Register No.: ..... Name : .....

# SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**SIXTH SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 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 For the transfer of solution of thick slurry, the pump used is a _____ pump

**A.** Gear **B.** Centrifugal

**C.** Reciprocating **D.** Diaphram

2 Hydraulic radius is the ratio of

**A.** Flow area to wetted perimeter **B.** Wetted perimeter to flow area

**C.** Flow area to square of wetted perimeter **D.** Square root of flow area to wetted perimeter

3 The specific weight of a substance

**A.** Does not change with location **B.** Is its weight per unit volume

**C.** Is its mass per unit volume **D.** None of the above

4 Cavitation in a centrifugal pump results from

**A.** High discharge pressure **B.** Low barometric pressure

**C.** High discharge velocity **D.** High discharge rate

5 One stoke is equal to

**A.** $1ft^2/s$ **B.** $1m^2/s$

**C.** $1mm^2/s$ **D.** $1\ cm^2/s$

6 An example of a dilatant fluid is

**A.** quicksand **B.** Sewage emulsion

**C.** Rubber latex **D.** Non colloidal solution

7 During Joule-Thomson expansion of gases

**A.** Enthalpy remains constant **B.** Temperature remains constant

**C.** Entropy remains constant **D.** None of these

8 Entropy is a measure of the _____ of a system.

**A.** Disorder **B.** Temperature changes

**C.** Orderly behaviour **D.** None of these

9 Fundamental principle of refrigeration is based on the _____ law of thermodynamics.

**A.** zeroth **B.** first

**C.** second **D.** third

10 Heating of water under atmospheric pressure is an _____ process.

**A.** Isochoric **B.** isobaric

**C.** Adiabatic **D.** isothermal

11 High _____ is an undesirable property for a good refrigerant.

**A.** Specific heat **B.** viscosity

**C.** Latent heat of vapourisation **D.** Both B and C

12 Water on heating from 1 to 4°C

**A.** Contracts **B.** expands

**C.** Has same volume **D.** May contract or expand

13 In which mode of heat transfer, the Biot number is important?

**A.** Transient heat conduction **B.** Natural convection

**C.** Forced convection **D.** Radiation

14 Economy of an evaporator is influenced by the

**A.** Steam pressure **B.** Feed temperature

**C.** Number of effect **D.** Both (b) & (c)

15 What is the emissivity of a black body?

**A.** 1 **B.** 0

**C.** 0.90 **D.** 0.5

16 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

17 Which is the most suitable for cold viscous feed?

**A.** Forward feed **B.** Backward feed

**C.** Mixed feed **D.** Parallel feed

18 The unit of heat transfer coefficient is

**A.** BTU/hr. $ft^2\ ^0F$ **B.** BTU/hr. ft. $^0F$

**C.** BTU/hr. $^0F$ **D.** BTU/hr. ft

19 Mass transfer coefficient is defined as

**A.** Flux = Coefficient / concentration difference **B.** Coefficient = flux/concentration difference

**C.** Flux = concentration difference/coefficient **D.** None of these

20 Flooding in a column results due to

**A.** High pressure drop **B.** Low pressure drop

**C.** Low velocity of the liquid **D.** High temperature

21 Raoult's law is applicable for

**A.** Ideal solutions **B.** Real solutions

**C.** Mixture of alcohol and water **D.** Non ideal gases

22 In a binary system, separation is very efficient, when the relative volatility is

**A.** 1 **B.** >1

**C.** <1 **D.** 0.5

23 Drift in a cooling tower is

**A.** The water entrained by the circulating air **B.** Dependent on the water lost by evaporation

**C.** Desirable **D.** All of the above

24 Dry bulb temperature of the gas is ……. the wet bulb temperature

**A.** Less than **B.** More than

**C.** Equal to **D.** None of these

25 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

26 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

27 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 the speed of a **D.** Alter the value of equilibrium constant in a reversible

28 For a tubular flow reactor with uniform concentration and temperature , the independent variable is

**A.** Time **B.** Length

**C.** Diameter **D.** None of these

29 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

30 Molecularity of a reaction

**A.** Is always equal to the overall order of reaction **B.** May not be equal to the order of the reaction

**C.** Can't have a fractional value **D.** Both B & C

**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 lubricant 100 times more viscous than water would have a viscosity (in Pa-s)

**A.** 0.011 **B.** 0.1

**C.** 1 **D.** 10

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 Clausius – Clayperon equation is application to _____ equilibrium processes

**A.** soild - vapour **B.** solid - liquid

**C.** liquid-vapour **D.** all a, b and c

35 In a forward feed multiple effect evaporator, the pressure is

**A.** Highest in last effect **B.** Lowest in last effect

**C.** Same in all effects **D.** None of these

36 Absorptivity and reflectivity of a perfect black body are respectively

**A.** 1 and 0 **B.** 0 and 1

**C.** 1 and $\infty$ **D.** 0 and 0,5

37 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

38 The relative volatility of a binary mixture at the azeotropic composition is

**A.** 1 **B.** >1

**C.** 0 **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