Name:

Enrolment No:

UPES
End Semester Examination, May 2025

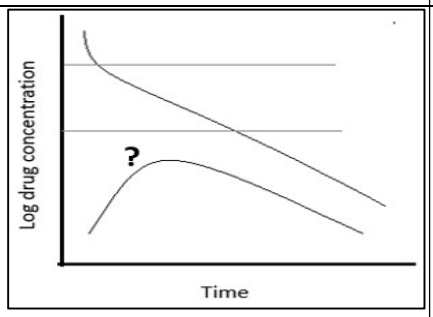
Course: Applied Pharmacokinetics and Principles of Drug Dosing **Semester : VI**
Program: Int. (B. Sc. + M. Sc. (Clinical Research)) **Time : 03 Hours.**
Course Code: HSCR3021P **Max. Marks: 100**

Instructions: Read all the questions carefully. Follow the instructions mentioned for each section.

Section A

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

S. No.		30 Marks	CO
Q 1	Define endocytosis.	**1.5**	**CO1**
Q 2	The rate and extent of drug absorption can be explained by the _____. A. Elimination rate constant B. Bioavailability C. Duration of action D. Therapeutic window	**1.5**	**CO1**
Q 3	State the formula for estimation of half-life ($t_{1/2}$).	**1.5**	**CO1**
Q 4	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**	**CO1**
Q 5	The concentration of drug that elicit the drug action is known as _____. A. Onset of action B. Therapeutic index C. Duration of action D. Therapeutic window	**1.5**	**CO1**
Q 6	$K_E \times V_d$ = _____. A. X_0 B. C_{ss} C. $T_{1/2}$ D. Cl_T	**1.5**	**CO1**
Q 7	If volume of distribution is 300 L, the drug is highly hydrophilic. A. True B. False	**1.5**	**CO1**
Q 8	Write down any three causes of renal failure.	**1.5**	**CO2**
Q 9	Drug-food interaction is one of the causes that may require change in dose of drug. A. True B. False	**1.5**	**CO2**
Q 10	State the endogenous biomarker to estimate GFR.	**1.5**	**CO2**
Q 11	If the drug has a narrow therapeutic index, the drug should be administered with small doses with frequent dosing. A. True B. False	**1.5**	**CO3**
Q 12	B.i.d. means the dose should be taken _____. A. thrice a day B. twice a day C. once a day D. four times a day	**1.5**	**CO3**

Q 13	The i.v. bolus dosage is 100 mg and the plasma drug concentration is 0.5 mg/ml. What should be the volume of distribution? A. 200 mg/mL B. 200 L C. 200 mL D. 0.005 mg/mL	**1.5**	**CO3**
Q 14	The plasma levels of drugs given in multiple doses must be maintained within the narrow limits of the therapeutic window. A. True B. False	**1.5**	**CO3**
Q 15	In the given picture, the marking "?" represents the drug concentration of which compartment? A. The central compartment in a two compartment model B. The peripheral compartment in a two compartment model C. The central compartment in a one compartment model D. The peripheral compartment in a one compartment model 	**1.5**	**CO3**
Q 16	Illustrate the effect of dosing frequency on plasma concentration-time profile after oral administration of a drug at fixed dose by a well labelled graph.	**1.5**	**CO3**
Q 17	If the drug has a narrow therapeutic index, the drug should be administered with small doses with frequent dosing. A. True B. False	**1.5**	**CO4**
Q 18	Define population pharmacokinetics.	**1.5**	**CO4**
Q 19	State any condition where therapeutic drug monitoring is necessary.	**1.5**	**CO5**
Q 20	Name three types of TDM process.	**1.5**	**CO5**
	Section B **(4Qx5M=20 Marks)**		
Q	Short Answer Type Question	**20 Marks**	**CO**
Q 1	Write a short note non-linearity observed in absorption and distribution.	**5**	**CO1**
Q 2	The dose of the drug must be changed in renal failure. Justify the statement.	**5**	**CO2**
Q 3	Define and illustrate with graph: onset of action, minimum effective concentration, duration of action, C_{max}.	**5**	**CO1**
Q 4	Discuss the approaches employed for pharmacokinetics population.	**5**	**CO4**
	Section C **(2Qx15M=30 Marks)**		
Q	**Two case studies 15 marks each subsection**	**30 Marks**	**CO**
Q 1	A 70 kg patient 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 the 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**

Q 2	Diltiazem is administered in a dose of 60 mg q.i.d. The oral availability of the drug is 50%, (Vd) is 30 liters and elimination half-life is 4 hours. a. Determine the maximum and minimum amounts of drug in the body after 4 doses. b. Calculate the maximum and minimum amounts of drug in the body at steady state. c. What is the accumulation index? d. What is the average amount of drug in the body at steady-state? e. If the desired Css,av is 0.099 mcg/ml, is there any need to administer the loading dose?	**15**	**CO3**
	Section D **(2Qx10M=20 Marks)**		
Q	Long Answer type Questions	**20 Marks**	**CO**
Q 1	Explain in detail the therapeutic drug monitoring.	**10**	**CO5**
Q 2	Discuss the need of dose adjustment on the basis of various factors.	**10**	**CO2**