	Utech
Name :	A
Roll No. :	In Assembly 100 Exercising and Explored
Invigilator's Signature :	

CS / B.PHARM (OLD) / SEM-5 / PT-507 / 2010-11 2010-11

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

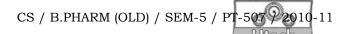
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following:

$$10 \times 1 = 10$$

- i) For a ball mill of mill diameter R and ball diameter r, the critical speed is
 - a) $\frac{1}{2\pi}\sqrt{\frac{R-r}{9}}$
- b) $\frac{1}{2\pi} \sqrt{\frac{G}{R-r}}$
- c) $2\pi\sqrt{\frac{G}{R-r}}$
- d) none of these.

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- For black body, emissivity is ii)
 - a) 0

> 1

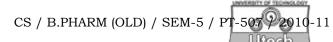
- 1. d)
- Maximum thermal conductivity among copper, silver, iii) gold, aluminium is
 - a) sliver

b) copper

c) gold

- d) aluminium.
- Size reduction is done for micronized aspirin and iv) griseofulvin by
 - fluid energy mills a)
- colloid mill b)
- ball mill c)
- d) all of these.
- Bond's law is stated as v)
 - work $\propto \frac{4}{\sqrt{\text{Particle size}}}$ b) work $\propto \sqrt{\text{Particle size}}$ a)
 - work $\propto \frac{1}{\sqrt{\text{Particle size}}}$ d) none of these.
- Vortex liquid circulation pattern occurs with vi)
 - a) mixing device set at an angle
 - b) mixing device set centrally
 - mixing device set centrally and vertically c)
 - none of these. d)

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- vii) Relation between the rate of evaporation and vapour pressure of liquid is
 - a) directly proportional
 - b) inversely proportional
 - c) rate of evaporation is proportional to square root of the vapour pressure of the liquid
 - d) none of these.
- viii) Long-tube vertical-type evaporator is also named as
 - a) climbing film evaporator
 - b) rising film evaporator
 - c) long-tube evaporator
 - d) all of these.
- ix) A body which absorbs all the incident energy, means
 - a) $\alpha = 1$, $\nu = 0$, $\Gamma = 0$
- b) $\alpha = 0$, $\nu = 1$, $\Gamma = 0$
- c) $\alpha = 0$, $\nu = 0$, $\Gamma = 1$
- d) None of these.
- x) Which type of glass is preferred for storage chemicals and pharmaceuticals?
 - a) Soda-lime glass
 - b) Treated soda-lime glass
 - c) Borosilicate glass
 - d) None of these.

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- xi) Jaw crusher is a / an
 - a) Ultra-fine grinder
- b) Fine grinder
- c) Coarse grinder
- d) None of these.
- xii) Propeller is a
 - a) Radial flow impeller
 - b) Axial flow impeller
 - c) Tangential flow impeller
 - d) None of these.

GROUP - B

(Short Answer Type Questions)

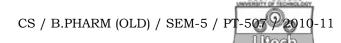
Answer any three of the following.

 $3 \times 5 = 15$

- 2. What do you mean by corrosion and erosion? Discuss on different types of rubbers used to prevent such problems.
- 3. What is vortex formation? What are the disadvantages of vortex formation? What are the ways to eliminate vortex formation?
- 4. What is Stoke's law? How does the law used to determine average diameter of particles?

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- 5. Write short note on inorganic materials as materials of construction.
- 6. What are the applications of heat exchangers in the process plant and their functions?

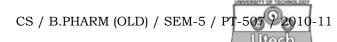
GROUP - C

(Long Answer Type Questions)

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

- 7. a) What is Crystal growth? What are the steps of crystal formation? Give a labelled diagram and working of agitated batch crystallizer.
 - b) Explain Mier's supersaturation theory. What are the limitations of the theory? 8 + 7
- 8. a) What do you mean by evaporation? Differentiate it with distillation. Explain material and energy balance in an evaporator.
 - b) What are entratainment and entrainment separator?
 - c) What is multiple effect evaporator? Draw the connection and sequence of flows in a multiple effect evaporator. 5 + 4 + 6

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- 9. a) Define mixing. What is the importance of mixing in pharmaceutical industries?
 - b) What are the different types of mixing impeller and respective flow pattern?
 - c) What is the shape factor of mixing vessels?
 - d) Briefly discuss the design and working of Silversion mixer emulsifier.
 3 + 4 + 3 + 5
- 10. a) What do you mean by size reduction? State its importance in control of particle size in pharmaceutical industry with examples.
 - b) Distinguish crushing and grinding. Explain with line diagram of open and closed circuit operation. Write the advantage of wet grinding. (1+6)+(3+3+2)
- 11. a) A hot solution containing 2000 kg of MgSO₄ and water at 330 K and with a concentration of 30% wt MGSO₄ is cooled to 293 K and MgSO₄, 7H₂O crystals are removed. The solubility at 293 K is 35·5 kg MgSO₄ / 100 kg total water. The average heat capacity of the feed solution is 2·93 kJ/kgK. The heat of solution is 293 K is 13·31 NO³ kJ/Kg mol MgSO₄, 7 H₂O. Calculate the yield of crystals and make a heat balance.

Given: Mol.wt of MgSO₄ = 120.35

Mol.wt. of 7 $H_2O = 126.14$

Mol.wt of MgSO₄, $7 \text{ H}_2\text{O} = 246.49$.

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b) A furnace is constructed with 2 m of firebriek, 0·1 m of insulating and 0·2 m of building brick. The inside temperature is 1200 K and the outside temperature is 330 K. If the thermal conductivity are as K = 1·4 w/mk, 0·21 w/mk, 0·7 w/mk respectively, estimate the heat loss per unit area and the temperature of the junction of the firebrick and the insulating brick.

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