AFE BABALOLA UNIVERSITY, ADO-EKITI, EKITI STATE, NIGERIA
COLLEGE OF ENGINEERING

BACHELOR OF ENGINEERING ASSIGNMENT I

ENG 381: Engineering Mathematics III

Session: 2019/2020 **Semester:** First **Unit:** 3 **Duration:** 3 days

Instruction: Answer all the questions.

Question 1 [20 Marks]

The dynamic model of a body in motion performing damped forced vibrations is as in Equation (1).

$$\frac{d^2x}{dt^2} + 5\frac{dx}{dt} + 6x = \cos t \qquad (1)$$

Given that when $t = 0,\ x = 0.1$ and $\frac{dx}{dt} = 0,$

(a) using the Auxiliary Equation Method, obtain the solution of the model in form of an expression having x as a function of t,

(b) with the aid of a MATLAB *mfile* program, plot the relationship between x and t for $0 \le t \le 15$ time unit using a step size of 0.01 unit, and

(c) write the steady-state solution of the model in form of $x = K\sin(t + a)$.