

6. PARTIAL FRACTIONS

PREVIOUS EAMCET BITS

1. For $|x| < 1$, the constant term in the expansion of $\frac{1}{(x-1)^2(x-2)}$ is **[EAMCET 2009]**

- 1) 2 2) 1 3) 0 4) $-\frac{1}{2}$

Ans : 4

Sol:
$$\frac{1}{(x-1)^2(x-2)} = \frac{1}{(1-x)^2(-2)} \left[1 - \frac{x}{2} \right]$$

$$= -\frac{1}{2}(1-x^2) \left(1 - \frac{x}{2} \right)^{-1}$$

$$= -\frac{1}{2} [1 + 2x + 3x^2 + \dots] \left[1 + \frac{x}{2} + \left(\frac{x}{2} \right)^2 + \dots \right]$$

$$\therefore \text{constant} = -\frac{1}{2}$$

2. If $\frac{x^2 + x + 1}{x^2 + 2x + 1} = A + \frac{B}{x+1} + \frac{C}{(x+1)^2}$ then $A - B =$ **[EAMCET 2008]**

- 1) 4c 2) 4c + 1 3) 3c 4) 2c

Ans: 4

Sol: $x^2 + x + 1 = A(x+1)^2 + B(x+1)C$

Put $x = -1$ comparing coefficient of x^2

$$c = 1$$

$$A = 1, \text{ put } x = 0$$

$$A + B + C = 1$$

$$1 + B + 1 = 1 \Rightarrow B = -1$$

$$A - B = 1 - (-1) = 2 \Rightarrow 2C$$

3. If $\frac{3x}{(x-a)(x-b)} = \frac{2}{x-a} + \frac{1}{x-b}$, then $a : b$ is equal to **[EAMCET 2007]**

- 1) 1 : 2 2) -2 : 1 3) 1 : 3 4) 3 : 1

Ans: 2

Sol: $3x = 2(x-b) + (x-a)$

Put $x = 0$

$$0 = -2b - a; a = -2b$$

$$\frac{a}{b} = \frac{-2}{1}$$

$$\therefore a : b = -2 : 1$$

4. If $\frac{3x+2}{(x+1)(2x^2+3)} = \frac{A}{x+1} + \frac{Bx+C}{2x^2+3}$ then $A+C-B$ is equal to [EAMCET 2006]

- 1) 0 2) 2 3) 3 4) 5

Ans: 2

Sol: $3x+2 = A(2x^2+3) + (Bx+C)(x+1)$

Put $x = -1$

$$-1 = 5A \Rightarrow A = -\frac{1}{5}$$

Put $x = 0 \Rightarrow 2 = 3A + C$

$$2 = -\frac{3}{5} + C \Rightarrow C = \frac{13}{5}$$

Comparing coefficient of x^2

$$2A + B = 0 \Rightarrow -\frac{2}{5} + B = 0 \Rightarrow B = \frac{2}{5}$$

$$A + C - B = -\frac{1}{5} + \frac{13}{5} - \frac{2}{5} = 2$$

5. If $\frac{x^3}{(2x-1)(x+2)(x-3)} = A + \frac{B}{2x-1} + \frac{C}{x+2} + \frac{D}{x-3}$, then A is equal to [EAMCET 2005]

- 1) $\frac{1}{2}$ 2) $-\frac{1}{50}$ 3) $-\frac{8}{25}$ 4) $\frac{27}{25}$

Ans: 1

Sol: $A = \frac{\text{Coefficient of } x^3 \text{ in Nr}}{\text{Coefficient } x^3 \text{ in Dr}}$

$$A = \frac{1}{2}$$

6. If $\frac{x+1}{(2x-1)(3x+1)} = \frac{A}{2x-1} + \frac{B}{3x+1}$, then $16A+9B$ is equal to [EAMCET 2004]

- 1) 4 2) 5 3) 6 4) 8

Ans: 3

Sol: $x+1 = A(3x+1) + B(2x-1)$

$$\text{Put } x = \frac{1}{2} \Rightarrow \frac{3}{2} = A\left(\frac{5}{2}\right) \Rightarrow A = \frac{3}{5}$$

$$\text{Put } x = -\frac{1}{3} \Rightarrow \frac{2}{3} = B \left(\frac{-5}{3} \right) \Rightarrow B = -\frac{2}{5}$$

$$\therefore 16A + 9B = 16 \left(\frac{3}{5} \right) + 9 \left(\frac{-2}{5} \right) = 6$$

7. Let a, b and c be such that $\frac{1}{(1-x)(1-2x)(1-3x)} = \frac{a}{1-x} + \frac{b}{1-2x} + \frac{c}{1-3x}$ then $\frac{a}{1} + \frac{b}{3} + \frac{c}{5}$

is equal to

[EAMCET 2003]

- 1) $\frac{1}{15}$ 2) $\frac{1}{6}$ 3) $\frac{1}{5}$ 4) $\frac{1}{3}$

Ans: 1

Sol: $1 = a(1-2x)(1-3x) + b(1-x)(1-3x) + c(1-x)(1-2x)$

Put $x = 1$

$$1 = a(-1)(-2) \Rightarrow a = \frac{1}{2}$$

$$\text{Put } x = \frac{1}{2} \Rightarrow 1 = b \left(\frac{1}{2} \right) \left(-\frac{1}{2} \right) \Rightarrow b = -4$$

$$\text{Put } x = \frac{1}{3} \Rightarrow 1 = c \left(\frac{2}{3} \right) \left(\frac{1}{3} \right) \Rightarrow c = \frac{9}{2}$$

$$\text{Now } \frac{a}{1} + \frac{b}{3} + \frac{c}{5} = \frac{1}{2} - \frac{4}{3} + \frac{9}{2.5} = \frac{1}{15}$$

8. If $\frac{1-x+6x^2}{x-x^3} = \frac{A}{x} + \frac{B}{1-x} + \frac{C}{1+x}$, then A is equal to

[EAMCET 2002]

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

Ans: 1

Sol: Given $1-x+6x^2 = A(1-x^2) + Bx(1+x) + Cx(1-x)$

Put, $x = 0$, then $A = 1$

9. If $\frac{x-4}{x^2-5x-2k} = \frac{2}{x-2} - \frac{1}{x+k}$, then k =

[EAMCET 2001]

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

Ans: 1

Sol: $\frac{x-4}{x^2-5x-2k} = \frac{2(x+k) - (x-2)}{(x-2)(x+k)}$

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

Comparing coefficient of x in Dr

$$k - 2 = -5 \quad \therefore k = -3$$

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

[EAMCET 2000]

1) 1

2) 2

3) 3

4) 4

Ans: 3

Sol: $x^2+5 = (x^2+2) + k$

$$2+k=5 \quad \therefore k=3$$

www.NetBadi.in