

JEE MAIN DIFFERENTIAL EQUATIONS — VARIABLES SEPARABLE METHOD — PYQS

Max. Marks: 36

Questions: 9

Section A (MCQ) — 6 questions

Q.1 Let $y = y(x)$ be the solution of the differential equation $\frac{dy}{dx} = (1 + x + x^2)(1 - y + y^2)$, $y(0) = \frac{1}{2}$.

Then $(2y(1) - 1)$ is equal to :

[JEE Main 2026 (Online) 4th April Morning Shift]

- (1) $\sqrt{3} \tan\left(\frac{11\sqrt{3}}{6}\right)$ (2) $\frac{\sqrt{3}}{2} \tan\left(\frac{11\sqrt{3}}{12}\right)$
 (3) $\sqrt{3} \tan\left(\frac{11\sqrt{3}}{12}\right)$ (4) $\frac{\sqrt{3}}{2} \tan\left(\frac{11\sqrt{3}}{6}\right)$

Scan or tap for the full solution



Q.2 If the curve $y = f(x)$ passes through the point $(1, e)$ and satisfies the differential equation $dy = y(2 + \log_e x)dx$, $x > 0$, then $f(e)$ is equal to :

[JEE Main 2026 (Online) 2nd April Morning Shift]

- (1) e^e (2) e^{e^2} (3) e^{2e} (4) e^{2e^e}

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Q.3 Let $y = y(x)$ be the solution curve of the differential equation $(1 + \sin x)\frac{dy}{dx} + (y + 1)\cos x = 0$, $y(0) = 0$. If the curve $y = y(x)$ passes through the point $\left(\alpha, \frac{-1}{2}\right)$, then a value of α is :

[JEE Main 2026 (Online) 2nd April Morning Shift]

- (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{2}$

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Q.4 If $y = y(x)$ satisfies the differential equation $16(\sqrt{9x + x\sqrt{x}})(4 + \sqrt{9 + \sqrt{x}})\cos y dy = (1 + 2\sin y)dx$, $x > 0$ and $y(256) = \frac{\pi}{2}$, $y(49) = \alpha$, then $2\sin \alpha$ is equal to :

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) $2\sqrt{2} - 1$ (2) $\sqrt{2} - 1$
 (3) $2(\sqrt{2} - 1)$ (4) $3(\sqrt{2} - 1)$

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Q.5 Let for some function $y = f(x)$, $\int_0^x t f(t) dt = x^2 f(x)$, $x > 0$ and $f(2) = 3$. Then $f(6)$ is equal to

[JEE Main 2025 (Online) 28th January Morning Shift]

- (1) 1 (2) 6 (3) 2 (4) 3

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Q.6 Let a curve $y = f(x)$ pass through the points $(0, 5)$ and $(\log_e 2, k)$. If the curve satisfies the differential equation $2(3 + y)e^{2x}dx - (7 + e^{2x})dy = 0$, then k is equal to

[JEE Main 2025 (Online) 23rd January Morning Shift]

- (1) 32 (2) 8 (3) 4 (4) 16

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Section B (Numerical) — 3 questions

Q.7 Let a differentiable function f satisfy the equation $\int_0^{36} f\left(\frac{tx}{36}\right) dt = 4\alpha f(x)$. If $y = f(x)$ is a standard parabola passing through the points $(2, 1)$ and $(-4, \beta)$, then β^α is equal to _____.

[JEE Main 2026 (Online) 24th January Morning Shift]

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Q.8 Let f be a twice differentiable non-negative function such that $(f(x))^2 = 25 + \int_0^x ((f(t))^2 + (f'(t))^2) dt$. Then the mean of $f(\log_e(1)), f(\log_e(2)), \dots, f(\log_e(625))$ is equal to _____.

[JEE Main 2026 (Online) 23rd January Morning Shift]

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Q.9 Let $f: (0, \infty) \rightarrow \mathbb{R}$ be a twice differentiable function. If for some $a \neq 0$, $\int_0^1 f(\lambda x) d\lambda = af(x)$, $f(1) = 1$ and $f(16) = \frac{1}{8}$, then $16 - f\left(\frac{1}{16}\right)$ is equal to _____.

[JEE Main 2025 (Online) 29th January Morning Shift]

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ANSWER KEY**Section A (MCQ) — 6 questions**

Ques.	1	2	3	4	5	6					
Ans.	3	3	4	1	1	2					

Section B (Numerical) — 3 questions

Ques.	7	8	9				
Ans.	64	1565	112				