

JEE MAIN RELATIONS AND FUNCTIONS (CLASS 12) — FUNCTIONAL EQUATIONS, EVEN-ODD AND PERIODIC FUNCTIONS (JEE) — PYQS

Max. Marks: 48

Questions: 12

Section A (MCQ) — 11 questions

- Q.1** Let for some $\alpha \in \mathbb{R}$, $f: \mathbb{R} \rightarrow \mathbb{R}$ be a function satisfying $f(x+y) = f(x) + 2y^2 + y + \alpha xy$ for all $x, y \in \mathbb{R}$. If $f(0) = -1$ and $f(1) = 2$, then the value of

$$\sum_{n=1}^5 (\alpha + f(n)) \text{ is :}$$

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

- (1) 110 (2) 140 (3) 150 (4) 170

Scan or tap for the
full solution 

- Q.2** Let f be a function such that $3f(x) + 2f\left(\frac{m}{19x}\right) = 5x$, $x \neq 0$, where $m = \sum_{i=1}^9 (i)^2$. Then $f(5) - f(2)$ is equal to

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

- (1) 36 (2) 9 (3) -9 (4) 18

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full solution 

- Q.3** Let f and g be functions satisfying $f(x+y) = f(x)f(y)$, $f(1) = 7$ and $g(x+y) = g(xy)$, $g(1) = 1$, for all $x, y \in \mathbb{N}$. If $\sum_{x=1}^n \left(\frac{f(x)}{g(x)}\right) = 19607$, then n is equal to :

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

- (1) 6 (2) 7 (3) 4 (4) 5

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- Q.4** Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a continuous function satisfying $f(0) = 1$ and $f(2x) - f(x) = x$ for all $x \in \mathbb{R}$. If $\lim_{n \rightarrow \infty} \left\{ f(x) - f\left(\frac{x}{2^n}\right) \right\} = G(x)$, then $\sum_{r=1}^{10} G(r^2)$ is equal to

[JEE Main 2025 (Online) 4th April Morning Shift]

- (1) 215 (2) 420 (3) 385 (4) 540

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- Q.5** Let f be a function such that $f(x) + 3f\left(\frac{24}{x}\right) = 4x$, $x \neq 0$. Then $f(3) + f(8)$ is equal to

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) 13 (2) 11 (3) 10 (4) 12

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full solution 

- Q.6** Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a twice differentiable function such that

$$(\sin x \cos y)(f(2x+2y) - f(2x-2y)) = (\cos x \sin y)(f(2x+2y) + f(2x-2y)),$$

for all $x, y \in \mathbb{R}$. If $f'(0) = \frac{1}{2}$, then the value of

$$24f''\left(\frac{5\pi}{3}\right) \text{ is :}$$

[JEE Main 2025 (Online) 2nd April Morning Shift]

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

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full solution 

- Q.7** If $f(x) = \frac{2^x}{2^x + \sqrt{2}}$, $x \in \mathbb{R}$, then $\sum_{k=1}^{81} f\left(\frac{k}{82}\right)$ is equal to

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

- (1) 82 (2) $81\sqrt{2}$
(3) 41 (4) $\frac{81}{2}$

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full solution 

- Q.8** Let $f: \mathbb{R} - \{0\} \rightarrow (-\infty, 1)$ be a polynomial of degree 2, satisfying $f(x)f\left(\frac{1}{x}\right) = f(x) + f\left(\frac{1}{x}\right)$. If $f(K) = -2K$, then the sum of squares of all possible values of K is:

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

- (1) 9 (2) 1 (3) 6 (4) 7

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full solution 

- Q.9** Let $f: \mathbb{R} - \{0\} \rightarrow \mathbb{R}$ be a function such that $f(x) - 6f\left(\frac{1}{x}\right) = \frac{35}{3x} - \frac{5}{2}$. If $\lim_{x \rightarrow 0} \left(\frac{1}{\alpha x} + f(x)\right) = \beta$; $\alpha, \beta \in \mathbb{R}$, then $\alpha + 2\beta$ is equal to

[JEE Main 2025 (Online) 24th January Morning Shift]

- (1) 6 (2) 5 (3) 3 (4) 4

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- Q.10** Let $f(x) = \frac{2^{x+2} + 16}{2^{2x+1} + 2^{x+4} + 32}$. Then the value of $8\left(f\left(\frac{1}{15}\right) + f\left(\frac{2}{15}\right) + \dots + f\left(\frac{59}{15}\right)\right)$ is equal to

[JEE Main 2025 (Online) 24th January Morning Shift]

(1) 108 (2) 92 (3) 118 (4) 102

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Q.11 Let $f(x)$ be a real differentiable function such that $f(0) = 1$ and $f(x + y) = f(x)f'(y) + f'(x)f(y)$ for all $x, y \in \mathbb{R}$. Then $\sum_{n=1}^{100} \log_e f(n)$ is equal to :

[JEE Main 2025 (Online) 22nd January Morning Shift]

(1) 2406 (2) 5220 (3) 2525 (4) 2384

Scan or tap for the
full solution**Section B (Numerical) — 1 question**

Q.12 Let f be a polynomial function such that $\log_2(f(x)) = \left(\log_2 \left(2 + \frac{2}{3} + \frac{2}{9} + \dots \infty \right) \right) \cdot \log_3 \left(1 + \frac{f(x)}{f\left(\frac{1}{x}\right)} \right)$, $x > 0$ and $f(6) = 37$. Then $\sum_{n=1}^{10} f(n)$ is equal to _____.

[JEE Main 2026 (Online) 8th April Evening Shift]

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full solution**ANSWER KEY****Section A (MCQ) — 11 questions**

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	4	4	3	2	3	4	3	4	3	3

Section B (Numerical) — 1 question

Ques.	12							
Ans.	395							