KATHMANDU UNIVERISTY
End Semester Examination
May/June, 2022

Marks Scored:

Level : B.Pharm.
Year : II
Course : PHAR 223
Semester : II

Exam Roll No. :
Time: 30 mins.
F. M. : 20

Registration No.:
Date :

SECTION "A"
[20 Q.×1=20 marks]

Encircle the most appropriate answer.

1. Which of the following is the most important for movement through capillary walls?
   a. Molecular size
   b. Lipid solubility
   c. Diffusion constant
   d. pK_a

2. Facilitated diffusion and active transport have in common that both are processes involving:
   a. Transport of a solute up its concentration gradient.
   b. Use of energy provided by ATP.
   c. ATP independent.
   d. Carrier-mediated transport

3. The most efficient absorption of a drug takes place in the ileum if the drug is:
   a. Ionised at a pH of ~8
   b. A weak base
   c. Non-ionised at a pH of ~6
   d. A weak acid

4. Fick's law is used for study of
   a. Dissolution rate b. Disintegration rate c. Dissociation rate d. Diffusion rate

5. When the solvent molecules are entrapped in the crystalline structure of the polymorph, it is called as
   a. Pseudo-polymorphism
   b. Amorphism
   c. Crystallinity
   d. All of the above

6. Two most common protein involved in plasma protein binding are
   a. Globulin and plasmin
   b. Albumin and globulin
   c. Fibrin and globulin
   d. Plasmin and fibrin

7. Biotransformation of a medicinal substance results in:
   a. Slower urinary excretion
   b. Faster urinary excretion
   c. Higher binding to membranes
   d. Easier distribution in organism

8. Which types of drugs get absorbed by ion-pair transport?
   a. Drugs that ionize at all pH conditions
   b. High lipophilicity
   c. Affinity for carriers
   d. Oily droplets

9. Which condition usually increases the rate of drug dissolution from a tablet?
   a. Increase in particle size of the drug
   b. Decrease in surface area of the drug
   c. Use of ionized form of the drug
   d. Use of sugar coating around the tablet

10. Two or more drug products are identical in strength, quality, purity, content uniformity and disintegration and dissolution characteristics, but may differ in containing different excipients.
   a. Bioequivalent products
   b. Generic equivalent products
   c. Therapeutic equivalent products
   d. Pharmaceutic equivalent products

11. Drugs that are extensively distributed into specific tissue regions, such as chloroquine into the liver, tend to have .....value for the apparent volume of distribution.
   a. small b. big c. no effect d. either small or big

12. Using the hypothetical drug considered Non-linear pharmacokinetics with (V_{max} = 0.5 µg/mL per hour, K_M = 0.1 µg/mL), how long would it take for the plasma drug concentration to decrease from 20 to 12 µg/mL?
   a. 8 hr b. 16 hr c. 32 hr d. 54 hr

13. The absorption rate constant (k_a) for three different preparations of a drug A, B and C are 0.2, 0.3 and 0.4 hr^{-1} respectively. Which preparation will give the lowest intensity of pharmacologic effect?
   a. A b. B c. C d. all have same effect

14. After intravenous injection of drug, 35% of the dose was eliminated within 12 hours. The half-life of this drug is
   a. 3 hour b. 6 hour c. 9 hour d. 19 hour

15. What infusion rate to be maintained to attained the desired concentration of 15 mg/L if the V_d and $t_{1/2}$ values for this drug are 40.2 L and 5.1 hr respectively?
   a. 1.3 mg/hr b. 9.5 mg/hr c. 82 mg/hr d. 225 mg/hr

16. Famotine 20 mg drug is given intravenously results in an AUC of 6000 mg/Lhr-1. hr. If 40 mg dose of drug is given orally and the resulting AUC is 500 mg/Lhr-1. Find the F value for this drug for oral route.
   a. 0.01 b. 0.04 c. 0.1 d. 0.4

