



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

**BACHELOR OF ENGINEERING ASSIGNMENT VI**

**ENG 382: Engineering Mathematics IV**

**Session:** 2019/2020

**Semester:** Second

**Unit:** 3

**Duration:** 5 days

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**Instruction:** Kindly solve all the problems.

**Question 1 [20 Marks]**

The temperature distribution of a rod can be represented by the model given in Equation (1), where the temperature is in *Kelvin* ( $K$ ).

$$u_t - cu_{xx} = 0, \quad \text{for} \quad 0 \leq x \leq 1m, \quad 0 \leq t \leq 0.1day \quad (1)$$

Given that the initial temperature of the rod is:

$$u(x,0) = x^4 K, \quad \text{for} \quad 0 \leq x \leq 1m, \quad (2)$$

and the temperatures at  $x = 0m$  and  $x = 1m$  are, respectively,

$$u(0,t) = 0K, \quad \text{and} \quad u(1,t) = 1K \quad \text{for} \quad 0 \leq t \leq 0.1day, \quad (3)$$

if the mesh size is  $\Delta x = 0.2m$ , the time step is  $\Delta t = 0.02day$  and the parameter  $c = 1 \frac{m^2}{day}$ , using explicit finite-difference method,

- manually obtain the temperature profile of the rod in tabular form, and
- generate the profile in tabular and 3D graphical forms with the aid of Microsoft Excel.

Thank you and, please, stay safe.