Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEM B.Tech. (BME) DEGREE END SEMESTER EXAMINATIONS APRIL 2018
SUBJECT: DRUG DELIVERY (BME 4004)
(REVISED CREDIT SYSTEM)

Tuesday, 24th April 2018: 2 PM to 5 PM

TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

Answer all the five full questions.

1A. Explain graphically, the advantages of controlled release dosage form over conventional dosage form. Discuss the post receptor events in pharmacodynamics. **5+5**

1B. Establish agonist and antagonist concentration-response relationship. Explain why the such a relationship is considered to be a 'capacity limited' process. **3+3**

1C. Explain briefly, the common routes of systemic drug administration. **4**

2A. The drug Ibuprofen has a log $D_{6.0}$ value of 2.12 and is poorly soluble in aqueous media. When administered orally, approximately 30% of the dose is lost due to incomplete dissolution. It encounters no further problems during absorption, but it is a CYP3A4 substrate and about 25% of the drug passing through the membrane undergoes intestinal metabolism. During its initial pass through liver, about 70% of the drug is lost due to metabolism. **3+3+2**
(i) Calculate the values of Fa, Fg, Fh and F for Ibuprofen.
(ii) Determine the effective dose when 50 mg is given orally.
(iii) Determine the value of an intravenous dose that is equivalent to a 100 mg oral dose.

2B. Differentiate between 'transcellular' and 'para-cellular' passive diffusion processes. Analyze the role of various determinants in para-cellular transport. **2+4**

2C. Explain with a schematic diagram, the principles associated with the mechanism of swelling controlled and degradable controlled release systems. **3+3**

3A. Warfarin has a volume of distribution of 8L. If the plasma concentration of warfarin is 1mg/L, **6**
(i) How much of the drug is in the body?
(ii) How much of the drug is in the plasma? (assume that the volume of plasma is 3L)
(iii) How much of the drug is in the tissue?

3B. Illustrate graphically and mathematically, the influence of tissue and plasma protein binding on the pattern of drug distribution. **4+4**

3C. Infer using a graph, the kinetics of drug metabolism [using Michaelis –Menton Equation $V=(V_{max}*C_p)/(K_m+C_p)$] at (i) very low and (ii) very high drug concentrations. **3+3**

4A. Explain how the following factors influence renal tubular reabsorption **6+2**

(i) The drug's lipophilicity, (ii) pH and (iii) Filtrate flow rate.

How does intake of coconut water influence renal clearance?

4B. How would you measure the total body clearance (consider i.v administration of the drug)? **6**

4C. (i) A drug ciprofloxacin, which is 20% bound to proteins, has a renal clearance of 300mL/min. What are the relative values of active secretion and tubular resorption? **3+3**

(ii) Consider an extraction unit, where in Ca=160mg/L, Cv=100mg/L and Q=2L/h. Find out the rate of extraction, clearance and the fraction extracted.

5A. Discuss briefly, the steps involved in the preparation of small pox vaccine. **8**

5B. Compare 'active acquired immunity' and 'passive acquired immunity'. **6**

5C. Explain the role of following components in the design of Trans-dermal delivery system, **6**

(i) Polymer matrix, (ii) Permeation enhancer and (iii) Release liner.