

c) Find $\frac{d^2y}{dx^2}$, if $x^3 + \tan x$ [5 Marks]

4. a) Resolve the integral using partial fractions

$$\int \frac{dx}{(x+1)(x+2)} \quad [10 \text{ Marks}]$$

b) Find the integral [6 Marks]

$$\int \sqrt{x} (3x^2 + 2x + 3)$$

c) Integrate the following using u-substitution $\int x (3x^2 - 1)^4 dx$ [4 Marks]

5. a) Find the rate of change of the area of a circle with respect to its radius when $r = 5\text{cm}$ [5 Marks]

b) Show that the function f given by $f(x) = x^3 - 3x^2 + 4x, x \in R$ is strictly increasing on R .

[5 Marks]

c) The volume of a cube is increasing at the rate of $9\text{cm}^3/\text{s}$ How fast is the surface area increasing when the length of an edge is 10cm . [10 Marks]

6. a) Evaluate the integral using partial fractions [10 Marks]

$$\int \frac{x^2 + 1}{x^2 - 5x + 6} dx$$

b) $\int \frac{3x}{x^2 - 4x - 5}$ solve the integral into partial fractions. [10 Marks]

7. a) For what range of values of x is the function $y = x^3 - 3x^2 - 9x + 4$. [10 Marks]

(a) Increasing (b) Decreasing

b) Find the area of the region bounded by the two parabolas $y = x^2$ and $y^2 = x$. [10 Marks]