Assignment 1 - EE1030

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I. E - Subjective Problems

1. A curve 'C' passes through $(2,0)$ and the slope at (x,y) as $\frac{(x+1)^2+(y-3)}{x+1}$. Find the equation of the curve. Find the area bounded by curve and x-axis in fourth quadrant. $(2004-4Marks)$
2. If length of tangent at any point on the curve $y=f(x)$ intercepted between the point and the x-axis in fourth quadrant. $(2005-4Marks)$

II. F - Match the Following

1) Match the statements/expressions in **Column I** with the open intervals in **Column II**.

III. H - Assertion Reason Type Questions

1) Let solution $y=y(x)$ of the differential equation $x\sqrt{x^2-1}dy - y\sqrt{y^2-1}dx = 0$ satisfy $y(2)=\frac{2}{\sqrt{3}}$.

STATEMENT-1: $y(x)=\sec\left(\sec^{-1}x-\frac{\pi}{6}\right)$ and

STATEMENT-2: $y(x)$ is given by $\frac{1}{y}=\frac{2\sqrt{3}}{x}-\sqrt{1-\frac{1}{x^2}}$ (2008)

a) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is a correct explanation for STATEMENT-1
b) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 **is NOT** a correct explanation for STATEMENT-1
c) STATEMENT-1 is True, STATEMENT-2 is False
d) STATEMENT-2 is False, STATEMENT-2 is True

IV. I - Integer Value Correct Type

1) Let $y'(x)+y(x)g'(x)=g(x),g'(x),y(0)=0$, $x\epsilon\mathbb{R}$, where $f'(x)$ denotes $\frac{df(x)}{dx}$ and $g(x)$ is a given non-constant differentiable function on R with $g(0)=g(2)=0$. Then the value of $y(2)$ is (2011)
2) Let $f{:}\mathbb{R}\to\mathbb{R}$ be a differentiable function with $f(0)=0$. If $y=f(x)$ satisfies the differential equation $\frac{dy}{dx}=(2+5y)+(5y-2)$, then the value of $\lim_{x\to-\infty}f(x)$ is. $(JEEAdv.2018)$
3) Let $f{:}\mathbb{R}\to\mathbb{R}$ be a differentiable function with $f(0)=1$ and satisfying the differential equation $f(x+y)=f(x)f'(y)+f'(y)f(x)$ for all $x,y\,\epsilon\mathbb{R}$ then, the value of $\log_e(f(4))$ is. $(JEEAdv.2018)$

V. Section-B // JEE Main / AIEEE

1) The order and degree of the differential equation $\left(1+3\frac{dy}{dx}\right)^{\frac{2}{3}}=4\frac{d^3y}{dx^3}$ are [2002]

a) $\left(1,\frac{2}{3}\right)$ c) $(3,3)$
b) $(3,1)$ d) $(1,2)$

2) The solution of the equation $\frac{d^2y}{dx^2}=e^{-2x}$ [2002]

a) $\frac{e^{-2x}}{4}$ c) $\frac{1}{4}e^{-2x}+cx^2+d$
b) $\frac{e^{-2x}}{4}+cx+d$ d) $\frac{1}{4}e^{-4x}+cx+d$

3) The degree and order of the differential equation of the family of all parabolas whose axis x-axis, are respectively. [2003]

a) $2,3$ c) $1,2$
b) $2,1$ d) $3,2$

4) The solution of the differential equation $\left(1+y^2\right)+\left(x-e^{\tan^{-1}y}\right)\frac{dy}{dx}=0$, is [2003]

a) $xe^{2\tan^{-1}y}=e^{\tan^{-1}}+k$ c) $2xe^{\tan^{-1}y}=e^{2\tan^{-1}y}+k$
b) $(x-2)=ke^{2\tan^{-2}y}$ d) $xe^{\tan^{-1}y}=\tan^{-2}y+k$

5) The differential equation for the family of circle $x^2+y^2-2ay=0$, where a is an arbitrary contant is [2004]

a) $\left(x^2+y^2\right)y^{/prime}=2xy$ c) $\left(x^2-y^2\right)y^{/prime}=2xy$
b) $2\left(x^2+y^2\right)y^{/prime}=xy$ d) $2\left(x^2-y^2\right)y^{/prime}=xy$

6) Solution of the differentisl equation $ydx+\left(x+x^2y\right)dy=0$ is [2004]

a)

a) $\log y = Cx$
b) $-\frac{1}{xy} + \log y = C$
c) $\frac{1}{xy} + \log y = C$
d) $-\frac{1}{xy} = C$

7) The differential equation representing the family of curves $y^2 = 2c\left(x + \sqrt{c}\right)$, where $c > 0$, is a parameter, is of order and degree as follows: [2005]

a) order 1, degree 2
b) order 1, degree 1
c) order 1, degree 3
d) order 2, degree 2

8) If $x\frac{dy}{dx} = y(\log y - \log x + 1)$, then the solution of the equation is [2005]

a) $y \log\left(\frac{x}{y}\right) = cx$
b) $y \log\left(\frac{y}{x}\right) = cy$
c) $\log\left(\frac{y}{x}\right) = cx$
d) $\log\left(\frac{x}{y}\right) = cy$