Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Pharm(N)/SEM-5/PT-507/2012-13

2012

PHARMACEUTICAL ENGINEERING

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Drying involves

a) mass transfer b) heat transfer

c) both (a) & (b) d) none of these.

ii) Psychrometry deals with the properties of

a) Air - water-vapour mixture

b) Gas - vapour mixture

c) both (a) and (b)

d) none of these.

iii) In a Bollman extractor the flow is

a) Co-current

b) Counter-current

c) both (a) and (b)

d) none of these.

iv) Penicillin is recovered from the fermentation broth by

a) Distillation

b) Evaporation

c) Leaching

d) Liquid extraction.

v) Plate towers, packed towers and spray towers are related to

a) distillation

b) extraction

c) dehumidification

d) none of these.

vi) For molar distillation the important parameter is

a) boiling point b) mean free path

c) none of these d) all of these.

vii) The principal objectives(s) of steam distillation is/are

a) separation of volatile oil

b) preparation fo aromatic water

c) separation miscible liquid mixture with low boiling points

d) both (a) & (b).

viii) 'Interface mass transfer' is defined as

a) mass transfer from bulk of one phase to interface surface and from interface to bulk of another phase

b) mass transfer from bulk of one phase to interface surface

c) mass transfer from bulk of one phase to bulk of another phase

d) all of these.

ix) Which of the following is not a packing materials for rectification column ?

a) Lessing ring

b) Berl saddle

c) Raschig ring

d) None of these.

x) In general flash distillation is not used for

a) binary system

b) muti-component system

c) only one phase/system

d) tertiary system.

xi) $\int_{L_1}^{L_2} \frac{dl}{L} = \ln \frac{L_1}{L_2}$ stands for

a) Rayleigh equation

b) Stefan's equation

c) Boltzmann equation

d) none of these.

xii) At dew point temperature, humidity is

a) 0%

b) 50%

c) 100%

d) 80%.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Discuss steady state diffusion with the help of Fick's First Law.

3. Explain the minimum boiling azeotropic mixture with proper boiling point diagram and exmaple.

4. What are cooling towers ? Explain their design and operation.

5. What method of distillation would you employ for removal of free fatty acid from fixed oils. Give reasons for using such a distillation.

6. For a mixture of air and water vapour of 70˚C calculate :

   a) humidity when air is saturated

   b) humidity when relative humidity of air is 50%

   Data given, vapour pressure of water at 70˚C = 233.7 mm Hg.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) With a neat sketch explain the working of compartment tray dryer, its application in pharmaceutical industry, its merits and demerits.

   b) State Raoult's law. What is its significance ? 10 + 5

8. A binary mixture of benzene and toluene containing 40 mole per cent benzene is to be distilled at atmospheric pressure to recover 90% of the benzene. Estimate the molal per cent of the mixture which should be distilled and the composition of the distillate obtained if the distillation is carried out by —

   a) Simple equilibrium distillation

   b) Differential distillation collecting all the distillate together.

   Data given : The average relative volatility of benzene to toluence in the temperature range involved is 2·5.

9. What do you understand by azeotropic distillation ? What is imbibition ? Explain continuous extraction process.

   3 + 2 + 10

10. a) What do you understand by Humidity chart ? Briefly discuss its significance in air conditioning. 3 + 4

b) Air in a laboratory at 110°F and atmospheric pressure contains 0·21 lb of water vapour per lb of dry air. Determine the humidity percentage. 8

11. Desribe the working principle of a dehumidifier. What is referigerant ? What are the factors for selection of refrigeratnt ? What are brine system of refrigeration ?

5 + 3 + 4 + 3