Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VI SEMESTER B.TECH (BIOMEDICAL ENGINEERING)

END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: DRUG DELIVERY [BME350]

REVISED CREDIT SYSTEM
Friday, May 6th 2016: 2pm-5pm

Time: 3 Hours MAX. MARKS: 100

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Answer should be brief and to the point

1A. Explain graphically, the advantages of controlled release dosage form over conventional dosage form. Highlight the limitations of controlled release formulation. **4+2**

1B. Discuss reversible and irreversible drug-receptor interactions in pharmacodynamics process. **10**

1C. Explain why the concentration–response relationship is considered a 'capacity limited' process. **4**

2A. The drug Lipoamide has a log $D_{6.0}$ value of 3.0 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 a drug passing through the membrane undergoes intestinal metabolism. During its initial pass through liver, about 70% of the drug is lost due to metabolism. **4+3+3**

(i) Calculate the values of F_a, F_g, F_h and F for Lipoamide.
(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. The therapeutic indices (T.I) of two drugs A and B are 95 and 3 respectively. Which of these drugs would you recommend for frequent administration without compromising patient's safety? Justify your views. **4**

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

Explain how coated beads would influence the design of sustained release dosage form.

3A. Illustrate mathematically, the influence of tissue and plasma protein binding on the pattern of drug distribution. **5+3**
Explain under which condition, the volume of distribution will be equal to that of the volume into which drug gets distributed.

3B. Amiodarone has a volume of distribution of 4600L. If the plasma concentration is 1mg/L, **6**
(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?

3C. Establish an expression for first order rate constant, in the context of perfusion controlled drug distribution. **6**

4A. How would you accelerate renal clearance of drug with high lipophilicity? **2**

4B. Explain the role following components in the design of Transdermal delivery system- **8**
(i) Polymer matrix, (ii) permeation enhancer, (iii) backing laminates, and (iv) release liner.

4C. Explain how the following factors influence tubular reabsorption **8+2**

(i) the drug's lipophilicity, (ii) pH, and (iii) filtrate flow rate

How does intake of coconut water influence renal clearance?

5A. How would you measure the total body clearance (consider i.v administration of the drug)? **8**

5B. Explain mathematically the kinetics of drug metabolism in the following conditions **8**
(i) at very low drug concentration
(ii) at high drug concentration

5C. Consider an extraction unit, where in Ca=160mg/L, Cv=100 mg/L, and Q=2L/h. Find out the rate of extraction, clearance and the fraction extracted. **4**

6A. Discuss the general method of preparation of unpurified Diphtheria formol toxoid. Explain all methods associated with purification of formol toxoid (FT). **10**

6B. Explain the diagnostic process to assess whether an individual is susceptible or immune to diphtheria. **5**

6C. Explain briefly, the steps involved in the preparation of small pox vaccine. **5**