B. PHARMACY THIRD YEAR SECOND SEMESTER EXAM 2024

Course Name: BIOPHARMACEUTICS AND PHARMACOKINETICS

Course Code: BP406T

Time: 3hours **Full Marks: 75**

*Answer **five** questions taking at least **two** from **group-A** and at least **one** from **group-B** and **Group-C***

Group A

1. (a) Draw drug absorption curve as plasma drug concentration against time. Show MEC, MSC, and therapeutic window. Show AUC, C_{max}, and t_{max}. Explain the term onset of drug action, and differentiate the onset of drug action, and lag phase of a dose, of a drug. What is zero-order kinetics? Deduce zero-order kinetics, and determine the half-life of a drug. (1+3+3+1+2 = 10)

(b) A drug that undergoes elimination following nonlinear kinetics has been administered to a patient with two different doses, 500 and 650 mg, in two different situations. The values for Km and vmax of the drug in the patient are 120 mg and 75 mg/h. Calculate the half-life of the drug on both occasions in the patient. (5)

2. (a) "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. Deduce Wagner Nelson equation for determination of drug absorption rate constant. Give the importance of the equation. Write the pre-assumptions of the equation. (3+4+1+2 =10)

(b) In a 60-year-old patient with body weight of 75 kg, a drug has been administered by intravenous infusion with an elimination half-life of 4 h. The apparent volume of the dose distribution is 0.6 L/kg, and the minimum plasma concentration of the drug in the patient at the steady-state is 8 mg/L. The drug is available in 5-mL with a drug concentration of 150 mg/mL. Find out the rate of infusion of the drug in the patient mg/h and mL/h. Calculate the loading dose of the drug for the patient. (5)

3. (a) What is drug metabolism? Using the compartmental model, deduce the equation of estimation of blood level of drug-metabolite excreted unchanged through urine.Give a time concentration relationship for a capacity-limited process. What do you mean by two-compartment open models? Write the assumptions of two-compartment models. (2+4+3+1+2 =12)

(b) The maximum and minimum plasma concentrations of a drug, following IV route is 450 ng and 50 ng. Determine accumulation factor. (3)

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Group-B

4. a) Define absorption, distribution, excretion, and bioavailability. b) What is passive diffusion? Describe the drug transport mechanism by passive diffusion process. c) What are the important characteristics of carrier-mediated transport? d) How particle size and effective surface area of the drug affects absorption through GI membrane? (4+5+3+3=15)

5. a) What are the factors affecting protein drug binding? b) Describe drug related factors affecting protein drug binding. c) Write about the significance of protein/tissue binding of drugs d) Derive the kinetics equation for protein drug binding (2+4+4+5=15)

Group-C

6. What do you mean by bioequivalence? Why is the average bioavailability of the test sample considered within 80 to 125% of the reference standard instead of 80 to 120%? Mention the criteria for drugs as per the BCS classification. Define clearance. Write examples of indicators that are used to determine GFR. Write a note on the entero-hepatic circulation of drugs. (2+2+2+2+2+5=15)

7. Define first-pass metabolism. Why do most of the orally administered drugs undergo first-pass metabolism? Name the routes through which drugs can bypass first-pass metabolism other than parenteral routes. Enumerate how the bioavailability of poorly water-soluble drugs can be increased. (2+2+2+9=15)