UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, August 2020

Programme Name: B. Tech (CE+RP)   **Semester : VIII**
Course Name : Process Modelling and Simulation   **Time : 03 hrs**
Course Code : CHEG440   **Max. Marks : 100**

Instructions: 1) Assume suitable data wherever necessary. 3) Report only final values after computation.

SECTION A (Total Marks: 5 x 6 = 30)

S. No.	Choose the correct option(s).	Marks	CO

Q 1	---------- does not follow the changes over time that results from the system activities.
	  a) Static model
	  b) Dynamic model
	  c) Analytical model
	  d) Numerical model
		06	CO1

Q 2	The system is modeled under isothermal condition when
	  a) Volume is constant
	  b) Temperature is constant
	  c) Pressure is constant
	  d) None of these
		06	CO2

Q 3	One advantage of process simulation is that
	  a) It's helpful where mathematical models are not applicable
	  b) It can be used to find an optimal solution
	  c) Simulation models are cheap to build
	  d) It does not involve calculations
		06	CO3

Q 4	ANN consists of
	  a) Multilayer processing of information
	  b) Summation function
	  c) Transfer function
	  d) All of these
		06	CO4

Q 5	When the system parameters are variable in both, temporal and spatial domain, the system is better represented by
	  a) Partial differential equations
	  b) Ordinary differential equations
	  c) Analytical equations
	  d) Polynomial equations
		06	CO5

SECTION B (Total Marks: 10 x 5 = 50)			
Q 7	Discuss about the classification of mathematical models used in process modeling and simulation.	10	CO1

Q 8	Discuss the assumptions of the bioreactor modeling. Also, discuss about the growth rate model used for bioreactor.	10	CO2
Q 9	Solve the following system by Gauss-Seidel method and report the final values of x, y and z. 2x + 3y + z = 9 x + 2y + 3z = 6 3x + y +2z = 8 _**OR**_ Explain about the approaches used in process simulation.	10	CO3
Q 10	State the advantages and disadvantages of artificial neural network method.	10	CO4
Q 11	Explain about the finite difference method used for solving the partial differential equations.	10	CO5
SECTION-C (Total Marks: 1 x 20 = 20)			

Q 12	A CSTR is operated at dynamic condition to carry out the first order, liquid phase exothermic reaction, $A \rightarrow B$. A mathematical model is to be developed and simulated for a CSTR. Using this information, answer the following.
	   a) State the assumptions applicable to this model.
	   b) What are the fundamental equations used to model a CSTR?
	   c) Discuss about the state variables, input variables and parameters.
	   d) Explain about the numerical methods used for solving these equations.
		05
		05
		05
		05
			CO2
			CO3