



## MATHS

### BOOKS - ML KHANNA

### PARTIAL FRACTION

#### Illustratives Examples

1. Resolve into partial fractions :

$$\frac{2x^3 - 3x^2 - 8x - 26}{2x^2 - 5x - 12}.$$



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2. Resolve into partial fractions :

$$\frac{6x^2 + 5x - 2}{2x^3 - x^2 - x}.$$



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3. Resolve into partial fractions :

$$\frac{x^2 + 7x + 11}{(x + 2)^2(x + 3)} = \frac{A}{(x + 2)} + \frac{B}{(x + 2)^2} + \frac{C}{x + 3}.$$



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4. Resolve into partial fractions :

$$\frac{14x^3 + 14x^2 - 4x + 3}{(3x^2 - x + 1)(x - 1)(x + 2)} = \frac{Ax + B}{3x^2 - x + 1} + \frac{C}{x - 1} + \frac{D}{x + 2}$$



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5. Resolve into partial fractions :

$$\frac{2x^4 + 2x^2 + x + 1}{x(x^2 + 1)^2} = \frac{A}{x} + \frac{Bx + C}{(x^2 + 1)^2} + \frac{Ex + F}{(x^2 + 1)}$$



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## Problem Set 1 Multiple Choice Questions

1. If  $\frac{3 - 4x - 5x^2 - x^3}{(x + 3)(x + 2)} = -x + \frac{a}{x + 3} + \frac{b}{x + 2}$  then (a,b) are

A. (2, - 1)

B. (2, - 2)

C. (3, - 1)

D. (3, 1)

**Answer: C**



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2. If  $\frac{x^2}{(x^2 + 1)(x^2 + 4)} = \frac{a}{x^2 + 1} + \frac{b}{x^2 + 4}$  then  $a + b =$

A. 0

B. 1

C. 2

D. 3

**Answer: B**



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3.  $\frac{3x^2 - 8x + 9}{(x + 1)^3} = \frac{a}{x + 1} + \frac{b}{(x + 1)^2} + \frac{c}{(x + 1)^3},$  then

$a + b + c =$

A. 26

B. 5

C. 18

D. 9

**Answer: D**

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4. If 
$$\frac{x^4}{(x-1)(x+2)} = \frac{1}{3(x-1)} - \frac{16}{3(x+2)} + x^2 - x + k,$$

then  $k =$

A. 0

B. 1

C. 2

D. 3

**Answer: D**

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5. If  $\frac{x^4}{(x-1)(x-2)} = f(x) + \frac{A}{x-1} + \frac{B}{x-2}$ , then

A.  $f(x) = x^2 - 3x + 7$

B.  $f(x) = x^2 + 3x + 7$

C.  $A + B = 15$

D.  $A - B = -15$

**Answer: B::C**



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6. If  $\frac{ax}{(x+2)(2x-3)} = \frac{2}{x+2} + \frac{3}{2x-3}$ , then  $a =$

A. 4

B. 5

C. 7

D. None of these

**Answer: C**

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7. If  $\frac{x^2}{(x^2 + a^2)(x^2 + b^2)} = K \left( \frac{a^2}{x^2 + a^2} - \frac{b^2}{x^2 + b^2} \right)$  then K=

A. 1

B.  $\frac{1}{(a^2 + b^2)}$

C.  $\frac{1}{(a^2 - b^2)}$

D.  $\frac{1}{(b^2 - a^2)}$

**Answer: C**

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8.  $\frac{x^2 + 1}{(x^2 + 4)(x - 2)} =$

A.  $\frac{3x + 6}{8(x^2 + 4)} + \frac{5}{8(x - 2)}$

B.  $\frac{3x + 3}{8(x^2 + 4)} + \frac{5}{8(x - 2)}$

C.  $\frac{3x + 3}{4(x^2 + 4)} + \frac{5}{4(x - 2)}$

D.  $\frac{x + 3}{8(x^2 + 4)} + \frac{5}{8(x - 2)}$

**Answer: A**



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9. If  $\frac{x^4 + 24x^2 + 28}{(x^2 + 1)^3} = \frac{A}{x^2 + 1} + \frac{B}{(x^2 + 1)^2} + \frac{C}{(x^2 + 1)^3}$ , then

A.  $A + B + C = 28$

B.  $A + B - C = 18$

C.  $A - B = -21$



$$D. 2A + B = 24$$

**Answer: A::B::C::D**

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10. If  $\frac{3x^2 + 5}{(x^2 + 1)^2} = \frac{a}{x^2 + 1} + \frac{b}{(x^2 + 1)^2}$  then  $(a, b) =$

A. (2, 3)

B. (3, 2)

C. (-2, 3)

D. (-3, 2)

**Answer: B**

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11. If  $\frac{3x}{(x-6)(x+a)} = \frac{2}{x-6} + \frac{1}{x+a}$  then  $a =$

