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Question Paper Code: 97903

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Seventh Semester

Chemical Engineering

19UCH703 - PROCESS MODELING AND SIMULATION

(Regulations 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- _____ is the process of representing a model which includes its construction and working. CO1- U
(a) Simulation (b) Modeling (c) Modeling & Simulation (d) None of the above
- In which year, first special-purpose simulation languages were developed? CO1- U
(a) 1940 (b) 1960 (c) 1970 (d) 1980
- According to lumped system analysis, solid possesses thermal conductivity that is CO2- U
(a) Infinitely large (b) Infinitely small (c) Moderate (d) 50% small
- What is the value of characteristics length for cylinder? CO3- U
(a) R/5 (b) R/4 (c) R/3 (d) R/2
- Transient heat conduction depends upon CO3- U
(a) Time and space (b) Temperature & time
(c) Time, temperature & space (d) None of the above
- Temperature wave in transient heat conduction depends upon CO3- U
(a) Piston angle (b) Crank angle
(c) Both piston & crank angle (d) None of the above
- Which of the following remains constant in the steady state system? CO4- U
(a) Mass (b) Energy (c) Momentum (d) Density

8. A reaction occurs in a vessel such that its mass does not change but its temperature is increased, then the system is which of the following? CO4- U
 (a) Steady-state (b) Unsteady-state (c) Cannot say (d) None of the above
9. In what ratio 57 octane and 63 octane should be mixed to obtain 59 octane? CO5- Ana
 (a) 1:1 (b) 2:1 (c) 3:1 (d) 4:1
10. Feed of a reactor has 0.25 mass fraction of H₂O and 0.75 mass fraction of CO₂ with rate 4 g/hr, if the product rate is 20 g/hr what is the mass of CO₂ in the product side? CO5- App
 (a) 3 grams (b) 9 grams (c) 15 grams (d) 21 grams

PART – B (5 x 2= 10 Marks)

11. How does a model differ from a theory? CO1- U
12. What is degrees of freedom analysis? CO2- U
13. How does a level control system work? CO3- U
14. What do you understand by compressible flow? CO4- U
15. What is hierarchical model structure? CO5- U

PART – C (5 x 16= 80 Marks)

16. (a) Discuss about mathematical model in process modeling and simulation? CO1- U (16)
 Or
 (b) What are the basic concepts of Modeling and simulation? CO1- U (16)
17. (a) Develops the heat exchanger with steam modeling and derive the simulation for it. CO2- U (16)
 Or
 (b) Explain the mathematical modeling of evaporator. CO2- U (16)
18. (a) Develops the model for a process Liquid storage tank. CO3- Ana (16)
 Or
 (b) Discuss briefly about the Conservation laws and auxiliary relations used in Mathematical modeling of chemical process. CO3- U (16)
19. (a) Develops the model for a mass exchange in packed column. CO4- Ana (16)
 Or
 (b) Explain about the single-component vaporizer. CO4- U (16)
20. (a) Explain the Hierarchy in model development. CO5- U (16)
 Or
 (b) Explain about the Population balance and stochastic modeling CO5- U (16)

