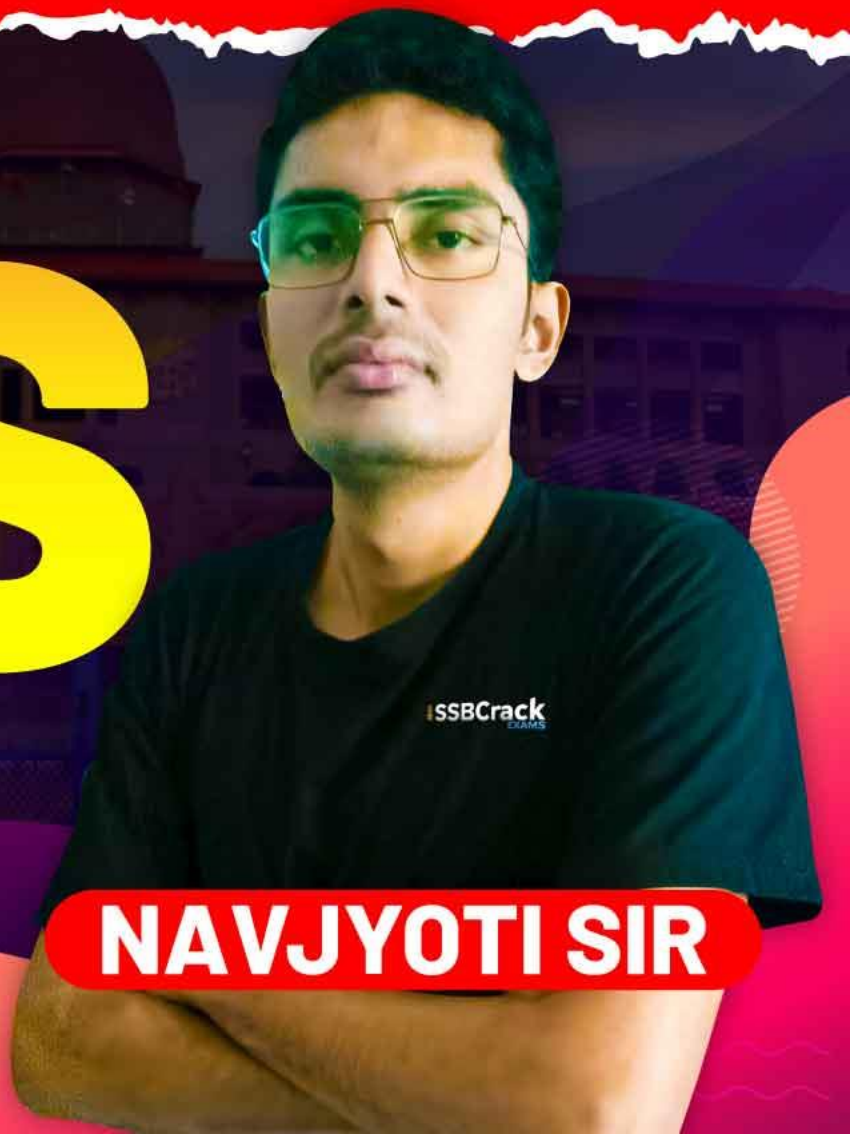
NDA 2 2024

LIVE

MATHS REVISION

CLASS 13



NAVJYOTI SIR

SSBCrack EXAMS

23 August 2024 Live Classes Schedule

8:00AM	23 AUGUST 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM

SSB INTERVIEW LIVE CLASSES

9:00AM	MOCK PERSONAL INTERVIEWS	ANURADHA MA'AM

NDA 2 2024 LIVE CLASSES

11:00AM	GK - CURRENT AFFAIRS REVISION - CLASS 2	RUBY MA'AM
1:00PM	MATHS REVISION - CLASS 13	NAVJYOTI SIR
2:00PM	CHEMISTRY REVISION - CLASS 6	SHIVANGI MA'AM
5:30PM	ENGLISH - REVISION - CLASS 7	ANURADHA MA'AM

