MATHS

BOOKS - SURA MATHS (TAMIL ENGLISH)

ORDINARY DIFFERENTIAL EQUATIONS

Exercise 10 1

1. Determine its order, degree (if exists)

$$\frac{dy}{dx} + xy = \cot x$$

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2. Determine its order, degree (if exists)

$$\left(\frac{d^3y}{dx^3}\right)^{\frac{2}{3}} - 3\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 4 = 0$$

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3. Determine its order, degree (if exists)

$$\left(\frac{d^2y}{dx^2}\right)^2 = x\sin\left(\frac{d^2y}{dx^2}\right)$$

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4. Determine its order, degree (if exists)

$$\sqrt{\frac{dy}{dx}} - 4\frac{dy}{dx} - 7x = 0$$

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5. Determine its order, degree (if exists)

$$y\left(\frac{dy}{dx}\right) = \frac{x}{\left(\frac{dy}{dx}\right) + \left(\frac{dy}{dx}\right)^3}$$

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6. Determine its order, degree (if exists)

$$x^2\frac{d^2y}{dx^2} + \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{1}{2}} = 0$$

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7. Determine its order, degree (if exists)

$$\left(\frac{d^2y}{dx^2}\right)^3 = \sqrt{1+\left(\frac{dy}{dx}\right)}$$

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8. Determine its order, degree (if exists)

$$\frac{d^2y}{dx^2} = xy + \cos\left(\frac{dy}{dx}\right)$$

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9. Determine its order, degree (if exists)

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

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10. Determine its order, degree (if exists)

$x = e^{xy\left(\frac{dy}{dx}\right)}$

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Exercise 10 2

1. Express each of the following physical statements in the form of differential equation.

(i) Radium decays at a rate proportional to the amount Q present.

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2. Express each of the following physical statements in the form of differential equation.

(ii) The population P of a city increases at a rate proportional to the product of population and to the difference between 5,00,000 and the population.

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3. Express each of the following physical statements in the form of differential equation.

(iii) For a certain substance, the rate of change of vapor pressure P with respect to temperature T is proportional to the vapor pressure and inversely proportional to the square of the temperature.

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4. Express each of the following physical statements in the form of differential equation.

(iv) A saving amount pays 8% interest per year, compounded continuously. In addition, the income

from another investment is credited to the amount continuoulsy at the rate of Rs. 400 per year.

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5. Assume that a spherical rain drop evaporates at a rate proportional to its surface area. Form a differential equation involving the rate of change of the radius of the rain drop.

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Exercise 10 3

1. Find the differential equation of the family of (i) all non- vertical lines in a plane

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2. Form the differential equation of all straight lines touching the circle $x^2 + y^2 = r^2$.

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3. Find the differential equation of the family of circles passing through the origin and having their centres on the x - axis.

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4. Find the differential equation of the family of all the parabolas with latus rectum 4a and whose axes are parallel to the x-axis.

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5. Find the differential equation of the family of parabolas with vertex at $(0, -1)$ and having axis along the y-axis.

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6. Find the differential equations of the family of all the ellipses having foci on the y-axis and centre at the origin.

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7. Find the differential equation corresponding to the family of curves represented by the equation $y = Ae^{8x} + Be^{-8x}$, where A and B are arbitrary constants.

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8. Find the differential equation of the curve represented by $xy = ae^{x} + be^{-x} + x^{2}$.

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Exercise 10 4

1. Show that each of the following expressions is a solution of the corresponding given differential equation.

$(i) y = 2x^{2}; xy' = 2y$

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2. Show that each of the following expressions is a solution of the corresponding given differential equation.

$(ii) y = ae^{x} + be^{-x}; y'' - y = 0$

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3. Find value of m so that the function $y = e^{mx}$ is a solution of the given differential equation.

$y' + 2y = 0$

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4. Find value of m so that the function $y = e^{mx}$ is a solution of the given differential equation.

$y'' - 5y' + 6y = 0$

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5. The slope of the tangent to the curve at any point is the reciprocal of four times the ordinate at that point. The curve passes through (2, 5). Find the equation of the curve.

