



Faculty of Medicine - University of Ruhuna

Third Examination for Medical Degrees (Part II) – October 2026

Pharmacology Paper I

Monday 5th October 2026

9.00 am to 11.30 am

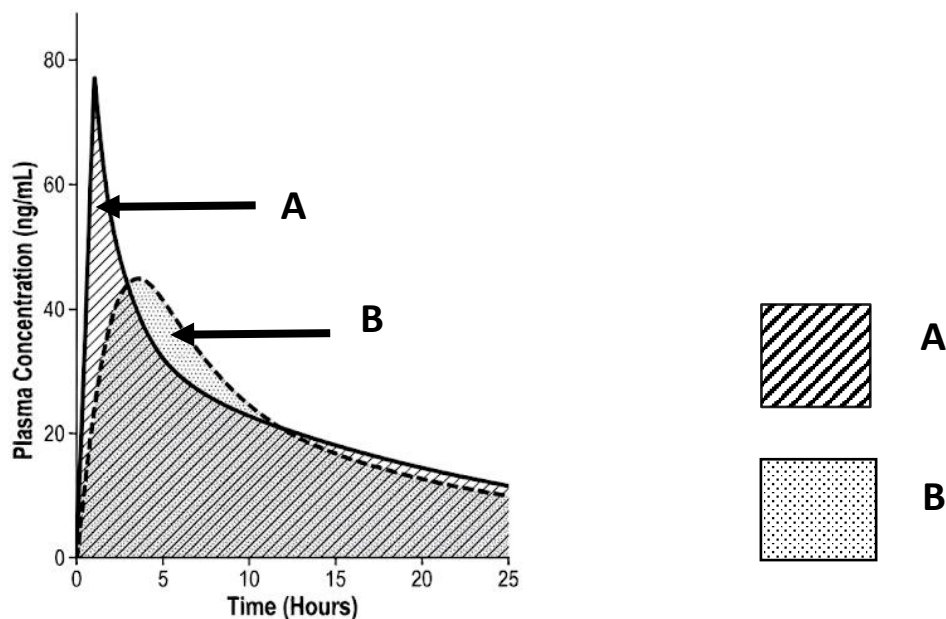
Two and half hours for all five (05) questions

Answer **ALL FIVE** questions.
Answer each part in the given space.

Index Number:

1.

- 1.1. Following plasma concentration-time graph shows the volume of distribution of diazepam. It illustrates the graphs obtained administering diazepam via two different routes of administration (**A**, **B**) to calculate volume of distribution.



- 1.1.1. Identify **A** and **B** by their corresponding routes of administration. **(05 marks)**

A:

B:

- 1.1.2. State the dosing condition required to compare the area under the curve between these two routes of administration accurately. **(05 marks)**

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- 1.1.3. The maximum concentration achieved after giving 10 mg diazepam is 0.125 mg/ml. Calculate the volume of distribution. **(15 marks)**

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Index Number:

1.1.4. Briefly describe the mechanism of action of diazepam.

(25 marks)

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1.2. A patient is initiated on oral lithium therapy. The elimination half-life of lithium is approximately 15 hours.

1.2.1. Calculate the time required for lithium to reach steady-state plasma concentration in this patient. (10 marks)

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1.2.2. Discuss the clinical significance of knowing the time required to reach steady state concentration for lithium. (10 marks)

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1.2.3. State **two (02)** indications for lithium therapy in psychiatric practice.

(10 marks)

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Index Number:

- 1.2.4. State **two (02)** investigations which should be done before commencing lithium therapy.
(10 marks)

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- 1.2.5. Explain why therapeutic drug monitoring is important in a patient on lithium therapy.
(10 marks)

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Index Number:

2.

2.1.

2.1.1. Write an example for each and the target (main receptor type) of first-generation antipsychotics and second-generation antipsychotics by completing the following table.

(20 marks)

	First generation antipsychotic	Second generation antipsychotic
Example		
Target: Main receptor type		

2.1.2. State **one (01)** second-generation antipsychotic drug for each which are known to cause weight gain and hyperprolactinaemia. (10 marks)

Weight gain :

Hyperprolactinaemia :

2.2. A 28 year-old male with a history of schizophrenia presents with persistent hallucinations and delusions. He is currently taking two different antipsychotic drugs at maximum therapeutic doses with confirmed adherence, but his symptoms have failed to improve.

2.2.1. What is the most effective antipsychotic drug for this patient? (05 marks)

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2.2.2. Write **two (02)** investigations that should be done before commencing the drug you mentioned in 2.2.1. (10 marks)

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2.2.3. List **three (03)** groups of antidepressants with an example to each. **(15 marks)**

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2.3. State the best antidepressant medication for the following scenarios.

2.3.1. A 25 year-old female university student presents to the clinic with a history of persistent low mood, impaired concentration and anxiety. **(05 marks)**

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2.3.2. A 78 year-old male patient diagnosed with major depressive disorder. He has severe insomnia, poor appetite, and 6 kg weight loss over two months. **(05 marks)**

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2.4. Briefly describe the mechanism of action of the drug you mentioned in 2.3.1. **(30 marks)**

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3.

- 3.1. A 55 year-old male patient with diabetes mellitus and hypertension presented with worsening central chest pain over four hours.

His heart rate is 102 beats per minute and in regular rhythm. Blood pressure is 150/110 mmHg.

Respiratory Rate is 16 bpm.

SpO₂ is 98% on room air.

ECG - ST elevations in V1-V4 chest leads.

Diagnosis of ST elevation myocardial infarction was made. It was decided to administer thrombolytic therapy to this patient.