CDS 2 2024 LIVE CLASSES

11:00AM	GK - CURRENT AFFAIRS REVISION - CLASS 2	RUBY MA'AM
2:00PM	CHEMISTRY REVISION - CLASS 6	SHIVANGI MA'AM
3:00PM	MATHS REVISION - CLASS 13	NAVJYOTI SIR
5:30PM	ENGLISH - REVISION - CLASS 7	ANURADHA MA'AM

REVISION TOPICS :

- Integration
- Differential Equations

Q) Let $f(x)$ be an indefinite integral of $\sin^2 x$. Consider the following statements :

Statement 1 : The function $f(x)$ satisfies $f(x + \pi) = f(x)$ for all real x.

Statement 2 : $\sin^2(x+\pi) = \sin^2 x$ for all real x.

Which one of the following is correct in respect of the above statements?

(a) Both the statements are true and Statement 2 is the correct explanation of Statement 1

(b) Both the statements are true but Statement 2 is not the correct explanation of Statement 1

(c) Statement 1 is true but Statement 2 is false

(d) Statement 1 is false but Statement 2 is true

$$f(x) = \int \sin^2 x \, dx$$

$$= \frac{1}{2}\int 2\sin^2 x \, dx$$

$$= \frac{1}{2}\int (1 - \cos 2x) \, dx$$

$$f(x) = \frac{x}{2} - \frac{\sin 2x}{2} + C$$

$$f(x+\pi) = \frac{\pi + x}{2} - \frac{\sin 2(\pi + x)}{2} + C = \frac{\pi}{2} + \frac{x}{2} - \frac{\sin 2x}{2} + C = \frac{x}{2} - \frac{\sin 2x}{2} + C'$$

$$\sin^2(x+\pi) = \sin^2 x$$

$$\sin(x+\pi) = \sin(\pi+x) = -\sin x$$

$$\sin^2(x+\pi) = \left[\sin(\pi+x)\right]^2 = (-\sin x)^2 = \underline{\sin^2 x}$$

Q) Let $f(x)$ be an indefinite integral of $\sin^2 x$. Consider the following statements :

Statement 1 : The function $f(x)$ satisfies $f(x + \pi) = f(x)$ for all real x.

Statement 2 : $\sin^2(x + \pi) = \sin^2 x$ for all real x.

Which one of the following is correct in respect of the above statements?

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(b) Both the statements are true but Statement 2 is not the correct explanation of Statement 1

(c) Statement 1 is true but Statement 2 is false

(d) Statement 1 is false but Statement 2 is true

Ans: (b)

Q) What is $\int \frac{xe^x dx}{(x+1)^2}$ equal to?

(a) $(x+1)^2 e^x + c$ (b) $(x+1)e^x + c$

(c) $\frac{e^x}{x+1} + c$ (d) $\frac{e^x}{(x+1)^2} + c$

where c is the constant integration.

(c) $\frac{(x+1)e^x - e^x(1)}{(x+1)^2} = \frac{e^x(x)}{(x+1)^2}$

(Differentiate and check from options)

Q) What is $\int \frac{xe^x dx}{(x+1)^2}$ equal to?

(a) $(x+1)^2 e^x + c$

(b) $(x+1)e^x + c$

(c) $\frac{e^x}{x+1} + c$

(d) $\frac{e^x}{(x+1)^2} + c$

where c is the constant integration.

Ans: (c)

Q) What is the equation of a curve passing through (0, 1) and whose differential equation is given by $dy = y \tan x \, dx$?

(a) $y = \cos x$ (b) $y = \sin x$

(c) $y = \sec x$ (d) $y = \operatorname{cosec} x$

$$dy = y \tan x \, dx$$

$$\int \frac{1}{y} dy = \int \tan x \, dx$$

$$\log y = \log |\sec x| + \log c$$

$$y = c \sec x$$

At $x = 0$, $y = 1$

$$1 = c(\sec 0)$$

$$c = 1$$

$$\log y = \log \sec x + 0$$

$$y = \sec x$$

Q) What is the equation of a curve passing through (0, 1) and whose differential equation is given by $dy = y \tan x \, dx$?

