**Total number of printed pages - 01**                                    **B.TECH**
                                                                          **PECE 5404**

8th  Semester Regular / Back Examination 2016 - 17
**PROCESS SIMULATION AND MODELING**
**BRANCH : Chemical Engineering**
**Time : 3 Hours**
**Max Marks : 70**
**Question Code : Z226**
*Answer Question No. 1 which is compulsory and any FIVE from the rest.*
*The figures in the right-hand margin indicate marks.*
*Answer all parts of a question at a place.*

1.          Answer the following questions :                                    (2 x 10)
   (a)   What is mathematical modeling?
   (b)   Write the application of simulation.
   (c)   Define phase equilibrium.
   (d)   Define equation of state.
   (e)   Write the demerits of Fibonacci search method.
   (f)   What is law of mass action?
   (g)   What is Wegstein'smethod?
   (h)   What is golden ratio?
   (i)   Differentiate between discrete & continuous simulation model.
   (j)   Define the basic & non-basic variable in LPP.

2.          Discuss the uses of mathematical model & its principle of formulation.       (10)

3.          Write the mathematical model of multi-component flash drum with a neat sketch.    (10)

4.   (a)   Write the component continuity equations for a perfectly mixed batch reactor (no
           inflow & outflow) with first-order isothermal consecutive, simultaneous, and
           reversible reactions.                                                (5)
     (b)   Describe the heating and cooling phase of a batch reactor.            (5)

5.   (a)   Find the root of the equation $x^x = 100$, correct to 4 decimal places, using Newto-
           Raphson method.                                                      (5)
     (b)   Find the root of the equation $\sin x - \cosh x + 1 = 0$, correct to 4 decimal places,
           byRegulafalsi method. The root lies between 1 & 2.                    (5)

6.          Solve the following problem using geometric programming
           Min $Z = 5x_1x_2^{-1}x_3^2 + x_1^{-2}x_3^{-1} + 10x_2^3 + 2x_1^{-1}x_2x_3^{-3}$    (10)

7.          Write the mathematical model of ideal binary distillation column.      (10)

8.          Write short notes on any **TWO**:                                    (5 x 2)
   (a)   Batch distillation
   (b)   Digital simulation
   (c)   Dichotomous search
   (d)   LPP

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