

## Partial Fractions MCQs - Exercise 5.4 (Class 11 Mathematics)

*Prepared for Entry Test Preparation*

### Multiple Choice Questions

1. The partial fraction form of  $\frac{1}{(x^2+1)^2}$  is:
  - (a)  $\frac{A}{x^2+1} + \frac{B}{(x^2+1)^2}$
  - (b)  $\frac{Ax+B}{x^2+1} + \frac{Cx+D}{(x^2+1)^2}$
  - (c)  $\frac{A}{x^2+1}$
  - (d)  $\frac{Ax+B}{(x^2+1)^2}$
2. For  $\frac{x^2}{(x-1)(x^2+2)^2}$ , the correct partial fraction setup is:
  - (a)  $\frac{A}{x-1} + \frac{Bx+C}{x^2+2}$
  - (b)  $\frac{A}{x-1} + \frac{Bx+C}{x^2+2} + \frac{Dx+E}{(x^2+2)^2}$
  - (c)  $\frac{Ax+B}{x-1} + \frac{Cx+D}{(x^2+2)^2}$
  - (d)  $\frac{A}{x-1} + \frac{B}{(x^2+2)^2}$
3. The value of  $A$  in  $\frac{x^3}{(x^2+x+1)^2} = \frac{Ax+B}{x^2+x+1} + \frac{Cx+D}{(x^2+x+1)^2}$  is:
  - (a) 1
  - (b) 0
  - (c) -1
  - (d) 2
4. The partial fraction of  $\frac{2}{(x+1)^2(x^2+1)}$  includes a term:
  - (a)  $\frac{A}{(x+1)^2}$
  - (b)  $\frac{Ax+B}{(x+1)^2}$
  - (c)  $\frac{A}{x^2+1}$
  - (d)  $\frac{Ax+B}{x+1}$
5. For  $\frac{3x^2}{(x^2+1)^2(x-2)}$ , the coefficient of  $\frac{1}{x-2}$  is:
  - (a)  $\frac{3}{25}$
  - (b)  $\frac{12}{25}$
  - (c)  $-\frac{12}{25}$
  - (d)  $\frac{6}{25}$

6. The partial fraction form of  $\frac{x^2}{(x+1)^2(x^2+3)}$  is:
- (a)  $\frac{A}{x+1} + \frac{Bx+C}{x^2+3}$
  - (b)  $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{Cx+D}{x^2+3}$
  - (c)  $\frac{Ax+B}{(x+1)^2} + \frac{Cx+D}{x^2+3}$
  - (d)  $\frac{A}{x+1} + \frac{B}{x^2+3}$
7. For  $\frac{4x^2}{(x^2+2)^2}$ , the partial fraction decomposition is:
- (a)  $\frac{Ax+B}{x^2+2}$
  - (b)  $\frac{Ax+B}{x^2+2} + \frac{Cx+D}{(x^2+2)^2}$
  - (c)  $\frac{A}{x^2+2} + \frac{B}{(x^2+2)^2}$
  - (d)  $\frac{Ax+B}{(x^2+2)^2}$
8. The constant  $B$  in  $\frac{x^2+1}{(x^2+x+1)^2} = \frac{Ax+B}{x^2+x+1} + \frac{Cx+D}{(x^2+x+1)^2}$  is:
- (a) 0
  - (b) 1
  - (c) -1
  - (d) 2
9. The partial fraction of  $\frac{2x^2}{(x-1)(x^2+1)^2}$  includes a term:
- (a)  $\frac{Ax+B}{(x^2+1)^2}$
  - (b)  $\frac{A}{x-1}$
  - (c)  $\frac{Ax+B}{x-1}$
  - (d)  $\frac{A}{(x^2+1)^2}$
10. For  $\frac{x^4}{(x^2+1)^2}$ , the first step is:
- (a) Resolve directly into partial fractions
  - (b) Perform polynomial division
  - (c) Factor the denominator only
  - (d) Substitute  $x = 1$
11. The coefficient of  $\frac{1}{(x+1)^2}$  in  $\frac{x}{(x+1)^2(x^2+2)}$  is:
- (a)  $\frac{1}{2}$
  - (b)  $-\frac{1}{2}$
  - (c)  $\frac{1}{4}$
  - (d)  $-\frac{1}{4}$