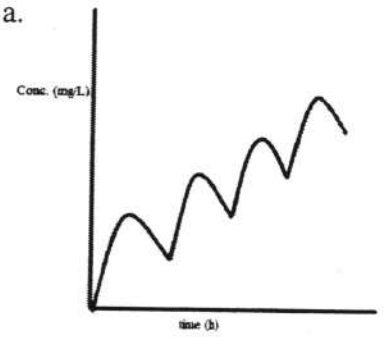
17. A 100 mg/hr infusion is given for two hours. Two samples are assayed and obtained Cp_{3hr} = 11 mg/L and Cp_{12hr} = 3 mg/L. Calculate k_e:
   a. 0.89 hr^{-1} b. 0.14 hr^{-1} c. 0.11 hr^{-1} d. 0.26 hr^{-1}

18. To administer 500mg Azithromycin with V_d = 3.5 L/kg and half-life = 50 hours, given at dose interval of 24 hours to the renally impaired patient of 65kg, what can be the possible adjusted dosage regimen for altered average plasma concentration of 2 mg/L (considering F =1)?

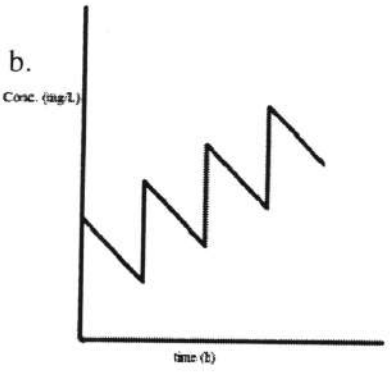
a. 100 mg at dose interval of 24 hours
b. 150 mg at dose interval of 24 hours
c. 200 mg at dose interval of 12 hours
d. 300 mg at the dose interval of 12 hours

19. A semilog plot of Cp versus time after four equal IV bolus doses of 250 mg given every 6 hours is represented by:

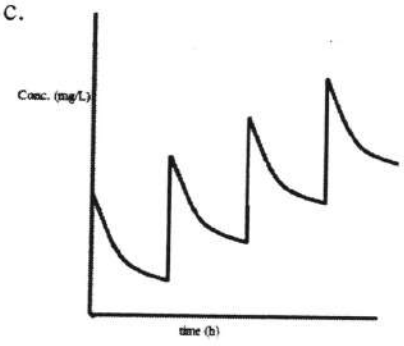
a.



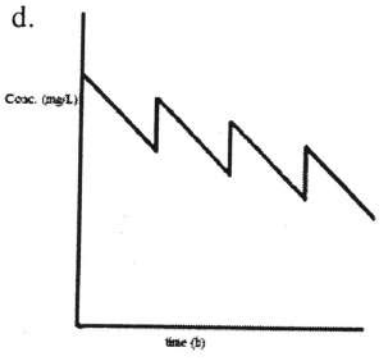
b.



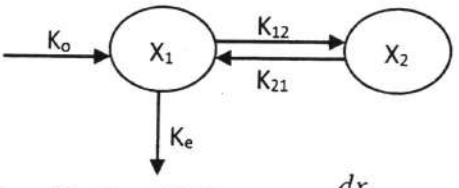
c.



d.



20. ..... is the suitable differential equation for the following schematic diagram.



a. $\frac{dx_1}{dt} = K_o + K_{21}X_2 - K_{12}X_1 - K_eX_1$

b. $\frac{dx_1}{dt} = K_o + K_{21}X_1 - K_{12}X_2 - K_eX_1$

c. $\frac{dx_1}{dt} = K_o - K_{21}X_2 + K_{12}X_1 + K_eX_1$

d. $\frac{dx_2}{dt} = K_o + K_{21}X_2 - K_{12}X_1 - K_eX_1$

KATHMANDU UNIVERISTY
End Semester Examination
May/June, 2022

Level	: B.Pharm.	Course	: PHAR 223
Year	: II	Semester	: II
Time	: 2 hrs. 30 mins.	F.M.	: 55

Note: Check (√) the number of each question of Section B, C and D you have answered in the front page of main answer book.

SECTION "B"

[5Q. × 3 =15 marks]

Answer *ANY FIVE* questions.