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6. Show that $y = e^{-x} + mx + n$ is a solution of the differential equation $e^x \frac{d^2y}{dx^2} - 1 = 0.$

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7. Show that $y = ax + \frac{b}{x}, x \neq 0$ is a solution of the differential equation $x^2y'' + xy' - y = 0.$

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8. Show what $y = ae^{-3x} + b,$ where a and b are arbitary constants, is a solution of the differential

equation $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} = 0$

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9. Show that the differential equation representing the family of curves $y^2 = 2a\left(x + a^{\frac{2}{3}}\right)$ where a is positive parameter, s $\left(y^2 - 2xy\frac{dy}{dx}\right)^3 = 8\left(y\frac{dy}{dx}\right)^5$

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10. Show that $y = a\cos bx$ is a solution of the differential equation $\frac{d^2y}{dx^2} + b^2y = 0.$

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Exercise 10 5

1. If F is the constant force generated by the motor of an automobiles of mass M, its velocity V is given by $M\frac{dV}{dt} = F - kV$, where k is a constant. Express V in terms of t given that V = 0 when t = 0.

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2. The velocity v, of a parachute falling vertically satisfies the equation $v\frac{dv}{dx} = g\left(1 - \frac{v^2}{k^2}\right)$, where g and k are constants. If v and x are both initially zero, find v in terms of x.

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3. Find the equation of the curve whose slope is $\frac{y-1}{x^2+x}$ and which passes through the point (1,0).

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4. Solve the differential equations :

$$\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$$

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5. Solve the differential equations :

$$ydx + \left(1+x^2\right)\tan^{-1} x dy = 0$$

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6. Solve the differential equations :

$$\sin. \frac{dy}{dx} = a, y(0) = 1$$

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7. Solve the differential equations :

$$\frac{dy}{dx} = e^{x+y} + x^3 e^y$$

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8. Solve the differential equations :

$$(e^y + 1)\cos x dx + e^y \sin x dy = 0$$

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9. Solve the differential equations :

$$(ydx - xdy)\cot\left(\frac{x}{y}\right) = ny^2dx$$

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10. Solve the differential equations :

$$\frac{dy}{dx} - x\sqrt{25 - x^2} = 0$$

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11. Solve the differential equations :

$$x\cos ydy = e^x(x\log x + 1)dx$$

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12. Solve the differential equations :

$$\tan y.\ \frac{dy}{dx} = \cos(x+y) + \cos(x-y)$$

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13. Solve the differential equations :

$$\frac{dy}{dx} = \tan^2(x+y)$$

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Exercise 10 6

1. Solve the differential equations :

$$\left[x + y\cos\left(\frac{y}{x}\right)\right]dx = x\cos\left(\frac{y}{x}\right)dy$$

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2. Solve the differential equations :

$$\left(x^3 + y^3\right)dy - x^2 y dx = 0$$

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3. Solve the differential equations :

$$ye^{\frac{x}{y}}dx = \left(xe^{\frac{x}{y}} + y\right)dy$$

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4. Solve the differential equations :

$2xydx + \left(x^2 + 2y^2\right)dy = 0$

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5. Solve the differential equations :

$\left(y^2 - 2xy\right)dx = \left(x^2 - 2xy\right)dy$

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6. Solve the following differential equations :

$$x\frac{dy}{dx} = y - x\cos^2\left(\frac{y}{x}\right)$$

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7. $\left(1 + 3e^{\frac{y}{x}}\right)dy + 3e^{\frac{y}{x}}\left(1 - \frac{y}{x}\right)dx = 0$, given that $y = 0$ and $x = 1$

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8. $\left(x^2 + y^2\right)dy = xydx$. It is given that $y(1) = 1$ and $y(x_0) = e$. Find the vale of x_0.