(a) $y = \cos x$ (b) $y = \sin x$

(c) $y = \sec x$ (d) $y = \operatorname{cosec} x$

Ans: (c)

Q) What is $\int e^{e^x} e^x dx$ equal to ?

(a) $e^{e^x} + c$

(b) $2e^{e^x} + c$

(c) $e^{e^x} e^x + c$

(d) $2e^{e^x} e^x + c$

$e^x = t$

$e^x dx = dt$

$\int e^t dt = e^t + c$

$= e^{e^x} + c$

Q) What is $\int e^{e^x} e^x dx$ equal to ?

(a) $e^{e^x} + c$

(b) $2e^{e^x} + c$

(c) $e^{e^x} e^x + c$

(d) $2e^{e^x} e^x + c$

Ans: (a)

Q) What is $\int_0^{\frac{\pi}{2}} e^{\ln(\cos x)}\, dx$ equal to?

(a) −1

(b) 0

(c) 1

(d) 2

$$I = \int_0^{\pi/2} e^{\ln(\cos x)}\, dx = \int_0^{\pi/2} \cos x\, dx$$

$$= \left[\sin x\right]_0^{\pi/2}$$

$$= \sin\left(\frac{\pi}{2}\right) - \sin(0)$$

$$= 1 - 0 = 1$$

$$e^{\ln x} = y$$

$$\ln x\,(\ln e) = \ln y$$

$$\ln x = \ln y$$

$$x = y$$

Q) What is $\int_0^{\frac{\pi}{2}} e^{\ln(\cos x)}\, dx$ equal to?

(a) -1

(b) 0

(c) 1

(d) 2

Ans: (c)

Q) What is $\int_0^{\pi} \ln\left(\tan\frac{x}{2}\right) dx$ equal to?

(a) 0

(b) $\frac{1}{2}$

(c) 1

(d) 2

$$I = \int_0^{\pi} \ln\left(\tan\frac{x}{2}\right) dx \quad \text{——— (1)}$$

$$I = \int_0^{\pi} \ln\left(\tan\left(\frac{\pi - x}{2}\right)\right) dx$$

$$I = \int_0^{\pi} \ln\left(\tan\left(\frac{\pi}{2} - \frac{x}{2}\right)\right) dx = \int_0^{\pi/2} \ln\left(\cot\frac{x}{2}\right) dx \quad \text{— (2)}$$

$$\int_0^a f(x)\,dx = \int_0^a f(a-x)\,dx$$

$$(1) + (2)$$

$$2I = \int_0^{\pi/2} \left(\ln \tan\frac{x}{2} + \ln \cot\frac{x}{2} \right) dx$$

$$= \int_0^{\pi/2} \ln\left(\tan\frac{x}{2} \cot\frac{x}{2} \right) dx$$

$$\ln(a) + \ln(b) = \ln(a \cdot b)$$

$$2I = \int_0^{\pi/2} \ln(1)\, dx = [\,0\,]_0^{\pi/2} = 0$$

$$I = 0$$

Q) What is $\int_0^{\pi} \ln\left(\tan\frac{x}{2}\right) dx$ equal to?

(a) 0

(b) $\frac{1}{2}$

(c) 1

(d) 2

Ans: (a)

Q) What is $\int_0^{4\pi} |\cos x| \, dx$ equal to?

(a) 0
(b) 2
(c) 4
(d) 8

Q) What is $\int_0^{4\pi} |\cos x| \, dx$ equal to?

(a) 0
(b) 2
(c) 4
(d) 8

Ans: (d)

Q) What is the value of $\int_{\pi/6}^{\pi/4} \frac{dx}{\sin x \cos x}$?

