Partial Fractions MCQs - Exercise 5.3 (Class 11 Mathematics)

Prepared for Entry Test Preparation

Multiple Choice Questions

1. The partial fraction decomposition of $\frac{1}{(x-1)(x+1)}$ is:

(a) $\frac{1}{x-1} + \frac{1}{x+1}$

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

(c) $\frac{1}{x-1} - \frac{1}{x+1}$

(d) $\frac{-1}{x-1} + \frac{1}{x+1}$

2. For $\frac{2x+1}{(x^2+1)(x+2)}$, the correct partial fraction form is:

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

(b) $\frac{Ax+B}{x^2+1} + \frac{C}{x+2}$

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

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

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

(a) $\frac{3}{x-2}$

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

(c) $\frac{3}{(x-2)^2}$

(d) $\frac{3}{x-2} - \frac{3}{(x-2)^2}$

4. For $\frac{x^2}{(x+1)(x^2+4)}$, the value of the constant C in the partial fraction $\frac{Ax+B}{x^2+4} + \frac{C}{x+1}$ is:

(a) $\frac{1}{5}$

(b) $\frac{4}{5}$

(c) $-\frac{1}{5}$

(d) 0

5. The partial fraction decomposition of $\frac{4x}{(x-1)(x+1)(x^2+1)}$ includes the term:

(a) $\frac{A}{x-1} + \frac{B}{x+1}$

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

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

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

6. For $\frac{x^3}{x^2-1}$, the first step is:

(a) Resolve directly into partial fractions

(b) Perform polynomial division

(c) Factor the denominator only

(d) Substitute $x = 1$

7. The partial fraction of $\frac{1}{(x^2+1)(x-1)}$ has a numerator of the form:

(a) $Ax + B$ for $x^2 + 1$

(b) A for $x^2 + 1$

(c) Ax for $x - 1$

(d) $A + Bx$ for $x - 1$

8. For $\frac{5}{(x+1)^2(x-2)}$, the partial fraction form is:

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

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

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

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

9. The value of A in $\frac{2x+3}{(x^2+4)(x-1)} = \frac{Ax+B}{x^2+4} + \frac{C}{x-1}$ is:

(a) $\frac{2}{5}$

(b) $-\frac{2}{5}$

(c) $\frac{3}{5}$

(d) 0

10. The partial fraction of $\frac{x^2+1}{x^3-1}$ is:

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

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

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

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

11. For $\frac{6x}{(x-1)(x^2+2)}$, the coefficient of $\frac{1}{x-1}$ is:

(a) 2

(b) 3

(c) -2

(d) 1

12. The partial fraction of $\frac{1}{(x+2)(x^2+3)}$ has a term:

(a) $\frac{Ax+B}{x+2}$

(b) $\frac{A}{x^2+3}$

(c) $\frac{A}{x+2} + \frac{Bx+C}{x^2+3}$

(d) $\frac{A}{x+2} + \frac{B}{x^2+3}$

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

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

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

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

(d) $\frac{A}{x-1} + \frac{C}{x+1}$

14. The constant C in $\frac{3x+1}{(x+1)(x^2+2)} = \frac{Ax+B}{x^2+2} + \frac{C}{x+1}$ is:

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

(b) $-\frac{4}{3}$

(c) $\frac{2}{3}$

(d) $-\frac{2}{3}$

15. For $\frac{x^4}{x^2-1}$, the partial fraction decomposition after division is:

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

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

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

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

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

(a) $\frac{A}{x-1} + \frac{B}{x+1}$

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

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

(d) $\frac{Ax+B}{x-1} + \frac{C}{x+1}$

17. For $\frac{x^2+3}{(x^2+1)(x-2)}$, the value of B in $\frac{Ax+B}{x^2+1} + \frac{C}{x-2}$ is:

(a) $\frac{11}{5}$

(b) $\frac{7}{5}$

(c) $-\frac{7}{5}$

(d) $\frac{4}{5}$

18. The partial fraction of $\frac{1}{(x+1)^2(x^2+1)}$ includes a term:

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

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

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

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

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

(a) $\frac{5}{3}$

(b) $\frac{7}{3}$

(c) $\frac{1}{3}$

(d) $-\frac{1}{3}$

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

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

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

(c) $\frac{Ax+B}{x-1}$

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

Answers and Explanations

1. **Answer: b** $\frac{1}{2(x-1)} - \frac{1}{2(x+1)}$ *Explanation*: Let $\frac{1}{(x-1)(x+1)} = \frac{A}{x-1} + \frac{B}{x+1}$. Multiply by $(x-1)(x+1)$: $1 = A(x+1) + B(x-1)$. Put $x = 1$: $1 = A(2) \implies A = \frac{1}{2}$. Put $x = -1$: $1 = B(-2) \implies B = -\frac{1}{2}$.

