UNIVERSITI KUALA LUMPUR
INSTITUTE OF MEDICAL SCIENCE TECHNOLOGY

FINAL EXAMINATION

OCTOBER 2025 SEMESTER

COURSE CODE	:	HDB20203
COURSE TITLE	:	HUMAN PHARMACOLOGY
PROGRAMME NAME	:	BACHELOR OF BIOMEDICAL SCIENCE (HONOURS)
DATE	:	23 JANUARY 2026
TIME	:	9:00AM - 12:00PM
DURATION	:	3 HOURS

Universiti Kuala Lumpur
ACADEMIC DEPT
MESTECH

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Answer ALL questions for Section A.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet. ☐ *Tick if applicable*
9. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

THERE ARE 18 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

1. Medication used to relieve the symptoms of anxiety and insomnia is referred to as _____.

   A. pre-anesthesia medication

   B. thrombolytic agents

   C. anxiolytic drugs

   D. oxytocic agents

2. Sulfonamide controls bacterial infection by _____.

   A. disrupting synthesis of peptidoglycan layers of bacterial cell walls

   B. binding to sterol thus altering cell membrane permeability

   C. causing bacterial cell lysis

   D. inhibiting folic acid production

3. A 21-year-old woman develops sneezing, itchy eyes, and a runny nose after being exposed to flower pollen. Her doctor gives her a medication to relieve these allergy symptoms. What is the role of this medication?

   A. It kills bacteria causing infection

   B. It destroys allergens in the body

   C. It reduces stomach acid

   D. It blocks histamine to reduce allergic symptoms

4. The presence of cocaine in the synaptic space will cause these following effects **EXCEPT**

   A. Accumulation of norepinephrine in the synaptic space

   B. Complete muscle relaxation

   C. Enhance sympathetic activity

   D. Block norepinephrine uptake into the adrenergic neuron

5. Which of the following statements describes the mechanism of action for tricyclic antidepressants agents?

   A. Rapidly decrease the serotonin, norepinephrine and dopamine level.

   B. Selectively inhibits the uptake of acetylcholine only.

   C. Occupies the pre-synaptic neuron and cause the release of norepinephrine.

   D. Blocks the uptake of norepinephrine and serotonin by the nerve terminals.

6. Phase II biotransformation process is described by the following statements **EXCEPT.**

   A. enhancing pharmacological activity of the drug molecules

   B. making the drug molecules more polar

   C. involving conjugation of endogenous molecule with the drug molecules

   D. making the drug molecules an ideal substrate for excretion

7. Neuromuscular blocking drugs _____.

   A. promote the release of epinephrine

   B. degrade acetylcholine to acetate and choline

   C. cause accumulation of acetylcholine

   D. cause complete muscle relaxation during surgery

8. Which of the following statements about chloroquine is **CORRECT**?

   A. It works by blocking histamine receptors

   B. It is only effective against bacterial infections

   C. It kills malaria parasites by inhibiting protein synthesis in the liver

   D. It works by interfering with parasite's heme metabolism

9. Which of these statements defines the direct-acting cholinergic agonists drugs?

   A. Cleaves acetylcholine to acetate and choline.

   B. Mimic acetylcholine effects but with longer duration of action.

   C. Capable of blocking the neuromuscular junction.

   D. Inhibit the muscarinic receptors function.

10. Biotransformation is a major mechanism for _____.

    A. drug distribution

    B. drug absorption

    C. drug administration

    D. drug metabolism

11. Phase I of biotransformation process makes the drug molecules _____.

    A. irreversibly bind to the receptors

    B. inhibit the reactions in Phase II

    C. more susceptible for Phase II reactions

    D. more compatible for binding with receptors

12. This drug produces analgesic effects by binding to receptors located primarily in the brain and spinal cord, which are involved in the transmission and modulation of pain. Based on the explanation given, what is the name of this drug?

