Name: Enrolment No:	UPES UNIVERSITY OF TOMORROW

UPES

End Semester Examination, December 2024

Course: Biopharmaceutics and Pharmacokinetics **Semester : V**

Program: Int. (B. Sc. + M. Sc. (Clinical Research) **Time : 03 Hours.**

Course Code: HSCR3014 **Max. Marks: 100**

Instructions: All questions are compulsory.

Section A

Short answer questions/ MCQ/T&F

(20Qx1.5M= 30 Marks)

S. No.		30 Marks	CO
Q 1	Select the true statement about volume of distribution. A. It is hypothetical. B. It estimated the volume of body fluid where drug is distributed. C. Its value is very high for hydrophilic drugs. D. Its value is very high for lipophilic drugs	**1.5**	**CO1**
Q 2	Define passive diffusion.	**1.5**	**CO1**
Q 3	Factors affecting drug distribution include_____. (Select all possible options) A. Physiological barriers B. Particle size and effective surface area C. Physicochemical properties of drug D. Plasma protein binding	**1.5**	**CO1**
Q 4	If the plasma drug concentration is 1 µg/mL and the dose of drug is 30 mg. What will be the volume of distribution of drug? A. 30 L B. 3 L C. 3000 mL D. 0.03L	**1.5**	**CO1**
Q 5	_____ barrier is the hardest physiological barrier for the distribution of drug. A. Capillary endothelial B. Placental C. Blood-Brain D. Blood Cerebrospinal Fluid	**1.5**	**CO1**
Q 6	State the formula for clearance.	**1.5**	**CO1**
Q 7	For the treatment of toxicity, _____ mechanism can be employed. A. forced absorption B. forced diuresis C. forced metabolism D. forced diffusion	**1.5**	**CO2**
Q 8	For calculation of absolute bioavailability of a drug, bioavailability of the same drug by intravenous route is taken as reference. A. True B. False	**1.5**	**CO2**
Q 9	_____ is the first steps of urine formation. A. Tubular reabsorption B. Secretion C. Glomerular filtration D. Tubular filtration	**1.5**	**CO2**
Q 10	Renal excretion of weekly acidic drugs is enhanced when the urine is acidic in nature. A. True B. False	**1.5**	**CO2**
Q 11	Which of the following is not a factor influencing pulmonary excretion?	**1.5**	**CO2**

	A. Pulmonary blood flow B. Rate of respiration C. The solubility of volatile substance D. Heart rate		
Q 12	The concentration of drug in blood when the drug starts the action is known as_____. A. minimum safe concentration B. minimum effective concentration C. maximum safe concentration D. maximum effective concentration	**1.5**	**CO3**
Q 13	Illustrate one compartment open model for IV bolus administration in block diagram.	**1.5**	**CO3**
Q 14	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**
Q 15	What is infusion?	**1.5**	**CO3**
Q 16	Select the correct formula for calculating half-life of a drug. A. $0.693/K_E$ B. $- K_E X$ C. $K_E /0.693$ D. $K_E .V_D$	**1.5**	**CO3**
Q 17	Heart is an example of peripheral compartment in two-compartment model. A. True B. False	**1.5**	**CO4**
Q 18	Urinary excretion data can be used to calculate pharmacokinetic parameters. A. True B. False	**1.5**	**CO4**
Q 19	State any example of non-linear kinetics.	**1.5**	**CO5**
Q 20	_____ equation describes the non-linear kinetics. A. Fick's B. Newton's C. Michaelis-Menton D. Henry's	**1.5**	**CO5**
Section B (4Qx5M=20 Marks)			
Q	**Short Answer Type Question**	**20 Marks**	**CO**
Q 1	Mention the tests of the non-linearity determination in pharmacokinetics.	**5**	**CO1**
Q 2	Explain the placental barrier for drug distribution.	**5**	**CO2**
Q 3	Discuss any two non-oral routes of absorption.	**5**	**CO2**
Q 4	"Drug interactions can be employed for selective excretion of some drugs". Explain the statement with an example.	**5**	**CO4**
Section C (2Qx15M=30 Marks)			
Q	**Two case studies 15 marks each subsection**	**30 Marks**	**CO**
Q 1	A patient with 70 kg of body weight is administered with a drug by IV infusion. The drug has plasma half-life of 22 hours, apparent Vd of 15.7 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) Concentration of drug in plasma after 48 hours **(3 marks)** e) Comment on the possible physico-chemical characteristics of the drug **(2 marks)**	**15**	**CO3**

Q 2	Explain IV infusion one compartment open model and deduce the pharmacokinetic factors used to explain it.	**15**	**CO4**
	Section D **(2Qx10M=20 Marks)**		
Q	**Long Answer type Questions**	**20 Marks**	**CO**
Q 1	Discuss and illustrate the process of urine formation.	**10**	**CO3**
Q 2	a) Non-linearity can be found in absorption and distribution. Justify the statement. b) Demonstrate and discuss the catenary and mammillary model of pharmacokinetics.	**5+5**	**CO2**