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Exercise 10 7 Solve The Following Linear Differential Equations

1. $\cos x \frac{dy}{dx} + y \sin x = 1$

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2. $\left(1 - x^2\right) \frac{dy}{dx} - xy = 1$

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3. $\frac{dy}{dx} + \frac{y}{x} = \sin x$

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4. $\left(x^2 + 1\right)\frac{dy}{dx} + 2xy = \sqrt{x^2 + 4}$

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5. $\left(2x - 10y^3\right)dy + ydx = 0$

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6. $x \sin x \frac{dy}{dx} + (x \cos x + \sin x)y = \sin x$

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7. $\left(y - e^{\sin^{-1} x}\right) \frac{dy}{dx} + \sqrt{1 - x^2} = 0.$

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8. $\frac{dy}{dx} + \frac{y}{(1 - x)\sqrt{x}} = 1 - \sqrt{x}.$

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9. $\left(1+x+xy^2\right)\frac{dy}{dx}+\left(y+y^3\right)=0$

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10. $\frac{dy}{dx}+\frac{y}{x\log x}=\frac{\sin 2x}{\log x}$

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11. $(x+a)\frac{dy}{dx}-2y=(x+a)^4$

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12. $\frac{dy}{dx} = \frac{\sin^2 x}{1+x^3} - \frac{3x^2}{1+x^3}y$

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13. $x\frac{dy}{dx} + y = x\log x$

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14. $x\frac{dy}{dx} + 2y - x^2\log x = 0$

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Exercise 10 7

1. $\frac{dy}{dx} + \frac{3y}{x} = \frac{1}{x^2}$, given that y = 2 when x = 1.

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Exercise 10 8

1. The rate of increase in the number of bacteria in a certain bacteria culture is proportional to the number present. Given that the number triples in 5 hours, find how many bacteria will be present after 10 hours ?

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2. Find the population of a city at any time t, given that the rate of increase of population is proportional to the population at that instant and that in a period of 40 years the population increased from 3,00,000 to 4,00,000.

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3. The equation of electromotive force for an electric circuit containing resistance and self inductance is $E = Ri + L\frac{di}{dt}$, where E is the

electromotive force is given to the circuit, R the resistance and L, the coefficient of induction. Find the current i at time t when E = 0.

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4. The engine of a motor boat moving at 10 m/s is shut off. Given that the restardation at any subsequent time (aftere shutting off the engine) equal to the velocity at that time. Find the velocity after 2 seconds of switching off the engine.

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5. Suppose a person deposits 10,000 Indian rupees in a bank account at the rate of 5% per annum compounded continuously. How much money will be in his bank account 18 months later?

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6. Assume that the rate at which radioactive nuclei decay is proportioanl to the number of such nuclei that are present in a given sample. In a certain sample 10% of the original number of radioactive nuclei have undergone disintegration in a period of

100 years. What percentage of the original radioactive nuclei will remain after 1000 years.?

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7. Water at temperature $100^\circ C$ cools in 10 minutes to $80^\circ C$ in a room temperature of $25^\circ C$.

Find

(i) The temperature of water after 20 minutes

$$\left[\log_e . \frac{11}{15} = -0.3101, \log_e 5 = 1.609\right]$$

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8. Water at temperature $100^\circ C$ cools in 10 minutes to $80^\circ C$ in a room temperature of $25^\circ C$.

Find

(i) The temperature of water after 20 minutes

(ii) The time when the temperature is $40^\circ C$

$$\left[\log_e \frac{11}{15} = -0.3101, \log_e 5 = 1.6094\right]$$

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9. At 10.00 A.M. a woman took a cup of hot instant coffe from her microwave oven and placed it on a nearby Kitchen counter to cool. At this instant the temperature of the coffee was $180^\circ F$, and 10

minutes later it was $160^\circ F$. Assume that constant temperature of the kitchen was $70^\circ F$.

(i) What was the temperature of the coffee at 10.15 A.M. ?

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10. At 10.00 A.M. a woman took a cup of hot instant coffe from her microwave oven and placed it on a nearby Kitchen counter to cool. At this instant the temperature of the coffee was $180^\circ F$, and 10 minutes later it was $160^\circ F$. Assume that constant temperature of the kitchen was $70^\circ F$.

The woman likes to drink coffe when its

temperature is between $130^\circ F$ and $140^\circ F$. between what time should she have drunk the coffee?

