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 :

$10 \times 1 = 10$

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.

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.

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.

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 *Vd* if dose administrated 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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