UNIVERSITI KUALA LUMPUR
ROYAL COLLEGE OF MEDICINE PERAK

FINAL EXAMINATION
JULY 2025 SEMESTER

COURSE CODE	: RPD11902
COURSE NAME	: INTRODUCTION TO PHARMACOLOGY
PROGRAMME NAME	: DIPLOMA IN PHARMACY
DATE	: 18 SEPTEMBER 2025
TIME	: 2.00 PM – 4.00 PM
DURATION	: 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please CAREFULLY read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of TWO (2) sections; Section A and Section B.
4. Answer ALL questions in Section A. For Section B, answer THREE (3) questions where Question 1 and Question 2 are COMPULSORY, answer either Question 3 or Question 4.
5. Please write your answers on the OMR answer script and answer booklet provided.
6. Answer all questions in English language ONLY.

THERE ARE 14 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

PAST YEAR QUESTION UniKL RCMP

SECTION A (Total: 25 marks)

INSTRUCTION: Answer ALL questions.

Please use the objective answer sheet provided.

1. Identify the **CORRECT** statement regarding Orphan Drug Act of 1983.
   A. Encourage the development of drugs for critical illness
   B. Encourage the development of drugs for rare diseases
   C. Orphan drugs are granted forever without generic competition
   D. Orphan drugs are granted easier pathway for approval in clinical trials

2. Which is a major rationale for using intravenous (IV) dosage forms?
   A. Poor absorption of the drug via oral route
   B. Slower onset of action is desired
   C. Drug is unstable in blood
   D. Patient compliance issues

3. Why are extended-release dosage forms preferred in chronic disease management?
   A. They are cheaper than immediate-release forms
   B. They increase the frequency of dosing
   C. They reduce fluctuations in drug levels
   D. They degrade faster in the body

4. What is the main difference between over the counter (OTC) and prescription medicines
   A. OTC medicines are less effective than prescription medicines
   B. OTC medicines can be purchased without a doctor's prescription
   C. Prescription medicines are only available in hospitals
   D. OTC medicines have no side effects

5. Ginkgo biloba extract is primarily used to
   A. treat arrhythmias
   B. enhance memory
   C. relieve migraine
   D. treat cardiac failure

6. Which of the following plant-derived drugs has bronchodilator effect?
   A. Aspirin
   B. Digoxin
   C. Ephedrine
   D. Paclitaxel

7. An effective anti-malarial drug has been derived from
   A. *Digitalis purpurea*
   B. *Papaver somniferum*
   C. *Artemisia annua*
   D. *Ephedra sinica*

8. Which of the following describes a Class III recall?
   A. A product that is unlikely to cause any adverse health reaction but violates NPRA labeling or manufacturing laws
   B. A product that might cause a temporary health problem or pose a slight threat of a serious nature
   C. A dangerous or defective product that could cause serious health problems or death
   D. A product that is recalled voluntarily by the manufacturer for marketing reasons

9. What are bioengineered drugs or biopharmaceuticals?
   A. Synthetic chemicals produced in a lab
   B. Herbal remedies made from plants
   C. Therapeutic substances produced using living cells or organisms
   D. Drugs extracted from animal organs

10. The first FDA-approved bioengineered drug is
   A. human growth hormone
   B. recombinant insulin
   C. Covid vaccine
   D. Thyroxine

PAST YEAR QUESTION UniKL RCMP

11. Select the **CORRECT** statement regarding dosage forms.
    A. A pessary is a dosage from designed for insertion into the vagina
    B. An inhalation can be used to relieve nasal congestion
    C. An antibiotic otic drop is indicated for eye infection
    D. Intravenous injection will be subjected to high first-pass metabolism

12. Which of the following best explains why pharmaceutical companies are often reluctant to develop drugs for rare diseases?
    A. Existing treatments are already highly effective
    B. These conditions lack scientific relevance
    C. The potential return on investment is low
    D. Regulatory bodies restrict research in this area

