ALTERNATIVE A
COURSE CODE: **PHY314**
COURSE TITLE: **Numerical Computation**
CREDIT UNIT   **2**
TIME ALLOWED   **(2 HRS)**

INSTRUCTION: *Answer question 1(section A) and any other three questions in section B*

SECTION A

Question 1 (25marks)

(i) Round the following numbers to 4 significant numbers (a) 12.0234 (½mks) (b) 529.501(½mks)

(ii) Transform the equation, $T = 2\pi\sqrt{\dfrac{l}{g}}$ into a straight line equation (2mks)

(iii) Using the method of least squares on the table below, calculate the (a) slope (2mks) and (b) intercept (2mks) (c) relationship between the variables. (2½mks)

t	5	12	19	26	33
x	25	28	32	38	41

(iv) What is the augmented matrix of the following equations?
     2x + y - z = 5
     x + 3y +2z = 5
     3x - 2y -4z = 3 (1mks)

(v) Solve the system of linear equations using Gaussian elimination method (4mks)

(vi) Write the forward difference table for the function, $f(x) = x^2 + 2x + 3$ at x = 0, 1, . . . 6. (3mks)

(vii) Integrate the following function, $f(x) = 3x^2 + 5x - 1$ of x with respect to using Trapezoidal rule (4mks).

(viii) List the different methods of solving first order ordinary differential equations (2mks).

(ix) What are the merits of Bisection method? (1mk)

(x) Given the augmented matrix, $\begin{bmatrix} 25 & 1 & -1 & 28 \\ 1 & 30 & 2 & 59 \\ 3 & -2 & -20 & 19 \end{bmatrix}$ (1½mks)

SECTION B
Question 2
(a) Round the following numbers to 4 significant numbers (i) 1.412519 (ii) 6.324319 (iii) 3.162159.(6mks)

(b) A student measured the length of a stick whose actual length of 72.5 cm as 72.3 cm. What is the (i) absolute error in the measurement (4mks) (ii) Relative error of the measurement (2mks) (iii) percentage error of the measurement (3mks).

Question 3
Given the equations

$$2x + 3y = 13$$
$$x - y = -1$$

    (i)   Write down the augmented matrix (3mks)

    (ii)   (ii) Use Gaussian elimination method to solve the problem (12mks).

Question 4

Find the value of y at x = 0.2 if y' + 2y = 0; y(0) = 1 step-length 0.2 using second-order Runga-Kutta formula (15mks).

Question 5

Integrate the following function, $f(x) = 3x^2 + 5x - 1$ of x with respect to using Simpson's $\frac{1}{3}$ rd rule (15mks).