



**Note: Answer the four questions only, for each question 12.5**

**Q1: Find the  $\frac{df}{dx}$  for the following functions (12.5 Mark)**

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

(2)  $f(x) = \ln(5 + e^{4x^2+6x})$

(3)  $f(x) = 4x^3 + 5x^2 - 15$

(4)  $f(x) = (4x - 2)(3x^2 - 9x)$

(5)  $f(x) = \frac{1}{3}(3x + 2)^{\frac{3}{2}}$

**Q2: Find the limit for the following functions : (12.5 Mark)**

(1)  $\lim_{x \rightarrow 2} \frac{x^3 + 4x - 2x^2 - 8}{4x^3 - 8x^2}$

(2)  $\lim_{x \rightarrow -3} f(x)$  if  $f(x) = \begin{cases} x + 5 & \text{if } x \leq -3 \\ 3x + 7 & \text{if } x > -3 \end{cases}$

(3)  $\lim_{x \rightarrow 3} \frac{x^3 - 27}{x^2 - 9}$

(4)  $\lim_{x \rightarrow 1} \frac{x - 1}{\sqrt{x} - 1}$

**Q3: Find the integration for the following Functions: (12.5 Mark)**

(1)  $\int (x^3 + 1) \sqrt{x^4 + 4x} dx$

(2)  $\int (2x^3 + 4x - 8) dx$

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

(4)  $\int \frac{1}{x^{-1}} dx$

Q4: (A) Find  $\frac{dy}{dx}$  for the following functions:

(7.5 Mark)

1-  $Y = 2u^4 + 4u$  ;  $U = e^{2x}$

2-  $Y = \frac{1}{1+u}$  ;  $U = 2x^{\frac{1}{2}}$

(B) Show that for the following function is Continuous :

(5 Mark)

(1)  $f(x) = \begin{cases} x^2 - 3 & \text{if } x < 4 \\ \sqrt{x} + 2 & \text{if } x \geq 4 \end{cases}$  at (4)

(2)  $f(x) = \begin{cases} x^2 + \frac{1}{2} & \text{if } x < 1 \\ 5 & \text{if } 1 \leq x < 5 \\ 10 - x & \text{if } x \geq 5 \end{cases}$  at (5)

Q5: Find the following:

(12.5 Mark)

1-  $A \cdot C$

2-  $B^T + A^T$

3-  $B - A$

4-  $(A + B) \times C^T$

Where

$$A = \begin{pmatrix} 2 & 0 & -6 \\ 3 & 4 & 5 \end{pmatrix} \quad B = \begin{pmatrix} 7 & -3 & 1 \\ 4 & 5 & 1 \end{pmatrix} \quad C = \begin{pmatrix} 1 & 3 & 4 \\ -6 & 2 & 0 \\ 0 & 0 & 4 \end{pmatrix}$$

*Good Luck*