

**Question 1. (3+3 marks ):**

Evaluate the following integrals

$$1) \int \frac{1}{x^2 \sqrt{25 - x^2}} dx, \quad 2) \int_0^{\frac{\pi}{4}} \tan^4 x \sec^4 x dx.$$

**Question 2. (3+2 marks ):**

Evaluate the following integrals

$$1) \int_0^{\frac{\pi}{4}} x \ln(4 + x^2) dx, \quad 2) \int e^{5x} \cos x dx.$$

**Question 3. (3 +2 marks ):**

Evaluate the following integrals

$$1) \int \frac{x^2 + 6x - 5}{x^3 - x} dx, \quad 2) \int \frac{x + 1}{\sqrt{5 - 4x - x^2}} dx.$$

**Question 4. (2+2 marks ):**

Determine whether the following improper integrals converges or diverges.

$$1) \int_{-\infty}^0 x e^{-x} dx, \quad 2) \int_0^3 \frac{dx}{\sqrt{9 - x^2}}.$$

**Extra Bonus Exercise (3 marks ):**

Evaluate  $\int_{-\infty}^{\infty} \frac{dx}{e^x + e^{-x}}$  if possible.