SECTION-D

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

Q.23 Describe Hess's law of constant heat summation in detail with the help of a suitable example.

Q.24 Discuss the material balance procedure in detail for plants that are comprised of multiple interconnected units with the help of a neat block diagram.

Q.25 What is importance of energy balance? Describe general guidelines for doing energy balance in detail.

3rd Sem. / Chemical, 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 For which type of process the balances are related to unit time?

     a) batch process   b) continuous process

     c) unit process   d) all of above

Q.2 The material balance is based upon which of the following laws?

     a) conservation of linear momentum

     b) conservation of angular momentum

     c) conservation of mass

     d) conservation of charge

Q.3 What is MKS unit of density?

     a) kg/m^3 b) g/cm^3

     c) lb/ft^3 d) kg/m^2

Q.4 Which of the following is the material balance equation for system under steady state?

a) input + output = accumulation

b) input = accumulation

c) output = accumulation

d) input = output

Q.5 If the system is perfectly insulated, then?

a) $Q = DU$ b) $Q = DH$

c) $DU = 0$ d) $Q = 0$

Q.6 All gases resulting from a combustion process including water vapour is known as?

a) flue gas   b) fuel gas

c) stack gas   d) water gas

SECTION-B

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

Q.7 What are the number oxygen molecules present 1 mol of oxygen?

Q.8 Define the normality?

Q.9 Write the name and symbol for SI unit of energy.

Q.10 Convert $1 \, g \, cm^{-3}$ into $kg \, m^{-3}$.

Q.11 What is sensible heat?

Q.12 Define the excess air.

SECTION-C

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

Q.13 What is the difference between molarity & molality?

Q.14 Explain the concept of purge in context of material balance with the help of neat diagram.

Q.15 Define and discuss differential material balance.

Q.16 What is pressure? What are the different units used for measuring it?

Q.17 Explain the different ways of transfer of energy between system and surroundings.

Q.18 What is significance of material balance?

Q.19 What is difference between steady state and unsteady state?

Q.20 Discuss the different aspects related to the air requirement for a combustion reaction in brief.

Q.21 Discuss general balance equation for a process in brief with the help of suitable block diagram.

Q.22 Define and discuss heat of reaction in brief.