Name:

Enrolment No:

UPES
End Semester Examination, December 2023

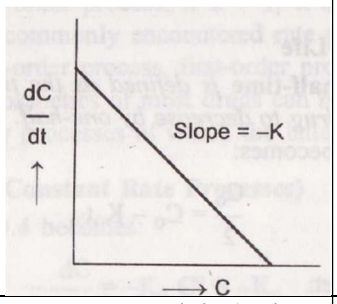
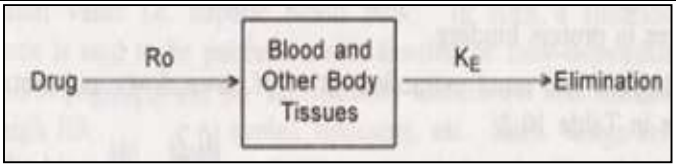
Course: Biopharmaceutics and Pharmacokinetics **Semester : V**
Program: Int. (B. Sc. + M. Sc. (Clinical Research)) **Time : 03 Hours.**
Course Code: HSCR3014 **Max. Marks: 100**

Instructions:

Section A

Short answer questions/ MCQ/T&F
(20Qx1.5M= 30 Marks)

S. No.		30 Marks	CO
Q 1	The transportation and alteration of the drug by the body is known as _____. A. Pharmacodynamics B. Pharmacokinetic C. Pharmacogenomics D. Toxicology	**1.5**	**CO1**
Q 2	Enlist any three factors affecting drug absorption.	**1.5**	**CO1**
Q 3	Basic drugs having pKa 10 to 10.5 are significantly absorbed from stomach. A. True B. False	**1.5**	**CO1**
Q 4	If drug Y has 10 times more affinity to plasma proteins than drug X, which of the following statement is true for drug X? A. Apparent volume of distribution of drug X decrease B. Free drug concentration of drug X in blood will increase. C. Apparent volume of distribution of drug Y increase D. Toxicity of drug Y increase	**1.5**	**CO1**
Q 5	If a drug is highly lipophilic in nature, then select all true statements regarding the drug. A. Drug is confined to blood plasma B. High volume of distribution. C. Drug is accumulated in fatty tissues D. Drug is slowly eliminated from body	**1.5**	**CO1**
Q 6	Which is the toughest barrier for drug permeability?	**1.5**	**CO1**
Q 7	Which of the following route of administration always shows 100% bioavailability? A. Oral B. Intramuscular C. Topical D. Intravenous	**1.5**	**CO2**
Q 8	List any three formulae for clearance.	**1.5**	**CO2**
Q 9	Iodopyracet clearance is indicative of _____. A. Renal excretion rate B. Active secretion rate C. Glomerular filtration rate D. Renal metabolism rate	**1.5**	**CO2**
Q 10	Which of the following is not a factor influencing pulmonary excretion? A. Pulmonary blood flow B. Rate of respiration	**1.5**	**CO2**

	C. The solubility of volatile substance D. Heart rate		
Q 11	Define clearance.	**1.5**	**CO2**
Q 12	The i.v. bolus dosage is 150 mg and the plasma drug concentration is 0.3 mg/ml. What should be the volume of distribution? A. 500 mg/mL B. 500 L C. 500 mL D. 0.0006 mg/mL	**1.5**	**CO3**
Q 13	Enlist any three names of models used for depicting pharmacokinetics.	**1.5**	**CO3**
Q 14	Half-life of the drug is the secondary pharmacokinetic parameter. A. True B. False	**1.5**	**CO3**
Q 15	In non-compartmental analysis, mean residence time is equal to _____. A. AUMC/AUC B. AUC/AUMC C. Dose / AUC D. 1/AUMC	**1.5**	**CO3**
Q 16	The given figure depicts_____. A. Zero order kinetics B. First order kinetics C. Non-linear kinetics D. Saturation kinetics 	**1.5**	**CO3**
Q 17	Which organs comprise the central compartment in a two-compartment model? (Select all possible options) A. Muscles B. Lung C. Kidneys D. Liver	**1.5**	**CO4**
Q 18	Identify the model depicted in the 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**	**CO4**
Q 19	In_____ pharmacokinetics, parameters for a drug can change with change in dose. A. Linear B. Non-linear C. Bothe of the above D. None of the above	**1.5**	**CO5**
Q 20	Explain in brief. Enzyme capacity limited pharmacokinetics is an example of non-linear kinetics.	**1.5**	**CO5**
Section B (4Qx5M=20 Marks)			
Q	Short Answer Type Question	**20 Marks**	**CO**
Q 1	What do you understand by sink condition? How it is ben maintained in GIT to ensure absorption by passive diffusion?	**5**	**CO1**
Q 2	Describe any two factors affecting volume of distribution.	**5**	**CO1**

Q 3	Why urinary excretion data is very useful in some patients for calculation of pharmacokinetic parameters?	**5**	**CO2**
Q 4	Explain two compartment model for IV bolus administration.	**5**	**CO5**
	Section C **(2Qx15M=30 Marks)**		
Q	**Two case studies 15 marks each subsection**	**30 Marks**	**CO**
Q 1	The equation that best fits the pharmacokinetics of a drug after oral administration of 250 mg dose: $\mathbf{C= 2.0 (e^{-0.3t} – e^{-1.2t})}$ Calculate following parameters, assuming one compartment open model a) Peak time (3 marks) b) Peak plasma concentration (3 marks) c) Elimination half-life (2 marks) d) Vd if fraction bioavailable is 0.3 (4 marks) a) Cp at 3h (3 marks)	**15**	**CO3**
Q 2	If the plasma concentration of vancomycin after IV bolus administration was found to be 20.0 and 11 µg/mL at 4 and 8 hours, respectfully. By assuming one compartment open model, calculate following parameters: a) The elimination rate constant (3 marks) b) half-life of the drug (2 marks) c) Concentration of drug at zero time (4 marks) d) Volume of distribution if dose is 300 µg (3 marks) e) Total systemic clearance (3 marks)	**15**	**CO3**
	Section D **(2Qx10M=20 Marks)**		
Q	Long Answer type Questions	**20 Marks**	**CO**
Q 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**
Q 2	a) Enlist the three steps of urine formation. b) Explain in detail the step-wise process of urine formation.	**1+9**	**CO2**