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Roll No

CM-804-GS
B.E. VIII Semester
Examination, December 2020
Grading System (GS)
Chemical Process Modeling and Simulation

Time : Three Hours

Maximum Marks : 70

- Note:** i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) Explain how a mathematical model is at best an approximation to the physical world.
b) What are limitations of mathematical models? Give examples.
2. a) Discuss advantages, limitations and applications of modeling in chemical industries.
b) What is Dimensional consistency of equation? Explain with the help of appropriate example. How dimensional analysis is helpful in modeling.
3. a) Define Lumped parameter, steady state models.
b) What does "Simulation" mean? Describe the capabilities and specific benefits of simulation modeling.
4. a) Write the difference between modelling and simulation.
b) Explain how to design a simulation experiment and how to perform a simulation analysis.

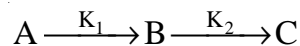
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5. a) Explain the tearing a system equations.
b) Explain Muller method as iterative convergence method.
6. a) Explain False position method as iterative convergence method.
b) Write down common computer programming for Newton-Raphson method.

7. The following reactions are carried out in liquid phase at constant temperature in a batch reactor:



Initially the reactor is charged with pure A of concentration 1 Kmol/m^3 . The rate constants at the temperature of reaction are $K_1 = 3 \text{ h}^{-1}$ and $K_2 = 1 \text{ h}^{-1}$. Find the concentrations of A and B at 0.2 h and 0.4 h employing fourth-order Runge-Kutta method.

8. Write a short note on any two of the following:
 - i) Modeling of reactors
 - ii) Simulation of absorber
 - iii) Sources of model equations