    A. Opioid agonists.

    B. Adrenergic agonists.

    C. Cholinergic agonists.

    D. Anticholinesterases.

13. In the human central nervous system, Gamma-aminobutyric acid (GABA) functions as the ____.

    A. excitatory neurotransmitter

    B. inhibitory neurotransmitter

    C. cholinergic neurotransmitter

    D. adrenergic neurotransmitter

14. A 60-year-old man has recurrent gout attacks and a high uric acid level. He is not having an attack today. The doctor wants to start a medicine to lower uric acid long-term. Which medication should be started?

    A. Naproxen

    B. Prednisolone

    C. Allopurinol

    D. Indomethacin

15. A 42-year-old woman comes to the clinic with fatigue, weight gain, dry skin, and constipation. Blood tests show low thyroid hormone (T4) and high TSH, confirming hypothyroidism. What is the primary treatment for her condition?

    A. Insulin therapy

    B. Antibiotic therapy

    C. Corticosteroid therapy

    D. Thyroid hormone replacement therapy

16. Azole group of antifungal drugs acts by inhibiting _____.

    A. the DNA synthesis

    B. cellular division

    C. the RNA synthesis

    D. the synthesis of ergosterol

17. The main goal of antihypertensive therapy is to ____.

    A. decrease the muscle activities

    B. prevent high insulin secretion

    C. lower arterial blood pressure irrespective of the cause

    D. decrease body activities and prevent the state of shock

18. Natural prostaglandins have no therapeutic application because they _____.

    A. can cause significant side effects

    B. do not interact with other endogenous molecule

    C. have a very short duration of action

    D. are not readily available

19. A woman has sneezing and runny nose from pollen allergies. She takes a pill every day to prevent allergy symptoms. What type of drug is this?

    A. Antibiotic

    B. NSAIDs (nonsteroidal anti-inflammatory drugs)

    C. Anticholinergics

    D. H1 antihistamine

20. Altered functions of this endogenous peptide may be responsible for the disturbances in sleep, mood, pain perception, migraine, endocrine control, and psychiatric disorders. Which of the following endogenous peptides fits into this statement?

    A. Norepinephrine

    B. Acetylcholine

    C. Albumin

    D. Serotonin

21. A 14-year-old boy comes to the clinic with fatigue, weight loss, frequent urination, and excessive thirst. Blood tests show very high blood glucose and low insulin levels. He is diagnosed with Type I diabetes mellitus. What is the primary treatment for this condition?

    A. Lifestyle changes only

    B. Insulin therapy

    C. Alpha adrenergic agonists

    D. Sulfonylureas

22. Which of the following describes the action of penicillin?

    A. Targets the 50S and 30S ribosomal subunits.

    B. Binds to and disrupts the protein membrane of the bacteria.

    C. Binds to an endogenous enzyme.

    D. Disrupts bacterial cell wall synthesis by blocking the formation of peptide links between peptidoglycan.

23. The aim of treatment for Parkinson's disease is to _____.

    A. increase cholinergic influence

    B. increase dopaminergic activity

    C. prevent high adrenaline secretion

    D. lower arterial blood pressure

24. Two drugs, A and B, have the same mechanism of action. Drug A in doses of 5 mg produces the same magnitude of response as Drug B in dose of 500 mg. Which of the following statement is correct with respect to these two drugs?

A. Toxicity of Drug A is less than Drug B

B. Drug A is 100 times more potent than Drug B

C. Drug A has a shorter duration of action

D. Drug B is less efficacious than Drug A

25. The aim of colchicine administration in the treatment of gout is to _____.

A. suppress the immune system

B. inhibit prostaglandins synthesis

C. initiate neutrophils migration

D. heal the gouty condition

26. Diuretic drugs lower blood pressure in hypertensive patients by _____.

A. dilating both arterioles and veins

B. blocking the calcium channels

C. dilating arterioles but not veins

D. depleting body sodium and reducing blood volume

27. Which of the following is **NOT** the steps in cholinergic neuron neurotransmission?

A. Binding to an endogenous enzyme.

B. Synthesis of acetylcholine.

C. Storage of acetylcholine in vesicles.

D. Degradation of acetylcholine.

28. A 12-year-old boy has recurrent seizures. The doctor prescribes a medicine to prevent further seizures by calming overactive nerve signals in the brain. Which type of drug is this?