(a) $2\, ln\, \sqrt{3}$
(b) $ln\, \sqrt{3}$
(c) $2\, ln\, 3$
(d) $4\, ln\, 3$

Q) What is the value of $\int_{\pi/6}^{\pi/4} \frac{dx}{\sin x \cos x}$?

(a) $2 \ln \sqrt{3}$
(b) $\ln \sqrt{3}$
(c) $2 \ln 3$
(d) $4 \ln 3$

Ans: (b)

Q) What is $\int_a^b [x]\,dx + \int_a^b [-x]\,dx$ equal to, where [,] is the greatest integer function?

(a) $b-a$ (b) $a-b$ (c) 0 (d) $2(b-a)$

Q) What is $\int_a^b [x]\,dx + \int_a^b [-x]\,dx$ equal to, where [,] is the greatest integer function?

(a) $b-a$ (b) $a-b$ (c) 0 (d) $2(b-a)$

Ans: (b)

Q) What is the area of the parabola $y^2 = 4bx$ bounded by its latus rectum ?

(a) $2b^2/3$ square unit

(b) $4b^2/3$ square unit

(c) b^2 square unit

(d) $8b^2/3$ square unit

Q) What is the area of the parabola $y^2 = 4bx$ bounded by its latus rectum ?

(a) $2b^2/3$ square unit
(b) $4b^2/3$ square unit
(c) b^2 square unit
(d) $8b^2/3$ square unit

Ans: (d)

Q) The value of $\int_0^{\frac{\pi}{4}} \sqrt{\tan x}\, dx + \int_0^{\frac{\pi}{4}} \sqrt{\cot x}\, dx$ is equal to

(a) $\frac{\pi}{4}$

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

(c) $\frac{\pi}{2\sqrt{2}}$

(d) $\frac{\pi}{\sqrt{2}}$

Q) The value of $\int_0^{\frac{\pi}{4}} \sqrt{\tan x}\, dx + \int_0^{\frac{\pi}{4}} \sqrt{\cot x}\, dx$ is equal to

(a) $\frac{\pi}{4}$

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

(c) $\frac{\pi}{2\sqrt{2}}$

(d) $\frac{\pi}{\sqrt{2}}$

Ans: (d)

Q) What is $\int \frac{dx}{2x^2 - 2x + 1}$ equal to?

(a) $\frac{\tan^{-1}(2x - 1)}{2} + c$

(b) $2 \tan^{-1}(2x - 1) + c$

(c) $\frac{\tan^{-1}(2x + 1)}{2} + c$

(d) $\tan^{-1}(2x - 1) + c$

Q) What is $\int \frac{dx}{2x^2 - 2x + 1}$ equal to?

(a) $\frac{\tan^{-1}(2x - 1)}{2} + c$

(b) $2 \tan^{-1}(2x - 1) + c$

(c) $\frac{\tan^{-1}(2x + 1)}{2} + c$

(d) $\tan^{-1}(2x - 1) + c$

Ans: (d)

Q) $\int_0^{\frac{\pi}{2}} |\sin x - \cos x| dx$ is equal to

(a) 0
(b) $2(\sqrt{2} - 1)$
(c) $2\sqrt{2}$
(d) $2(\sqrt{2} + 1)$

Q) $\int_0^{\frac{\pi}{2}} |\sin x - \cos x| dx$ is equal to

(a) 0
(b) $2(\sqrt{2} - 1)$
(c) $2\sqrt{2}$
(d) $2(\sqrt{2} + 1)$

Ans: (b)

Q) What is $\int \ln(x^2)dx$ equal to?

(a) $2x\ln(x) - 2x + C$

(b) $\frac{2}{x} + C$

(c) $2x\ln(x) + C$

(d) $\frac{2\ln(x)}{x} - 2x + C$

Q) What is $\int \ln(x^2)dx$ equal to?

