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## **CM-222-CBCS**

### **B.E., III Semester**

Examination, June 2020

### **Choice Based Credit System (CBCS)**

### **Material and Energy Balance**

*Time : Three Hours*

*Maximum Marks : 60*

**Note:** i) Attempt any five questions.

ii) All questions carry equal marks.

1. Define Absolute humidity, Percent humidity and Relative humidity respect to humidification operation.
2. Classify the material balance. Discuss the various methods involved for solving material balance problems without chemical reactions.
3. a) Define vapour pressure, humid heat and dew point.  
b) Explain humidification and dehumidification process.
4. a) Define Adiabatic flame temperature and Tests for proximate analysis.  
b) Define gross calorific value and net calorific value.
5. Explain: Limiting reactant, excess reactant, percent excess reactant mass fraction, mass% and mole fraction and mol%.

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6. An aqueous solution of Acetic Acid of 30% concentration (by mass) has density  $1040 \text{ kg/m}^3$ . Find Molarity, normality and molality of the solution.
  
7. A gas mixture has the following composition by volume:  
Ethylene -30.6%, Benzene - 24.5%, Oxygen - 1.3%,  
Methane -15.5%, Ethane - 25%, Nitrogen - 3.1%  
Find out:
  - i) The average molecular weight of gas mixture
  - ii) The composition by weight
  
8. Write short notes on following: (Any two)
  - a) Recycle and by-pass streams.
  - b) Effect of temperature and pressure on heat of reaction.
  - c) Energy balance with and without chemical reaction.

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