1. Define drug excretion and drug elimination.
2. What is Gastric emptying time? Explain about its effect on drug absorption.
3. Mention the conditions during which Cp_{max} and Cp_{min} of plasma drug concentration occur after multiple doses of IV bolus administration.
4. How does the size of the particle affect the drug absorption?
5. How will you select the subject for the purpose of Bioavailability and Bioequivalence study?
6. Given that a drug follows linear one compartment pharmacokinetics, with $k_{el} = 0.21\ hr^{-1}$ and V_d = 230 L, calculate a suitable I.V. bolus dose to maintain plasma concentrations of the drug above 0.5 mg/L for 6 hours. What is the initial plasma concentration?
7. Explain on Lineweaver- Burk plot. Mention its advantages and disadvantages.

SECTION "C"

[5Q. × 5 = 25 marks]

Answer *ANY FIVE* questions.

8. How does the food present in the GI tract affect the drug absorption?
9. Define K_m and V_{max} in non-linear Pharmacokinetics. How can you detect the linearity of the pharmacokinetic parameters of a drug?
10. Define Cross-over design. How to perform it? Explain about its importance for Bioavailability and Bioequivalence study.
11. Why the Therapeutic Drug Monitoring (TDM) is required in renally-impaired patient? How the renal function is monitored and dose adjustment done?
12. A drug follows first order (i.e. linear) two compartment pharmacokinetics. The k_{el} and V_1 for this drug in this patient (90.5 kg) are $0.192\ hr^{-1}$ and 0.39 L/kg, respectively. The k_{12} and k_{21} values for this drug are 1.86 and $1.68\ hr^{-1}$, respectively. Calculate the appropriate A, B, α and β values and determine the plasma concentration of this drug 1.5 hours after a 500 mg, IV Bolus dose.

13. Losartan is an antihypertensive drug for which therapeutic range is 8-25mg/L. The drug has half- life of 7 hr and volume of distribution of 30 L. After oral administration, this drug is rapidly absorbed and 85% of the dose reaches the systemic circulation. Suggest the most appropriate multiple dosing regimen for this drug. What will be the average steady-state concentration achieved from the regimen you recommended?

14. A dose of 50 mg IV bolus was administered to healthy volunteer. Seven blood samples were collected at 0.5, 1, 2, 4, 6, 8, 10 hours. Plasma was separated from each blood sample and analyzed for drug concentration. The collected data are shown in the table below. Estimate $AUC_{(0-10hr)}$, $AUC_{(0-\infty)}$, Cp_0 and K_e.

Time (hr)	0	0.5	1	2	4	6	8	10	∞
Cp (mg/L)		1.95	1.48	1.03	0.44	0.23	0.1	0.05	

SECTION "D"

[2Q. × 7.5 =15 marks]

Answer *ANY TWO* questions.

15. Define Biopharmaceutical Classification system (BCS). What are biowaivers? Atenolol is β blocker drug which belongs to class III BCS system. Atenolol belongs to BCS class III with oral bioavailability of 50%. Discuss what can be the various biopharmaceutical strategies that you can apply to achieve targeted pharmacokinetic profile?

16. Do all the drugs require Therapeutic Drug Monitoring (TDM) study? Describe the current status of TDM study in Nepal. If you are clinical pharmacist in hospital, how will you conduct TDM study?

17. What are the assumptions considered for using method of residuals in one compartmental model for oral drug administration? The table 1 shows the Plasma concentration–time data following oral administration of 500 mg dose of a drug that is excreted unchanged and completely absorbed (F = 1.0);
Ddetermine all pharmacokinetic parameters (K_a, K_e, V_d, $t_{1/2}$, C_{max}, T_{max}).

Time (h)	Plasma concentration ($\mu g\ mL^{-1}$)
0.5	5.36
1.0	9.35
2.0	17.18
4.0	25.78
8.0	29.78
12.0	26.63
18.0	19.40
24.0	13.26
36.0	5.88
48.0	2.56
72.0	0.49

Table 1