CUET Mathematics Test - Set 6

Chapter: Differential Equations (Order, Degree, and Variable Separable)

General Instructions

1. Total Questions: **15**
2. Duration: **60 Minutes**
3. All questions are compulsory.
4. Each question carries **5 marks**.
5. For each correct answer: **+5 marks**.
6. For each incorrect answer: **-1 mark**.
7. No negative marking for unanswered questions.
8. Use of calculator or electronic devices is strictly prohibited.
9. Choose the most appropriate answer from the given options.

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1. The degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^{5/3} = \frac{d^3y}{dx^3}$ is:
   (A) 3
   (B) 2
   (C) 1
   (D) 5

2. The order and degree of the differential equation of the family of parabolas having their axes of symmetry coincident with the x-axis are:
   (A) 1, 2
   (B) 2, 1
   (C) 2, 2
   (D) 1, 1

3. The general solution of $\frac{dy}{dx} = 2^{y-x}$ is:
   (A) $2^x + 2^y = C$
   (B) $2^{-x} + 2^{-y} = C$
   (C) $2^x - 2^y = C$
   (D) $2^{-x} - 2^{-y} = C$

4. The differential equation representing the family of curves $y = e^{cx}$ is:
   (A) $y' = y \log y$
   (B) $xy' = y \log y$
   (C) $yy' = \log x$
   (D) $xy' = \log y$

5. The solution of $(1+x^2)\frac{dy}{dx} = x(1+y^2)$ is:
   (A) $\log(1+x^2) = \log(1+y^2) + C$
   (B) $1 + x^2 = C(1+y^2)$
   (C) $\sqrt{1+y^2} = C\sqrt{1+x^2}$
   (D) $y^2 - x^2 = C$

6. The degree of the differential equation $\frac{d^2y}{dx^2} + 3\left(\frac{dy}{dx}\right)^2 = x^2 \log\left(\frac{d^2y}{dx^2}\right)$ is:
   (A) 1
   (B) 2
   (C) 3
   (D) Not defined

7. The general solution of $\frac{dy}{dx} = \frac{1+y}{1-x}$ $(x \neq 1)$ is:
   (A) $(1+y)(1-x) = C$
   (B) $\frac{1+y}{1-x} = C$
   (C) $\log(1+y)\log(1-x) = C$
   (D) $y - x = C$

8. The order of the differential equation of all circles of given radius a is:
   (A) 1
   (B) 2
   (C) 3
   (D) 4

9. The solution of $y' = \sin(x+y)$ is:
   (A) $\tan(x+y) - \sec(x+y) = x + C$
   (B) $\tan(x+y) + \sec(x+y) = x + C$
   (C) $\log|\tan\frac{x+y}{2}| = x + C$
   (D) $y = \cos(x+y) + C$

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10. A curve passes through $(0, 1)$ and has the property that the slope of the tangent at any point (x, y) is x^2. The equation of the curve is:
    (A) $y = \frac{x^3}{3}$
    (B) $y = \frac{x^3}{3} + 1$
    (C) $y = x^3 + 1$
    (D) $y = \frac{x^2}{2} + 1$

11. The differential equation of the family of lines passing through the origin is:
    (A) $y = x\frac{dy}{dx}$
    (B) $\frac{dy}{dx} = y$
    (C) $xdy + ydx = 0$
    (D) $\frac{d^2y}{dx^2} = 0$

12. The solution of $\frac{dy}{dx} = e^{x+y} + e^{x-y}$ is:
    (A) $e^y = e^x + e^{-x} + C$
    (B) $e^{-y} = e^x - e^{-x} + C$
    (C) $e^y = \tan(e^x + C)$
    (D) $\tan(e^y/2) = e^x + C$

13. The sum of the order and degree of $\left(\frac{d^3y}{dx^3}\right)^2 + \left(\frac{d^2y}{dx^2}\right)^3 + \frac{dy}{dx} + y = 7$ is:
    (A) 3
    (B) 5
    (C) 6
    (D) 4

14. The solution of $\frac{dy}{dx} = \frac{y^2}{1-xy}$ is not possible by variable separable method unless we substitute:
    (A) $v = y/x$
    (B) $v = xy$
    (C) $v = x + y$
    (D) $v = 1/y$

15. The area bounded by the curve representing the solution of $\frac{dy}{dx} = \frac{y}{x}$ passing through $(1, 1)$, the x-axis, and $x = 2$ is:
    (A) 2 sq. units
    (B) 1/2 sq. units
    (C) 3/2 sq. units
    (D) 1 sq. unit

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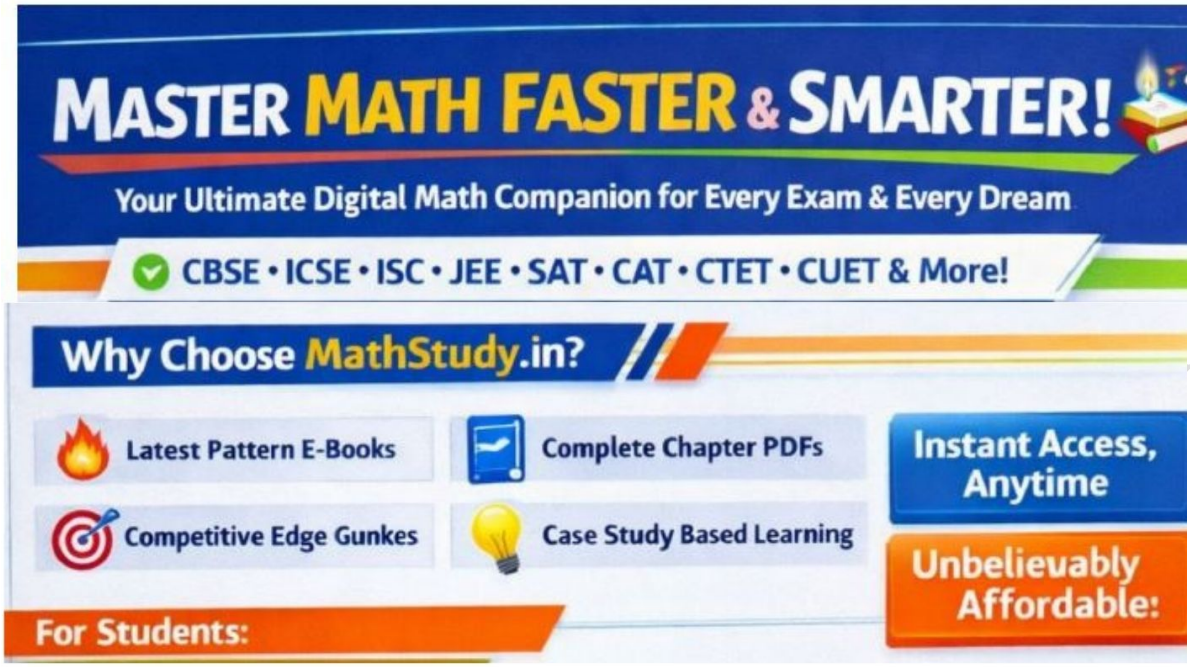

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