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

CLASS: B.PHARM **SEMESTER: VI**
BRANCH: PHARMACY **SESSION: SP 2025**

SUBJECT: BP604T BIOPHARMACEUTICS AND 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 handbook/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. Write down the slope of the plasma drug concentration vs time curve from an extravascular administration at the $t_{max.}$
B. State one assumption is not applicable for two compartment pharmacokinetic model for IV bolus dosage form but applicable for one compartment pharmacokinetic model for the same dosage form.
C. Write down the assumptions to determine the rate of absorption by using "method of residuals" method.
D. The plasma drug concentration at time zero (post dose) and at 12 hr from an IV bolus administration are 350 µg/mL and 20 µg/mL. The overall elimination rate constant is 0.2 hr^{-1}. calculate the $AUC_{0-\infty}$.
E. Define drug absorption.
F. What is the significance of surface area in drug absorption?
G. Discuss the role of pH in GIT drug absorption.
H. What is active transport? Give one example of a drug absorbed through active transport.
I. What criteria must drug products meet to be considered bioequivalent?
J. Specify some conditions where the area under the plasma concentration-time curve (AUC) is not directly proportional to the administered drug dose.

PART-II

Short Answers

(Instruction: Answer seven out of nine questions)

(7 x 5 = 35 Marks)

Q2. Discuss the various methods to assess the bioavailability of a drug.
Q3. Explain the different factors that influence the bioavailability of a drug.
Q4. Describe in detail the various mechanisms of drug absorption through the gastrointestinal tract.
Q5. Write a detailed note on the absorption of drugs from non-per oral extravascular routes.
Q6. Discuss how gastrointestinal pH and motility influence drug absorption.
Q7. Derive the equation by which primary pharmacokinetic parameters are determined from plasma drug concentration vs time profile of IV infusion administration following one compartment pharmacokinetic model.
Q8. Write a short note on Wagner-nelson method by which rate of absorption is determined from an extravascular drug administration.
Q9. Calculate the absorption rate constant of a drug given orally from the following plasma drug concentration vs time data by the "Method of Residuals" without using any graph paper.

Time (hr)	Plasma Concentration (mg/L)	Time (hr)	Plasma Concentration (mg/L)
0.25	22	3	43
0.5	52	4	30
0.75	73	5	16
1	78	6	13
1.5	85	7	9
2	65	8	4

Q10. Derive the equation by which over all elimination rate constant is calculated from urinary excretion data from an extravascular drug administration following one compartment pharmacokinetic model.

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

(2 x 10 = 20 marks)

Q11. From the following data of plasma drug concentration vs time, calculate the absorption rate constant by Wagner-Nelson method. Overall elimination rate constant is 0.16 hr^{-1}. No need of using any graph paper.

Time (hr)	Plasma Concentration (mg/L)
0	0
1	22
2	51
3	68
4	77
5	84
6	70
8	54
10	44
12	31
18	14

Q12. Write a short note on two-compartment open pharmacokinetic model of IV bolus administration.
Q13. Enlist and explain various patient-related factors that play a role in gastrointestinal drug absorption.

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