(a) $2x\ln(x) - 2x + C$

(b) $\frac{2}{x} + C$

(c) $2x\ln(x) + C$

(d) $\frac{2\ln(x)}{x} - 2x + C$

Ans: (a)

Q) If $I_1 = \int_e^{e^2} \frac{dx}{\log x}$ and $I_2 = \int_1^2 \frac{e^x}{x}\, dx$, then

(a) $I_1 = I_2$
(b) $2I_1 = I_2$
(c) $I_2 + I_1 = 0$
(d) $I_1 = 2I_2$

Q) If $I_1 = \int_e^{e^2} \frac{dx}{\log x}$ and $I_2 = \int_1^2 \frac{e^x}{x}\, dx$, then

(a) $I_1 = I_2$
(b) $2I_1 = I_2$
(c) $I_2 + I_1 = 0$
(d) $I_1 = 2I_2$

Ans: (a)

Q) What is $\int_0^1 x(1-x)^n\,dx$ equal to?

(a) $\dfrac{1}{n(n+1)}$

(b) $\dfrac{1}{(n+1)(n+2)}$

(c) 1

(d) 0

Q) What is $\int_0^1 x(1-x)^n\,dx$ equal to?

(a) $\dfrac{1}{n(n+1)}$

(b) $\dfrac{1}{(n+1)(n+2)}$

(c) 1

(d) 0

Ans: (b)

Q) If $\int_0^{\pi/2} \frac{\cot x}{\cot x + \operatorname{cosec} x} dx = m(\pi + n)$, then $m \cdot n$ is equal to

(a) $-\frac{1}{2}$ (b) 1 (c) $\frac{1}{2}$ (d) -1

Q) If $\int_0^{\pi/2} \frac{\cot x}{\cot x + \operatorname{cosec} x} dx = m(\pi + n)$, then $m \cdot n$ is equal to

(a) $-\frac{1}{2}$ (b) 1 (c) $\frac{1}{2}$ (d) -1

Ans: (d)

NDA 2 2024 - REVISION - MATHS – CLASS 13

Q) What is $\int \frac{\left(x^{e-1}+e^{x-1}\right)dx}{x^{e}+e^{x}}$ equal to?

(a) $\frac{x^2}{2}+c$

(b) $\ln(x+e)+c$

(c) $\ln(x^e+e^x)+c$

(d) $\frac{1}{e}\ln\left(x^e+e^x\right)+c$

Q) What is $\int \frac{\left(x^{e-1}+e^{x-1}\right)dx}{x^{e}+e^{x}}$ equal to?

(a) $\frac{x^2}{2}+c$

(b) $\ln(x+e)+c$

(c) $\ln(x^e+e^x)+c$

(d) $\frac{1}{e}\ln\left(x^e+e^x\right)+c$

Ans: (d)

Q) $\int (\ln x)^{-1}\,dx - \int (\ln x)^{-2}\,dx$ is equal to

(a) $x(\ln x)^{-1} + c$

(b) $x(\ln x)^{-2} + c$

(c) $x(\ln x) + c$

(d) $x(\ln x)^{2} + c$

Q) $\int (\ln x)^{-1}\,dx - \int (\ln x)^{-2}\,dx$ is equal to

(a) $x(\ln x)^{-1} + c$

(b) $x(\ln x)^{-2} + c$

(c) $x(\ln x) + c$

(d) $x(\ln x)^{2} + c$

Ans: (a)

Q) Which one of the following differential equations is not linear?

(a) $\frac{d^2y}{dx^2} + 4y = 0$

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

(c) $(x-y)^2\frac{dy}{dx} = 9$

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

Linear diff. eqns.

$\frac{dy}{dx} + Py = Q$ — $f(x)$

$\frac{dx}{dy} + Px = Q$ — $f(y)$

(c) $\frac{dy}{dx} = \frac{9}{x^2+y^2-2xy}$

$\frac{dx}{dy} = \frac{x^2+y^2-2xy}{9}$

$\frac{dx}{dy} + \left(\frac{2y}{9}\right)x = \frac{y^2}{9} + \frac{x^2}{9}$

extra

Q) Which one of the following differential equations is not linear?

