Student Name: _____ Reg. No: _____

Course Title: Differential Equations Course Code: CSSS-2763 , Sec: E7

Course Instructor: Fatima Asif Exam Type: Assignment # 2

Question#1

Archaeologists used pieces of burned wood, or charcoal, found at the site to date prehistoric paintings and drawings on walls and ceilings of a cave in Lascaux, France. Determine the approximate age of a piece of burned wood, if it was found that 85.5% of the C-14 found in living trees of the same type had decayed.

Question#2

(a) Consider the initial-value problem $dA/dt=kA, A(0) =A_0$ as the model for the decay of a radioactive substance. Show that, in general, the half-life T of the substance is $T=-(\ln 2)/k$.

(b) Show that the solution of the initial-value problem in part (a) can be written $A(t) = A_0 2^{-t/T}$.

(c) If a radioactive substance has the half-life T given in part (a), how long will it take an initial amount $A0$ of the substance to decay to $\frac{1}{8}A_0$?

Question#3

A small metal bar, whose initial temperature was 20° C, is dropped into a large container of boiling water. How long will it take the bar to reach 90° C if it is known that its temperature increases 2° in 1 second? How long will it take the bar to reach 98° C?

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