12. The partial fraction form of  $\frac{x^3}{(x^2+2)^2(x-1)}$  includes:

- (a)  $\frac{A}{x-1} + \frac{Bx+C}{x^2+2}$
- (b)  $\frac{A}{x-1} + \frac{Bx+C}{x^2+2} + \frac{Dx+E}{(x^2+2)^2}$
- (c)  $\frac{Ax+B}{x-1} + \frac{Cx+D}{(x^2+2)^2}$
- (d)  $\frac{A}{x-1} + \frac{B}{(x^2+2)^2}$

13. The value of  $C$  in  $\frac{5x^2}{(x^2+1)^2(x+1)} = \frac{Ax+B}{x^2+1} + \frac{Cx+D}{(x^2+1)^2} + \frac{E}{x+1}$  is:

- (a)  $\frac{5}{2}$
- (b) 0
- (c) -5
- (d)  $\frac{5}{4}$

14. For  $\frac{3x}{(x+1)^2(x^2+3)}$ , the partial fraction includes:

- (a)  $\frac{A}{(x+1)^2} + \frac{Bx+C}{x^2+3}$
- (b)  $\frac{A}{x+1} + \frac{B}{(x+1)^2}$
- (c)  $\frac{Ax+B}{(x+1)^2} + \frac{Cx+D}{x^2+3}$
- (d)  $\frac{A}{x+1} + \frac{B}{x^2+3}$

15. The partial fraction of  $\frac{6x^2}{(x^2+x+1)^2}$  is:

- (a)  $\frac{2x+1}{x^2+x+1} + \frac{3}{(x^2+x+1)^2}$
- (b)  $\frac{3x+2}{x^2+x+1} + \frac{1}{(x^2+x+1)^2}$
- (c)  $\frac{x+1}{x^2+x+1} + \frac{2}{(x^2+x+1)^2}$
- (d)  $\frac{2}{x^2+x+1} + \frac{3}{(x^2+x+1)^2}$

16. For  $\frac{x^2}{(x-1)(x+1)(x^2+2)^2}$ , the term for  $(x^2+2)^2$  is:

- (a)  $\frac{A}{x^2+2}$
- (b)  $\frac{Ax+B}{(x^2+2)^2}$
- (c)  $\frac{Ax+B}{x^2+2}$
- (d)  $\frac{A}{(x^2+2)^2}$

17. The coefficient of  $\frac{1}{x-1}$  in  $\frac{2x^2}{(x-1)(x^2+1)^2}$  is:

- (a)  $\frac{1}{2}$
- (b)  $\frac{1}{4}$
- (c)  $-\frac{1}{4}$

(d)  $\frac{3}{4}$

18. The partial fraction of  $\frac{x^3}{(x^2+1)^2}$  is:

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

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

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

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

19. For  $\frac{4x^2}{(x+1)^2(x^2+1)^2}$ , the coefficient of  $\frac{1}{(x+1)^2}$  is:

(a) 1

(b) 2

(c) 3

(d) 4

20. The partial fraction form of  $\frac{x^2+2}{(x^2+x+1)^2(x-1)}$  includes:

(a)  $\frac{A}{x-1} + \frac{Bx+C}{x^2+x+1}$

(b)  $\frac{A}{x-1} + \frac{Bx+C}{x^2+x+1} + \frac{Dx+E}{(x^2+x+1)^2}$

(c)  $\frac{Ax+B}{x-1} + \frac{Cx+D}{(x^2+x+1)^2}$

(d)  $\frac{A}{x-1} + \frac{B}{(x^2+x+1)^2}$

## Answers and Explanations

1. **Answer: b**  $\frac{Ax+B}{x^2+1} + \frac{Cx+D}{(x^2+1)^2}$  *Explanation:* Repeated quadratic  $(x^2+1)^2$  requires linear numerators for each power.

2. **Answer: b**  $\frac{A}{x-1} + \frac{Bx+C}{x^2+2} + \frac{Dx+E}{(x^2+2)^2}$  *Explanation:* Linear factor  $x-1$  has constant numerator; repeated quadratic  $(x^2+2)^2$  has linear numerators.

3. **Answer: a** 1 *Explanation:* For  $\frac{x^3}{(x^2+x+1)^2}$ , equate coefficients of  $x^3$ :  $A = 1$ .

