Hall Ticket No:

Question Paper Code :

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
B. Tech II Semester Regular Examinations May - 2016
(Regulations: R15)
INTRODUCTION TO CHEMICAL ENGINEERING
(CHEMICAL)

Date: **Time: 3 hours**   **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT-I

1.   a) Define Unit Operations and Unit Process. Give one example for each.   **(4M)**

      b) Explain what are material and energy balances and discuss their importance.   **(8M)**

OR

2.   a) Define mass fraction, mole fraction, Ideal gas law and avagadro hypothesis   **(4M)**

      b) Air contains 21% O_2 and 79% N_2 by volume. Calculate the composition of air in terms of percent by weight. Also calculate the density of air at pressure of 730 mm Hg and at a temperature of $25^{\circ}C$. Assume air to behave as an ideal gas.   **(8M)**

UNIT-II

3.   a) Define Newton's law of viscosity. Explain the terms. What is kinematic viscosity and its units?   **(4M)**

      b) What is the viscosity of the air filled in a tube of I.D 5 cm if 15 cm long cylindrical metal rod slides with a velocity of 0.1 m/s inside the tube? Assume the mass of the rod is 0.5 kg and the clearance between the rod and water of the tube is 0.05 mm.   **(8M)**

OR

4.   a) Define NPSH and cavitation.   **(4M)**

      b) Write down Bernoulli's equation in its complete form and explain the terms in it.   **(8M)**

UNIT-III

5.   a) Define Fourier law of conduction and explain the terms involved.   **(4M)**

      b) Determine the rate of heat loss Q through a wall of red brick (k= 0.70 W/m-K), 5m in length, 4m in height and 0.25 m in thickness, if the wall surfaces are maintained at 100^0C and 30^0C respectively.   **(8M)**

OR

6. a) Explain different feeding techniques to the multiple effect evaporator.   **(4M)**

    b) With a neat flow diagram explain the working of forced circulated type evaporator.   **(8M)**

UNIT-IV

7. a) Explain Fick's law of diffusion and explain it terms.   **(4M)**

    b) Explain the various parameters for the choice of solvent for absorption.   **(8M)**

OR

8. a) Define and explain phase rule and relative voltality   **(4M)**

    b) Explain   i) Flash distillation   ii) Batch or differential distillation   **(8M)**

UNIT-V

9. a) What is extraction? Distinguish between co-current and counter current extraction.   **(4M)**

    b) With a neat diagram explain the working of mixer settler.   **(8M)**

OR

10. a) Define wet bulb temperature, dry bulb temperature.   **(4M)**

    b) Explain the working of a tray drier with a neat diagram.   **(8M)**

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UNIT-I

1.   a) Define mole, mole fraction, volume percent, mass fraction.   **(4M)**

      b) Discuss the role of a chemical engineers to betterment of society.   **(8M)**

OR

2.   a) Define average molecular weight and calculate the average molecular weight of air.   **(4M)**

      b) Discuss briefly about different subjects of chemical engineering and their importance.   **(8M)**

UNIT-II

3.   a) Define Newtonian and non-newtonian fluids   **(4M)**

      b) i)Explain the continuity equation.   **(4M)**
       ii) Ina pipe flowing air, the velocity at section 1 (I.D. 50 mm) is 15 m/s and the density is 2.1 kg/m^3. What is the velocity at section 2 (I.D. 75 mm) if air is maintained at a pressure of 1.8 atm and 25°C   **(4M)**

OR

4.   a) Explain fluidization and its applications.   **(4M)**

      b) Explain the working of a centrifugal pump with a schematic diagram. What are its applications?   **(8M)**

UNIT-III

5.   a) Define and explain the laws of radiation.   **(4M)**

      b) With a neat diagram explain the working of a 1-1 shell and tube heat exchanger.   **(8M)**

OR

6.   a) Define Prandtl number and Nusselt number and explain their importance.   **(4M)**

      b) With a neat flow diagram explain the working of long tube vertical type evaporator.   **(8M)**

UNIT-IV

7. a) Explain reflux ratio and plate efficiency. **(4M)**

   b) With a neat schematic diagram explain the working of fractional distillation column **(8M)**

OR

8. a) Define diffusivity and mass transfer coefficient with units. **(4M)**

   b) Distinguish between the sieve plate and packed columns for gas liquid operations. **(8M)**

UNIT-V

9. a) Explain the principle of extraction by defining the distribution coefficient. **(4M)**

   b) Discuss in detail about single stage and multistage extractions. **(8M)**

OR

10. a) Explain bound moisture and critical moisture. **(4M)**

    b) Explain the working of a rotary drier with a neat diagram. **(8M)**