Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
School of Health Sciences

Mid Semester Examination, September-October 2021

Programme Name: M.Sc. Clinical Research
Course Name: Applied pharmacokinetics and drug dosing
Course Code: HSCR8004P
No. of pages: 5

Semester: III
Time: 3 hour
Max. Marks: 100

Instructions: All questions are compulsory

SECTION A
(Type the answers in test box)

	MCQs, One or two line answers.	**Marks**	
Q 1	Which of the following is NOT a pharmacokinetic process? a. Bioavailability b. Excretion c. Metabolism d. Receptor binding	**1.5**	**CO1**
Q2	Which of the following formulas defines bioavailability? a. Amount of drug absorbed ÷ drug dose b. Amount of drug in body ÷ plasma drug concentration c. Rate of drug elimination ÷ plasma drug concentration d. Plasma concentration of unbound drug ÷ total plasma drug concentration	**1.5**	**CO1**
Q3	In a plasma concentration time curve for a drug following first order kinetics, the absorption rate constant is calculated based on- a. Half life b. Volume of distribution c. Clearance d. Constant steady state concentration	**1.5**	**CO1**
Q4	Duration of action depends upon a. Clearance b. Rate of elimination c. Bioavailability	**1.5**	**CO1**

	d. All of the above		
Q5	The volume of distribution (Vd) for a drug that is completely retained in the vascular compartment would be? a. High b. Low c. Unchanged d. Cannot be determined	**1.5**	**CO1**
Q6	We start IV infusion of a drug and ensures that rate of drug delivery is constant over time. Which of the following factor will determine the time required for drug to reach steady state concentration (Css) in the blood? a. Apparent volume of distribution b. Bioavailability c. Clearance d. Half-life	**1.5**	**CO1**
Q7	Acidic drug binds to: a. Globulin b. Alpha-1 glycoprotein c. Albumin d. None	**1.5**	**CO1**
Q8	Loading dose depends on- a. Half life b. Plasma volume c. Volume of distribution d. Rate of clearance	**1.5**	**CO1**
Q9	Ratio of LD_{50} and ED_{50} is? a. Therapeutic index b. Bioavailability c. Potency d. Efficacy	**1.5**	**CO1**
Q10	Equation for first order half-life is……? a. $t_{1/2} = 0.5\ C_0/k_0$ b. $t_{1/2} = 2\ C_0/k_0$ c. $t_{1/2} = 1.5\ C_0/k_0$ d. $t_{1/2} = 0.693\ C_0/k_0$	**1.5**	**CO2**

Q11	Which of the following terms describe the application of pharmacokinetic principles to individualize pharmacotherapy? a. Drug individualization b. Individual-factor monitoring c. Patient-factor monitoring d. Therapeutic drug monitoring	**1.5**	**CO2**
Q12	A 70kg man was given a drug with dose of 100 mg/kg, $t_{1/2}$ is 10 hours, plasma concentration is 1.9 mg/ml. Find the clearance. a. 20 liter/hour b. 40 liter/hour c. 0.2 liter/hour d. 2 liter/hour	**1.5**	**CO2**
Q13	Concentration of drug in blood is 40 microgram/ml. Dose of the drug is 200mg. Find the volume of distribution.	**1.5**	**CO2**
Q14	What is the amount of drug remaining in the body after 3 half-lives in first order kinetics?	**1.5**	**CO2**
Q15	A drug having 40% absorption and hepatic extraction ratio of 0.6. What is the bioavailability of that drug?	**1.5**	**CO2**
Q16	Drug X is given IV at a dose of 300 mg. Blood concentrations were measured and the AUC was calculated to be 9.9 mg*h/L. What is the clearance of this drug?	**1.5**	**CO2**
Q17	Displacement of Plasma protein bound drug will_____ a. Increase drug plasma level b. Increase side effects c. Decrease effect d. None	**1.5**	**CO2**
Q18	Volume of distribution of drug is 500ml and target concentration of drug in blood is 5 g/L. 20% of administered drug is reached to systemic circulation. What will be the loading dose of that drug? a. 1 gram b. 5 grams c. 12.5 grams d. 25 grams	**1.5**	**CO3**
Q19	A drug X was given continuous intravenous infusion at 1.6 mg/min. The clearance of the drug is 640 ml/min. With a half-life of 1-8 hours, what would be the steady state plasma concentration of drug?	**1.5**	**CO3**

	a. 2.88 mg/ml b. 0.004 mg/ml c. 0.002 mg/ml d. 3.55 mg/ml		
Q20	We are planning to infuse a drug intravenously at a constant amount per unit time (rate). It has a first-order elimination rate constant (k_{el}) of 0.35 h^{-1}. No loading dose will be given. Approximately how long will it take for blood levels to reach steady state after the infusion begins? a. 0.7-1 h b. 1.2-3 h c. 3.5-5 h d. 8-10 h	**1.5**	**CO3**
	SECTION B **(Scan and upload)** **Word limit 250**		
	Short answer type questions		
Q1	Drug X is administered IV at a dose of 250 mg. A blood concentration was drawn at 3 h and urine was collected from 2 to 4 hours. The blood concentration at 3 h was 5 mg/L and during the two-hour interval, 50 mg of drug was eliminated. What is the renal clearance of this drug?	**5**	**CO1**
Q2	Drug X is given IV at a dose of 100 mg. The renal clearance of the drug is 7 L/h and the hepatic clearance is 23 L/h. Assuming that these are the only two routes of elimination, what is the total clearance? How much drug (in mg) was metabolized?	**5**	**CO1**
Q3	Drug X (100 mg), administered as an intramuscular injection, has the following pharmacokinetic parameters: $t_{1/2}$ = 8 h, ka = 1.5 h^{-1}, V = 10 L, F = 65%. What will be the concentration at 12 hours after the dose is administered?	**5**	**CO2**
Q4	What is therapeutic drug monitoring?	**5**	**CO5**
	SECTION C **(Scan and upload)**		
Long answer type questions (Calculation)			
Q1	a. Write about most commonly used method for AUC calculation. (5) b. The following data were obtained after a short-term infusion of drug. Calculate the AUC_t and AUC_∞ using trapezoid method. (10) Time (h) | [Drug] (mg/L) **0** | 0 **1** | 10 **2** | 15 **3** | 18	**15**	**CO2** **CO3**

	4 9 **5** 4 **6** 2		
Q2	In the one compartment pharmacokinetic system after extravascular administration The following data were obtained after drug X was administered orally as a 1000 mg tablet. Determine the clearance (CL/F), half-life, volume (V/F), maximum concentration (C_{max}), time to maximal concentration (t_{max}) and the absorption rate constant (assume ka>>k). Time (h) / Drug (mg/L) 0 / 0.00 1 / 19.85 2 / 21.92 4 / 14.42 6 / 7.75 8 / 3.96	**15**	**CO2**
SECTION D **(Scan and upload)** **Word limit 500**			
Q1	Write a note on principles behind pharmacokinetic population modeling.	**10**	**CO1** **CO2**
Q2	Describe the drug dosing consideration in patients with acute and chronic kidney disease.	**10**	**CO4**