer (Please [click here](#) to Add Answer)

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26

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Solve the boundary value problem $\frac{d^2 y}{dx^2} + 25y = 0$ subject to the boundary conditions $y(0) = 0$, $y\left(\frac{\pi}{10}\right) = 0$

Answer (Please [click here to Add Answer](#))



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