SMA 2102 CALCULUS II CAT II

1. Evaluate $\int_0^{\pi/2} \sin^5 x \cos^2 x \, dx$ (4 marks)

2. Find the approximate value of the integral $\int_0^{\pi} \sqrt{\sin\theta}\, d\theta$ using Simpson's rule with six subintervals. (4 marks)

3. Solve the integrals

(i) $\int e^{2x} \sin 3x \, dx$ (4 marks)

(ii) $\int \frac{x^2}{\sqrt{x^2-4}} \, dx$ (4 marks)

(iii) $\int \cos^{-1} x \, dx$ (4 marks)

4. Find the length of the curve $y^2 = x\left(1-\frac{x}{3}\right)^2$, measured from the origin to the ordinate where $x = 4$. (6 marks)

5. Solve the differential equation $\frac{\sin x}{1+y} \cdot \frac{dy}{dx} = \cos x$. (4 marks)