M. PHARM FIRST YEAR SECOND SEMESTER EXAMINATION - 2025
COURSE NAME: ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS
COURSE CODE: MPH202T

Time: 3hour **Full Marks: 75**

Answer **question No. 1** and **any one** from the rest of **Group-A** and **any three** from the **Group-B**

Group: A

1. (a) Define partition coefficient and distribution coefficient. Which one and why is more significant? (3)
   (b) What do you mean by absolute and relative bioavailability? (2)
   (c) Write on similarity and difference factors. (5)
   (d) Write on brush border membrane vesicle drug permeability study. (2)
   (e) Write on an acute pharmacological method for bioavailability measurement. When and why is this method adopted? (3)
2. Describe in detail the film theory of drug dissolution. How does a first order dissolution process become zero order process? (15)
3. Why are most of the orally administered drugs affected by first pass metabolism? Write in detail on transcellular passive drug transport. (15)
4. Define bioequivalence. Why is the bioequivalence acceptance criterion considered to be 80-125%? How can the bioavailability of a poorly water soluble drug be increased? (15)

Group: B

5. (a) Determine absolute bioavailability through urinary excretion data in terms of half-life of a drug that is excreted unchanged through urine, when it is administered by oral and intravenous route.
   (b) Deduce the time-concentration relationship equations for more than one capacity limited elimination process.
   (c) Find out the intravenous infusion rate of a drug administered to a patient who achieved the steady-state plasma concentration of the drug 18 mg/L. The apparent volume of distribution of the dose is 14 L, and the elimination rate is 0.12 h-1. Find out how long the drug requires achieving 85 and 95% of the steady-state plasma concentration in the patient? When the rate of elimination is 0.15 h-1, what should be the rate of infusion then? (5+5+5=15)
6. (a) Write Dominguez equation and give its importance. "To determine drug absorption rate constant, plotting the data of the percentage of drug remaining to be absorbed versus time is truly rational"—justify the statement. Determine Ka by Loo-Riegelman method. Write the advantages of this method over Wagner-Nelson methods for determination of Ka. (2+2+3+2 = 9)
   (b) A bi-exponential series represents the plasma concentration of a drug at time t in a two-compartmental model in the form of $cp = Ae^{-\alpha t} + Be^{-\beta t}$, where A = 22 and B =6.8 and α =2.0 and β = 0.41. The dose of the drug is 450 mg. Find K21, K12, KE and Vc. (6)
7. (a) A drug undergoes hepatic first-pass metabolism, using a two-compartmental model, show that bioavailability of the drug is invariably more by intravenous route.
   (b) An intravenous infusion rate of a drug is 15 mg/h, and it provided plasma concentration of the drug at 7 h and 28 h to be 11 mg/L and 20 mg/L, respectively, in a patient. The volume of distribution of a drug is 32 L, rate of elimination half-life of the drug in the patient varied between 4 and 6 h. Find the volume of distribution and the elimination half-life of the drug. (9+6=15)
8. (a) What is accumulation factor? What is called loading dose? Deduce the equation of accumulation factor. Explain Flip-flop phenomenon related to drug absorption and elimination. (1+2+3+3 = 9)
   (b) Following zero-order degradation kinetics, 170 mg of a drug became 138 mg in 6 months. Find the time required by the drug to become 120 mg. (3)
   (c) Deduce the equation of Sigma-minus method of elimination. (3)