    A. Antibiotic

    B. Antihistamine

    C. Analgesic

    D. Antiepileptic

29. A 40-year-old man has depression that did not improve with usual medications. The doctor prescribes a medicine that increases serotonin and norepinephrine in the brain. Which type of medicine is this?

    A. Tricyclic Antidepressant

    B. Amphetamine

    C. Benzodiazepine

    D. Antipsychotic

30. Fibrinolytic agents rapidly lyse thrombi by _____.

    A. relaxing the smooth muscles of blood vessels

    B. hydrolyzing angiotensin I to angiotensin II

    C. catalyzing the conversion of plasmin from plasminogen

    D. inhibiting calcium influx into arterial smooth muscle cells

31. Radiation therapy is commonly used in cancer treatment. What is the main purpose of radiation therapy?

    A. To increase appetite in cancer patients

    B. To prevent infections during chemotherapy

    C. To use high-energy x-rays or particles to destroy cancer cells

    D. To boost the immune system

32. Which drug–treatment pairing below does **NOT** match the main therapeutic role of the drug group?

A. Anxiolytic drugs are used to treat the symptoms of anxiety.

B. Antiepileptic drugs are used to treat episode of seizure.

C. Antipsychotics drugs mainly used for treating schizophrenia.

D. Antidepressants are widely used to treat cocaine addiction.

33. The most common adverse effects of nonsteroidal anti-inflammatory drugs (NSAIDs) occur in the _____.

A. respiratory tract

B. gastrointestinal tract

C. cardiovascular system

D. central nervous system

34. Which of the following statements about antimicrobial agents is **FALSE**?

A. Antibiotics are produced by various species of microorganisms that suppress the growth of other microorganisms.

B. Antimicrobials are used to treat bacterial, fungal and viral infections.

C. Bactericidal agents directly kill bacteria, causing cell death and disruption.

D. Bacteriostatic agents kills the growth and reproduction of bacteria.

35. Heparin inhibit the conversion of _____ to _____.

A. fibrin; fibrinogen

B. fibrinogen; fibrin

C. thrombin; prothrombin

D. prothrombin; thrombin

36. Mr. Bean, 53, was recently diagnosed with type 2 diabetes. His doctor prescribed an oral antidiabetic medication. He asks why he was not prescribed insulin like his friend, who also has diabetes. Which of the following is the most appropriate explanation?

A. Insulin is only used in type 1 diabetes

B. Older people respond better to oral drugs than insulin

C. Insulin is sometimes used, but not needed for him

D. His friend also had kidney problems, so needed insulin

37. Drug M is administered intravenously to a laboratory subject and is found to have a high degree of serum protein binding. Which of the following effects is most likely to be increased as a result?

A. Drug absorption.

B. Renal excretion.

C. Drug-drug interaction.

D. Liver metabolism.

38. Nicotine from tobacco affects the neurons by _____.

A. interacting with enzymes and increasing neurotransmitter release

B. causing drugs tolerance

C. binding to nicotinic receptors and produced false signals

D. blocking neurotransmitter uptake

39. Adrenocortical hormones control the metabolism of the following **EXCEPT**.

A. electrolytes

B. protein

C. carbohydrate

D. minerals

40. Drug-resistant bacteria use enzyme such as _____ to inactivate the drugs.

A. DNA gyrase

B. peroxidase

C. oxidase

D. β-lactamase

SECTION B (Total: 60 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

Drugs acting on the central nervous system (CNS) were among the first pharmacological agents discovered by humans and remain one of the most widely used drug groups. Answer the following questions based on the medical condition described below.

(a) A man experiencing a sudden episode of uncontrolled jerking movements and loss of awareness. The doctor explains that the attack was caused by a group of neurons in the brain firing rapidly and abnormally. He is started on antiepileptic medication to prevent future episodes. Based on this situation:

i. Describe how a seizure occurs in the brain.

(2 marks)

ii. Explain the two main mechanisms by which antiepileptic/anticonvulsant drugs control seizures.

(4 marks)

(b) A patient with Parkinson's disease is brought to the clinic with progressive muscle stiffness, slowness of movement, resting tremors, and difficulty maintaining posture and balance. Based on this scenario, describe:

i. The main clinical features of Parkinsonism.

