Name: Enrolment No:	UPES UNIVERSITY WITH A PURPOSE

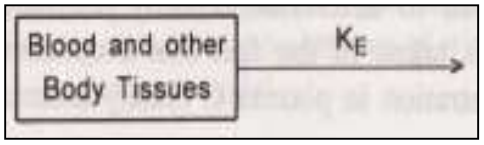
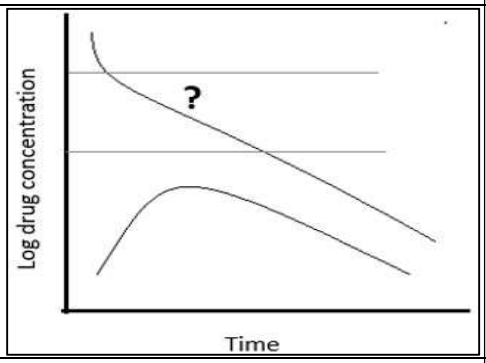
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Course: Biopharmaceutics and Pharmacokinetics **Semester : III**
Program: M.Sc. (Clinical Research/Microbiology/Nutrition and Dietetics) **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	Which of the following is not the process of drug absorption from GIT? A. Carrier-mediated transport B. Metastasis C. Active transport D. Endocytosis	1.5	CO1
2	Define volume of distribution.	1.5	CO1
3	Which of the following pharmaceutical factors significantly affect absorption? (Select all possible options) A. Gastric emptying time B. Dissolution time C. Drug solubility D. Polymorphism	1.5	CO1
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
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
6	Following are the steps of renal excretion except _____ . A. Tubular reabsorption B. Secretion C. Glomerular filtration D. Tubular filtration	1.5	CO2
7	Which of the following route of administration always shows 100% bioavailability? A. Oral B. Intramuscular C. Topical D. Intravenous	1.5	CO2
8	Induction of metabolizing enzymes requires the increase in dose of some drugs. A. True B. False	1.5	CO2
9	Inulin renal clearance is indicative of _____ . A. Renal excretion rate B. Active reabsorption rate C. Glomerular filtration rate D. Renal metabolism rate	1.5	CO2
10	Pharmaceutical equivalent dosage forms are similar in _____ .	1.5	CO2

	A. Drug or its salt B. Strength C. Dosage form D. Pharmacological response		
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	The i.v. bolus dosage is 500mg and the plasma drug concentration is 0.8 mg/ml. What should be the volume of distribution? A. 625 mg/mL B. 625 L C. 625 mL D. 0.0016 mg/mL	**1.5**	**CO3**
13	In which of the model peripheral compartments are connected to a central compartment? A. Compartment model B. Caternary model C. Compartment model D. Mammillary model	**1.5**	**CO3**
14	Area under curve of plasma concentration – time curve represents total amount of drug that is been absorbed in systemic circulation. A. True B. False	**1.5**	**CO3**
15	In one compartment open model, clearance can be calculated by_____. (Select all possible answers) A. $K_E V_d$ B. (dX/dt) / C C. Dose / AUC D. None of the above	**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 organs comprise the peripheral compartment in a two compartment model? A. Muscles B. Lung C. Kidneys D. Liver	**1.5**	**CO4**
18	In the given picture, the marking "?" represents the drug concentration of which compartment?  E. The central compartment in a two compartment model F. Peripheral compartment in a two compartment model G. The central compartment in a one compartment model H. Drug concentration of the plasma	**1.5**	**CO4**
19	The characteristic of non-linear pharmacokinetics include…….. A. Area under the curve is proportional to the dose B. Elimination half-life remains constant C. Area under the curve is not proportional to the dose D. Amount of drug excreted through remains constant	**1.5**	**CO5**
20	In non-linear kinetics, pharmacokinetic parameters change with the size of dose administered.	**1.5**	**CO5**

	A. True B. False		
SECTION B			
Q	Short Answer Type Question	**20 Marks**	**CO**
1	Discuss any five factors affecting drug absorption from GIT.	**5**	**CO1**
2	Chloroquine has volume of distribution of 15000 L. Comment on the characteristics of the drug and its distribution in the body.	**5**	**CO1**
3	Enlist the objectives of bioavailability studies.	**5**	**CO2**
4	Explain any two non-renal routes of drug excretion.	**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 is has plasma half-life of 22 hours, apparent Vd of 15.7 liters and desied steady state level plasma concentration of 0.0002 µg/mL. By assuming one compartment open model, estimate 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	If the plasma concentration of vancomycin after IV bolus administration was found to be 10.0 and 5.5 µg/mL at 2 and 4 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 20 marks		
Q	Long Answer type Questions	**20 Marks**	**CO**
1	a) Summarize 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	**10**	**CO5**
2	a) Explain two-compartment open model IV bolus with the help of compartment diagram and graph. b) State the equation for determining concentration.	**8+2**	**CO4**