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

CLASS: B.PHARM **SEMESTER : VII**
BRANCH: PHARMACY **SESSION : MO/18**

SUBJECT: PS7403 BIOPHARMACEUTICS AND PHARMACOKINETICS

TIME: 3.00 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Differentiate between Absolute and Relative bioavailability. [2]
Q.1(b) Explain major rate limiting steps of an orally administered drugs. [4]
Q.1(c) Write short notes on Diffusion layer model and Danckwert's model of drug dissolution [6]

Q.2(a) Define following terms (i) bioequivalence and (ii) pharmaceutical equivalents. [2]
Q.2(b) Discuss Biopharmaceutics Classification System of Drugs. [4]
Q.2(c) Discuss in detail about particle size and effective surface area in the drug's absorption. [6]

Q.3(a) Write Henderson-Hasselbach equation for weak acid and weak base. [2]
Q.3(b) Write short note on pH Partition hypothesis. [4]
Q.3(c) What are the major limitations of pH-Partition hypothesis? [6]

Q.4(a) Discuss the influence of disintegration time on drug absorption. [2]
Q.4(b) Discuss following factors in absorption of drug (i) Gastric emptying time and (ii) Gastrointestinal pH [4]
Q.4(c) Write short notes on (i) Pre-systemic metabolism and (ii) Everted sac technique to measure drug uptake. [6]

Q.5(a) Explain volume of distribution and its significance. [2]
Q.5(b) Discuss method of trapezoid to estimate $AUC_{0\text{-}n}$. How will you estimate residual $AUC_{n-\infty}$. [4]
Q.5(c) The equation that best fits the pharmacokinetics of paracetamol after oral administration of 500 mg dose is $C=3.76\ (e^{-0.24t}-e^{-1.6t})$. Assuming one compartment kinetics calculate: [6]
(i) Peak time (ii) Peak plasma concentration (iii) Elimination half-life

Q.6(a) Discuss assumptions of urinary excretion method to estimate pharmacokinetic parameters [2]
Q.6(b) Calculate the $\boldsymbol{AUC_{n-\infty}}$ of given plasma concentration time data given orally. Given K_E= 0.0678 h^{-1} [4]

Time (hr)	0	0.5	1.0	2.0	4.0	8.0	12.0	18.0	24.0	36.0	48.0	72.0
Conc. (µg/mL)	0	5.47	11.14	19.24	27.74	31.47	25.42	18.24	11.47	3.78	2.49	0.40

Q.6(c) Derive a suitable method to estimate absorption rate constant using method of residuals when the drug is administered orally conferring one compartment model. Comment if elimination rate is greater than absorption rate. [6]

Q.7(a) Derive an equation to calculate loading dose (Xo), when the drug is to be administered orally after fixed intervals with maintenance dose of (X). Assume that drug confers the characteristics of one compartment model. [2]
Q.7(b) Assuming two cases, when infusion rate is stopped after achieving steady state and before achieving steady state, derive a method to estimate Elimination rate constant (KE) considering one compartment kinetics. [4]
Q.7(c) A drug eliminated from the body by capacity-limited pharmacokinetics has a K_M of 100 mg/L and a V_{max} of 50 mg/hr. 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. Using the same drug, 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. [6]

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