A. 1

B. 2

C. 3

D. 4

**Answer: C**

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12. If

$$\frac{1}{x(x+1)(x+2)\dots(x+n)} = \frac{A_0}{x} + \frac{A_1}{(x+1)} + \dots + \frac{A_n}{(x+n)}$$

then  $A_r =$

A.  $\frac{r!(-1)^r}{(n-r)!}$

B.  $\frac{(-1)^r}{r!(n-r)!}$

C.  $\frac{1}{r!(n-r)!}$

D. None of these

**Answer: B**

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13. If  $\frac{ax + b}{(3x + 4)^2} = \frac{1}{(3x + 4)} - \frac{3}{(3x + 4)^2}$  then

A.  $a + b = 4$

B.  $a - b = 3$

C.  $a - b = 2$

D.  $a + b = 5$

**Answer: A:C**

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14. If  $\frac{2x + 3}{(x + 1)(x - 3)} = \frac{a}{x + 1} + \frac{b}{x - 3}$ , then  $a + b =$

A. 1

B. 2

C.  $9/4$

D.  $-1/4$

**Answer: B**



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15.  $\frac{1}{(1 + \sin x)(2 + \sin x)} = \frac{a}{1 + \sin x} - \frac{b}{2 + \sin x}$  then

$a + b =$

A. 0

B. 1

C. 2

D. 3

**Answer: C**

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$$16. \frac{x^3 + 3x^2 + 5}{(x-1)(x+2)^2} = 1 + \frac{a}{x-1} + \frac{b}{x+2} + \frac{c}{(x+2)^2}$$

a, b, c are respectively

A. 1,2,3

B. 1,-1,3

C. 1,-1,-3

D. 1,0,3

**Answer: C**

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17.

If

$$\frac{x^3 - x^2 - 13x + 25}{(x - 2)^2(x - 3)^2} = \frac{A}{x - 2} + \frac{B}{(x - 2)^2} + \frac{C}{x - 3} + \frac{D}{(x - 3)^2}$$

then A, B, C, D are

A. 1,3,0,4

B. 1,0,3,4

C. 1,4,0,3

D. none

**Answer: A**

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18. 
$$\frac{2x}{x^4 + x^2 + 1} =$$

A.  $\frac{x + 1}{x^2 - x + 1} + \frac{x - 1}{x^2 + x - 1}$

B.  $\frac{x - 1}{x^2 - x + 1} - \frac{x + 1}{x^2 + x - 1}$

C.  $\frac{x}{x^2 - x + 1} + \frac{x + 1}{x^2 + x - 1}$

D.  $\frac{1}{x^2 - x + 1} - \frac{1}{x^2 + x + 1}$

**Answer: D**

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### Problem Set 1 True And False

1. If  $\frac{7x - 1}{6x^2 - 5x + 1} = \frac{A}{3x - 1} + \frac{B}{2x - 1}$ , then  $A + B = ?$ .

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2.  $\frac{1 - \cos x}{\cos x(1 + \cos x)} = \frac{1}{\cos x} - \frac{2}{1 + \cos x}$



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3.

$$\frac{1}{(x^2 + 1)^2(x^2 + 3)} = \frac{1}{2} \cdot \frac{1}{(x^2 + 1)^2} - \frac{1}{4} \cdot \frac{1}{x^2 + 1} + \frac{1}{4} \cdot \frac{1}{(x^2 + 3)}$$



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4. 
$$\frac{2x^2 - 11x + 5}{(x - 3)(x^2 + 2x + 5)} = \frac{x}{x^2 + 2x + 5} - \frac{4}{x - 3}$$



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5. 
$$\frac{(x^2 + 1)^2}{x^4 + x^2 + 1} = 1 - \frac{x}{2(x^2 + x + 1)} + \frac{x}{x^2 - x + 1}$$



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## Problem Set 1 Fill In The Blanks

1. If  $\frac{x^4}{(x-1)(x-2)} = \frac{16}{x-2} - \frac{1}{x-1} + x^2 + 3x + k$ , then  $k =$

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2. The partial fractions of  $\frac{9}{(x-1)(x+2)^2}$  are .....

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3. The partial fractions of  $\frac{x^2 - 5x + 7}{(x-1)^3}$  are .....

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4. If  $\frac{5x^2 + 8x - 2}{(3x - 2)(x^2 - x + 3)} = \frac{A}{3x - 2} + \frac{Bx + C}{x^2 - x + 3}$ , then  
 $A + B + C = \dots\dots\dots$

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5. The partial fractions of  $\frac{(x - 1)(x - 2)(x - 3)}{(x - 4)(x - 5)(x - 6)}$  are .....

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6. Partial fractions of  $\frac{x - 2}{(1 - x^2)(1 - 2x)} = \dots\dots\dots$

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7. The partial fractions of  $\frac{8}{(1 - x)(1 + x)^2(1 + x^2)}$  are .....

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8. The partial fractions of  $\frac{3x^4 + x^3 + 8x^2 + x + 2}{x(x^2 + 1)^2}$  are .....



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