(2 marks)

ii. The two primary pharmacological strategies used to manage Parkinsonism.

(2 marks)

(c) Depression is a common affective disorder linked to the balance of neurotransmitters in the brain. Various pharmacological agents are used to manage its symptoms by altering chemical signaling at the synapse.

i. Name TWO specific monoamine neurotransmitters whose uptake is typically blocked by tricyclic antidepressants (TCAs).

(2 marks)

ii. Describe the mechanism of action of monoamine oxidase inhibitors (MAOIs) and state how this affects neurotransmitter levels in the synaptic cleft.

(3 marks)

iii. Explain the specific mechanism of selective serotonin reuptake inhibitors (SSRIs) and suggest ONE reason why "selectivity" is an advantage in drug design.

(3 marks)

iv. State the primary difference between the effect of tricyclic antidepressants (TCAs) and selective serotonin reuptake inhibitors (SSRIs) on nerve terminals.

(2 marks)

Question 2

A patient presents with a severe bacterial infection. To treat the infection effectively, the medical personnel must choose an antibiotic that targets specific bacterial structures or pathways without harming the human host.

i. Discuss the pharmacological mechanism of Beta-lactams such as penicillins and cephalosporins, by identifying their primary target in the bacterial cell and describing how this interference results in a lethal effect.

(6 marks)

ii. Antibiotics that target protein synthesis must selectively bind to bacterial ribosomes to inhibit growth. Discuss the pharmacological mechanisms of aminoglycosides, tetracyclines, and macrolides.

(9 marks)

iii. Discuss the mechanism of action of sulfonamides by identifying the specific essential metabolic product they prevent the bacteria from producing. In your answer, explain the normal role of the enzyme dihydropteroate synthetase (DHPS) in this pathway, and describe its mechanism of inhibition and disruption.

(5 marks)

Question 3

Viruses are unique pathogens that present significant challenges for drug development compared to bacteria.

(a) Explain why developing antiviral drugs is more difficult than developing antibacterial drugs.

(4 marks)

(b) Describe the general stages of viral replication from attachment to the release of new virions.

(6 marks)

(c) Provide a detailed account of how specific antiviral agents target different stages of the viral cycle, using examples such as neuraminidase inhibitors, aciclovir, antiretroviral drugs (NRTIs and protease inhibitors), and interferons.

(10 marks)

Question 4

Managing blood disorders and inflammation requires precise pharmacological control of the clotting cascade and immune mediators. The following questions examine the mechanisms and clinical applications of drugs used to restore hematological and immunological balance.

(a) A 45-year-old woman is diagnosed with anemia after routine blood tests. The doctor explains that the treatment will depend on the cause and severity of her anemia.

i. Describe how iron supplementation and vitamin C work together in the treatment of iron deficiency anemia.

(2 marks)

ii. Explain the role of folic acid and vitamin B12 in preventing megaloblastic anemia.

(2 marks)

iii. Describe the situations in which the following therapies may be used:
1) Recombinant erythropoietin.
2) Blood transfusion.
3) Hyperbaric oxygen therapy.

(6 marks)

(b) A 65-year-old patient with chronic osteoarthritis takes high doses of a non-selective Nonsteroidal Anti-inflammatory Drugs (NSAIDs) for joint pain. He is now experiencing a fever and stomach "burning".

i. Identify the specific enzyme inhibited by NSAIDs and name the primary acid that this enzyme uses as a substrate to create inflammatory mediators.

(2 marks)

ii. Explain the antipyretic effect of NSAIDs and identify the molecule inhibited in the hypothalamus.

(2 marks)

iii. NSAIDs reduce joint swelling by inhibiting Prostaglandins (PG). Describe THREE ways the inhibition of PG affects the behavior of white blood cells (neutrophils).

(3 marks)

iv. Explain the physiological reason why non-selective NSAIDs cause a "burning" sensation in the stomach, and name one major organ system frequently affected by NSAID toxicity.

(3 marks)

END OF EXAMINATION PAPER