13. What is one of the reasons why orphan drug market exclusivity is beneficial for pharmaceutical companies?
    A. It enables them to manufacture drugs without FDA oversight
    B. It allows them to market the drugs without generic competition
    C. It guarantees long-term funding from the government
    D. It removes the requirement for clinical trials

14. What must a research sponsor do before starting a clinical trial?
    A. Ensuring the drug is profitable
    B. Getting informed consent from participants
    C. Selecting only healthy individuals for the study
    D. Guaranteeing the drug's success

15. Vincristine and Vinblastine, used in cancer treatment, are derived from which plant?
    A. Madagascar periwinkle
    B. Sweet worm wood
    C. Willow bark
    D. Foxglove

16. What type of participants are usually recruited for Phase 1 clinical trials?
    A. Patients with the target disease
    B. Healthy volunteers
    C. Only elderly individuals
    D. Only children and pregnant women

17. Choose the main purpose of Phase 3 clinical trials.
    A. To determine drug toxicity
    B. To confirm efficacy and monitor side effects
    C. To evaluate interactions with other drugs
    D. To test on healthy volunteers

18. Why is double-blinding important in a clinical trial?
    A. It reduces the number of participants required
    B. It eliminates selection bias
    C. It minimizes placebo effect
    D. It ensures faster results

19. In vivo test means conducting test in
    A. living organism
    B. test tubes
    C. 3D organelles
    D. humans

20. The safest phase in clinical trials is
    A. Phase 1
    B. Phase 2
    C. Phase 3
    D. Phase 4

PAST YEAR QUESTION UniKL RCMP

Question 21 to 25 requires the following answer.

A	B	C	D
I and III	II and IV	I, II and III	II, III and IV

21. Characteristics of modified-release dosage forms include
    I. immediate onset of action
    II. controlled or sustained drug release
    III. increased peak plasma concentration
    IV. reduced frequency of administration

22. Identify the drugs that are derived from the opium plant.
    I. Cocaine
    II. Codeine
    III. Fentanyl
    IV. Morphine

23. Which of the following statements about lead compounds are **CORRECT**?
    I. Lead compounds serve as the starting point for drug development
    II. All lead compounds can directly proceed to human clinical trials
    III. Structural modifications are often made to improve their efficacy and safety
    IV. Lead compounds are identified only through computational methods

24. What are common functions of secondary metabolites in plants?
    I. Photosynthesis
    II. Defence against herbivores
    III. Attracting pollinators
    IV. Protection from bacterial and fungal infections

25. Which of the following are characteristics of preclinical studies?
    I. They assess the drug's toxicity, pharmacokinetics, and pharmacodynamics
    II. They include both in vitro and in vivo experiments
    III. They involve human volunteers before clinical trials begin
    IV. They are required before an Investigational New Drug (IND) application

PAST YEAR QUESTION UniKL RCMP

SECTION B (Total: 75 marks)

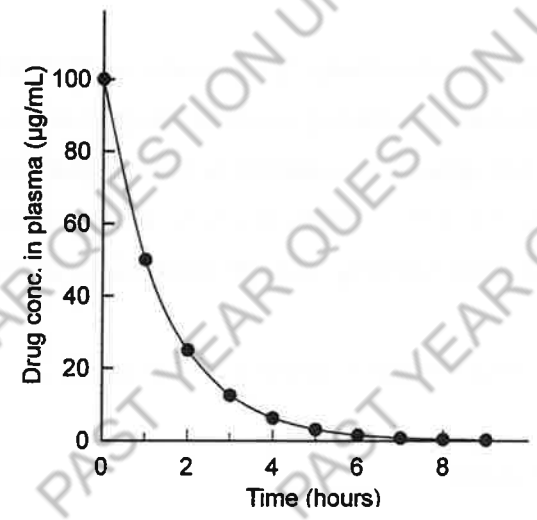
INSTRUCTION: This section consists of FOUR (4) modified essay questions (MEQ).
You are required to answer THREE questions in the answer booklet provided.
Question 1 and Question 2 are COMPULSORY.
Answer either Question 3 OR Question 4.