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11. A pot of boiling water at $100^\circ C$ is removed from a stove at time t = 0 and left to cool in the kitchen. After 5 minutes, the water temperature has decreased to $80^\circ C$, and another 5 minutes later it has dropped to $65^\circ C$. Determine the temperature of the kitchen.

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12. A tank initially contains 50 litres of pure water. Starting at time t = 0 a brine containing with 2 grams of dissolved salt per litre flows into the tank at the rate of 3 litres per minutes. The mixture is kept uniform by stirring and the well - stirred mixture simultaneously flows out of the tank at the same rate. Find the amount of salt present in the tank at any time $t > 0$.

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Exercise 10 9

1. The order and degree of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^{\frac{1}{3}} + x^{\frac{1}{4}} = 0$ are respectively.

A. 2,3

B. 3,3

C. 2,6

D. 2,4

Answer:

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2. The differential equation representing the family of curves $y = A\cos(x + B)$, where A and B are parameters, is

A. $\frac{d^2y}{dx^2} - y = 0$

B. $\frac{d^2y}{dx^2} + y = 0$

C. $\frac{d^2y}{dx^2} = 0$

D. $\frac{d^2x}{dy^2} = 0$

Answer:

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3. The order and degree of the different equation $\sqrt{\sin x}(dx + dy) = \sqrt{\cos x}(dx - dy)$ is

A. 1,2

B. 2,2

C. 1,1

D. 2,1

Answer:

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4. The differential equation of the family of curves $y = Ae^x + be^{-x}$, where A and B are arbitrary constant is

A. $\frac{d^2y}{dx^2} + y = 0$

B. $\frac{d^2y}{dx^2} = 0$

C. $\frac{dy}{dx} + y = 0$

D. $\frac{dy}{dx} - y = 0$

Answer:

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5. The general solution of the differential equation $\frac{dy}{dx} = \frac{y}{x}$ is

A. $xy = k$

B. $y = k \log x$

C. $y = kx$

D. $\log y = kx$

Answer:

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6. The solution of the differential equation $2x\frac{dy}{dx} - y = 3$ represents

A. straight lines

B. circles

C. parabola

D. ellipse

Answer:

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7. The solution of $\frac{dy}{dx} + p(x)y = 0$ is

A. $y = ce^{\int px}$

B. $y = ce^{-\int pdx}$

C. $x = ce^{-\int pdy}$

D. $xce^{\int pdy}$

Answer:

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8. The integrating factor of the differential equation $\frac{dy}{dx} + y = \frac{1+y}{x}$ is

A. $\frac{x}{e^{\lambda}}$

B. $\frac{e^{\lambda}}{x}$

C. λe^{x}

D. e^{x}

Answer:

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9. The integrating factor of the differential equation $\frac{dy}{dx} + P(x)y = Q(x)$ is x, then $P(x)$

A. x

B. $\frac{x^2}{2}$

C. $\frac{1}{x}$

D. $\frac{1}{x^2}$

Answer:

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10. The degree of the differential equation $y(x) = 1 + \frac{dy}{dx} + \frac{1}{1.2}\left(\frac{dy}{dx}\right)^2 + \frac{1}{1.2.3}\left(\frac{dy}{dx}\right)^3 + \ldots$ is

A. 2

B. 3

C. 1

D. 4

Answer:

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11. If p and q are the oder and degree of the differential equation $y\frac{dy}{dx} + x^3\left(\frac{d^2y}{dx^2}\right) + xy = \cos x,$ when

A. $p < q$

B. $p = q$

C. $p > q$

D. p exists and q does not exist

Answer:

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12. The solution of the differential equation $\frac{dy}{dx} + \frac{1}{\sqrt{1-x^2}} = 0$ is

A. $y + \sin^{-1} x = c$

B. $x + \sin^{-1} y = 0$

C. $y^2 + 2\sin^{-1} x = c$

D. $x^2 + 2\sin^{-1} y = 0$

Answer:

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13. The solution of the differential equation $\frac{dy}{dx} = 2xy$ is

A. $y = Ce^{x^2}$

B. $y = 2x^2 + c$

C. $y = Ce^{-x^2} + C$

D. $y = x^2 + C$

Answer:

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14. The general solution of the differential equation $\log\left(\frac{dy}{dx}\right) = x + y$ is

