SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x8=16)

Q.23 Discuss the concept of material balance and write steps of procedure to carry material balance. (CO3)

Q.24 A distillation column is used to separate 1000 kg/hr of mixture containing 60% benzene and rest toluene. The distillate or overhead product contains 10 % toluene and bottom product contains 92% toluene. Calculate the flow rate of overhead or distillate and bottom product. (CO3)

Q.25 A Coke containing 80% carbon and 20% non-combustion material by weight. Calculate. (CO4)

i) The amount of O_2 theoretically required to burn 150kg of coke completely.

ii) Calculate the amount of nitrogen in the product stream if 40% excess air is supplied.

No. of Printed Pages : 4
Roll No. .....

3rd Sem. / Chemical Engineering / Chemical (Pulp & Paper)
Subject : Chemical process calculations

Time : 3 Hrs. M.M. : 60

SECTION-A

Note: Multiple choice questions. All questions are compulsory (6x1=6)

Q.1 Burning is always an _____ process. (CO4)

a) Endothermic b) Exothermic
c) No heat transfer d) None of these

Q.2 Which one of the following is the unit of temperature? (CO1)

a) Celsius b) Kelvin
c) Rankine d) All of these

Q.3 Number of atoms present in 1 mole of substance (CO2)

a) 6.022×10^{23} b) 60.22×10^{23}
c) 6.022×10^{20} d) 6.022×10^{25}

Q.4 Number of moles of solute present per kg of solvent (CO2)

a) Molarity b) Molality
c) Normality d) None of these

Q.5 Heat energy required for phase change is called (CO4)

a) Sensible heat

b) Heat of reaction

c) Latent heat

d) Heat of solidification

Q.6 The quantity of matter present in an object is (CO1)

a) Mass b) Molecular weight

c) Moles d) Molar mass

SECTION-B

Note: Objective/ Completion type questions. All questions are compulsory. (6x1=6)

Q.7 Define molarity. (CO2)

Q.8 State Boyle's law. (CO2)

Q.9 Define sensible heat. (CO4)

Q.10 Calculate the number of moles present in 196gm of sulphuric acid (H_2SO_4). (CO2)

Q.11 State ideal gas law. (CO2)

Q.12 Expand CGS. (CO1)

SECTION-C

Note: Short answer type questions. Attempt any eight questions out of ten questions. (8x4=32)

Q.13 Prove that mole percent is equal to volume percent. (CO2)

Q.14 Calculate the number of kilo moles of HNO_3 containing 144 kg of Oxygen. (CO2)

Q.15 Explain in brief theoretical oxygen requirement. (CO4)

Q.16 Describe in brief viscosity and write its unit. (CO1)

Q.17 Explain in brief heat of formation and heat of combustion. (CO4)

Q.18 List down the basic steps taken for energy balance. (CO4)

Q.19 Derive relation between C_p and C_v. (CO2)

Q.20 A solid mass of 40 kg containing moisture is dried from 50 percent moisture to 10 percent moisture. Calculate the quantity of water evaporated. (CO3)

Q.21 Discuss the concept of purge operation with the help of neat diagram. (CO3)

Q.22 Calculate the gm weight of Na_2SO_4 needed to prepare one litre of 5 molar (5M) Na_2SO_4 solution. (Co2)