



Name :

Roll No. :

Invigilator's Signature :

CS/B.PHARM/SEPARATE SUPPLE/SEM-7/PT-707/2011

2011

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 any *ten* of the following :

10 × 1 = 10

- a) Volatile oil is separated from crude drugs by
 - i) Vacuum distillation ii) Steam distillation
 - iii) Simple distillation iv) None of these.
- b) Constant boiling solutions are completely separated by
 - i) Fractional distillation
 - ii) Azeotropic distillation
 - iii) Distillation under reduced pressure
 - iv) Simple distillation.

SS-171

[Turn over



- c) Which solutions are called ideal solutions ?
- i) solutions that obey Raoult's Law
 - ii) solutions that obey Dalton's Law
 - iii) solutions that disobey both Raoult's and Dalton's Law
 - iv) None of these.
- d) Thermolabile substances are extracted by
- i) Percolation Method
 - ii) Maceration Method
 - iii) Reserved Percolation Method
 - iv) All of these.
- e) Mechanism of Freeze Drying is
- i) Lyophilization
 - ii) Partial Evaporation
 - iii) Segregation
 - iv) None of these.
- f) Fluidised Bed Dryer is
- i) Faster than tray dryer
 - ii) Purchase cost is less expensive than tray dryer
 - iii) Operation is simple than tray dryer
 - iv) All of these.



- g) Brine system acts as
- i) Cold reservoir
 - ii) Hot reservoir
 - iii) Thermal transformer system
 - iv) Air reservoir.
- h) Cover-And-Row-Down Method is used in
- i) Distillation
 - ii) Evaporation
 - iii) Extraction
 - iv) Refrigeration.
- i) Common bricks are made from
- i) Carbon or acid proof refractory materials
 - ii) Silicon or alkali proof refractory materials
 - iii) Non-metallic refractory materials
 - iv) All of these.



- j) Fick's Second Law is mostly related with
- i) The change in concentration with time at a definite location
 - ii) The mass diffusing across a unit area of barrier in unit time
 - iii) The change in concentration with direction
 - iv) all of these.
- k) Adiabatic cooling line is related with
- i) Extraction
 - ii) Evaporation
 - iii) Drying
 - iv) Humidity.
- l) Drugs release from Polymer Matrices followed
- i) Fick's First Law
 - ii) Fick's Second Law
 - iii) Higuchi's equation
 - iv) all of these.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

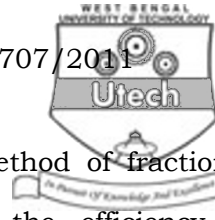
2. With neat labelled diagram, describe the design and working of a compartment dryer. 5
3. Describe the principle of working of refrigerators. 5
4. Explain the modified maceration processes and what are their advantages. 3 + 2
5. State Raoult's law and explain how it is applied in distillation. 2 + 3
6. State Fick's second law and explain what is the difference between Fick's first and second laws. 3 + 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Giving a neat labelled diagram, describe the working of Robert diffusion battery.
- b) With a neat sketch, explain the construction and working of Rotocel extractor. $2 \times 7\frac{1}{2} = 15$



8. a) With a neat sketch describe the method of fractional distillation and write a note on the efficiency of fractionating columns.
- b) Turpentine oil with boiling point 160° and approximate MV of 136 is to be distilled in presence of water. The mixture boils at atmospheric pressure and the boiling point of the mixture is 95.6° C. The vapour pressure of pure water at 95.6° C is 647 mm Hg. Find the ratio of the oil in the distillate.
- $$2 \times 7 \frac{1}{2} = 15$$
9. a) Describe the operation and advantages of a flooded evaporation system and compare it with the expansion valve system in compression refrigeration.
- b) With a neat labelled diagram, describe a refrigeration system using a compression refrigeration system.
- $$2 \times 7 \frac{1}{2} = 15$$
10. a) Describe, with examples, the applications of automatic process control systems in pharmaceutical industry.
- b) Explain unit operations control, unit process control and plant level control.
- $$2 \times 7 \frac{1}{2} = 15$$



11. a) With a neat labelled diagram, explain the design and working of a fluidized bed dryer.
- b) During a drying operation it was found that 100 kg of a moist drug granulation sample reached its equilibrium moisture content (EMC) and was found to contain 96 kg of dry material. What is the equilibrium moisture content of this sample under these conditions ?

$$2 \times 7 \frac{1}{2} = 15$$

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