A. $e^x + e^y = C$

B. $e^x + e^{-y} = C$

C. $e^{-x} + e^y = C$

D. $e^{-x} + e^{-y} = C$

Answer:

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15. The solution of $\frac{dy}{dx} = 2^{y-x}$ is

A. $2^x + 2^y = C$

B. $2^x - 2^y = C$

C. $\frac{1}{2^x} - \frac{1}{2^y} = C$

D. $x + y = C$

Answer: C

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16. The solution of the differential equation $\frac{dy}{dx} = \frac{y}{x} + \frac{\phi\left(\frac{y}{x}\right)}{\phi'\left(\frac{y}{x}\right)}$ is

A. $x\phi\left(\frac{y}{x}\right) = k$

B. $\phi\left(\frac{y}{\times}\right) = kx$

C. $y\phi\left(\frac{y}{x}\right) = k$

D. $\phi\left(\frac{y}{x}\right) = ky$

Answer:

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17. If $\sin x$ is the integrating factor of the linear differential equation $\frac{dy}{dx} + Py = Q$, then P is

A. $\log \sin x$

B. $\cos x$

C. $\tan x$

D. $\cot x$

Answer:

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18. The number of arbitrary constants in the general solutions of order n and $n+1$ are respectively

A. $n-1, n$

B. $n, n+1$

C. $n+1, n+2$

D. $n+1, n$

Answer: B

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19. The number of arbitrary constants in the particular solution of a differential equation of third order is

A. 3

B. 2

C. 1

D. 0

Answer:

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20. Integrating factor of the differential equation is $\frac{dy}{dx} = \frac{x+y+1}{x+1}$ is

A. $\frac{1}{x+1}$

B. $x+1$

C. $\frac{1}{\sqrt{x+1}}$

D. $\sqrt{x+1}$

Answer:

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21. The population P in any year t is such that the rate of increase in the population is proportional to the population. Then

A. $P = Ce^{kt}$

B. $P = Ce^{-kt}$

C. $P = Ckt$

D. $P = C$

Answer:

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22. P is the amount of certain substanc left in after time t. If the rate of evaporation of the substance is proportional to the amount remaining, then

A. $P = Ce^{kt}$

B. $P = Ce^{-ket}$

C. $Pt = C$

D. $P = C$

Answer:

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23. The slope at any point of a curve $y = f(x)$ is given by $\frac{dy}{dx} = 3x^2$ and it passes through $(-1, 1)$. Then the equation of the curve is

A. $y = x^3 + 2$

B. $y = 3x^2 + 4$

C. $y = 3x^2 + 4$

D. $y = x^3 + 5$

Answer:

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Government Exam Questions Choose The Correct Or The Most Suitable Answer From The Given Four Alternatives

1. If m, n are the order and degree of the differential equation $\left[\frac{d^4y}{dx^4} + \frac{d^2y}{dx^2}\right]^{\frac{1}{2}} = a\frac{d^2y}{dx^2}$ respectively, then the value of $4m - n$ is

A. 15

B. 12

C. 14

D. 13

Answer:

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2. The order and degree of the differential equation

$$[x + y']^2 = (y')^2$$

A. 1,2

B. 1,1

C. 2,1

D. 2,2

Answer:

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Government Exam Questions

1. Solve : $\frac{dy}{dx} + 2y \cot x = 3x^2 \operatorname{cosec}^2 x.$

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2. From the differential equations by eliminating arbitrary constants given in bracket $Y = e^{3x} \quad (C \cos 2x + D \sin 2x)$, {C, D}.