Question 1

(a) State **TWO (2)** disadvantages of parenteral dosage form.

(2 marks)

(b) i. The Plasma Concentration versus Time curve of Drug A is shown below. State whether Drug A follows the zero-order or first-order of elimination and justify your answer.



(2 marks)

ii. Determine the half-life of Drug A.

(1 mark)

(c) i.

Suggest **TWO (2)** reasons why Salbutamol is formulated as the above dosage form.

(2 marks)

ii. State a disadvantage of the above dosage form.

(1 mark)

(d) Explain how pH affects the absorption of weakly acidic drugs.

(2 marks)

(e) Explain how lipid solubility influence the absorption of a drug.

(2 marks)

(f) Drug B has a volume of distribution of 40L. 10mg of Drug B is injected intravenously, calculate the initial plasma concentration of Drug B.
Give your answer in mcg/L.

(3 marks)

(g) Two drugs, C and D, are tested for their effects on blood pressure. Drug C lowers blood pressure by 10mmHg at 2mg, while Drug D lowers it by 10mmHg at 10mg. Determine which drug is more potent and explain your reasoning.

(2 marks)

(h) Briefly explain the consequence of receptor downregulation on the therapeutic effect of a drug over time.

(2 marks)

(i) Drug E has a therapeutic index of 5, while Drug F has a therapeutic index of 10.

Briefly explain which drug is safer to be prescribed.

(3 marks)

(j) A hypertensive patient on long-term Propranolol (beta-antagonist) therapy suddenly stops taking the medication. Within 2 days, he experiences increased heart rate and high blood pressure.

Comment on why this happened.

(3 marks)

PAST YEAR QUESTION UniKL RCMP

Question 2

(a) i. Define volume of distribution and explain how it is calculated.

(2 marks)

ii. Predict how an increase in body fat may affect the half-life and rate of elimination of lipophilic drugs.

(2 marks)

(b) i. A patient receives a 500mg IV dose of a Drug G. The plasma concentration after distribution is 12.5mg/L.
Calculate the volume of distribution of Drug G.
Comment on where it is distributed.

(3 marks)

ii. Comment on the solubility of Drug G and its molecular size.

(2 marks)

(c) i. Briefly explain Cytochrome P450 enzymes and their roles with regards to drugs.

(3 marks)

ii. A 65-year-old patient is on Warfarin for atrial fibrillation. He develops a fungal infection and is prescribed Ketoconazole. A few days later, he presents with bleeding gums and high INR levels. Rationalize why this happened.

(3 marks)

(d) i. Compare and contrast the effectiveness of sublingual and oral tablets in an emergency situation in terms of absorption and bioavailability.

(4 marks)

ii. Explain the reason why some injections are formulated as powder that need to be reconstituted with water before use.

(1 mark)

(e) Drug J and Drug K have the same efficacy, but Drug K is more potent. Predict which drug will require a higher dose to reach the maximum effect.
Justify your answer.

(3 marks)

(f) Name an agonist drug that you know and briefly explain how it works.

(2 marks)

PAST YEAR QUESTION UniKL RCMP

Answer either Question 3 OR Question 4.

Question 3

(a) i. Explain why elderly patients may require lower doses of drugs that are metabolized by the liver.

(2 marks)

ii. By using an example, explain how an enzyme inducer affects drug metabolism and its consequence.

(2 marks)

(b) i. Drug L follows first order kinetics of elimination and has a half-life of 8 hours. If the initial plasma concentration is 100mcg/ml, determine the drug concentration after 24 hours.

(3 marks)

ii. Calculate the half-life of Drug M if its plasma concentration drops from 200mg/L to 25mg/L in 36 hours after a single dose. Assuming Drug M follows first-order kinetics.

(2 marks)

(c) Explain why breast-feeding mothers are advised against smoking.

(2 marks)

(d) i. Provide **TWO (2)** reasons why some drugs are ineffective when given orally but are effective when injected.