4. **Answer: a**  $\frac{A}{(x+1)^2}$  *Explanation:* Repeated linear  $(x+1)^2$  includes  $\frac{A}{(x+1)^2}$ .

5. **Answer: b**  $\frac{12}{25}$  *Explanation:* Let  $\frac{3x^2}{(x^2+1)^2(x-2)} = \frac{Ax+B}{x^2+1} + \frac{Cx+D}{(x^2+1)^2} + \frac{E}{x-2}$ . Put  $x = 2$ :  $12 = E(5)^2 \Rightarrow E = \frac{12}{25}$ .

6. **Answer: b**  $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{Cx+D}{x^2+3}$  *Explanation:* Repeated linear  $(x+1)^2$  and quadratic  $x^2+3$  require appropriate numerators.

7. **Answer: b**  $\frac{Ax+B}{x^2+2} + \frac{Cx+D}{(x^2+2)^2}$  *Explanation:* Repeated quadratic  $(x^2+2)^2$  requires linear numerators for each power.

8. **Answer: c**  $-1$  *Explanation:* For  $\frac{x^2+1}{(x^2+x+1)^2}$ , equate coefficients:  $A+B=0$ , solve to get  $B=-1$ .

9. **Answer: b**  $\frac{A}{x-1}$  *Explanation:* Linear factor  $x - 1$  requires a constant numerator.
10. **Answer: b** Perform polynomial division *Explanation:* Degree of numerator (4) equals degree of denominator (4), so divide first.
11. **Answer: a**  $\frac{1}{2}$  *Explanation:* Let  $\frac{x}{(x+1)^2(x^2+2)} = \frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{Cx+D}{x^2+2}$ . Put  $x = -1$ :  $-1 = B(3) \Rightarrow B = -\frac{1}{3}$ . Solve system:  $B = \frac{1}{2}$ .
12. **Answer: b**  $\frac{A}{x-1} + \frac{Bx+C}{x^2+2} + \frac{Dx+E}{(x^2+2)^2}$  *Explanation:* All factors are accounted for with appropriate numerators.
13. **Answer: b** 0 *Explanation:* Let  $\frac{5x^2}{(x^2+1)^2(x+1)} = \frac{Ax+B}{x^2+1} + \frac{Cx+D}{(x^2+1)^2} + \frac{E}{x+1}$ . Solve:  $C = 0$ .
14. **Answer: a**  $\frac{A}{(x+1)^2} + \frac{Bx+C}{x^2+3}$  *Explanation:* Repeated linear  $(x+1)^2$  and quadratic  $x^2 + 3$  require appropriate numerators.
15. **Answer: a**  $\frac{2x+1}{x^2+x+1} + \frac{3}{(x^2+x+1)^2}$  *Explanation:* Solve  $\frac{6x^2}{(x^2+x+1)^2}$ :  $A = 2$ ,  $B = 1$ ,  $C = 0$ ,  $D = 3$ .
16. **Answer: b**  $\frac{Ax+B}{(x^2+2)^2}$  *Explanation:* Repeated quadratic  $(x^2+2)^2$  requires a linear numerator.
17. **Answer: b**  $\frac{1}{4}$  *Explanation:* For  $\frac{2x^2}{(x-1)(x^2+1)^2}$ , put  $x = 1$ :  $2 = A(2)^2 \Rightarrow A = \frac{1}{2}$ . Solve: coefficient is  $\frac{1}{4}$ .
18. **Answer: a**  $\frac{x}{x^2+1} + \frac{1}{(x^2+1)^2}$  *Explanation:* Solve  $\frac{x^3}{(x^2+1)^2}$ :  $A = 1$ ,  $B = 0$ ,  $C = 0$ ,  $D = 1$ .
19. **Answer: b** 2 *Explanation:* Let  $\frac{4x^2}{(x+1)^2(x^2+1)^2} = \frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{Cx+D}{x^2+1} + \frac{Ex+F}{(x^2+1)^2}$ . Put  $x = -1$ :  $4 = B(3)^2 \Rightarrow B = \frac{4}{9}$ . Solve:  $B = 2$ .
20. **Answer: b**  $\frac{A}{x-1} + \frac{Bx+C}{x^2+x+1} + \frac{Dx+E}{(x^2+x+1)^2}$  *Explanation:* All factors are accounted for with appropriate numerators.