Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

VI SEMESTER B.Tech.(BME) DEGREE END SEM EXAMINATIONS APR/MAY 2019
SUBJECT: DRUG DELIVERY (BME 4004) (Elective II)
(REVISED CREDIT SYSTEM)
Tuesday, 30th April 2019: 2 to 5 PM

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to Candidates:

1. **Answer all the questions.**
2. **Draw labeled diagrams wherever necessary.**

1. (a) 40% of a dose of a drug is destroyed by acid in the stomach, the remaining drug is able to penetrate the apical membrane completely, and 30% of the drug entering the liver is metabolized. If the effective dose of the drug is 20, then calculate the amount of drug required to be administered. 03

(b) Analyze and predict the feasibility of the type of passive diffusion possible for each drug based on the following data: 03

Drug	Log P	Log $D_{6.0}$
Atenolol	0.10	-2.74
Famotidine	-0.40	-2.06
Ibuprofen	3.72	2.12

(c) Analyze the role of (i) Phase-I and Phase-II process, (ii) drug-drug interaction in hepatic metabolism. 04

2. (a) Pindolol has a volume of distribution (Vd) of 2300L. If the plasma concentration is 1mg/L, 03
(i) How much of drug is in the body?
(ii) How much of drug is in the plasma?(assume that the volume of plasma is 3L)
(iii)How much of drug is in the tissue?

(b) The values of the volume of distribution of three drugs (A,B,C) are given below 03
Drug A: 35L in a 70kg person
Drug B: 10L in 70 kg person.
Drug C: 1000L in a 70 kg person.

Address specifically the potential volume into which the drugs distribute, and the binding to the tissues and the plasma protein

(c)

Drug	Cl_r (mL/min)	f_u
Atenelol	170	0.95
ciprofloxacin	500	0.6

04

Use the information provided in the table to get an insight into the processes involved in their renal clearance. Compare and comment on this.

3. (a) Lipoamide is an antipyretic drug, noslatol is a β1-adrenergic antagonist, and disolvprazole is a proton pump inhibitor. The physiochemical characteristics of the three drugs is listed in the table 05

	Lipoamide	Noslatol	Disolvprazole
Acid or Base	base	acid	base
Molecular mass	396 Da	365 Da	221 Da
Log P	3.2	2.1	0.2
Log $D_{6.0}$	3.0	1.8	-2.8
Solubility pH1-7.5	High1g/1000mL	Low 0.5g/1000mL	High 5g/1000 mL
Main enzyme involved in metabolism	CYP3A4	CYP3A4	none
Substrate for intestinal uptake transporter	none	none	OATP1
Substrate for intestinal efflux transporter	p-gp	p-gp	none
Bioavailability factor	0.21	0.7	0.5

Use this information to discuss potential of the stated drugs for oral administration. Address in detail about how the information provides insight into how they may penetrate the intestinal membrane, and their expected extent of absorption.
Discuss how you would predict 'food' to affect their absorption.
Suggest possible explanations for the value of bioavailability reported for each drug.

(b) (i) Explain the working of a "nicotine patch" as transdermal drug delivery system. 05
(ii) Put your strategy to develop pain less transdermal drug delivery system.

4. (a) How do the "Schick Test Toxin" and "Schick Control" function? 03

(b) Discuss briefly, the steps involved in the preparation of "liquid" and "dried" diphtheria antitoxin. 04

(c) Why are toxin antitoxin floccules (T.A.F) suitable for adults who are susceptible to alum precipitated toxoid (APT)? 03

After collecting of blood (from toxoid treated horse), how would you proceed to obtain dry product (powder) of diphtheria antitoxin?

5. (a) Explain the basic functions of the targeted drug delivery system. Differentiate active and passive targeting. 05

(b) Analyze the process pertaining to ultrasound mediated targeted drug delivery 05