(2 marks)

ii. Gentamicin is a drug with low therapeutic index, and it is excreted unchanged in the kidneys. Rationalize the need to monitor the plasma level of Gentamicin in elderly patients.

(2 marks)

(e) Two pain-relieving drugs, Drug M and Drug N, are tested for their effects on postoperative pain. The results show that Drug M produces complete pain relief at a dose of 10mg, while Drug N also produces complete pain relief, but only at 50mg. However, Drug M causes more sedation than Drug N.

i. Based on the information above, compare the potency and efficacy of Drug M and Drug N.

(2 marks)

ii. Draw the dose response curve of Drug M and Drug N in the same graph.

(2 marks)

(f) Define the following terms.

(6 marks)

i Analgesic

ii. Anxiolytic

iii. Teratogen

iv. Antiepileptic

v. Hematinics

vi. Laxative

PAST YEAR QUESTION UniKL RCMP

Question 4

(a) i. Define entero-hepatic recirculation of drugs.

(2 marks)

ii. Explain how taking a course of antibiotic may affect the duration of action of a drug that undergoes entero-hepatic recirculation.

(2 marks)

(b) Drug P follows the zero-order kinetics of elimination. If 600mg of Drug P was ingested at 8.00am and was fully eliminated at 8.00pm, calculate the rate of elimination of Drug P.

(2 marks)

(c) Drug Q follows the first-order kinetics of elimination. The half-life of Drug Q is 8 hours. If a patient is given an IV dose of Drug Q at 10.00pm on Monday, determine the percentage of Drug Q that has been eliminated at 10.00pm on Tuesday.

(2 marks)

(d) i. Comment on the pharmacological effect of a prodrug after Phase I metabolism.

(1 mark)

ii. Mr. Arumugam has been taking Enalapril for his hypertension. Enalapril is a prodrug. Recently he has been having gastritis and started self-medicating with Cimetidine to reduce gastric acid secretion. His gastric problem has reduced but his blood pressure has gone up.

Rationalize why his blood pressure has gone up.

(3 marks)

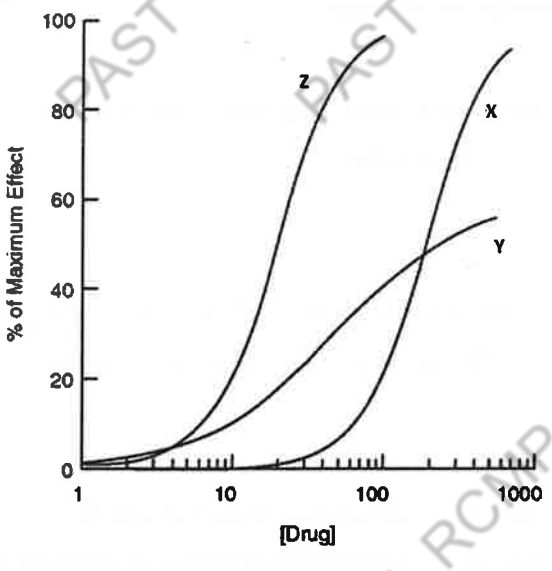
(e) An investigational new oral drug was found to be very effective for chronic pain. However, its half-life was found to be very short and so it needs to be administered 4 times daily. Suggest a suitable formulation strategy to reduce the dosing frequency and explain how it works.

(3 marks)

PAST YEAR QUESTION UniKL RCMP

(f) Below is the dose response curve of 3 drugs X, Y and Z that reduces blood pressure. Answer the following questions based on the graph.

i.



Arrange the potency and efficacy of X, Y and Z in ascending order (lowest to highest).

(2 marks)

ii. Make **TWO (2)** conclusions on Drug X and Drug Z.

(2 marks)

(g) Define the following terms:

(6 marks)

i Hypersensitivity
ii. Carcinogen
iii. Antihypertensive
iv. Diuretic
v. Anticoagulant
vi. Antipyretic

END OF EXAMINATION PAPER