

II SEMESTER M.TECH (INDUSTRIAL BIOTECHNOLOGY) END-SEMESTER EXAMINATION, 26/06/24

SUBJECT: Pharmaceutical Biotechnology (BIO 5408)

REVISED CREDIT SYSTEM ANSWER ALL QUESTIONS

TIME: 3 HOURS

MAX. MARKS: 50

Q. NO		MARKS
1A	What is a Plasma Level-Time Curve, and how is it used to study the pharmacokinetics of a drug in the body? Additionally, what are some of the key parameters that can be derived from a Plasma Level-Time Curve, and what do they tell us about the drug's behavior in the body?	4
1B	What is the difference between solution binders and dry binders? Can you provide examples of each type?	3
1C	Discuss the following mechanisms of drug movement across cell membrane (a) Vesicular transport (b) Ion-pair formation	3
2A	Table gives plasma drug concentrations (Cp) obtained following an intravenous bolus administration of a 250mg dose of a drug that exhibited the characteristics of a one-compartment model and was eliminated exclusively by urinary excretion. Plot the data and, using the plot, determine the following. $\overline{\text{Time (h)}}$ 0.512357Plasma concentration (mg/mL)68543018.561.8a. The elimination half life (t1/2).b. The initial plasma concentration, (Cp) ⁰ .c. Determine the drug plasma concentration at 75 min following the administration of a 2.5mg/kg dose to a subject weighing 70 kg.	3
2B	An antibiotic is to be given to an adult male patient (58 years old, 70 kg) by IV infusion. The elimination half-life is 8 hours and the apparent volume of distribution is 1.4 L/kg. The drug is supplied in 60-mL ampules at a drug concentration of 15 mg/ml. The desired steady-state drug concentration is 20 µg/ml. (a) What infusion rate, in milliliters per hour, would you recommend for this patient?	3

	(b) What loading dose would you recommend for this patient? By what route of administration would you give the loading dose? When?	
	(c) According to the manufacturer, the recommended starting infusion rate is 15 ml/hr. Do you agree with this recommended infusion rate for your patient? Give a reason for your answer.	
2C	Derive the Wagner–Nelson Method to calculate absorption rate constant when the drug is given orally (Assume drug is eliminating by first order and follows one compartment model)	4
3A	 Studied the pharmacokinetics of amrinone after a single IV bolus injection (75 mg) in 14 healthy adult male volunteers. The pharmacokinetics of this drug followed a two-compartment open model and fit the following equation: C_P=Ae^{-at}+Be^{-bt} Where A = 4.62 µg/mL, B = 0.64 µg/mL, a = 8.94 hr⁻¹, b = 0.19 hr⁻¹ From these data, calculate: a) The volume of the tissue compartment b) The elimination half-life of amrinone after the drug has equilibrated with the tissue compartment c) The volume of distribution by area 	3
3B	 A patient receives 1000 mg every 6 hours by repetitive IV injection of an antibiotic with an elimination half-life of 3 hours. Assume the drug is distributed according to a one-compartment model and the volume of distribution is 20 L. a) Determine the maximum plasma concentration of the drug at steady state. b) the plasma drug concentration <i>C</i>_p at 3 hours after the second dose c) Average plasma concentration of drug. 	3
3 C	Why prodrugs are made in formulation? Illustrate the different ways of making prodrugs	4
4 A	Explain Enhanced permeation and retention (EPR) effect in cancer tumor. How is this effect utilized to treat cancer? illustrate the different formulations using EPR effect	4
4B	How are nano-systems used in pharmaceutical formulations?	3
4C	Active targeting moiety is one of the new area used in nanomedicine. How this will be helpful ? Mention different active targeting moieties and their limitations	3
5A	Combating drug resistance in infectious diseases is the major problem in the health industry. How does nanomedicine helps in this regard?	3
5B	Retinal diseases do not have cure right now, why? How recent research using nanomedicine help in solving the problem? Illustrate with proper examples	3
5C	Why tuberculosis is a very difficult disease to contain? explain how Nanomedicine is very promising method for drug delivery?	4