Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech**

PBT4I102

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 $W/m^{2}°C$. 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 equillibria? **(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)**