(a) $\frac{d^2y}{dx^2} + 4y = 0$

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

(c) $(x-y)^2\frac{dy}{dx} = 9$

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

Ans: (a) / (c)

Q) What is the degree of the differential equation

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

(a) 1
(b) 2
(c) -1
(d) Degree does not exist.

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

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

$$y\frac{dy}{dx} - x\left(\frac{dy}{dx}\right)^2 - 1 = 0$$

order = 1

degree = 2

Q) What is the degree of the differential equation

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

(a) 1
(b) 2
(c) -1
(d) Degree does not exist.

Ans: (b)

Q) What does the differential equation $y\frac{dy}{dx}+x=a$

(where a is a constant) represent?

(a) A set of circles having centre on the Y-axis

(b) A set of circles having centre on the X-axis ✓

(c) A set of ellipses

(d) A pair of straight lines

$$y\frac{dy}{dx} = a-x$$

$$\int y\,dy = \int (a-x)\,dx$$

$$\frac{y^2}{2} = ax - \frac{x^2}{2} + c$$

$$y^2 - 2ax + x^2 = c$$

$$x^2 - 2ax + a^2 + y^2 = c^2 + a^2$$

$$(x-a)^2 + (y-0)^2 = r^2$$

circle with centre $(a, 0)$.

Q) What does the differential equation $y\frac{dy}{dx}+x=a$

(where a is a constant) represent?

(a) A set of circles having centre on the Y-axis
(b) A set of circles having centre on the X-axis
(c) A set of ellipses
(d) A pair of straight lines

Ans: (b)

Q) If the solution of the differential equation

$$\frac{dy}{dx} = \frac{ax+3}{2y+f}$$

represents a circle, then what is the value of a?

(a) 2 (b) 1

(c) -2 (d) -1

Q) If the solution of the differential equation

$$\frac{dy}{dx} = \frac{ax+3}{2y+f}$$

represents a circle, then what is the value of a?

(a) 2 (b) 1

(c) -2 (d) -1

Ans: (c)

Q) The growth of a quantity $N(t)$ at any instant t is given by

$\frac{dN(t)}{dt} = \alpha N(t)$. Given that $N(t) = ce^{kt}$, c is a constant. What is the value of α?

(a) c (b) k

(c) $c + k$ (d) $c - k$

Q) The growth of a quantity $N(t)$ at any instant t is given by

$\frac{dN(t)}{dt} = \alpha N(t)$. Given that $N(t) = ce^{kt}$, c is a constant. What is the value of α?

(a) c (b) k

(c) $c + k$ (d) $c - k$

Ans: (b)

Q) What is the order of the differential equation of all ellipses whose axes are along the coordinate axes?

(a) 1 (b) 2

(c) 3 (d) 4

Q) What is the order of the differential equation of all ellipses whose axes are along the coordinate axes?

(a) 1 (b) 2

(c) 3 (d) 4

Ans: (b)

Q) What is the differential equation of $y = A - \frac{B}{x}$?

(a) $xy_2 + y_1 = 0$ (b) $xy_2 + 2y_1 = 0$

(c) $xy_2 - 2y_1 = 0$ (d) $2xy_2 + y_1 = 0$

Q) What is the differential equation of $y = A - \frac{B}{x}$?

