Name :	
Roll No. :	A Alaman Without State
Invigilator's Signature :	

CS/B.PHARM (NEW)/SEM-3/PT 307/2011-12

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 for any *ten* of the following :

 $10 \times 1 = 10$

- i) One atmospheric pressure is equal to
 - a) 1.01325×10^5 pascal
 - b) 1.3101325×10^7 pascal
 - c) 1.01325×10^3 pascal
 - d) 1.01325×10^9 pascal.
- ii) Dimensional formula for Fanning Friction Factor is equal to

a)
$$QL^{-2} \theta^{-1} T^{-1}$$
 b) $ML^{-1} \theta^{-1}$
c) $QL^{-1} \theta^{-1} T^{-1}$ d) $M^0 Q^0 L^0 \theta^0 T^0$.

- iii) Seperation of liquids of same volatility and different densities is possible by
 - a) Distillation b) Filtration
 - c) Centrifugation d) Extraction.

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- iv) A 10% change in porosity of cake can produce change in volume by
 - a) 3-folds b) 2-folds
 - c) 4-folds d) 5-folds.
- v) Flow of filtrate through pores of filter cake is considered to follow
 - a) Poiseuille's equation b) Fick's equation
 - c) Stokes equation d) none of these.
- vi) Which of the following types of filter is used to filter gelatinous precipitate ?
 - a) Rotary filter
 - b) Leaf filter
 - c) Plate and frame filter.
- vii) Supercentrifuge is a
 - a) filtration centrifuge
 - b) sedimentation centrifuge
 - c) ultracentrifuge
 - d) none of these.
- viii) De Laval clarifier is called
 - a) conical disc centrifuge
 - b) tubular bow centrifuge
 - c) basket
- ix) Detonation is the sudden violent change of
 - a) volume b) pressure
 - c) temperature d) humidity.
- x) Unit of kinematic viscosity is
 - a) dynes/cm² b) stokes
 - c) dynes.sec/cm d) poise.

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xi)	Which of the following valves is used for unidirectional					
	flow	of fluids ?		" Annual (Y Excepting and Excelor		
	a)	Ball valve	b)	Check valve		
	c)	Diaphragm valve	d)	Gate valve.		
xii)	Mol	e fraction of O_2 in a g	gaseo	us mixture is 0.25. The		

mole per cent will be

a)	30	b)	40

c) 25 d) 35.

GROUP – B

(Short Answer Type Questions)

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

- Explain Prandtl boundary layer of fluid flow in a pipeline with a suitable sketch.
- 3. Write a short note on joints and valves in pipelines.
- 4. Water is flowing in a pipe (I.D 3.0 cm) with the Reynolds number 3500. The viscosity and density of water at the operating condition are 0.01 poise and 0.99537 gm/cc. Calculate mass flow rate.
- 5. The heat transfer co-efficient of an organic liquid is 350 BTU / (ft^2) (hr) (^{o}F) what would be its value in kcal/ (m^2) (hr) (^{o}C) .
- 6. Deduce the pressure drop (ΔP) expression for turbulent flow by dimensional analysis.

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GROUP – C

(Long Answer Type Questions) Answer any *three* of the following. $3 \times 15 = 45$

Answer any *three* of the following. 5 ×

- 7. a) Write a short note on graphical integration.
 - b) Write a note on material balance and energy balance.
 - c) Explain mole fraction and weight fraction. 5 + 5 + 5
- 8. a) What is inclined tube manometer ? Derive the relevant equation. What is the utility of inclination ?
 - b) Describe the principle, construction and industrial application of a U-tube manometer. 9+6
- 9. With the help of diagrams, describe the design and working of non-washing and washing types of plate and frame filter presses. What are the advantages, disadvantages and applications of filter press. $5 + 5 + \left(2 \times 2\frac{1}{2}\right)$
- 10. The power (P, ft lb/sec) required to rotate a given impeller in an agitation tank is a function of few variables. Derive empirical correlation of power with its variable by dimensional analysis method where shape factors are ignored & liquid is assumed to be Newtonian.
- 11. a) A gas mixture has the following composition by

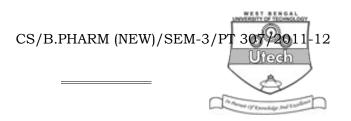
volume —
$$SO_2 = 8 \cdot 5\%$$

 $O_2 = 10\%$
 $N_2 = 81 \cdot 5\%$

Determine —

- i) Composition by weight
- ii) Average molecular weight of the mixture
- iii) The density of gas mixture at a temperature of $473K(200^{\circ}C)$ and 202.65 kPa
- b) What are the possible industrial hazards ? How can they be controlled ? 7 + 8

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