BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B. PHARM. **SEMESTER: VI**
BRANCH: PHARMACY **SESSION: SP2024**

SUBJECT: BP604T BIOPHARMACEUTICS & PHARMACOKINETICS

TIME: 3.00 Hours **FULL MARK: 75**

INSTRUCTIONS:

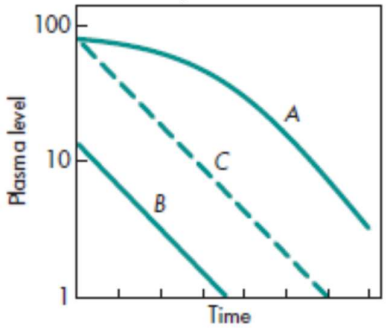
1. **The missing data, if any, may be assumed suitably.**
2. **Before attempting the question paper, be sure that you have got the correct question paper.**
3. **Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**
4. **This question paper consists of (03) three parts. Read the part wise instructions before attempting the questions.**

PART-I

Objective types questions (Instruction: Answer all questions)

Q1. (10 x 2 = 20 Marks)

A.	Excessive tissue binding of drug …… Volume of distribution	CO1	BL1
B.	Justify the term "*apparent* volume of distribution"	CO2	BL4
C.	In fasted condition the phase II in GI tract last for …… min	CO3	BL2
D.	In the following figure which curve corresponds to non-linear pharmacokinetics	CO4	BL5



E.	Small polar molecules follow passive diffusion through pores. True/False. Justify	CO5	BL2
F.	Define relative and absolute bioavailability.	CO1	BL1
G.	Write down the criterion for establishing bioequivalence.	CO2	BL2
H.	Write down the important assumptions for applying method of residuals to determine the absorption rate constant.	CO3	BL1
I.	Write the relation between the amount of drug with plasma concentration.	CO4	BL4
J.	Define pharmaceutical equivalent.	CO5	BL1

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PART-II
Short Answers
(Instruction: Answer seven out of nine questions)

(7 x 5 = 35 Marks)

Q2.	Differentiate between active and passive diffusion	CO1	BL2
Q3.	Analyse vesicular transport and ion pair transport system in GIT with suitable example	CO2	BL4
Q4.	Discuss and comment on various phases of GI motility under fasted condition	CO3	BL3
Q5.	Using suitable example, comment on various *in vitro* cases to justify the term "apparent Vd"	CO4	BL4
Q6.	Derive and discuss kinetics of plasma protein binding of drug	CO5	BL1
Q7.	Describe the method of residuals to determine the absorption rate constant with citing proper assumptions.	CO1	BL3
Q8.	Determine the overall elimination rate constant from urinary excretion data obtained after IV infusion administration.	CO2	BL4
Q9.	Derive the equation to determine apparent volume of distribution and systemic clearance from plasma concentration vs. time data after an IV infusion administration following one compartmental pharmacokinetic model.	CO3	BL4
Q10.	Determine Cmax and Tmax from the plasma concentration vs. time data after an extravascular administration following one compartmental pharmacokinetic model.	CO4	BL4

PART-III
Long Answers
(Instruction: Answer two out of three questions)

(2 x 10 = 20 marks)

Q11.	A drug eliminated from the body by capacity-limited pharmacokinetics has a KM of 100 mg/L and a Vmax of 50 mg/h. If 400 mg of the drug is given to a patient by IV bolus injection, calculate the time for the drug to be 50% eliminated. If 320 mg of the drug is to be given by IV bolus injection, calculate the time for 50% of the dose to be eliminated. Explain why there is a difference in the time for 50% elimination of a 400-mg dose compared to a 320-mg dose. Also calculate the time for 50% elimination of the dose when the doses are 10 and 5 mg. Explain why the times for 50% drug elimination are similar even though the dose is reduced by one-half.	CO5	BL6
Q12.	Determine the elimination rate constant using the declining drug concentration in plasma versus time data collected after stopping the infusion after an IV infusion administration following one compartmental pharmacokinetic model.	CO2	BL5
Q13.	100 mg of a drug was administered by rapid IV injection to a 70-kg, healthy adult male. Blood samples were taken periodically after the administration of drug, and the plasma fraction of each sample was assayed for drug. Formulate the equation which demonstrate the two-compartment pharmacokinetic model. The following data were obtained:	CO3	BL5

Time (hr)	Plasma Concentration (µg/mL)
0.25	43.00
0.5	32.00
1.0	20.00
1.5	14.00
2.0	11.00
4.0	6.50
8.0	2.80
12.0	1.20
16.0	0.52

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