COURSE CODE: PHY 211
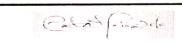
COURSE TITLE: COMPUTATIONAL PHYSICS

DURATION: 2 HOURS

Instruction: Attempt any 4 of the 5 questions

Question one

Use the trapezium rule with four ordinates to find an approximate value for (i) $\int_0^6 3(2^x + 1)\, dx$ (ii) $\int_{1.5}^6 x^2\sqrt{x^2-1}\, dx$ (iii) $\int_0^3 \sqrt{2^x}\, dx$ giving your answer to three significant figures.

Question two

Use Simpson rule to (a) evaluate $\int_0^{\pi/2} \sqrt{\sin x}\, dx$ with n=4 (b) evaluate $\int_0^{12} \sqrt{1+x^2}\, dx$ (c) $\int_0^{\pi} 1\backslash x + \cos x\, dx$ using 2 intervals.

Question three

(a) Given that $f(x) = 5x^2 + x - 7$ determine (i) $f(3+a) - f(3)\, /\, a$ (ii) $f(3) - f(-1)$
(b) If $f(t) = 5t + 1/(t^3)^{1/2}$. Find $f'(t)$ (ii) Differentiate $y = (x + 2)^2/x$ with respect to x.
(c) Determine $\int 2x^3 - 3x\, /\, 4x\, dx$ (ii) $\int (1 + \theta)^2\, /\, \theta^{1/2}\, d\theta$
(d) Evaluate $\int_{-2}^3 (4 - x^2)\, dx$

Question four

(a) What is meant by eigenvalues and eigenvectors?
(b) In most statistical analysis, why sample is preferred to population?
(c) Evaluate $\int 3/5x\, d$
(d) Determine $\int (2m^2 + 1\, /m)\, dm$

QUESTION FIVE

(a) Find the derivative of $y = (8t^3 - 4t)^6$
(b) Differentiate $y = 5\tan^4 3x$
(c) Given $y = 2xe^{-3x}$ Show that $d^2y/dx^2 + 6dy/dx + 9y = 0$