- 3.1.1. State the drug, dose and route of administration of drugs prescribed before thrombolysis once the above-mentioned diagnosis was made? **(30 marks)**

Example drug	Dose	Route of administration

- 3.1.2. State **two (02)** pharmacological agents that are used in thrombolytic therapy.

(10 marks)

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- 3.1.3. Describe the pharmacodynamics of **one (01)** drug stated in 3.1.2.

(15 marks)

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Index Number:

- 3.1.4. List **three (03)** absolute contraindications you would exclude before thrombolytic therapy in this patient. **(15 marks)**

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- 3.2. A 70 year-old female patient is admitted to hospital with palpitations and dizziness. She has diabetes and hypertension.

Her blood pressure is 140/80mmHg; heart rate is 120 beats per minutes with irregularly irregular rhythm.

ECG shows atrial fibrillation.

- 3.2.1. Write **one (01)** antiarrhythmic drug for each, which is prescribed for heart rate and rhythm control and the class of Vaughan Williams Classification each drug belongs to **(10 marks)**

	Example	Class (I-IV)
Rate control		
Rhythm control		

It is decided to start lifelong anticoagulant therapy for this patient.

- 3.2.2. Write **two (02)** anticoagulants from different classes which can be prescribed for this patient. **(10 marks)**

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- 3.2.3. Describe the mechanism of action of **one (01)** drug stated in 3.2.2. **(10 marks)**

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4. A 40 year-old male patient presented with intermittent low-grade fever, malaise and exertional dyspnoea for two weeks. On examination, he was found to have a pansystolic murmur at the mitral area. A bedside 2D echocardiogram showed mitral regurgitation with vegetation on the anterior leaflet of the mitral valve.

Diagnosis of infective endocarditis was made. It was decided to start empirical antibiotic therapy after taking blood cultures.

4.1. Define the following terms of antimicrobial chemotherapy.

4.1.1. Bactericidal

(05 marks)

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4.1.2. Concentration-dependent killing

(05 marks)

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4.1.3. Minimum inhibitory concentration

(05 marks)

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4.1.4. Post-antibiotic effect

(05 marks)

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4.2. State the antibiotics recommended in combination empirical therapy for infective endocarditis. Assume that the causative organism is *Streptococcus viridans*. **(30 marks)**

Antibiotic	Antibiotic drug class	Route of administration

4.3. Describe the pharmacodynamics of **one (01)** of the antibiotics stated in 4.2. (10 marks)

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4.4. Describe the rationale for prescribing combination antibiotic therapy in this patient as stated in 4.2. (20 marks)

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Following administering antibiotic therapy for a week, he developed frequent episodes of loose stools with abdominal pain. It was suspected to be an adverse drug reaction due to prolonged antibiotic therapy.

4.5. What is this adverse drug reaction? (10 marks)

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4.6. Name **two (02)** measures you would take in managing the adverse drug reaction stated in 4.5. (10 marks)

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5. A 55 year-old female patient with diabetes mellitus, hypertension and obesity, presented with bilateral ankle swelling for one month. She reported passage of frothy urine. Recent eye examination has revealed bilateral non-proliferative diabetic retinopathy.

Her investigations over four months is as follows.

Date	Serum creatinine (mg/dL)	Estimated Glomerular Filtration rate (eGFR) (mL/min/1.73 m ²)	Urine Albumin Creatinine Ratio (mg/g)	Haemoglobin (g/dL)	Serum Ionised Calcium (mmol/L)	Serum Phosphate (mmol/L)
Reference range	0.6 - 1.2	≥60	<30	12 - 15	1.15 - 1.33	0.8 - 1.5
20.05.2026	1.58	47	96	10	1.12	1.55
30.09.2026	2.85	22	248	8	1.06	1.82

- 5.1. What is the most likely cause for her bilateral ankle swelling?

(10 marks)

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- 5.2. Following are the complications of the diagnosis stated in 5.1.

Write **one (01)** drug for each complication with the route of administration.

- 5.2.1. Normocytic normochromic anaemia

(05 marks)

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- 5.2.2. Hypocalcaemia

(05 marks)

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- 5.2.3. Hyperphosphataemia

(05 marks)

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- 5.2.4. Albuminuria

(05 marks)

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This patient has been on following medications for the last four months.

Metformin 500 mg twice daily

Linagliptin 5 mg daily

Glimepiride 2 mg twice daily

Atorvastatin 20 mg nightly

Acarbose 25 mg three times daily

Empagliflozin 10 mg daily

Subcutaneous Insulin detemir 15U at bedtime

5.3. What antidiabetic drugs would you discontinue in this prescription considering her current eGFR? **(15 marks)**

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It was decided to start premixed human insulin in this patient.

5.4. State the type of insulin, frequency and route of administration of pre-mixed human insulin therapy.

5.4.1. Types of insulin **(05 marks)**

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5.4.2. Frequency **(05 marks)**

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5.4.3. Route of administration **(05 marks)**

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5.4.4. State **four (04)** benefits of having empagliflozin in this patient. **(20 marks)**

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A 56 year-old male patient presented with bilateral ankle swelling and abdominal distention.

He underwent an ultrasound scan of the abdomen, which showed evidence of chronic liver disease with portal hypertension and ascites.

- 5.5. State **one (01)** example drug for each class that is prescribed in this patient with chronic liver disease. **(10 marks)**

Drug Class	Example
5.5.1. Loop diuretics	
5.5.2. Mineralocorticoid receptor antagonists	
5.5.3. Non-cardio selective beta blockers	
5.5.4. Laxatives	

- 5.6. Describe the pharmacological basis of prescribing non-cardioselective beta blockers in patients with chronic liver disease. **(10 marks)**

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