



Name :
Roll No. :
Invigilator's Signature :

CS / B.PHARM (OLD) / SEM-6 / PT-611/ 2011

2011

PHARMACEUTICS

(BIOPHARMACEUTICS AND PHARMACOKINETICS)

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 × 1 = 10

- i) In renal insufficiency
 - a) $t_{1/2}$ of the drug increases
 - b) $t_{1/2}$ of the drug decreases
 - c) $t_{1/2}$ of the drug unchanged
 - d) none of these.

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[Turn over



- ii) The half-lives require to reach 99% of the steady state is
- a) 6 – 7 b) 2 – 3
- c) 8 – 10 d) 12 – 15.
- iii) The influence of route of administration on drug's bioavailability is generally in the following order
- a) oral > parenteral ? rectal > topical
- b) parenteral > rectal > oral > topical
- c) rectal > topical > parenteral > oral
- d) parenteral > oral > rectal > topical.
- iv) Monotropic polymorph is the one which
- a) can be reversely changed into another form by altering the temperature or pressure
- b) is unstable at all temperature and pressure
- c) is stable at all temperature and pressure
- d) can be reversibly changed into another form by altering light.
- v) Drug Pka is determined by the
- a) partition coefficient
- b) particle size
- c) Hederson-Hasselbach equation
- d) Stokes law.

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- vi) Kinetic of protein drug binding is determined by the
- a) scatchard plot
 - b) craig plot
 - c) sigma plot
 - d) Cartesian plot.
- vii) Which one of the following is an appropriate permeation enhancer ?
- a) H_2O
 - b) CCL_4
 - c) DMSO
 - d) none of these.
- viii) Which type of drugs can cross blood brain barrier rapidly ?
- a) Low o/w coefficient
 - b) Non-polar
 - c) Polar
 - d) High o/w coefficient.
- ix) The elimination rate constant (K_{elim}) assesses the activity of the
- a) combined process of metabolism and excretion
 - b) combined process of administration and excretion
 - c) single process of excretion
 - d) none of these.
- x) The equation that describes the process of non-linear pharmacokinetics is
- a) Michaelis-Menten equation
 - b) Nelson equation
 - c) Wagner and Nelson equation
 - d) Noyes-Whitney equation.



- xi) The Kriiger-Thiemer's dose ratio is related to
- a) Loading dose and Maintenance dose
 - b) Initial dose and Maintenance dose
 - c) Loading dose only
 - d) all of these.
- xii) The two compartment model is related to
- a) drug level in central compartment
 - b) drug level in peripheral compartment
 - c) drug level in central and peripheral compartment
 - d) none of these.

GROUP – B

(Short Answer Type Questions)

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

2. Define and explain extraction ratio. How is it related to oral bioavailability of drug ?
3. What are the factors affecting the renal clearance of a drug ?
4. Briefly explain pharmacokinetic drug interactions with suitable examples.
5. "Polymorphic character affects the bioavailability of a drug." Justify with example.
6. Write a note on blood-brain barrier's effect on drug distribution.



GROUP – C

(Long Answer Type Questions)

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

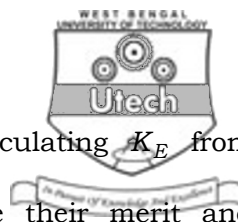
7. Define drug absorption. Discuss the following factors affecting drug absorption (any *four*) :

- i) Drug dissolution
- ii) Particle size and effective surface area
- iii) Polymorphism and amorphism
- iv) pH partition hypothesis
- v) Salt form of drug.

What do you mean by 'apparent volume of distribution' ?

$$2 + (4 \times 3) + 1$$

8. a) What are the advantages of administering a drug by constant rate *i.v* infusion ?
- b) Derive an expression to correlate C_{ss} with time for a drug that obeys one compartment kinetics after *i.v* infusion and show how K_E can be computed graphically.



c) What are the two methods for calculating K_E from urinary excretion data ? Compare their merit and demerit.

d) A drug has volume of distribution of 12 L and K of 0.18 hr^{-1} . A steady state concentration (C_{ss}) 12 mg / ml is desired.

i) What is the infusion rate needed to maintain this concentration ?

ii) How long does it take to achieve 90% and 99% of C_{ss} ?

2 + 5 + 4 + 4

9. What is pinocytosis ? What are the differences between facilitated diffusion and active transport ? Write a note on binding of drug to Human Serum albumin.

1 + 7 + 7

10. a) Derive the equation $C = C_0 e^{-Kt}$ where,

C = concentration of drug at time t

C_0 = Initial concentration of drug

K = First order rate constant.

b) Show that half life of a drug of first order process is independent of initial concentration.

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- c) If the plasma concentration of diazepam after *i.v* bolus administration was found to be 10.0 and 5.5 mcg/ml at 2 and 4 hours respectively, assuming one compartment kinetics, calculate

- i) half life of the drug
- ii) the concentration of drug in plasma at time zero
- iii) the V_d if dose administered was 300 mg
- iv) the total systemic clearance. 4 + 3 + 8

11. Write short notes on :

- a) Bioequivalence studies
- b) Assumptions made in the development of compartment models

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