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Matric no: 19/MHS07/367

Department: MBBS

1.
$$\int \frac{11-3x}{x^2+2x-3}$$

$$\frac{11-3x}{x^2+2x-3} = \frac{11-3x}{(x-1)(x+3)}$$

$$\frac{11-3x}{(x-1)(x+3)} = \frac{A}{x-1} + \frac{B}{x+3}$$

$$11-3x = A(x+3) + B(x-1)$$

$$f(-3) \Rightarrow 11-3(-3) = B(-3-1)$$

$$20 = -4B$$

$$B = -\frac{20}{4}$$

$$B = -5$$

$$f(1) \Rightarrow 11-3(1) = A(1+3)$$

$$8 = 4A$$

$$A = \frac{8}{4}$$

$$A = 2$$

$$\int \frac{11-3x}{(x+1)(x-3)} = \int \frac{2}{x-1} - \int \frac{5}{x-3}$$

$$\int \frac{2}{x-1}$$

$$\text{Let } u = x-1, \frac{du}{dx} = 1, dx = du$$

$$\int \frac{2du}{u} = 2 \int \frac{2u}{u} = 2 \ln u$$

$$\int \frac{2dx}{(x-1)} = 2 \ln(x-1)$$

$$\int \frac{5dx}{(x-3)}$$

$$\text{Let } u = x-3, \frac{du}{dx} = 1, dx = du$$

$$\int \frac{5du}{u} = 5 \int \frac{du}{u} = 5 \ln u = 5 \ln(x-3)$$

$$\int \frac{11-3x}{(x-1)(x+3)} = 2 \ln(x-1) + 5 \ln(x+3) + C$$

2)
$$\int \frac{4x-16}{x^2-2x-3}$$

$$\frac{4x-16}{(x+1)(x-3)} = \frac{A}{x+1} + \frac{B}{x-3}$$

$$4x-16 = A(x-3) + B(x+1)$$

$$f(3) \Rightarrow 4(3)-16 = B(3+1)$$

$$-4 = 4B$$

$$B = -1$$

$$f(-1) \Rightarrow 4(-1)-16 = A(-1-3)$$

$$-20 = -4A$$

$$A = 5$$

$$\int \frac{4x-16}{(x+1)(x-3)} = \int \frac{5}{x+1} dx - \int \frac{dx}{x-3}$$

$$= 5 \ln(x+1) - \ln(x-3) + C$$

$$-6(2-B-C) + 3B - 2C = -35$$

$$9B + 4C = -23 \dots *$$

$$3B - 2C = -11 \quad \times 3$$

$$9B + 4C = -23 \quad \times 1$$

$$9B - 6C = -33$$

$$-9B + 4C = -23$$

$$-10C = -10$$

$$C = \frac{-10}{-10}$$

$$C = 1$$

$$\text{From } 3B - 2C = -11$$

$$3B - 2(1) = -11$$

$$B = \frac{-9}{3} = -3$$

$$\text{From } A = 2 - B - C$$

$$A = 2 - (-3) - 1$$

$$A = 4$$

$$3) \int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} dx$$

$$2x^2 - 9x - 35 = \frac{A}{x+1} + \frac{B}{x-2} + \frac{C}{x+3}$$

$$(x+1)(x-2)(x+3) \quad (x+1)(x-2)(x+3)$$

$$2x^2 - 9x - 35 = A(x-2)(x+3) + B(x+1)(x+3)$$

$$+ C(x+1)(x-2)$$

$$2x^2 - 9x - 35 = A(x^2 + x - 6) + B(x^2 + 4x + 3)$$

$$+ C(x^2 - x - 2)$$

$$2x^2 - 9x - 35 = Ax^2 + Ax - 6A + Bx^2 + 4Bx +$$

$$3B + Cx^2 - Cx - 2C$$

$$2x^2 - 9x - 35 = x^2(A+B+C) + x(A+4B+C)$$

$$+ 1(-6A+3B-2C)$$

$$A+B+C = 2 \dots \textcircled{1}$$

$$A+4B+C = -9 \dots \textcircled{2}$$

$$-6A+3B-2C = -35 \dots \textcircled{3}$$

$$\text{From } \textcircled{1} \quad A = 2 - B - C \dots \textcircled{4}$$

Put equ $\textcircled{4}$ into equ $\textcircled{2}$ & $\textcircled{3}$

$$(2 - B - C) + 4B + C = -9$$

$$3B - 2C = -11 \dots *$$

$$\int \frac{2x^2 - 9x - 35}{(x+1)(x+2)(x+3)} = \int \frac{4}{x+1} dx - \int \frac{3}{x-2} dx + \int \frac{dx}{x+3}$$

$$2x^2 - 9x - 35 = 4 \ln(x+1) - 3 \ln(x-2) + \ln(x+3) + C$$