I. Choose the best answer (3% each)

1. Thirty percent of a drug administered orally appears unchanged in the urine. What can you most correctly conclude about the oral bioavailability of this drug?
   A. At least 30% of the drug was absorbed into the systemic circulation.
   B. 100%of the drug was absorbed into the systemic circulation.
   C. 30% of the drug was absorbed and 70% of the drug was metabolized.
   D. It is not possible to conclude anything about the oral absorption of this drug.

2. For drugs administered extravascularly, the peak of the plasma concentration vs. time curve approximates the
   A. time required for all of the drug to be absorbed.
   B. point in time when absorption and elimination of the drug have equalized.
   C. time when the maximum pharmacological effect occurs.
   D. time when the drug starts to be eliminated.

3. Intestinal membrane permeability is an important determinant of drug absorption because
   A. It is independent of drug solubility, physical chemical parameters.
   B. It is not influenced by intestinal pH variation.
   C. It increases with increasing drug solubility.
   D. It determines the velocity of drug transport through the intestinal mucosal cells.

4. The tablet excipients known as glidants are included to
   A. improve the manufacturability, speed, and uniformity of manufacturing process.
   B. aid in swallowing of the tablet.
   C. provide better disintegration characteristics and improve release of drug.
   D. improve patient ease of use and manipulation.

5. Eighty-nine percent of a drug injected intravenously appears in the urine as unchanged drug while 40% of the drug appears unchanged in the urine following oral dosing. What is the systemic availability of the drug?
   A. 89%
   B. 49%
   C. 36%
   D. 45%

II. In zero order kinetics, the rate of absorption is proportional to the amount of drug in the body and depends on the amount remaining to be absorbed. Comment on the above statement. (5%)

III. Digoxin is an inotropic agent. An average of 60 to 70% of digoxin administered as an oral tablet is absorbed from the GI tract. This drug is excreted by the kidney. Approximately 50% of the drug appears unchanged in the urine after oral dosing. A pharmacokinetic study was conducted to investigate quinidine-digoxin interaction after oral administration under steady-state conditions in healthy male volunteers (Int J Clin Pharmacol Ther Toxicol 23:145-153, 1985). The pharmacokinetic parameters of digoxin are shown in the following table. Please comment on the effect of quinidine on the renal excretion of digoxin? (10%)

(背面仍有題目,請繼續作答)

Parameters	Digoxin	Digoxin + Quinidine
K_{el} (hr^{-1})	0.0221±0.0056	0.016±0.0024
$t_{1/2}$ (hr)	33.0±8.0	43.9±6.2
AUC_{0-48} (mg·hr/ml)	37.75±14.14	100.22±30.40
CL_{cr} (ml/min)	127.2±12.36	117.4±14.8
CL_r (ml/min)	150.7±46.5	79.0±23.3
CL (ml/min)	198.8±66.4	91.7±21.9

(CL_r : renal clearance; CL_{cr}: renal clearance of creatinine)

IV. Describe and explain "Good Manufacturing Practice" for pharmaceutical industry. (10%)

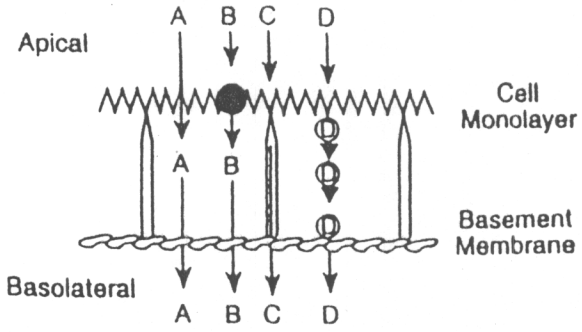
V. What features of drug candidates are appropriate to develop transdermal delivery systems? Give examples to explain their design and development process. (10%)

VI. Describe the characteristics of biotechnology-derived therapeutics that require special consideration in designing their delivery systems. What strategies can be used to deliver these drugs? (10%)

VII. Drug A is a weakly basic drug with several pKa values between 2 and 6. Its solubility in the free base form is very poor, on the order of a few micrograms/mL. In terms of gastric pH, discuss whether it would be most appropriate to dose Drug A before meals, with meals, or 2 hours after meal intake. (10%)

VIII. On the diagram below identified the uptake mechanism available for drug absorption. (2% each)

A. _____
B. _____
C. _____
D. _____



Match the requirement for uptake given below with each of the four mechanism listed above by placing the or letter A, B, C, D next to the requirement for transport.

E. no special requirements _____
F. lipophilic _____
G. small and water soluble _____
H. specific chemical structure _____

IX. Define the following terms.

A. Bioequivalence (3%)
B. In Vitro-In Vivo Correlation (5%)
C. Biopharmaceutical Classification System (6%)