(a) $xy_2 + y_1 = 0$ (b) $xy_2 + 2y_1 = 0$

(c) $xy_2 - 2y_1 = 0$ (d) $2xy_2 + y_1 = 0$

Ans: (b)

Q) A particle starts from origin with a velocity (in m/s) given by the equation $\frac{dx}{dt} = x + 1$. The time (in second) taken by the particle to traverse a distance of 24 m is

(a) $\ln 24$ (b) $\ln 5$

(c) $2\ln 5$ (d) $2\ln 4$

Q) A particle starts from origin with a velocity (in m/s) given by the equation $\frac{dx}{dt} = x + 1$. The time (in second) taken by the particle to traverse a distance of 24 m is

(a) ln24 (b) ln5

(c) 2ln5 (d) 2ln4

Ans: (c)

Q) What is the degree of the following differential equation?

$$x = \sqrt{1 + \frac{d^2y}{dx^2}}$$

(a) 1
(b) 2
(c) 3
(d) Degree is not defined

Q) What is the degree of the following differential equation?

$$x = \sqrt{1 + \frac{d^2y}{dx^2}}$$

(a) 1
(b) 2
(c) 3
(d) Degree is not defined

Ans: (a)

Q) What is the solution of the differential equation $\ln\left(\frac{dy}{dx}\right) = ax + by$?

(a) $ae^{ax} + be^{by} = C$

(b) $\frac{1}{a}e^{ax} + \frac{1}{b}e^{by} = C$

(c) $ae^{ax} + be^{-by} = C$

(d) $\frac{1}{a}e^{ax} + \frac{1}{b}e^{-by} = C$

Q) What is the solution of the differential equation $\ln\left(\frac{dy}{dx}\right) = ax + by$?

(a) $ae^{ax} + be^{by} = C$

(b) $\frac{1}{a}e^{ax} + \frac{1}{b}e^{by} = C$

(c) $ae^{ax} + be^{-by} = C$

(d) $\frac{1}{a}e^{ax} + \frac{1}{b}e^{-by} = C$

Ans: (d)

Q) What is the solution of the differential equation $\frac{dx}{dy} = \frac{x+y+1}{x+y-1}$?

(a) $y - x + 4\ln(x + y) = C$

(b) $y + x + 2\ln(x + y) = C$

(c) $y - x + \ln(x + y) = C$

(d) $y + x + 2\ln(x + y) = C$

Q) What is the solution of the differential equation $\frac{dx}{dy} = \frac{x+y+1}{x+y-1}$?

(a) $y - x + 4\ln(x + y) = C$
(b) $y + x + 2\ln(x + y) = C$
(c) $y - x + \ln(x + y) = C$
(d) $y + x + 2\ln(x + y) = C$

Ans: (c)

Q) Match List I (Differential equation) with List II (Its solution) and select the correct answer using the codes given below the lists.

List I	List II
A. $yy' = \sec^2 x$	1. $y \sec^2 x = \sec x + C$
B. $y' = x \sec y$	2. $xy = \sin x + C$
C. $y' + (2 \tan x)\, y = \sin x$	3. $y^2 = 2 \tan x + C$
D. $xy' + y = \cos x$	4. $x^2 = 2 \sin y + C$

Codes

	A	B	C	D
(a)	3	2	1	4
(b)	4	1	2	3
(c)	3	4	1	2
(d)	3	2	4	1

Q) Match List I (Differential equation) with List II (Its solution) and select the correct answer using the codes given below the lists.

List I	List II
A. $yy' = \sec^2 x$	1. $y \sec^2 x = \sec x + C$
B. $y' = x \sec y$	2. $xy = \sin x + C$
C. $y' + (2 \tan x)\, y = \sin x$	3. $y^2 = 2 \tan x + C$
D. $xy' + y = \cos x$	4. $x^2 = 2 \sin y + C$

Codes

	A	B	C	D
(a)	3	2	1	4
(b)	4	1	2	3
(c)	3	4	1	2
(d)	3	2	4	1

Ans: (c)

Q) What does the solution of the differential equation $x\,dy - y\,dx = 0$ represent?

(a) Rectangular hyperbola

(b) Straight line passing through (0, 0)

(c) Parabola with vertex at (0, 0)

(d) Circle with centre at (0, 0)

Q) What does the solution of the differential equation $x\,dy - y\,dx = 0$ represent?

