I. Answer the following questions: (10%)

1. All of the following physicochemical constants may be useful when predicting the solubility of a chemical except
   (A) dielectric constants
   (B) pH of solution
   (C) pKa of the chemical
   (D) solubility parameters
   (E) valence of the chemical

2. The shrinkage that occurs when alcohol and purified water are mixed is primarily due to
   (A) attractive van der Waals forces
   (B) covalent bonding
   (C) hydrogen bonding
   (D) ionic bonding
   (E) temperature changes

3. Which one of the following procedures will not improve the absorption of a drug into the skin?
   (A) Applying the ointment and covering the area with an occlusive bandage
   (B) Incorporating an oil-soluble drug in PEG ointment rather than white ointment
   (C) Applying the medicated ointment on the back of the hand rather than on the palm
   (D) Increasing the concentration of the active drug in the ointment bases
   (E) Using an ointment base in which the active drug has excellent solubility

4. When a drug is compressed into tablets with a slowly soluble polymer, the mechanism of drug release for the formulation design is best described as:
   (A) Encapsulated dissolution
   (B) Ion-exchange
   (C) Matrix diffusion
   (D) Matrix dissolution
   (E) Osmotic pump

（背面仍有題目，請繼續作答）

II. What is the minimum amount of a potent drug that may be weighted on a prescription balance with a sensitivity requirement of 6 mg if at least 98% accuracy is required? (5%)

III. How many ml of HCl USP are needed to prepare 4 L of Diluted HCl USP? The concentration of the available HCl is 36.8% W/W and the solution specific gravity is 1.19. The diluted HCl is 10% W/V. (5%)

IV. A radiopharmacist prepares a solution of ^{99m}Tc (40 mCi/ml) at 6:00 AM. (1) If the solution is intended for administration at 12:00 PM at a dose of 20 mCi, how many ml of the original solution are needed? The half-life of the radioisotope is 6 h. (2) What concentration of the original ^{99m}Tc solution will remain 24 hour after its original preparation? (10%)

V. Answer questions based on the following prescription: (10%)

Rx

Ephedrine sulfate	2%
Menthol	0.5%
Camphor	
Methyl salicylate	aa 0.2%
Mineral oil	qs 30 ml

1. The prescription is intended to be administered into (A) nose (B) eyes (C) ears
2. Which of the following ingredients will not dissolve in mineral oil? (A) ephedrine sulfate (B) menthol (C) methyl salicylate
3. Methyl salicylate is also known as (A) camphorated oil (B) peppermint oil (C) salicylamide (D) oil of wintergreen (E) sweet oil
4. Camphor forms a eutectic mixture with (A) ephedrine sulfate (B) menthol (C) methyl salicylate

VI. From the following types of bases, select one that is most closely associated with each designated purposes: (10%)

(A) cold cream (B) hydrophilic ointment (C) hydrophilic petrolatum
(D) PEG ointment (E) white petrolatum

1. For an ophthalmic drug

2. For an antibiotic with limited stability

3. For absorbing a large quantity of water

4. To aid in hydrating the skin

VII. Describe the factors that affect volume of distribution of a drug. (10%)

VIII. Describe and explain the level A, level B and level C *in vitro-in vivo* correlations for the evaluation of modified-release products. (10%)

IX. Describe the methods for assessing bioavailability and bioequivalence. (10%)

X. From 0 to 3 hr after a 50-mg i.v. bolus dose of drug, the area under plasma-concentration time curve (AUC) is 5.1 mg*hr/L. The total AUC is 22.4 mg*hr/L and the cumulative amount excreted unchanged in urine is 11 mg. (20%)

(1) What percent of the administered dose remains in the body as drug at 3 hr?

(2) Calculate the total body clearance.

(3) Calculate the renal clearance of the drug.

(4) What is the fraction of the dose that is eliminated by renal excretion?