KENYATTA UNIVERSITY
UNIVERSITY EXAMINATIONS 2019/2020
SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF PHARMACY (BPharm Level IV)

PPA 420: PHARMACEUTICS IV

DATE: Thursday 1st April 2021 TIME: 11.00 a.m. – 1.00 p.m.

INSTRUCTIONS:

1. Answer ALL questions
2. Answer each sectionin a separate booklet

SECTION A:
ANSWER ALL QUESTIONS

1. Use the expressions on clearance below to answer the questions that follow:

$$Cl_H = \frac{HBF.(f_B.Cl_{INT})}{HBF + (f_B.Cl_{INT})}$$

Clearance = Q x ER

a. What does Q represent? **1 Mark**
b. What does f_B represent? **1 Mark**
c. Describe the hepatic clearance of drugs with a low extraction ratio. **3 Marks**

2. Explain how a physical property, such as partition coefficient, affects drug distribution. **3 Marks**

3. Discuss the causes of a long distribution half-life for a body organ if blood flow to the tissue is rapid. **3 Marks**

4. Is it **true** or **false** that when a body organ is equilibrated with drug from the plasma, the drug concentration in that organ should be the same as that of the plasma? Justify your answer. **3 Marks**

5. Explain why the plasma concentration of free (unbound) naproxen increases in patients with chronic alcoholic liver disease and probably other forms of cirrhosis, whereas the total plasma drug concentration decreases.

3 Marks

6. Drug *A* and drug *B* have apparent volume of distribution (V_{app}) of 20 and 100 L, respectively. Both drugs have a plasma volume (V_p) of 4 L and a tissue volume (V_t) of 10 L, and they are 60% bound to plasma protein. Calculate the tissue binding fraction of the two drugs?

3 Marks

7. A drug fitting a one-compartment model was found to be eliminated from the plasma by the following pathways with the corresponding elimination rate constants.

   Metabolism: $k_m = 0.200\ h^{-1}$
   Kidney excretion: $k_e = 0.250\ h^{-1}$
   Biliary excretion: $k_b = 0.150\ h^{-1}$

   I) calculate the following:

   a. The elimination half-life of this drug? **2 Marks**

   b. The half-life of this drug if biliary secretion was completely blocked? **2 Marks**

   c. The half-life of this drug if drug excretion through the kidney was completely impaired? **2 Marks**

   II). If drug-metabolizing enzymes were induced so that the rate of metabolism of this drug doubled, what would be the new elimination half-life?

   2 Marks

8. The bioavailability of propranolol is 26%. Propranolol is 87% bound to plasma proteins and has an elimination half-life of 3.9 hours. The apparent volume of distribution of propranolol is 4.3 L/kg. Less than 0.5% of the unchanged drug is excreted in the urine.

a. Calculate the hepatic clearance for propranolol in an adult male patient (43 years old, 80 kg).

3 Marks

b. Assuming the hepatic blood flow is 1500 mL/min, estimate the hepatic extraction ratio for propranolol. **3 Marks**

9. The following is the pharmacokinetic information for erythromycin:

Bioavailability: 35%

Urinary excretion: 12%

Bound in plasma: 84%

Volume of distribution: 0.78 L/kg

Elimination half-life: 1.6 hours

An adult male patient (41 years old, 81 kg) was prescribed 250 mg of erythromycin every 6 hours for 10 days. From the given data, calculate the following:

a. Total body clearance **2 Marks**

b. Renal clearance **2 Marks**

c. Hepatic clearance **2 Marks**

SECTION B

ANSWER ALL QUESTIONS

1. Explain the difference between a suspension and an emulsion? **(2marks)**
2. a) Describe electrical double layer (EDL) as it applies to suspensions? **(2 marks)**

   b) Explain how the overall potential varies across the EDL of a cationic colloidal particle in aqueous solution. **(5 marks)**
3. a) Explain the DVLO theory with respect to suspensions systems. **(4 marks)**

   b) Distinguish between flocculation and deflocculation in suspensions. **(4 marks)**
4. Explain how you would assess the sedimentation of a suspension. **(4 marks)**

5. a) Define an emulsifier.

b) Explain the influence of an emulsifier on the stability of an emulsion?

(3 marks)

6. a) Describe a multiple emulsion? **(2 marks)**

b) Outline two classes of emulsifying agents and give an example of each. **(2 marks)**

7. Describe three factors that affect the stability of an emulsion? **(3 marks)**

8. Discuss how the stability of an emulsion is assessed. **(4 marks)**

9. The following equation can be used to illustrate the stability of emulsions:

$\Delta G = (\gamma A) - (T\Delta S)$

a) Define the terms in the equation. **(2marks)**

b) Describe how they relate to the stability of an emulsion. **(3 marks)**

SECTION C

ANSWER ALL QUESTIONS

1. Outline two differences between ointments and creams **(2marks)**

2.Using specific examples, describe the four classes of bases used in preparation of creams (4marks)

3. Explain four factors to consider when choosing bases for creams and ointments **(4 marks)**

4. Discuss three methods used in manufacturing of ointments **(3marks)**

5. i) Define incompatibility in creams **(2marks)**

ii) Explain how incompatibility in creams can be avoided **(2marks)**

6. Differentiate between:

i) Gel and Jelly **(2marks)**

ii) Single phase and Two-phase gels **(2marks)**

iii) Paste and Poultice **(2marks)**

7. Discuss the ideal storage conditions for i) Pastes **(2marks)**

ii) Poultices **(2marks)**

8. Describe the characteristics of a good gelling agent **(2marks)**

9 i) Differentiate between pessaries and suppositories **(2marks)**

ii) Explain two classes of bases used in formulation of suppositories **(2marks)**

iii)Describe the formulation of suppositories **(3marks)**

iv) Explain two methods of evaluation of suppositories **(2marks)**

10. Explain how a patient should use the following:

i)Suppository **(1mark)**

ii) Pessary **(1mark)**