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3. Solve : $\frac{dy}{dx} + 2y \cot x = 3x^2 \operatorname{cosec}^2 x.$

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Additional Questions

1. The order and degree of the differential equation

$$\left[\left(\frac{d^2y}{dx^2}\right)+\left(\frac{dy}{dx}\right)^2\right]^{\frac{1}{2}}=\frac{d^3y}{dx^3}$$ are

A. 1,2

B. 2,1

C. 3,2

D. 2,3

Answer:

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2. The differential equation of the family of parabolas $y^2 = 4ax$ is

A. $2y = x\left(\frac{dy}{dx}\right)$

B. $y = 2x\left(\frac{dy}{dx}\right)$

C. $y = 2x^2\left(\frac{dy}{dx}\right)$

D. $y^2 = 2x\left(\frac{dy}{dx}\right)$

Answer:

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3. The solution of $\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0$ is

A. $\tan x + \tan y = c$

B. $\sec x + \sec y = c$

C. $\tan x \tan y = c$

D. $\sec x - \sec y = c$

Answer:

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4. The solution of $\left(x^2 - ay\right)dx = \left(ax - y^2\right)dy$ is

A. $y = x^2 + y^2 - a(x + y)$

B. $x^2 - y^2 + x - ay = 0$

C. $x^3 + y^3 = 3ayx + c$

D. $\left(x^2 - ay\right)\left(ax - y^2\right) = 0$

Answer:

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5. The transformation $y = vx$ reduces $\frac{dy}{dx} = \frac{x + y}{3x}$ to

A. $\frac{3av}{4v+1} = \frac{dx}{x}$

B. $\frac{3dv}{v+1} = \frac{dx}{x}$

C. $2x\frac{dv}{dx} = v$

D. $\frac{3dv}{1-2v} = \frac{dx}{x}$

Answer:

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6. The I.F. of $\text{cosec x} = \frac{dy}{dx} + \frac{y\sec^2 x}{\text{cosec x}} = 0$ is

A. $e^{\sec x}$

B. $e^{\tan x}$

C. $e^{\sec x \tan x}$

D. $e^{\sec^2 x}$

Answer:

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7. The solution of $\frac{dy}{dx} + y \cot x = \sin 2x$ is

A. $y \sin x = \frac{2}{3} \sin^3 x + c$

B. $y \sec x = \frac{x^2}{2} + c$

C. $y \sin x = c + x$

D. $2y \sin x = \sin x - \frac{\sin 3x}{3} + c$

Answer:

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8. The I.F. of $y \log y \frac{dx}{dy} + x - \log y = 0$ is

A. $\log(\log y)$

B. $\log y$

C. $\frac{1}{\log y}$

D. $\frac{1}{\log(\log y)}$

Answer:

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9. The I.F of $\frac{dy}{dx} - y\tan x = \cos x$ is

A. $\sec x$

B. $\cos x$

C. $e^{\tan x}$

D. $\cot x$

Answer:

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10. Form the differential equation satisfied by all the straight lines in xy - plane.

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11. A curve passing through the origin has its slope. e^x. Find the equation of the curve.

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12. Solve: $\frac{dy}{dx} = 1 + e^{x-y}$

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13. Solve: $x\frac{dy}{dx} = x + y$

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14. Solve: $\frac{dy}{dx} + y = e^{-x}$

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15. Solve $\frac{dy}{dx} + \frac{y^2}{x^2} = \frac{y}{x}$

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16. Form the differential equation for $y = e^{2x}[A\cos 3x - B\sin 3x]$

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17. Solve : $\frac{dy}{dx} = (4x + y + 1)^2$

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18. Solve : $x\frac{dy}{dx} + 2y = x^2.$

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19. Solve : $\frac{dy}{dx} + y = \cos x$

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20. Solve : $\left(1 + e^{2x}\right) dy + \left(1 + y^2\right) e^x dx = 0$ when $y(0) = 1$

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21. A population grows at the rate of $2\,\%$ per year. How long does it take for the population to double?

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22. The surface area of a balloon being infilated changes at a constant rate. If initially, its radius 3 units and after 2 seconds it is 5 units, find the radius after t seconds.

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23. The slope of the tangent at $p(x, y)$ on the curve is $-\left(\frac{y+3}{x+2}\right)$. If the curve passes through the origin, find the equation of the curve.

