FEDERAL UNIVERSSITY OF TECHNOLOGY, OWERRI
SCHOOL OF HEALTH TECHNOLOGY
DEPARTMENT OF BIOMEDICAL TECHNOLOGY
2011/2012 RAIN SEMESTER EXAMINATION

COURSE: BIOMEDICAL SYSTEM ANALYSIS **COURSE CODE: BMT 302**

Instruction: Instruction: Answer any four questions **Time: 2hours; Unit: 2**

1(a) Discuss three types of models you know in biomedical system analysis

(b) Distinguish between modeling and analysis

(c) Solve this non-linear biomedical mode: $f(x) = 2x^3 - 7x + 2$. For the interval of $0 \leq x \leq 0.5$ with $\varepsilon < 0.001$.Using the following numerical methods: (i) Newton's method (ii) Bisection method. Hence stat with reason(s) the best method.

(Total: 20marks)

2(a) what do you understand by the term simulation tool.

(b) State six (6) sources of mathematical models employed in biomedical field

(c) Solve the biomedical models:

$$2x + 10y - z = 4$$
$$8x - y - z = 1$$
$$x + y - 5z = 3$$

Using any of the following numerical techniques: Jacobi or Gaus-seidel method.

(Total: 20marks)

3(a) State six (6) analytical tools for simulation of biomedical models.

(b) State (i) Secant model

(ii) Regular-Falsi model for simulation of non-linear model.

(c) Solve non-linear biomedical model below

$$4x^2 + 4y^2 = -21$$
$$xy - xz = 0$$
$$2xz + 2y^2 - 8z = -1$$

Using Newton-Raphson approach with initial values (1, 1, 1) for iteration.

(Total: 20marks)

4(a) State four (4) finite difference schemes with their model and application regards to ODE.

(b) Solve (i) $y' = x + y$. Using forward difference scheme.

Given that$x(0) = 0$ *and* $y(0) = 0.8$ *for range of* $x = 0(0.4)2.0$.

(Total: 20marks)

5(a) State steps involves in solving first order ordinary differential equation using:

(i) Euler's method and (ii) Euler-Cauchy method.

(b) Solve $y' = x^2 - 4y$ using the two (2) methods above and state the best method with reasons.

(Total: 20marks)

6(a) State steps involves in solving Second order ordinary differential equation using Euler-Cauchy method

(b) State two reasons for using the following in simulation of biomedical system over one another: Euler's method and Euler-Cauchy method.

(Total: 20marks)