A

Reg. No. :

Question Paper Code: 97903

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

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)

1. _____ is the process of representing a model which includes its construction   CO1- U
   and working.

   (a) Simulation   (b) Modeling   (c) Modeling & Simulation   (d) None of the above

2. In which year, first special-purpose simulation languages were developed?   CO1- U

   (a) 1940   (b) 1960   (c) 1970   (d) 1980

3. According to lumped system analysis, solid possesses thermal conductivity that is   CO2- U

   (a) Infinitely large   (b) Infinitely small   (c) Moderate   (d) 50% small

4. What is the value of characteristics length for cylinder?   CO3- U

   (a) R/5   (b) R/4   (c) R/3   (d) R/2

5. Transient heat conduction depends upon   CO3- U

   (a) Time and space   (b) Temperature & time

   (c) Time, temperature & space   (d) None of the above

6. 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

7. 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 H_2O and 0.75 mass fraction of CO_2 with rate 4 g/hr, if the product rate is 20 g/hr what is the mass of CO_2 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)

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