NATIONAL OPEN UNVERSITY OF NIGERIA
JABI, ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF PURE AND APPLIED SCIENCE
JANUARY/FEBRUARY 2017_2 EXAMINATION

COURSE CODE: PHY314
COURSE TITLE: NUMERICAL COMPUTATION
TIME: 2 Hours 30 Minutes

CREDIT UNIT:2

INSTRUCTION: Answer Any four questions.

1.

a) Use the intermediate value theorem to show that $f(x) = x^5 - 2x^3 + x^2 - 1$ has a root in the interval [-1, 0] (6 Marks)

b) Convert the following machine numbers to their decimal equivalent

i. 0 1000010 10010000100000000000000

ii. 1 1111010 10010000100000000000000 (7.5 Marks)

c) Evaluate $f(x) = x^3 - 6x^2 + 3x - 0.149$ at x=4.71 using three digit

i. Chopping and

ii. Rounding arithmetic (4 Marks)

2.

a) The polynomial $x^3+x^2 - 3x - 3 = 0$ has root at $-\sqrt{3}$, 1, $\sqrt{3}$, beginning with two suitable value that bracket the $-\sqrt{3}$ root , show the bisection method converges to that root . (8 Marks)

b) With the polynomial given in (a) ,start with $x = -1.5 \quad and\ x = -1.7$ using the secant method and determine how many iterations are required to estimate the root correct to four decimals ii) with the starting values $x = -1.5\ and\ x = -1.1$ which root is obtained by the secant method? iii) what will the root be when the starting values are $x = 1.5\ and\ x = -1.25.$ (9.5 Marks)

3. For the functions given in question 5, evaluate the integral using Simpson's rule $\binom{1}{3}$ with (a) h=0.1 (b) h=0.2 (c) h=0.4 determine the errors in computations. (17 ½ marks)

4. Consider the function $y = f(x) = \cos(x)$ over [0.0,1,2]

a) Use the nodes$x_0 = 0{,}0, and\ x_1 = 1.2$to construct a linear Interpolation polynomial $P_1(x)$. (8.5 Marks)

b) Use the three nodes $x_o = 0.0,\ x_1 = 0.6\ and\ x_2 = 1.2$ to construct a quadratic interpolation polynomial $P_2(x)$. (9 Marks)

5. The following values of a function are given

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
$f(x)$	1.543	1.668	1.811	1.971	2.151	2.352	2.577	2.828	3 .107

Find $\int_{1.0}^{1.8} f(x)dx$, using the trapezoidal rule with (a) h=0.1 (b) h=0.2 and (c) h=0.4. The function $\int x = \cos h\, x$ determine the error in the computations. (17 ½ Marks)