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Total Number of Pages : 02

B.Tech
PBT41102

4th Semester Regular / Back Examination 2017-18
UPSTREAM PROCESS ENGINEERING - II
BRANCH : BIOTECH
Time : 3 Hours
Max Marks : 100
Q.CODE : C888

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Part – A (Answer all the questions)

- Q1** **Answer the following questions: *multiple type or dash fill up type*** **(2 x 10)**
- a) Capacity ratio is defined as the product of
 - (i) Mass and temperature (ii) Mass and specific heat
 - (iii) Specific heat and temperature (iv) Time and temperature
 - b) Which of the following is not associated with heat exchanger?
 - (i) Fouling (ii) NTU
 - (iii) Capacity ratio (iv) Mc Adam's correction factor
 - c) For evaporators and condensers, for the given conditions, the logarithmic mean temperature difference for parallel flow is
 - (i) Does not depend on counter flow
 - (ii) Smaller than counter flow
 - (iii) Greater than counter flow
 - (iv) Equal to counter flow
 - d) When heat is transferred from one particle of hot body to another by actual motion of the heated particle, it is referred as :
 - (i) conduction (ii) convection
 - (iii) radiation (iv) none
 - e) Statement related to process of evaporation that is incorrect is :
 - (i) Evaporation occurs at any temperature
 - (ii) Evaporation takes place within liquid
 - (iii) Temperature may change during evaporation;
 - (iv) no bubbles are formed in liquid during evaporation
 - f) Which of following factors do not affect rate of evaporation?
 - (i) Temperature of liquid
 - (ii) Humidity of surrounding air
 - (iii) Depth of liquid
 - (iv) Surface of liquid
 - g) Heat lost in the condenser is due to
 - (i) Decrease in the degree of super heat
 - (ii) Decrease in the degree of sub cooling
 - (iii) Decrease in degree of super heat + Latent heat + Increase of degree of sub-cooling
 - (iv) None
 - h) What is relative humidity?
 - (i) Temperature of air measured by thermometer whose bulb is dry
 - (ii) It is the temperature attained by small amount of evaporating water in such a manner that sensible heat transferred from air to liquid is equal to latent heat required for evaporation
 - (iii) The ratio of partial pressure of water vapor in air to the vapor pressure of water at same temperature
 - (iv) Direct measure of moisture content in a gas

- i) Which of the following is an advantage of size reduction?
 - (i) Enhanced heat/mass transfer
 - (ii) Intimate contact with certain food items
 - (iii) both
 - (iv) None
- j) Which of the following is NOT a method used for size reduction?
 - (i) Cutting
 - (ii) Impact
 - (iii) Burning
 - (iv) Shear

Q2 Answer the following questions: Short answer type: (2 x 10)

- a) Define Specific heat capacity.
- b) What is the difference between natural and forced evaporator?
- c) What are the main differences among evaporation drying, and distillation?
- d) What is Duhring's rule ?
- e) What are the criteria to know natural and forced convection?
- f) Define Thermal Conductivity, k.
- g) What is fractional distillation?
- h) What is fouling?
- i) What are the different types of evaporators?
- j) What is the role of fins in heat exchangers?

Part – B (Answer any four questions)

- Q3** a) Write the working principles of crusher. (10)
b) Discuss the method of particle size analysis. (5)
- Q4** a) What do you mean by size reduction? Discuss the various principle and objective of size reduction. (10)
b) Define and derive the expression of LMTD? (5)
- Q5** a) What are the different modes of heat transfer? Discuss the differences between them? (10)
b) Discuss drop wise condensation. (5)
- Q6** a) Discuss the principle and working of evaporator. (10)
b) Hot water enters a counter flow heat exchanger at 95°C. This hot water is used to heat a cool stream of water from 8 to 40° C. The flow rate of the cool water is 1.2 kg/s, and the flow rate of the hot water is 2.7 kg/s. The overall heat-transfer coefficient is 850 W/m²°C. What is the area of the heat exchanger and its effectiveness? (5)
- Q7** a) Discuss the principle and working of humidifier. (10)
b) Discuss the different types of humidifier. (5)
- Q8** a) What are heat exchangers? How they work? Discuss the different types of heat exchangers. (10)
b) Differentiate adsorption from absorption. Write in brief on adsorption equilibria? (5)
- Q9** a) Describe it details the working of distillation column. (10)
b) What are the different types of adsorption and criteria of adsorbents? (5)