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24. Solve : $\frac{dy}{dx} = (3x + 2y + 1)^2$

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Additional Questions Fill In The Blanks

1. The order and degree of $y' + (y'')^2 = (x + y'')^2$ are _____.

A. 1,1

B. 1,2

C. 2,1

D. 2,2

Answer:

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2. The differential equation corresponding to $xy = c^2$ where c is an arbitrary constant is _____

A. $xy'' + x = 0$

B. $y'' = 0$

C. $xy' + y = 0$

D. $xy'' - x = 0$

Answer:

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3. On finding the differential equation corresponding to $y = e^{mx}$ where m is the arbitrary constant, then m is _____.

A. $\frac{y}{y^1}$

B. $\frac{y^1}{y}$

C. y'

D. y

Answer:

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4. The population p of a certain bacteria decreases at a rate proportional to the population p. The differential equation corresponding to the above statement is _____.

A. $\frac{dp}{dt} = \frac{k}{p}$

B. $\frac{dp}{dt} = kt$

C. $\frac{dp}{dt} = kp$

D. $\frac{dp}{dt} - kp$

Answer:

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5. The solution of $\log\left(\frac{dy}{dx}\right) = ax + by$ is _____.

A. $\frac{e^{ax}}{a} + \frac{e^{=-by}}{b} + c = 0$

B. $ae^{ax} - be^{-by} + c = 0$

C. $ae^{x} + be^{y} = k$

D. $be^{ax} + ae^{-by} = k$

Answer:

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6. The general solution of $x\frac{dy}{dx} = y$ is _____.

A. $y = cx$

B. $x^2 + y^2 = c$

C. $x^2 - y^2 = c$

D. $y = c^x$

Answer: A

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7. The differential equation of $x^2y = k$ is _____.

A. $x^2\dfrac{dy}{dx} = 0$

B. $x^2\dfrac{dy}{dx} + y = 0$

C. $x\dfrac{dy}{dx} + 2y = 0$

D. $y\dfrac{dy}{dx} + 2x = 0$

Answer:

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8. Using $y = vx$, the differential equation $\frac{dy}{dx} = \frac{y}{x + \sqrt{xy}}$ is reduced to _____.

A. $x\left(1 + \sqrt{v}\right)dv = v\sqrt{v}dx$

B. $x\left(1 - \sqrt{v}\right)dv = v\sqrt{v}dx$

C. $x\left(1 + \sqrt{v}\right)dv = -v\sqrt{v}dx$

D. $v\left(1 + \sqrt{v}\right)dx - v\sqrt{v}dv = 0$

Answer:

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9. The I.E. of $\left(1+y^2\right)dx = \left(\tan^{-1}y - x\right)dy$ is _____.

A. $e^{\tan^{-1}y}$

B. $e^{\tan^{-1}x}$

C. $\tan^{-1}y$

D. $\tan^{-1}x$

Answer:

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10. The differential equation associated with the family of concentric circles having their centres at the origin is _____.

A. $\frac{dy}{dx} = \frac{-x}{y}$

B. $\frac{dy}{dx} = \frac{-y}{x}$

C. $\frac{dy}{dx} = \frac{x}{y}$

D. $\frac{dy}{dx} = \frac{y}{x}$

Answer:

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Additional Questions Choose The Incorrect Answer

1. The differential equation obtained by eliminating a and b from $y = ae^{3x} + be^{-3x}$ is

A. $\frac{d^2y}{dx^2} - 9y$

B. $\frac{d^2y}{dx^2} + 9y$

C. $y'' - 9y = 0$

D. $y' = 3ae^{3x} - 3be^{-3x}$

Answer:

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2. $y = cx - c^2$ is the general solution of the differential equation.

A. $y' = c$

B. $y = y'x - (y')^2$

C. $y'' = 0$

D. $(y')^2 - xy' + u = 0$

Answer:

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3. If $\cos x$ is an I.F. of $\frac{dy}{dx} + py = Q$, then p

A. $\tan x$

B. $-\tan x$

C. $p = \dfrac{f^1(x)}{f(x)}$ where $f(x) = \cos x$

D. `((d)/(dx))(cosx)

Answer:

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4. Solution of $\dfrac{dx}{dy} + mx = 0$ where $m < 0$ is

A. $\dfrac{dx}{x} = -mdy$

B. $y = ce^{mx}$

C. $\log x = -my + \log c$

D. $x = ce^{-my}$

Answer:

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