Register No.: ....　　Name : ....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023

CHEMICAL ENGINEERING

(2020 SCHEME)

Course Code : 20CHT308

Course Name : Comprehensive Course Work

Max. Marks : 50　　　　　　　　　　　　　　　　**Duration : 75 Minutes**

PART A

(Answer all questions. Each question carries 1 mark)

1　　If the fluid particles move in a zig -zag way, the flow is called
    A. Unsteady s　　　　　　　　**B.** Turbulent
    C. Non- uniform　　　　　　　**D.** incompressible

2　　Fluid flow through a packed bed is represented by _____ equation.
    A. Fanning's　　　　　　　　**B.** Ergun's
    C. Hagen-Poiseuill's　　　　　**D.** None of these

3　　Flow occurring in a pipeline when a valve is being opened is
    A. Steady　　　　　　　　　　**B.** Unsteady
    C. Laminar　　　　　　　　　**D.** vortex

4　　The dividing factor for converting one poise into MKS unit of dynamic viscosity is
    A. 9.81　　　　　　　　　　　**B.** 0.981
    C. 98.1　　　　　　　　　　　**D.** 981

5　　An example of a dilatant fluid is
    A. quicksand　　　　　　　　**B.** Sewage emulsion
    C. Rubber latex　　　　　　　**D.** Non colloidal solution

6　　The friction resistance in pipe is inversely proportional to V^2, according to
    A. Darcy Equation　　　　　　**B.** Reynold's number
    C. Froude number　　　　　　**D.** Weber Froude

7　　Van Laar equation deals with the activity coefficients in
    A. Binary solutions　　　　　　**B.** Ternary solutions
    C. Azeotropic mixture　　　　　**D.** None of these

8　　A refrigerator may be termed as a
    A. Heat engine　　　　　　　　**B.** Carnot engine
    C. Heat pump　　　　　　　　**D.** None of these

9　　During Joule-Thomson expansion of gases
    A. Enthalpy remains constant　　**B.** Temperature remains constant
    C. Entropy remains constant　　**D.** None of these

10　　A chemical reaction will occur spontaneously at constant pressure and temperature, if the free energy is
    A. Zero　　　　　　　　　　　**B.** Negative
    C. Positive　　　　　　　　　**D.** Infinity

11　　For ideal gases, the ratio of fugacity to pressure is
    A. zero　　　　　　　　　　　**B.** -1
    C. 1　　　　　　　　　　　　　**D.** ∞

12 Measurement of thermodynamic property of temperature is facilitated by
    _____ law of thermodynamics
    A. First   **B.** Zeroth
    C. Second   **D.** Third

13 What is the emissivity of a black body?
    A. 1   **B.** 0
    C. 0.90   **D.** 0.5

14 Which of the following is used in case of heat flow by conduction through a
    cylinder?
    A. Logarithmic mean area   **B.** Arithmetic mean area
    C. Geometric mean area   **D.** None of these

15 Fourier's law applies to the heat transfer by
    A. Convection   **B.** Radiation
    C. Conduction   **D.** All (a), (b), (c)

16 At what value of Prandtl number, conduction is negligible in the turbulent core
    of a fluid flowing through a heated pipe?
    A. 0.5   **B.** < 0.5
    C. >0.6   **D.** <0.1

17 Economy of an evaporator is influenced by the
    A. Steam pressure   **B.** Feed temperature
    C. Number of effect   **D.** Both (b) & (c)

18 Heat flux through several resistance in series is analogous to the current flowig
    through several
    A. Resistance in parallel   **B.** Capacitor in series
    C. Resistance in series   **D.** None of these

19 Alcohol is dehydrated using.......distillation
    A. Extractive   **B.** Azeotropic
    C. Steam   **D.** Molecular

20 Raoult's law is applicable for
    A. Ideal solutions   **B.** Real solutions
    C. Mixture of alcohol and water   **D.** Non ideal gases

21 In a binary system, separation is very efficient, when the relative volatility is
    A. 1   **B.** >1
    C. <1   **D.** 0.5

22 Drift in a cooling tower is
    A. The water entrained by the   **B.** Dependent on the water lost by
          circulating air   evaporation
    C. Desirable   **D.** All of the above

23 Azeotropic distillation is employed to separate
    A. Constant boiling mixtures   **B.** High boiling mixtures
    C. Mixture with very high relative   **D.** Heat sensitive materials
          volatility

24 Flooding in a column results due to
    A. High pressure drop   **B.** Low pressure drop
    C. Low velocity of the liquid   **D.** High temperature

25 Catalyst is a substance, which .....chemical reaction
    A. Increases the speed of a   **B.** Decreases the speed of a
    C. Can either increase or decrease   **D.** Alter the value of equilibrium
          the speed of a   constant in a reversible

26 Rate of a chemical reaction is independent of the concentration of the reactant for a ..... reaction
   A. Zero order
   B. Third Order
   C. Consecutive
   D. None of these

27 Half life period of a chemical reaction is
   A. The time required to reduce the concentration of the reacting substance to half its initial value
   B. Half of the space time of a reaction
   C. Half of the residence time of the reaction
   D. None of these

28 The half life period of a first order reaction is given by
   A. 1.5 K
   B. 2.5 K
   C. 0.693 K
   D. 6.93 K

29 Semi batch reactor is preferred,when a/an
   A. A highly exothermic reaction is to be controlled
   B. Undesirable side reaction(at high concentration of one of the reactants) is to be controlled
   C. A gas is to be reacted with liquid(Hydrogenation of Fat)
   D. All of the above

30 A plug-flow reactor is characterised by
   A. High capacity
   B. Presence of axial mixing
   C. Presence of lateral mixing
   D. Constant composition & temperature of reaction mixture

PART B
(Answer all questions. Each question carries 2 marks)

31 A piece of metal of specific gravity 9 floats in mercury of specific gravity 13.6. What fraction of its volume is under mercury?
   A. 0.5
   B. 0.4
   C. 0.34
   D. 0.66

32 A liquid is pumped at a rate of 600 litres using 1000 rpm. If the rpm is changed to 1100, the liquid pumped is _____ litres.
   A. 600
   B. 660
   C. 1.1
   D. 60

33 The values of Cp and Cv for monoatomic gas in Cal/mol-K are
   A. 5 and 3
   B. 3.987 and 1.987
   C. 0.66 and 1.987
   D. None of these

34 A chemical reaction will occur spontaneously at constant pressure and temperature, if the free energy is
   A. zero   positive
   C. negative   none of these

35 The rate of emission of radiation by a body does not depend upon the
   A. wavelength of radiation
   B. nature of the surface
   C. surface temperature of the body
   D. shape and porosity of the body

36 Air enters a counter flow heat exchanger at 70°C and leaves at 40 ^{o}C. Water enters at 30oC and leaves at 50°C. The LMTD in ^{o}C is
   A. 5.65
   B. 4.43
   C. 19.52
   D. 20.17

37 If the stage efficiency is 50%, then the value of Y is
   A. 1/12
   B. 1/6
   C. 1/4
   D. 1/3

38 In a packed bed absorption column, the channelling will be noted by the
   A. Increase in flow rate
   B. Sharp drop in pressure drop
   C. Sharp rise in pressure drop
   D. None of these

39   In a recycle reactor, the recycle ratio is zero. This means the reactor is basically a
   A.   PFR   **B.**   CSTR
   C.   PFR with zero radial mixing   **D.**   None of these

40   Time required for 50% decomposition of a liquid in an isothermal batch reactor following first order kinetics is 2 minutes. The time required for 75% decomposition will be about _____ minutes
   A.   3   **B.**   4
   C.   6   **D.**   8