Register Number……

B.TECH. DEGREE EXAMINATIONS: NOVEMBER 2009

Third Semester

BIOTECHNOLOGY

U07BT308: Principles of Chemical Engineering

Time: Three Hours **Maximum Marks: 100**

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

1. Gypsum is chemically
   (a) Calcium chloride (b) Potassium sulphate
   (b) Sodium sulphate (d) Calcium sulphate

2. Unsaturated oils compared to saturated oils have
   (a) Lower melting point & higher reactivity to oxygen
   (b) Higher melting point & higher reactivity to oxygen
   (c) Lower melting point & lower reactivity to oxygen
   (d) Higher melting point & lower reactivity to oxygen

3. Number of gm moles of solute dissolved in one litre of a solution is called its
   (a) equivalent weight (b) molarity (c) molality (d) normality

4. 1 bar is almost equal to .....atmosphere.
   (a) 1 (b) 10 (c) 100 (d) 1000

5. In an adiabatic process, the
   (a) heat transfer is zero b) temperature change is zero
   (b) work done is a path function d) enthalpy remains constant

6. Which of the following is an extensive property of a system?

   (a) Heat capacity (b) Molal heat capacity (c) Pressure (d) Concentration

7. Dry ice is

   (a) moisture free ice (b) solid helium (c) solid carbon dioxide (d) solid NaOH

8. Potential flow is characterised by the
   (a) irrotational and frictionless flow
   (b) irrotational and frictional flow
   (c) one in which dissipation of mechanical energy in to heat occurs
   (d) formation of eddies within the stream

9. Bernoulli's equation describes the
   (a) mechanical energy balance in potential flow
   (b) kinetic energy balance in laminar flow
   (c) mechanical energy balance in turbulent flow
   (d) mechanical energy balance in boundary layer

10. The value of critical Renold's number for pipe flow is

    (a) 1300 (b) 10000 (c) 100000 (d) 1000

PART B (10 x 2 = 20 Marks)

11. State various unit systems available in engineering system.

12. What is conservation of mass and energy?

13. What is relative humidity?

14. What are degrees of freedom?

15. What is sensible heat?

16. State Newton's law of viscosity.
17. What is compressible fluid? Give an example.
18. State two applications of fluid mechanics in chemical engineering.
19. Define power number in Agitation.
20. What are the types of pumps used in chemical industry?

PART C (5 x 14 = 70 Marks)

21. (a) (i) Explain various methods available for experimental curve fitting. (7)

(ii) Explain the concept of numerical differentiation for solving first order differential equation by any one method. (7)

(OR)

(b) Explain in details various types of unit system used in chemical engineering practice with suitable examples

22. (a) A solution chloride in water contains 180 gms at 25^{o}C. The density of the solutions is 1.130 mg/cc at 25^{o}C. Calculate

(i) composition in weight percent

(ii) volumetric percent of water

(iii) composition in mole percent.

(OR)

(b) (i) Describe the various steps to be followed in material balance calculation. (7)

(ii) Calculate the heat required to raise the temperature of water of 10 kg from 30 to 40 degree centigrade. (7)

23. (a) Explain the basic principles of absorption, distillation and leaching & extraction.

(OR)

(b) Explain various thermodynamic process like constant volume, constant pressure, isothermal and adiabatic process.

24. (a) Explain the concept of heat capacity and how it is being calculated for various substances.

(OR)

(b) Derive the Bernoulli's equation for the steady flow of fluids. Give some applications of it.

25. (a) Explain the operating characteristics of centrifugal pump.

(OR)

(b) Explain various phenomena of fluidization in detail.

****