(a) Rectangular hyperbola
(b) Straight line passing through (0, 0)
(c) Parabola with vertex at (0, 0)
(d) Circle with centre at (0, 0)

Ans: (b)

Q) The general solution of the differential equation

$$\frac{dy}{dx} + \sin\left(\frac{x+y}{2}\right) = \sin\left(\frac{x-y}{2}\right) \text{ is}$$

(a) $\log \tan\left(\frac{y}{2}\right) = C - 2\sin x$

(b) $\log \tan\left(\frac{y}{4}\right) = C - 2\sin\left(\frac{x}{2}\right)$

(c) $\log \tan\left(\frac{y}{2} + \frac{\pi}{4}\right) = C - 2\sin x$

(d) $\log \tan\left(\frac{y}{4} + \frac{\pi}{4}\right) = C - 2\sin\left(\frac{x}{2}\right)$

Q) The general solution of the differential equation

$$\frac{dy}{dx} + \sin\left(\frac{x+y}{2}\right) = \sin\left(\frac{x-y}{2}\right) \text{ is}$$

(a) $\log \tan\left(\frac{y}{2}\right) = C - 2\sin x$

(b) $\log \tan\left(\frac{y}{4}\right) = C - 2\sin\left(\frac{x}{2}\right)$

(c) $\log \tan\left(\frac{y}{2} + \frac{\pi}{4}\right) = C - 2\sin x$

(d) $\log \tan\left(\frac{y}{4} + \frac{\pi}{4}\right) = C - 2\sin\left(\frac{x}{2}\right)$

Ans: (b)

Q) Which one of the following equations represents the differential equation of circles, with centres on the x-axis and all passing through the origin?

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

(b) $\frac{dy}{dx} = \frac{x^2 - y^2}{2xy}$

(c) $\frac{dy}{dx} = \frac{y^2 - x^2}{2xy}$

(d) $\frac{dy}{dx} = -\frac{x}{y}$

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Ans: (c)

Q) What is the degree of the differential equation $\frac{dy}{dx} + x = \left(y - x\frac{dy}{dx} \right)^{-4}$?

(a) 2 (b) 3 (c) 4 (d) 5

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Ans: (c)

Q) The solution of the differential equation

$$\frac{dy}{dx} + \frac{y}{x \log x} = \frac{1}{x} \text{ is}$$

(a) $y = \frac{1}{2} \log x + C(\log x)^{-1}$ (b) $y = \log x + C(\log x)^{-1}$

(c) $y = \frac{1}{2} \log x + \frac{C}{(\log x)^2}$ (d) $y = \frac{1}{3} \log x - C(\log x)^{-1}$

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Ans: (a)

Q) What is the equation of the curve passing through the point $\left(0, \frac{\pi}{3}\right)$ satisfying the differential equation $\sin x \cos y \, dx + \cos x \sin y \, dy = 0$?

(a) $\cos x \cos y = \frac{\sqrt{3}}{2}$

(b) $\sin x \sin y = \frac{\sqrt{3}}{2}$

(c) $\sin x \sin y = \frac{1}{2}$

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Ans: (d)

Q) Which one of the following differential equations represents the system of circles touching the y-axis at the origin?

(a) $x^2 + y^2 - 2xy\left(\frac{dy}{dx}\right) = 0$ (b) $x^2 + y^2 + 2xy\left(\frac{dy}{dx}\right) = 0$

(c) $x^2 - y^2 + 2xy\left(\frac{dy}{dx}\right) = 0$ (d) $x^2 - y^2 - 2xy\left(\frac{dy}{dx}\right) = 0$

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Ans: (c)

Q) The order and degree of the differential equation

$$\left(1+3\frac{dy}{dx}\right)^{2/3} = 4\frac{d^3y}{dx^3}$$ are

(a) $(1, \frac{2}{3})$

(b) $(3, 1)$

(c) $(3, 3)$

(d) $(1, 2)$

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Ans: (c)

REVISION TOPICS : (27/08/24)

- Statistics
- Probability