Name: Enrolment No:	

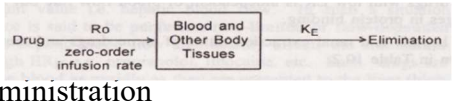
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

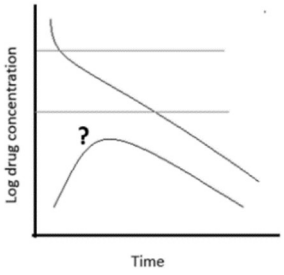
Course: Biopharmaceutics and Pharmacokinetics **Semester : III**
Program: M.Sc. (Clinical Research) **Time : 03 hrs.**
Course Code: HSCR8001 **Max. Marks: 100**

Instructions:

SECTION A

S. No.	MCQs or Fill in the blanks (1.5 marks each)	30 Marks	CO
1	…..is the process of movement of unchanged drug from the site of administration to the systemic circulation.? A. Absorption B. Dissolution C. Distribution D. Elimination	1.5	CO1
2	Drugs undergoing first-pass metabolism are advised not to be administered through A. Oral route B. Rectal route C. Parental route D. Transdermal route	1.5	CO1
3	In equation X=Vd C, what does Vd denotes? a) Density b) Volume of blood c) Volume of body d) The volume of the body fluid in which the drug is getting dissolved	1.5	CO1
4	The amount of drug in the body is directly proportional to the concentration of the drug in plasma. a) True b) False	1.5	CO1
5	What will be the apparent volume of distribution of warfarin? a) The apparent volume of distribution is less than the total body water b) The apparent volume of distribution is more than the total body water c) The apparent volume of distribution is equal to the total body water d) Warfarin is not a medicine	1.5	CO1
6	Drug elimination involves…. (ADME are steps of pharmacokinetics) A. ADME B. DME C. ME D. E only	1.5	CO2
7	If the distribution of drugs is slower than the process of biotransformation and elimination A. It will cause high blood level of drug B. It will cause low blood level of drug C. Cause failure to attain diffusion equilibrium D. None of the above	1.5	CO2
8	Which tissue has the greatest capacity to biotransform the drugs? A. Kidney B. Lung	1.5	CO2

	C. Liver D. Skin		
9	Total body clearance is_____ . A. The drug elimination rate divided by the plasma drug concentration B. The drug elimination rate divided by Vd C. The amount of drug in the body divided by the plasma drug concentration D. None of the above	**1.5**	**CO2**
10	Renal clearance is expressed as A. Rate of urinary excretion/Plasma drug concentration B. Elimination rate/ Plasma drug concentration C. Rate of urinary excretion/ Elimination Rate D. Elimination Rate	**1.5**	**CO2**
11	What does the word "open" mean in the one-compartment open model? A. Unidirectional input and output B. The drug easily enters C. The drug readily mixes with the blood D. Easy absorption	**1.5**	**CO3**
12	How much time does an intravenously administered drug take to complete a complete circulation? a) 5-8 min b) 7-10 min c) 1-3 min d) 1 min	**1.5**	**CO3**
13	In which model compartments are joined in series? a) Compartment model b) Caternary model c) Physiologic model d) Mammillary model	**1.5**	**CO3**
14	The i.v. bolus dosage is 400 mg and volume of distribution of drug is 200 L Find the plasma drug concentration. A. 2 mg/mL B. 20 L C. 2 mL D. 2 mg/L	**1.5**	**CO3**
15	In the equation log C = log Co – KEt/2.303, what does Co stand for _____ a) Plasma drug concentration after 60 min of i.v. injection b) Plasma drug concentration after 15 min of i.v. injection c) Plasma drug concentration after 30 min of i.v. injection d) Plasma drug concentration immediately after i.v. injection	**1.5**	**CO3**
16	Identify the model depicted in given figure.  A. One compartment open model for IV bolus administration B. One compartment open model for IV infusion C. One compartment open model for IV extravascular administration D. One compartment open model for IV loading dose + IV infusion	**1.5**	**CO3**
17	Which of the following is not a category of 2 compartment model? A. Two compartment model with elimination from the central compartment B. Two compartment model with elimination from the peripheral compartment C. Two compartment model with elimination from only plasma and blood D. Two compartment model with elimination from both the compartments	**1.5**	**CO4**

18	In the given picture, the marking "?" represents the drug concentration of which compartment? A. The central compartment in a two compartment model B. Peripheral compartment in a two compartment model C. The central compartment in a one compartment model D. Drug concentration of the plasma 	**1.5**	**CO4**
19	In the Michaelis-Menton equation, when the value of Km = C A. Rate of the process is half (1/2) the maximum rate. B. The elimination of most drugs follows first-order kinetic C. The elimination of most drugs follows zero order kinetic D. The elimination of most drugs follow second order kinetic	**1.5**	**CO5**
20	Non-linear pharmacokinetic is also known as……. A. Dose dependent B. Enzyme capacity limited C. Saturation pharmacokinetics D. All of the above	**1.5**	**CO5**
	SECTION B		
Q	Short Answer Type Question	**20 Marks**	**CO**
1	Explain the term volume of distribution and any two factors affecting it.	**5**	**CO1**
2	If the drug has very high octanol-water partition coefficient, comment on the characteristics of the drug and its distribution in the body.	**5**	**CO1**
3	What is absolute and relative bioavailability? Give their formulae for calculation.	**5**	**CO2**
4	"Drug interactions can be employed for selective excretion of some drugs". Explain the statement with an example.	**5**	**CO2**
	SECTION C 30 marks		
Q	**Two case studies 15 marks each subsections**	**30 Marks**	**CO**
1	A 70 kg of patient is administered with a drug by IV infusion. The drug has plasma half-life of 11 hours, apparent Vd of 20 liters and desired steady state level plasma concentration of 0.0002 µg/mL. By assuming one compartment open model, calculate following parameters: a) Time required to reach 90% of Css (3 marks) b) Infusion rate to achieve Css (4 marks) c) Loading dose to achieve Css rapidly (3 marks) d) The concentration of drug after 2 half-lives of drug (3 marks) e) Comment on the drug distribution in the body (2 marks)	**15**	**CO3**
2	A best fit equation IV bolus one compartment model after 2000mg of drug dose administration is : $C = 143\ e^{-0.87t}$ a) Volume of distribution (3 marks) b) Plasma half-life (3 marks) c) Plasma drug concentration after 6 hours (4 marks)	**15**	**CO3**

	d) How much drug will be left after 6 hrs in the body (3 marks) e) What should be the dose of drug if instantaneous plasma concentration of 500 µg/ml is to be attained? (2 marks)		
	SECTION- D 20 marks		
Q	Long Answer type Questions	**20 Marks**	**CO**
1	a) Discuss any two tests to determine the non-linearity in pharmacokinetic parameters. b) Derive Michaelis-Menton Equation for three situations viz. i) Km = C, ii) Km >> C, iii) Km << C	**4+6**	**CO5**
2	a) Explain two-compartment open model IV bolus with the help of compartment diagram and graph. b) How body tissues are classified considering two compartment model? In which compartment the brain should be classified.	**8+2**	**CO4**