2. **Answer: b** $\frac{Ax+B}{x^2+1} + \frac{C}{x+2}$ *Explanation*: For an irreducible quadratic $x^2 + 1$, the numerator is $Ax + B$. For linear $x + 2$, it's a constant C.

3. **Answer: c** $\frac{3}{(x-2)^2}$ *Explanation*: Since the denominator is $(x-2)^2$, the fraction is already in its simplest form.

4. **Answer: b** $\frac{4}{5}$ *Explanation*: Let $\frac{x^2}{(x+1)(x^2+4)} = \frac{Ax+B}{x^2+4} + \frac{C}{x+1}$. Multiply through and put $x = -1$: $1 = C(1+4) \implies C = \frac{1}{5}$. Equate coefficients to find $A = 0$, $B = \frac{3}{5}$.

5. **Answer: c** $\frac{A}{x-1} + \frac{B}{x+1} + \frac{Cx+D}{x^2+1}$ *Explanation*: Linear factors $x - 1$, $x + 1$ have constants; quadratic $x^2 + 1$ has $Cx + D$.

6. **Answer: b** Perform polynomial division *Explanation*: Since degree of numerator (3) > degree of denominator (2), divide first.

7. **Answer: a** $Ax+B$ for x^2+1 *Explanation*: Irreducible quadratic x^2+1 requires a linear numerator $Ax + B$.

8. **Answer: a** $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{x-2}$ *Explanation*: Repeated linear $(x+1)^2$ requires $\frac{A}{x+1} + \frac{B}{(x+1)^2}$; linear $x - 2$ requires $\frac{C}{x-2}$.

9. **Answer: a** $\frac{2}{5}$ *Explanation*: Let $\frac{2x+3}{(x^2+4)(x-1)} = \frac{Ax+B}{x^2+4} + \frac{C}{x-1}$. Put $x = 1$: $5 = C(5) \implies C = 1$. Equate coefficients: $A = \frac{2}{5}$, $B = \frac{11}{5}$.

10. **Answer: a** $\frac{1}{x-1} - \frac{x+2}{x^2+x+1}$ *Explanation*: For $\frac{x^2+1}{(x-1)(x^2+x+1)}$, solve to get $A = 1$, $B = -1$, $C = -2$.

11. **Answer: b** 3 *Explanation*: Let $\frac{6x}{(x-1)(x^2+2)} = \frac{A}{x-1} + \frac{Bx+C}{x^2+2}$. Put $x = 1$: $6 = A(3) \implies A = 2$. Equate coefficients to confirm.

12. **Answer: c** $\frac{A}{x+2} + \frac{Bx+C}{x^2+3}$ *Explanation*: Linear $x + 2$ has constant numerator; quadratic $x^2 + 3$ has $Bx + C$.

13. **Answer: b** $\frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{x+1}$ *Explanation*: Repeated $(x-1)^2$ requires $\frac{A}{x-1} + \frac{B}{(x-1)^2}$; linear $x + 1$ requires $\frac{C}{x+1}$.

14. **Answer: a** $\frac{4}{3}$ *Explanation*: Let $\frac{3x+1}{(x+1)(x^2+2)} = \frac{Ax+B}{x^2+2} + \frac{C}{x+1}$. Put $x = -1$: $3(-1) + 1 = C(3) \implies C = \frac{4}{3}$.

15. **Answer: a** $x^2+1+\frac{1}{x-1}-\frac{1}{x+1}$ *Explanation*: Divide $\frac{x^4}{x^2-1} = x^2+1+\frac{1}{x^2-1}$. Resolve $\frac{1}{(x-1)(x+1)}$ to get $\frac{1}{x-1} - \frac{1}{x+1}$.

16. **Answer: b** $\frac{A}{x-1} + \frac{Bx+C}{x^2+1} + \frac{D}{x+1}$ *Explanation*: All factors are accounted for with appropriate numerators.

17. **Answer: b** $\frac{7}{5}$ *Explanation*: Let $\frac{x^2+3}{(x^2+1)(x-2)} = \frac{Ax+B}{x^2+1} + \frac{C}{x-2}$. Put $x = 2$: $7 = C(5) \implies C = \frac{7}{5}$. Equate coefficients: $A = 0$, $B = \frac{7}{5}$.

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

19. **Answer: b** $\frac{7}{3}$ *Explanation*: Let $\frac{4x+1}{(x-1)(x+2)} = \frac{A}{x-1} + \frac{B}{x+2}$. Solve: $A = \frac{7}{3}$, $B = \frac{5}{3}$.

20. **Answer: a** $\frac{Ax+B}{x^2+x+1}$ *Explanation*: Quadratic $x^2 + x + 1$ requires $Ax + B$.